

June 2002

ANRA



Angelina & Neches River Authority

ANRA Clean Rivers Program

The goal of the Clean Rivers Program is to maintain and improve the quality of water resources within each river basin in Texas through an ongoing partnership involving the Texas Natural Resource Conservation Commission (TNRCC), river authorities, regional entities, local governments, industry, citizens, and other state and federal agencies. The CRP utilizes a watershed management approach to identify and evaluate water quality issues, establish priorities for corrective action and work to implement those actions.

As the Clean Rivers Program planning agency in the Upper Neches River Basin, the Angelina & Neches River Authority (ANRA) is responsible for implementing the goals of the Clean Rivers Program (CRP) through data collection activities, data analysis, identification of water quality concerns, and public outreach activities. In addition, ANRA is working to develop, enhance, and protect the abundant water resources of the Basin.

Highlights for 2002 are centered around the Clean Water Act 305 (b) Texas Water Quality Inventory Report. This report, commonly referred to as the 305(b) Report, compares current water quality conditions to the standards established for water bodies across the state. The 305(b) Report serves as a focal point for CRP planning agencies like ANRA to plan for future allocations of monitoring resources and develop special projects to address water quality issues identified. ANRA's Upper Neches Basin Highlights Report summarizes the findings of the 2002 Draft 305(b) Report by classified river segments and provides ANRA's monitoring plan of action for resolving any water quality issues.

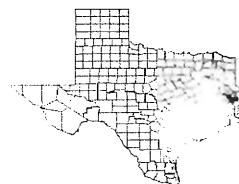
The 2002 Highlights Report also includes an update regarding ANRA's Upper Neches Basin Water Quality Monitoring Programs. Maps and tables on each classified river segment are used to summarize current monitoring activities. Information on public outreach activities, water quality events inventory, and special projects such as the Alto Watershed Project are all inside the 2002 edition of the ANRA Highlights Report.

Photo by Connie Thompson

Texas Natural Resource Conservation
Commission
Clean Rivers Program



Upper Neches Basin Highlights Report



Summary of Events for 2002

Where is the Angelina-Neches River Basin?

The Upper Neches River Basin Study Area originates in southwest Van Zandt county and extends southeasterly through the Piney Woods of East Texas to the confluence of the Angelina with the Neches River. The Upper Neches River Basin is primarily located within the South Central Plains ecoregion and encompasses approximately 7,451 square miles.

Summary of Events

The 2002 ANRA Highlights Report documents the many events and occurrences that took place in the previous year. Major events include review of the 305(b) Texas Water Quality Inventory Report, and subsequent findings. Other events included the completion of the first year of the Sam Rayburn Reservoir Water Quality Monitoring Program.

Review of the 305(b) Report

The Texas Water Quality Inventory Report, or better known as the 305(b) Report among monitoring entities, is currently conducted every two years. The assessment reviews water quality data from the previous five years and identifies any concerns or possible trends. Data collection agencies like ANRA review the 305(b) Report as a guidance for future monitoring activities and to verify findings. Summary tables and ANRA recommendations for each segment in the Upper Neches Basin are listed on pp. 4-17.

During ANRA's review of the 305(b) Report, several significant issues were uncovered. Due to quality assurance issues, ANRA recommended that several historical data points from 1998 and 1999 for dissolved metals in water not be included in the assessment, and as a result of this recommendation, the historical dissolved metals data was removed from the 305(b) Report.

This occurrence is very significant because several of the segments in the Upper Neches River Basin showed concerns for metals in water. By removing the historical data, many of the concerns for metals in water were subsequently removed from the 305(b) Report. Most segments either had insufficient data to assess or no concern with limited data. To remedy this situation, an intensive dissolved metals in water study will be implemented beginning June of 2002.

Dissolved Metals in Water Study

ANRA has been allocated funding through the Clean Rivers Program to conduct an intensive dissolved metals in water study from June 2002 to August 2003. Fifteen historical, long-term monitoring stations will be monitored quarterly for dissolved metals in water. At the end of the study, ANRA will have sufficient metals in water data to properly assess the aquatic life use in most segments.

ANRA will be using clean collection and analysis techniques to accurately determine trace metals at the parts per billion (ppb) to sub-parts per trillion (ppt) level. The focus of this study is to use the clean techniques to either validate or disregard historical findings from the initial 305(b) Report that were removed based on quality assurance issues.

Sam Rayburn Water Quality Monitoring Program

Sam Rayburn Reservoir is the focus of many water quality issues in East Texas. Due to its significance, ANRA entered into an interlocal agreement with the Lower Neches Valley Authority. As part of this agreement, ANRA began monitoring water quality at seven sites on Sam Rayburn Reservoir in FY02. These sites are monitored monthly from March to November for a total of nine monitoring events.

November 2001 saw the completion of the first year of water quality monitoring on Sam Rayburn Reservoir. See the monitoring results on pp. 12-14 from the Sam Rayburn Reservoir.

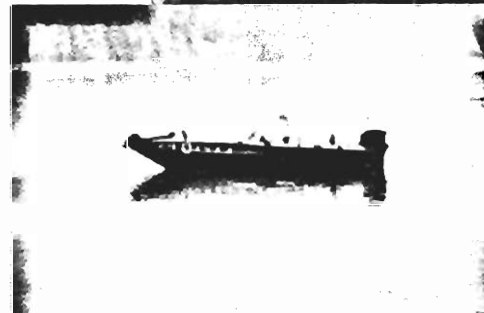
Future monitoring on Sam Rayburn Reservoir will help paint a better picture of the water quality. More representative data will be available to develop trends and determine true water quality conditions. Significant improvements in wastewater discharge from the Abitibi papermill should help water quality in the long-term. Abitibi is in the process of renovating its wastewater treatment facility which should reduce waste loads significantly.

Other Events

Each year, ANRA includes significant occurrences or events, both positive and negative, affecting water quality in its water quality events inventory. This year, significant events include a leaking sewer main in segment 611 and improvements to the City of Nacogdoches Wastewater Collection System. Also, a Fish consumption advisory was issued for Ratcliff Lake in Houston County. See page 18 for information on these events.



Dr. Paul Boothe of Albion Environmental demonstrates clean metals sample collection technique to be used during intensive metals study



Water Quality Monitoring at Sam Rayburn Reservoir

ANRA Surface Water Quality Monitoring Program-An Introduction

Cost-effective watershed management decisions must be based on scientifically valid data to complete assessments of water quality conditions and contributing causes of impairments. Water bodies are chosen based upon the importance of the resource, risk from pollution, and local interest in the water body. To prevent the duplication of monitoring efforts and resources, coordinated monitoring meetings are conducted annually with other basin monitoring entities.

Through the Clean Rivers Program, ANRA continues an aggressive Surface Water Quality Monitoring (SWQM) Program that was established in 1996 to collect scientifically valid water quality data using the following monitoring programs. The following provide information about parameters tested, monitoring frequencies, and descriptions of ANRA monitoring in each SWQM program.

Fixed Station / Routine Monitoring

Routine monitoring is currently performed quarterly at 15 designated stations on high-profile water bodies, and on 7 stations monthly from March to November for the Sam Rayburn Water Quality Monitoring Program. Routine monitoring is conducted in order to document long term water quality conditions and characteristics over a variety of seasonal and flow conditions. These events are coded as RT (Routine/Fixed Sampling) on the monitoring schedule.

Systematic / Intensive Monitoring

Systematic and Intensive Monitoring are utilized to more thoroughly characterize water quality conditions in the basin. These events are coded IS (Intensive/Systematic Sampling).

Systematic monitoring is routinely done on

areas where baseline data is needed or to better characterize an entire watershed. Since 1996, ANRA has conducted systematic monitoring in five of its major watersheds within the basin to further characterize water quality conditions.

Intensive monitoring is performed most often on problem areas that require additional data. Typically, intensive monitoring is used as a means to identify a source or specific area where problems are occurring.

During FY 2002, the intensive monitoring program will be a continuation of the FY 2001 program including 5 stations within the Mud Creek subwatershed in Smith and Cherokee Counties. Two stations for data acquisition in the Biloxi Creek watershed were established as additional intensive monitoring sites for 2001. Additional intensive monitoring for FY2002 includes quarterly bacteria monitoring for Jack Creek and bimonthly bacteria monitoring for Ayish Bayou.

Diurnal Monitoring

Diurnal Monitoring events are coded DI in the monitoring schedule. These events are designed specifically for the collection of 24 Hour measurements, most often 24 hour dissolved oxygen measurements. Diurnal measurements are essential for characterizing the aquatic life use of a waterbody. Diurnal measurements allow scientists to analyze the daily variation in an aquatic system that cannot typically be seen with grab samples.

Parameters Collected

The table below lists parameters collected by ANRA during routine physical/chemical characterization of water quality. The following is a brief explanation of the parameter categories and why these parameters are analyzed.

Conventional

Total Dissolved and Suspended Solids, Chloride and Sulfate are common constituents of wastewater and source waters. These parameters can create water that is aesthetically displeasing, or in high concentrations they can cause unwanted physiological reactions in consumers, harming aquatic systems, especially aquatic plants.

Ammonia, Nitrate, Nitrite, Phosphorus, and Orthophosphates are nutrients which, in large quantities, can cause eutrophication. In the long-term, algal blooms decrease dissolved oxygen and can cause fish kills or other unpleasant effects. Common sources of these pollutants are fertilizers, wastewater discharges, and laundry detergents.

Metals in Water/Sediment

Metals are usually required in small amounts for all organisms but in greater amounts can be toxic. Metals in water are those which are available for uptake by organisms.

Bacteria

Fecal Coliform and E. Coli are collected because they are indicators. High levels of these bacteria could mean that harmful enteric pathogens and viruses are present. E. Coli is a member of the fecal group and is indicative of human waste.

Field Parameters

The field parameters indicate the general health of an aquatic system. Great variations from routine conditions can cause serious health and reproductive problems in aquatic organisms. Just like the air we breathe, dissolved oxygen is used in respiration by aquatic organisms. Without sufficient levels of dissolved oxygen, these organisms die.

ANRA Monitoring Parameters-Clean Rivers Program 2001

Metals in Sediment	Metals in Water	Field Parameters	Conventional	Bacteria
- Cadmium - Copper - Lead - Silver - Zinc - Nickel - Selenium - Mercury	Dissolved - Cadmium - Copper - Lead - Silver - Zinc - Nickel Total - Selenium - Mercury - Hardness	- pH (S.U.) - Temperature (°C) - Dissolved Oxygen (mg/L) - Specific Conductance (µS/cm) 24 Hour Measurements (D.O., pH, Conductance)	- Total Suspended Solids (TSS) - Total Dissolved Solids (TDS) - Sulfate - Chloride - Nitrate+Nitrite Nitrogen - Orthophosphate - Total Phosphorus - Ammonia-Nitrogen	- Fecal Coliform E. Coli

The Texas Water Quality Inventory Report

The Texas Water Quality Inventory Report, or better known as the 305(b) Report among monitoring entities, is currently conducted every two years. The assessment reviews water quality data from the previous five years and identifies any concerns or possible trends. If a waterbody is non-supporting for any use criteria, the 305(b) Report is the precursor to the Texas Water Quality Monitoring And Assessment Report, which consists of the Clean Water Act 303(d) Impaired Waters List. The 303(d) List identifies water bodies that do not meet, or are not expected to meet, standards for their use, and is the basis for scheduling the development of total maximum daily loads (TMDLs). Data collection agencies like ANRA review the 305(b) Report and 303(d) List to provide a focal point for future monitoring and to verify findings. The 305(b) Report provides planning agencies direction as to the location of problem areas or where more data needs to be collected. ANRA uses this information to develop a plan of action for conducting cost-efficient data collection.

The Texas Water Quality Inventory Report has been completed by TNRCC for 2002. ANRA reviewed the draft version of the 305(b) Report to make comments and verify findings. This review is significant to prove that findings are true and not biased toward unusual circumstances. It is beneficial to have the regional entities familiar with the watershed(s) make recommendations regarding findings.

ANRA intends to use the information obtained from its review of the 305(b) Assessment to shape its monitoring program. ANRA will prioritize monitoring sites using the monitoring priority guidelines indicated in the 305(b) Assessment. ANRA plans to focus on those sites which have showed a primary concern but need more data, ie "T1" Concerns.

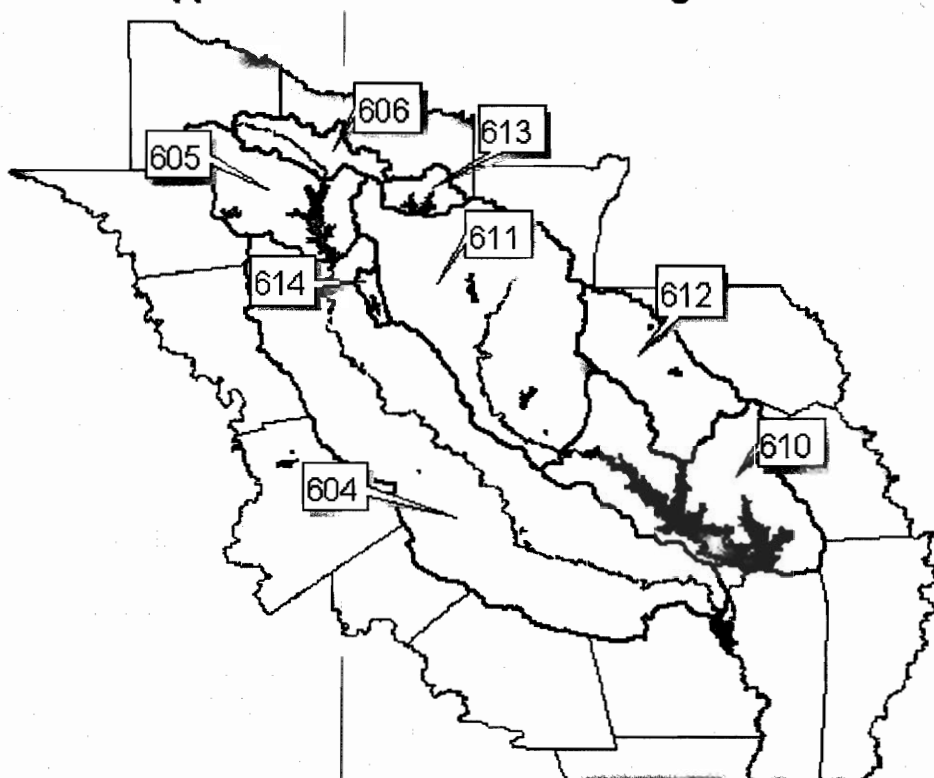
The following pages of this report outline information for the individual segments assessed in the Upper Neches Basin. The sections include maps of the segments, ANRA monitoring locations, assessment findings, comments, and ANRA action plans. Classified segments in the Upper Neches Basin include:

- ◆ 604-Neches River Below Lake Palestine
- ◆ 605-Lake Palestine
- ◆ 606-Neches River Above Lake Palestine
- ◆ 610-Sam Rayburn Reservoir
- ◆ 611-Angelina River Above Sam Rayburn Reservoir
- ◆ 612-Attoyac Bayou
- ◆ 613-Lake Tyler/Lake Tyler East
- ◆ 614-Lake Jacksonville
- ◆ 615-Sam Rayburn Upper Angelina Arm (Included in Segment 610)

Interpreting what the 305(b) Report says...

The tables for each individual segment on the following pages identify findings from the draft 2002 305(b) Report. These tables identify only impairments for the segments. If a particular area does not appear in the table, then that portion of the segment was not assessed because of minimal data, no concerns were identified based on a partial data set, or was fully supporting of current water quality standards. See table at right for explanation of codes used in the tables

View of Upper Neches Basin Classified Segments



Support Code	Assessment Status	Monitoring Priority
T1	Partial data set (< 10 Samples); Identified Primary Concern	1
T2	Complete Data Set (≥ 10 Samples) Identified Primary Concern	2
C	Secondary concern for nutrients, sediment (≥ 10 Samples)	3
T	Threatened water body/declining trend	4
PS	Use partially supported on 303(d) list	5
NS	Use not supported on 303(d) list	6
PS, NS, or T	303(d) impaired water bodies with not enough data to reassess	7

Segment 604—The Neches River Below Lake Palestine

The Neches River below Lake Palestine is by far the largest segment in the Upper Neches Basin, beginning in Anderson/Cherokee County and ending 231 miles later in Jasper/Tyler County with a drainage area of over 3400 square miles. Segment 604 has monitoring conducted by ANRA and by both TNRCC Region 5 and Region 10. The TNRCC regional offices conduct monitoring on the Neches River portion of the segment. ANRA conducts monitoring

on unclassified segments within 604.

These waterbodies make up the tributaries which discharge into the Neches River. The unclassified segments of 604 include:

- 604A-Cedar Creek
- 604B-Hurricane Creek
- 604C-Jack Creek
- 604D-Piney Creek
- 604M-Biloxi Creek

• 604N-Buck Creek

As part of its intensive monitoring program, ANRA monitors two sites on Biloxi Creek. These sites have proven to be hot spots for non-point source pollution as rural dump sites. Jack Creek was dropped as a routine site in FY02 and was added as an intensive site for bacterial monitoring only. This was done to assess the concern for bacteria noted in the table below.

What the 305(b) Report says...

Segment Id	Seg Name	Station ID	Impairment or Concern	Support Code	Monitoring Priority
604	Neches River	10588	Lead in Water exceeds Chronic Criteria	NS	6
604A	Cedar Creek	10478	Ammonia	C	3
604A	Cedar Creek	10478	Nitrate+Nitrite Nitrogen	C	3
604A	Cedar Creek	10479	Bacteria	T1,NS	1,7
604B	Hurricane Creek	10487	Bacteria	NS	7
604B	Hurricane Creek	13529	Ammonia	C	3
604B	Hurricane Creek	13529	Nitrate+Nitrite Nitrogen	C	3
604B	Hurricane Creek	13529	Bacteria	NS	6
604C	Jack Creek	10492	Ammonia	C	3
604C	Jack Creek	10492	Nitrate+Nitrite Nitrogen	C	3
604C	Jack Creek	10492	Bacteria	NS	6
604C	Jack Creek	10493	Bacteria	T2,NS	2,6
604D	Piney Creek	16081	Bacteria	T1	1

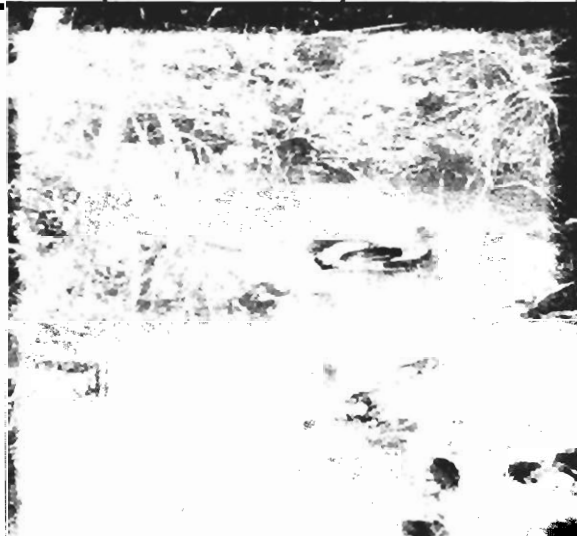
ANRA's Plan of Action...

To address the aforementioned issues, ANRA will continue monitoring at its current locations in segment 604. To address the impairment for bacteria in Jack Creek, ANRA is conducting bacterial monitoring only on Jack Creek in FY 2002. For FY 2003, ANRA will resume collecting conventional parameters on Jack Creek. To address Cedar Creek, ANRA has added an additional site upstream for FY03. This site should address both bacteria and nutrient concerns. Although there are currently no impairments for Biloxi Creek, ANRA added the intensive sites in FY01 to address some possible concerns. As mentioned above, the headwater sites are continuous rural dumping sites. In FY03, ANRA plans to keep the on stream site and look for non-point source "hot spots".

A few of the above stations are not currently monitored, but are listed for bacterial impairments. These impairments are most likely biased toward flood conditions, but routine monitoring at current locations should indicate if impairments are ongoing.

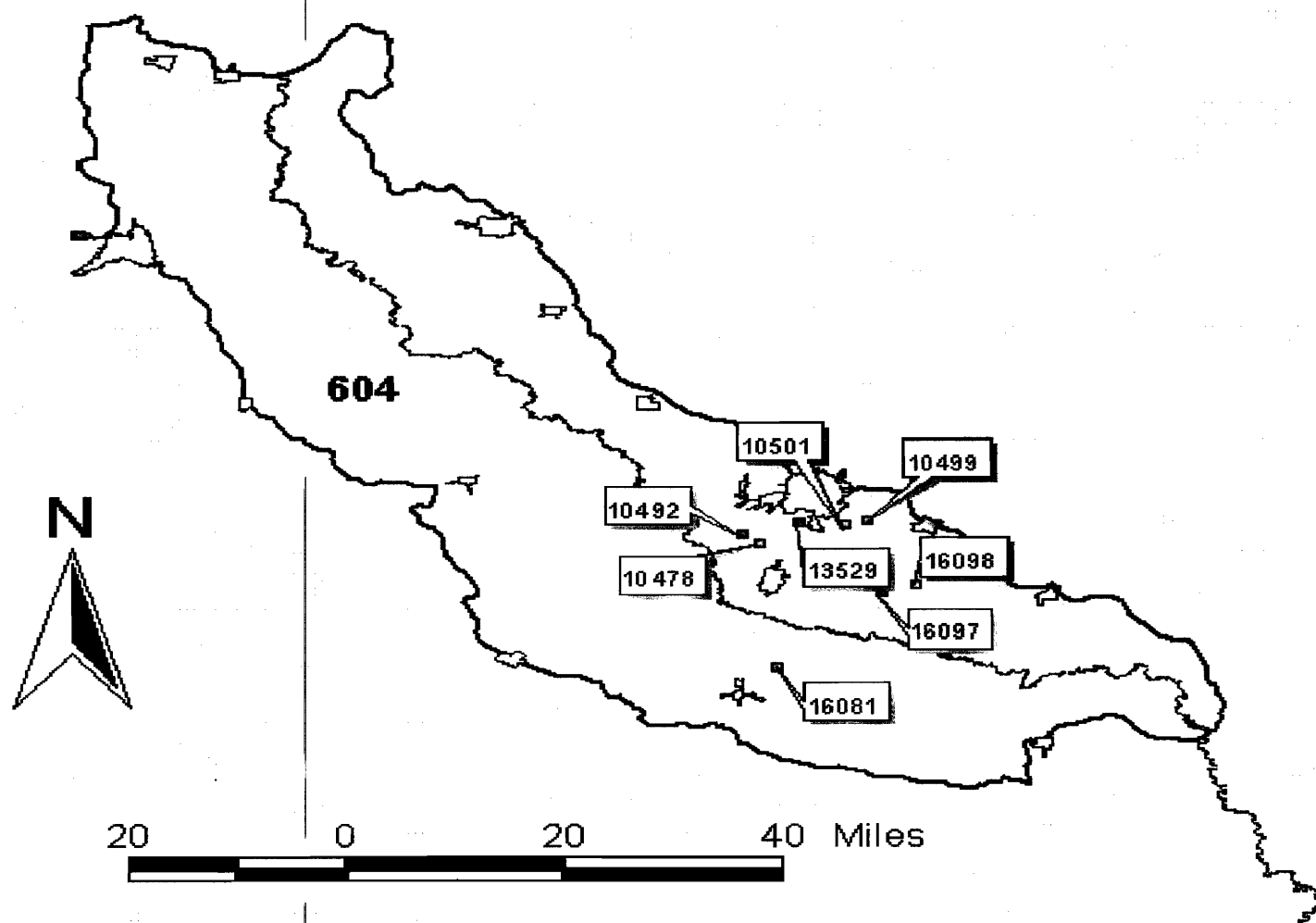
Potential point and non-point sources of the above impairments include illegal dumping, failing on-site septic systems, agricultural and municipal stormwater run-off, and both municipal and industrial wastewater discharges.

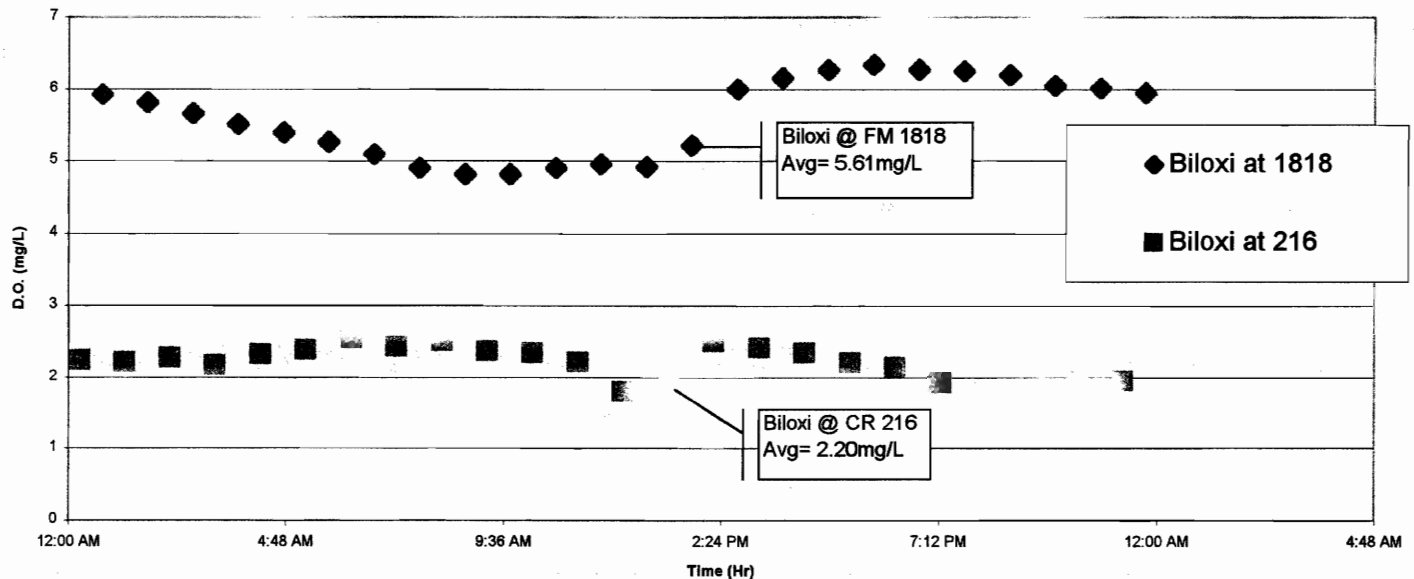
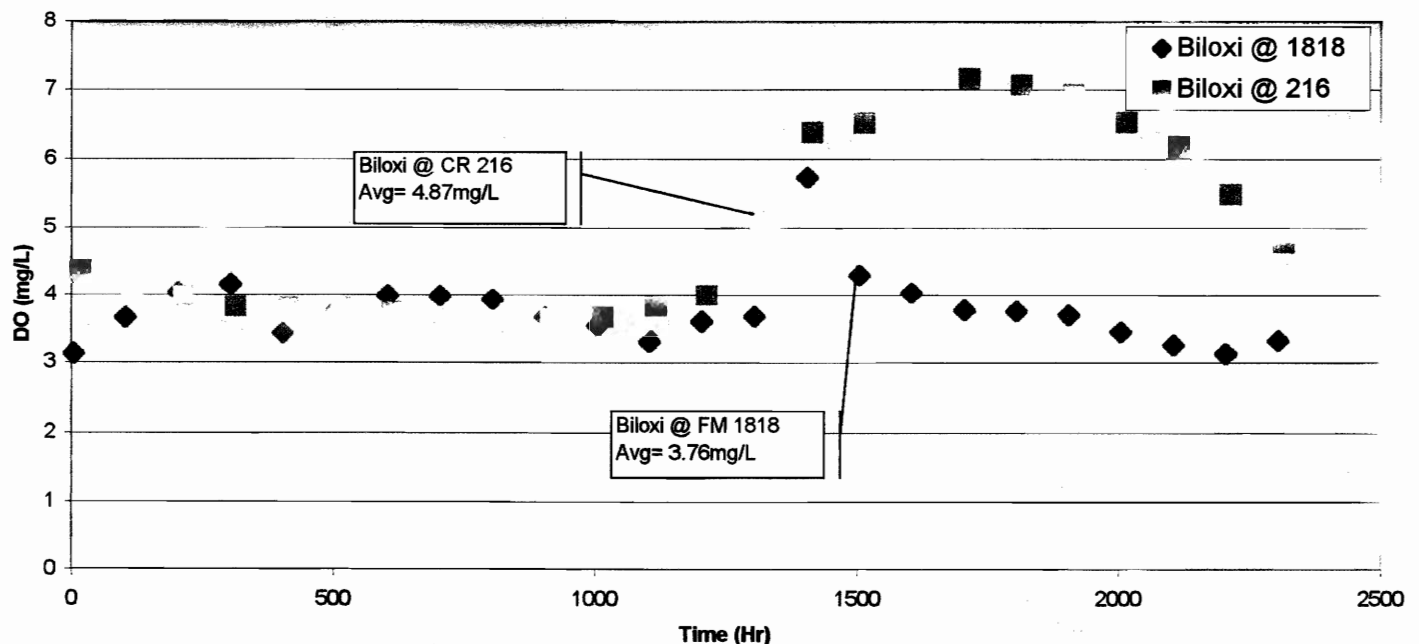
One-eye Creek at CR 274 during the winter. This site is a significant rural dump site. Bacteria levels are typically high at this site during the winter months. This is an example of non-point source pollution.



Segment 604 - ANRA FY 2002 Monitoring Schedule

ANRA Monitoring Stations									
Station ID	Station Description	Prog Code	Monitoring Parameters						
			24 HR DO	Metals Water	Metals Sed	Conv	Bacteria	Inst Flow	Field
10478	Cedar Creek at FM 2497	RT		2		4	4	4	4
13529	Hurricane Creek at FM 324	RT		2		4	4	4	4
16081	Piney Creek at FM 1987	RT		2		4	4	4	4
16081	Piney Creek at FM 1987	DI	2						
16098	Buck Creek at FM 1818	RT		1		4	4	4	4
16097	Biloxi Creek at FM 1818	RT		2		4	4	4	4
16097	Biloxi Creek at FM 1818	DI	2						2
10492	Jack Creek at FM 2497	IS					4	4	4
10499	Biloxi Creek at CR 216	IS		1	1	4	4	4	4
10499	Biloxi Creek at CR 216	DI	2						2
10501	One-eye Creek at CR 274	IS		1	1	4	4	4	4

View of Segment 604-ANRA Monitoring Stations

Dissolved Oxygen, 24 Hr Measurement
Biloxi Creek-Index Period24 Hr DO Biloxi Creek
Critical Period Measurement

24 Hour Dissolved Oxygen Measurement of Biloxi Creek

The above graphics show the 24 Hour Dissolved Oxygen variation for the upstream and downstream Biloxi Creek monitoring stations at Angelina CR 216 and FM 1818, respectively. The top graph depicts the 24HR DO during the index period (March 15-October 15) in May 2001. The bottom graph depicts 24HR DO measured during the hot, low flow conditions typical of the critical period (July 1-September 15) in August 2001. The Biloxi at FM 1818 site shows what is typically expected from spring to summer, because water temperature increases and flow discharges decrease as a result of summer temperatures and little rainfall. The Dissolved Oxygen averages drop substantially between the index and critical period measurements. Biloxi at CR 216 does the opposite. The variation from both events are most likely attributed to fluctuations in flow. In FY02 and FY03, ANRA plans to continue 24 HR Monitoring of these sites and five others throughout the Upper Neches Basin.

Segment 605—Lake Palestine

Lake Palestine impounds the Neches River from below Van Zandt County until it reaches the Anderson/Cherokee County boundaries. Lake Palestine stretches for 21 miles and the watershed has a drainage area of 714 square miles. Major tributaries feeding Lake Palestine are the Neches River, Kickapoo Creek (Segment 605A), and Flat Creek. Both ANRA and TNRC Region 5

conduct routine monitoring on Lake Palestine. In addition, ANRA conducts routine monitoring on Kickapoo Creek near Brownsboro. In FY02, ANRA added two additional sites on Lake Palestine. This was done to determine the effects of Flat Creek on Lake Palestine and to determine the downstream effects of Kickapoo Creek in the Upper Arm of Lake Palestine. Please

note that TNRC Region 5 has collected most of the historical data for the on segment sites used in the assessment with the exception of Lake Palestine at the headwaters (10595).

What the 305(b) Report says...

Segment Id	Seg Name	Station ID	Impairment or Concern	Support Code	Monitoring Priority
605	Lake Palestine	16346	High pH	T1	1
605	Lake Palestine	10594	High pH	T1	1
605	Lake Palestine	16345	Depressed Dissolved Oxygen	T1	1
605	Lake Palestine	10595	Ammonia	C	3
605	Lake Palestine	10595	Nitrate+Nitrite Nitrogen	C	3
605A	Kickapoo Creek	10517	Ammonia	C	3
605A	Kickapoo Creek	10517	Bacteria	T2,NS	2,6

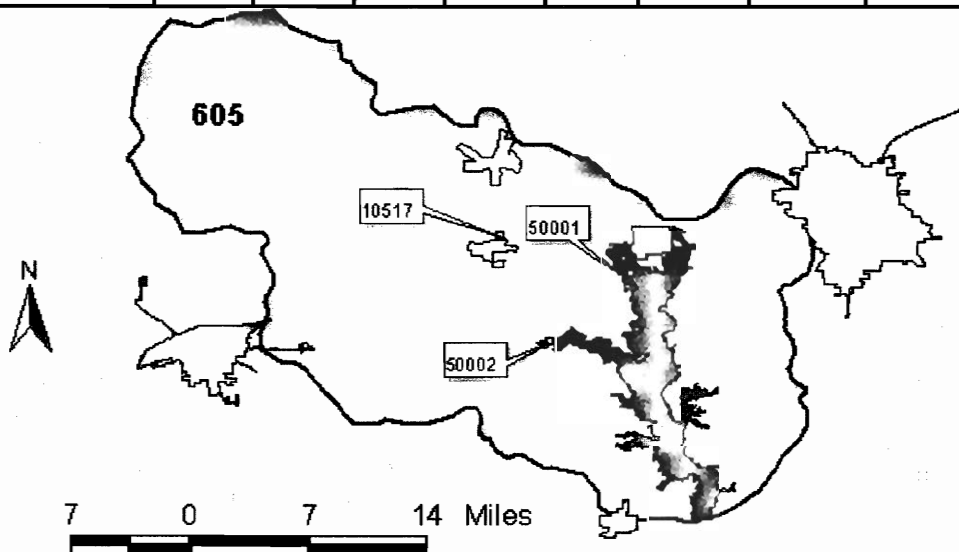
Segment 605 - ANRA FY 2002 Monitoring Schedule

ANRA Monitoring Stations									
Station ID	Station Description	Prog Code	Monitoring Parameters						
			24 HR DO	Metals Water	Metals Sed	Conv	Bacteria	Inst Flow	Field
10517	Kickapoo Creek at FM 314	RT		2		4	4		4
10517	Kickapoo Creek at FM 314	DI	2						
50001	Lake Palestine at FM 315	RT		1		4	4		4
50002	Lake Palestine at FM 314	RT		1		4	4		4

ANRA's Plan of Action...

To address the aforementioned issues, ANRA will continue monitoring at its current locations in Segment 605. The goal of this data collection effort is to verify that concerns are ongoing.

Potential point and non-point sources of the impairments include agricultural stormwater run-off and municipal wastewater discharges.



View of Segment 605-ANRA Monitoring Stations

Segment 606—Neches River Above Lake Palestine

The Neches River above Lake Palestine consists of the headwaters at Rhines Lake Dam in Van Zandt County to where it enters Lake Palestine in Henderson/Smith County. Segment 606 is 27 miles long and has a drainage area of 264 square miles.

Historically, ANRA monitored on Prairie Creek (Segment 606A) during the inception of its monitoring program in 1996 for one year.

Currently all of the monitoring for Segment 606 is conducted by TNRCC Region 5.

ANRA staff collects routine field parameters utilizing a multiprobe sonde



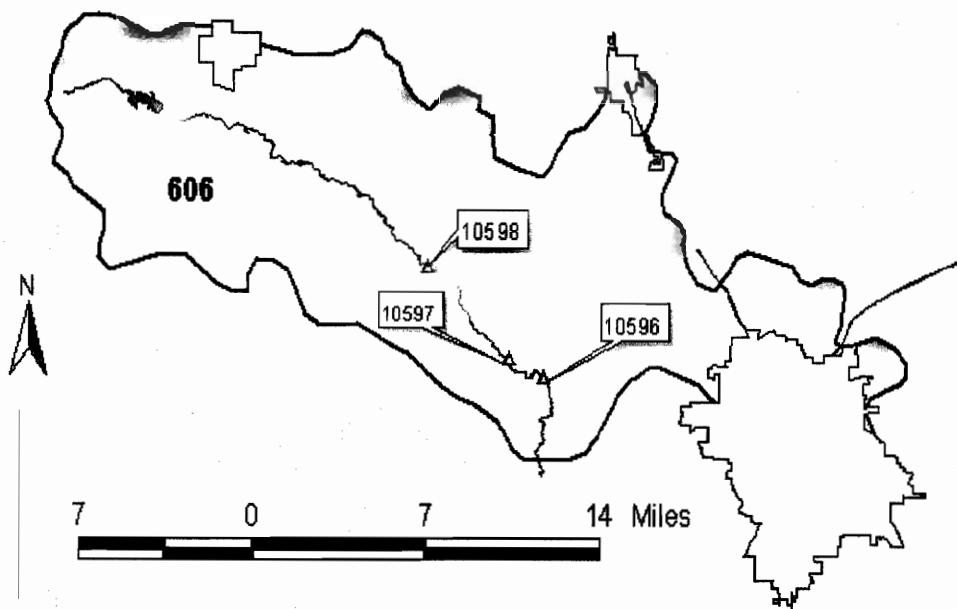
What the 305(b) Report says...

Segment Id	Seg Name	Station ID	Impairment or Concern	Support Code	Monitoring Priority
606	Neches River	10596	Nitrate+Nitrite-Nitrogen	C	3
606	Neches River	10597	Depressed Dissolved Oxygen	T1,T2	1,2
606	Neches River	10597	Impaired Macrobenthos Community	T1	1
606	Neches River	10597	Low pH	PS	5
606	Neches River	10597	Zinc in Water exceeds Acute/Chronic Cr.	NS	6
606	Neches River	10598	Low pH	T1	1
606	Neches River	10598	Zinc in Water exceeds Acute/Chronic Cr.	T1	1
606A	Prairie Creek	10520	Cadmium in Water exceeds Chronic Crit.	T1	1
606A	Prairie Creek	10520	Bacteria	T2,NS	2,6
606A	Prairie Creek	10520	Depressed Dissolved Oxygen	T2	2
606A	Prairie Creek	10518	Cadmium in Water exceeds Chronic Crit.	T1	1
606A	Prairie Creek	10518	Zinc in Water exceeds Acute/Chronic Cr.	T1,NS	1,7

ANRA's Plan of Action...

As mentioned above, ANRA does not currently monitor in Segment 606 because TNRCC Region 5 has it well covered. The TNRCC Regional Office will continue monitoring in Segment 606.

In its review of the 305(b) Assessment, ANRA discovered that the bacteria impairment for Prairie Creek is not representative of natural conditions. The majority of the bacterial exceedances were collected during conditions where the water body was susceptible to stormwater run-off. This biases the data set in ANRA's opinion. In FY03, if resources are available, ANRA will monitor this site intensively for bacteria to try and remove it from the 303(d) list. Also noteworthy, the zinc and pH impairments for 606 are most likely naturally occurring due to the geology and natural conditions of that area.



View of Segment 606-ANRA Monitoring Stations

Segment 610—Sam Rayburn Reservoir & Segment 615-Angelina River/Sam Rayburn

Sam Rayburn Reservoir is the largest reservoir wholly within the State of Texas. It extends from below the confluence of Papermill Creek with the Angelina River and impounds the Angelina River for 79 miles with over 100,000 surface acres of water, until it reaches Sam Rayburn Dam in Jasper County. In 2001, the riverine portion of Segment 610 was reclassified based on revised water quality standards to create Segment 615, the Upper Angelina River Arm of Sam Rayburn Reservoir (Not shown on map below.)

Sam Rayburn is the focus of many water

quality issues in East Texas. Due to its significance, ANRA entered into an interlocal agreement with the Lower Neches Valley Authority. As part of this agreement, ANRA began monitoring water quality at seven sites on Sam Rayburn Reservoir in FY02. These sites are monitored monthly from March to November for a total of nine monitoring events. Also noteworthy is ANRA's Control Zone Program, which permits on site sewage facilities around the lake. ANRA adds all sewage complaints and permitted facilities to its GIS inventory of factors influencing water quality. For the 305(b) Assessment, all data col-

lected on Sam Rayburn Reservoir have been historically collected by TNRCC Region 10. ANRA's only historically monitored sites in Segment 610 include Ayish Bayou. TNRCC Region 10 continues to monitor in addition to ANRA's Sam Rayburn Reservoir Water Quality Monitoring Program.

See the graphs on pp 13-14 to see the findings for the data ANRA collected in 2001. Please note that graphs include data from less than one year and may not be representative of natural conditions.

What the 305(b) Report says...

Segment Id	Seg Name	Station ID	Impairment or Concern	Support Code	Monitoring Priority
610	Sam Rayburn Reservoir	14906 15672 16786	Copper in Water exceeds Acute Criteria Mercury in Fish Tissue	T1 PS	1 5
610	Sam Rayburn Reservoir	15522 15670 15671	Mercury in Fish Tissue	PS	5
610	Sam Rayburn Reservoir	10612 16790	Mercury in Fish Tissue	PS	5
610	Sam Rayburn Reservoir	15524 15669 16792 16793	Mercury in Fish Tissue Depressed Dissolved Oxygen	PS PS	5 7
610	Sam Rayburn Reservoir	15523 15667 16791	Mercury in Fish Tissue Depressed Dissolved Oxygen	PS PS	5 7
610	Sam Rayburn Reservoir	10614	Depressed Dissolved Oxygen Mercury in Fish Tissue	T2 PS	2 5
610	Sam Rayburn Reservoir	10613 16789	Aluminum in Water exceeds Acute Cr. Mercury in Fish Tissue Depressed Dissolved Oxygen	T1,PS PS PS	1,7 5 7
610	Sam Rayburn Reservoir	15527 15674 16787	Mercury in Fish Tissue	PS	5
610	Sam Rayburn Reservoir	15526 15673 15675 16784	Mercury in Fish Tissue	PS	5
610	Sam Rayburn Reservoir	14907	Mercury in Fish Tissue Depressed Dissolved Oxygen	PS PS	5 7
610	Sam Rayburn Reservoir	10615 15525 16789	Mercury in Fish Tissue	PS	5
610A	Ayish Bayou	15364	Bacteria	NS	7
610A	Ayish Bayou	15365	Bacteria	NS	7

What the 305(b) Report says...(cont.) Segment 615

Segment Id	Seg Name	Station ID	Impairment or Concern	Support Code	Monitoring Priority
615	Angelina River/ Sam Rayburn Reservoir	10623	Impaired Habitat Color Nitrate+Nitrite Nitrogen Mercury in Fish Tissue Depressed Dissolved Oxygen	T1 C C PS PS	1 3 3 5 7
615	Angelina River/ Sam Rayburn Reservoir	10621	Depressed Dissolved Oxygen Ammonia Color Nitrate+Nitrite Nitrogen Orthophosphorus Total Phosphorus Copper in Water exceeds Acute Criteria Mercury in Fish Tissue Impaired Fish Community Lead in Water Exceeds Chronic Criteria	TI,T2,NS C C C C C PS PS NS NS	1,2,7 3 3 3 3 3 5 5 6 6
615A	Papermill Creek	10502	Ammonia Color Orthophosphorus Total Phosphorus Copper in Water exceeds Acute Criteria Zinc in Water exceeds Acute Criteria	C C C C NS NS	3 3 3 3 6 6

Segment 610 - ANRA FY 2002 Monitoring Schedule

ANRA Monitoring Stations									
Station ID	Station Description	Prog Code	Monitoring Parameters						
			24 HR DO	Metals Water	Metals Sed	Conv	Bacteria	Inst Flow	Field
10612	Sam Rayburn at SH 147	RT		1		9	9		9
14906	Sam Rayburn at Main Pool	RT		1		9	9		9
15522	Sam Rayburn near Veach Basin	RT		1		9	9		9
15523	Sam Rayburn adjacent to Alligator Cove	RT		1		9	9		9
15524	Sam Rayburn near Shirley Creek	RT		1		9	9		9
15526	Sam Rayburn near Needmore Point	RT		1		9	9		9
15527	Sam Rayburn near Mill Creek	RT		1		9	9		9
15361	Ayish Bayou at SH 103	IS					6		6

ANRA's Plan of Action...

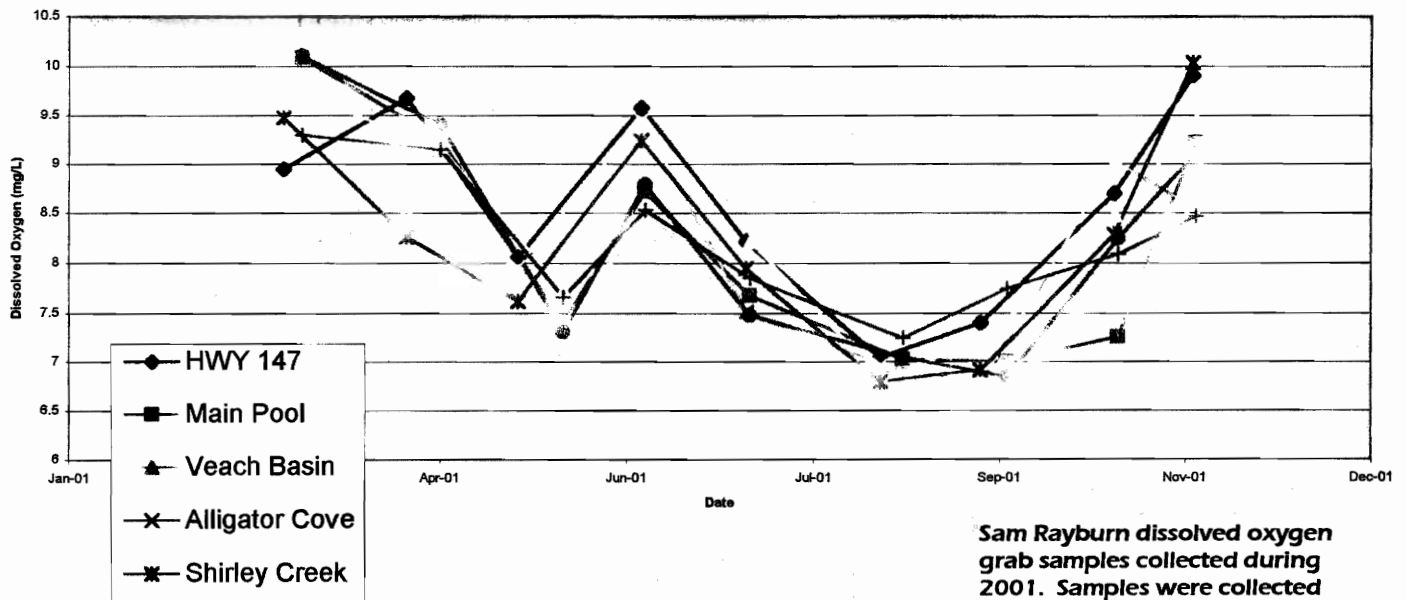
In the future, ANRA plans to continue monitoring its current reservoir sites as part of the Sam Rayburn Water Quality Monitoring Program. Also, TNRCC Region 10 will continue monitoring sites in Segment 610 and Segment 615. To address the bacterial impairment on Ayish Bayou, ANRA undertook an intensive bacterial monitoring initiative in FY02. This bacterial monitoring should provide enough data for reassessment to either verify findings or remove the segment from the 303(d) list. Potential point and non-point sources of impairments include fail-

ing septic systems, wastewater discharges, illegal dumping, and stormwater run-off.

Also, a TMDL is underway for Sam Rayburn Reservoir. The contract was awarded by the TNRCC in May 2002 and planning stages are scheduled to begin in July 2002.

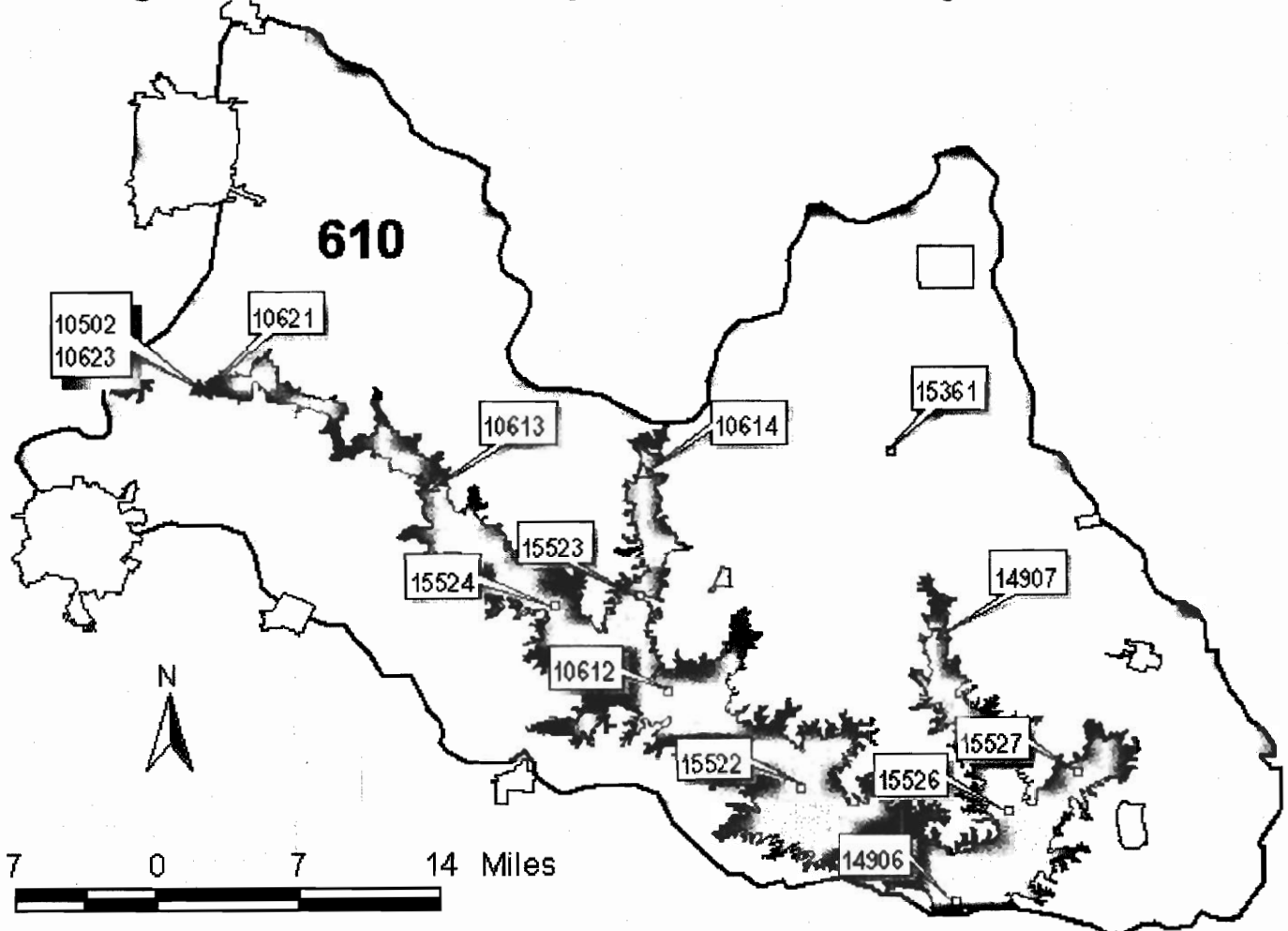
See the graph on p. 12 depicting D.O. grab samples collected on the Sam Rayburn sites in 2001.

Sam Rayburn Reservoir-D.O. Data 2001

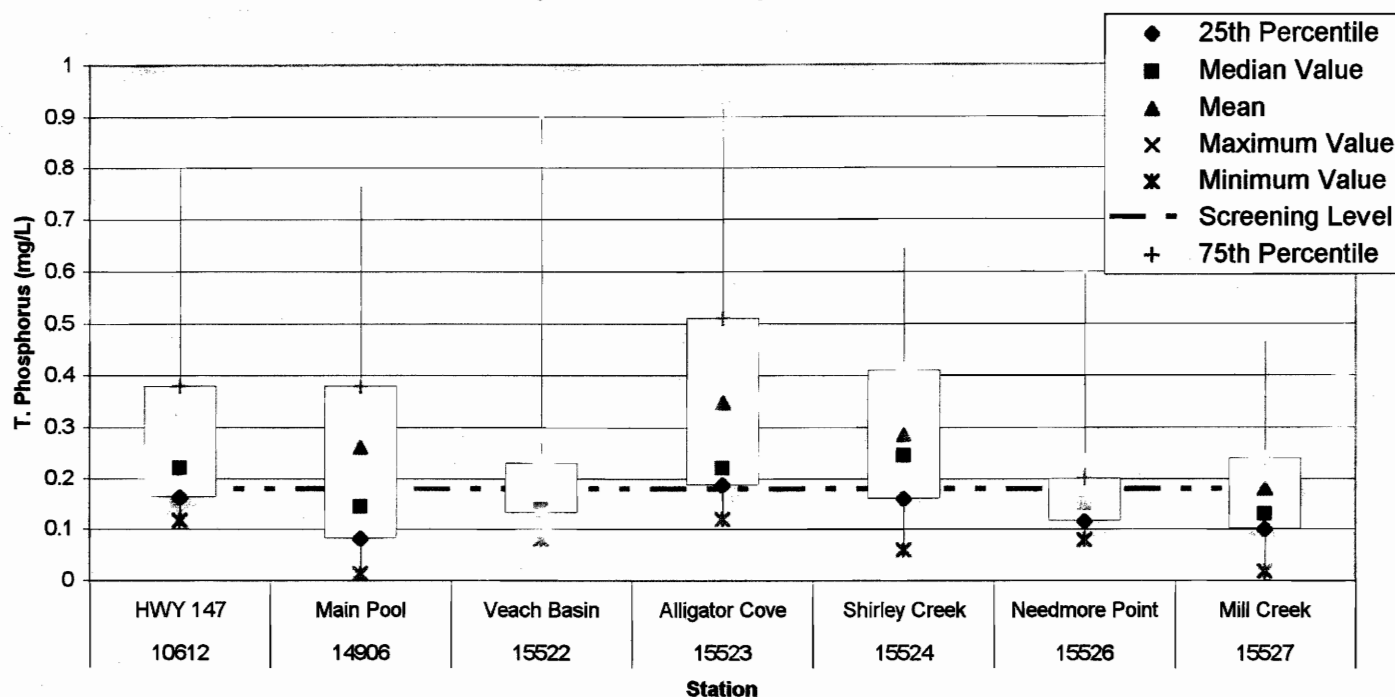


Sam Rayburn dissolved oxygen grab samples collected during 2001. Samples were collected approximately 1.5 meters deep. Notice the sag that occurs during the summer months.

View of Segment 610-ANRA Monitoring Stations

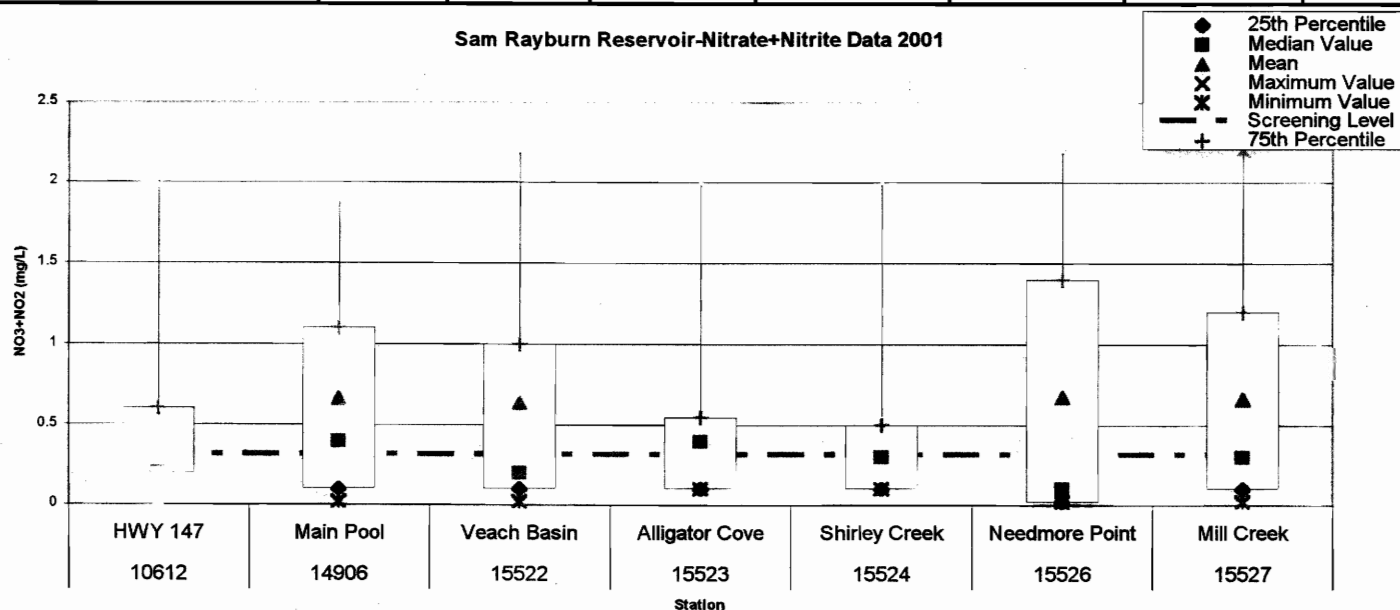


Sam Rayburn Reservoir-Phosphorus Data 2001



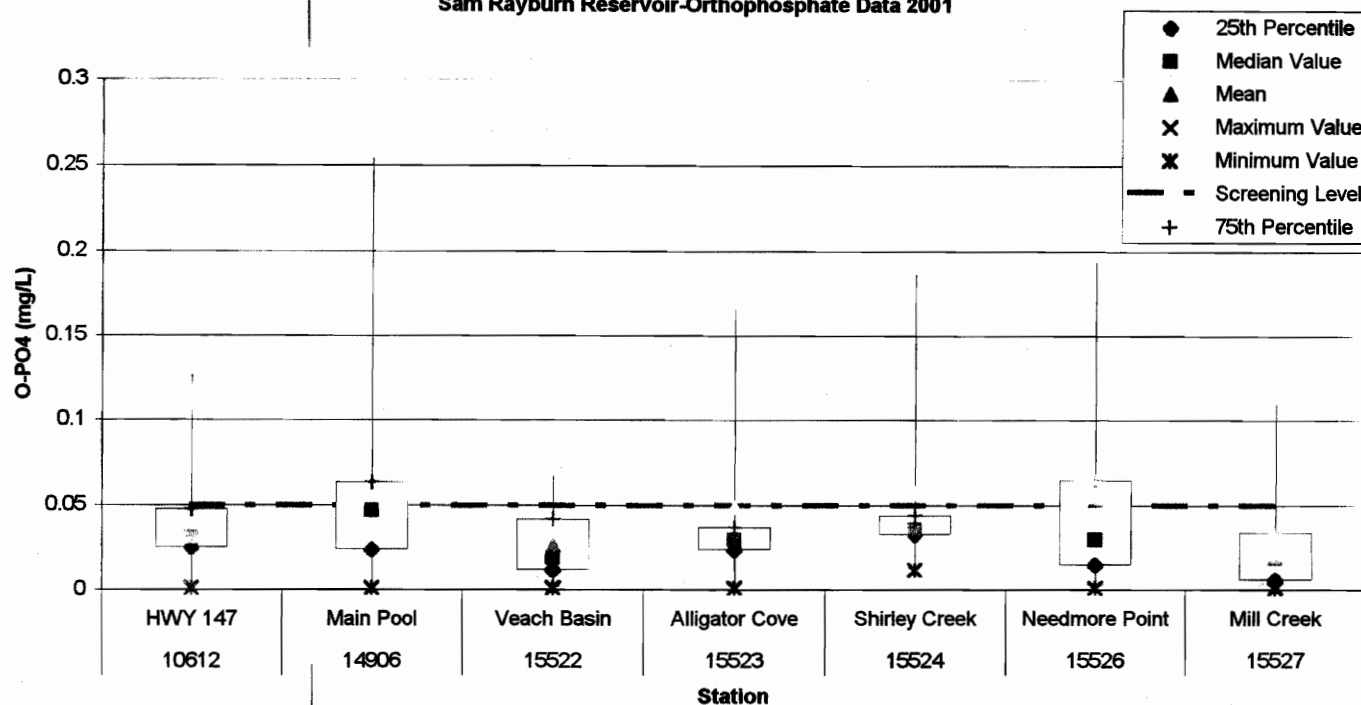
Station	HWY 147	Main Pool	Veach Basin	Alligator Cove	Shirley Creek	Needmore Pt	Mill Creek
Number Sxs	9	9	9	9	9	9	9
# Excds Criteria-Phosphorus	5	4	4	7	6	4	3
# Excds Criteria-NO3+NO2	4	5	4	5	4	3	4

Sam Rayburn Reservoir-Nitrate+Nitrite Data 2001



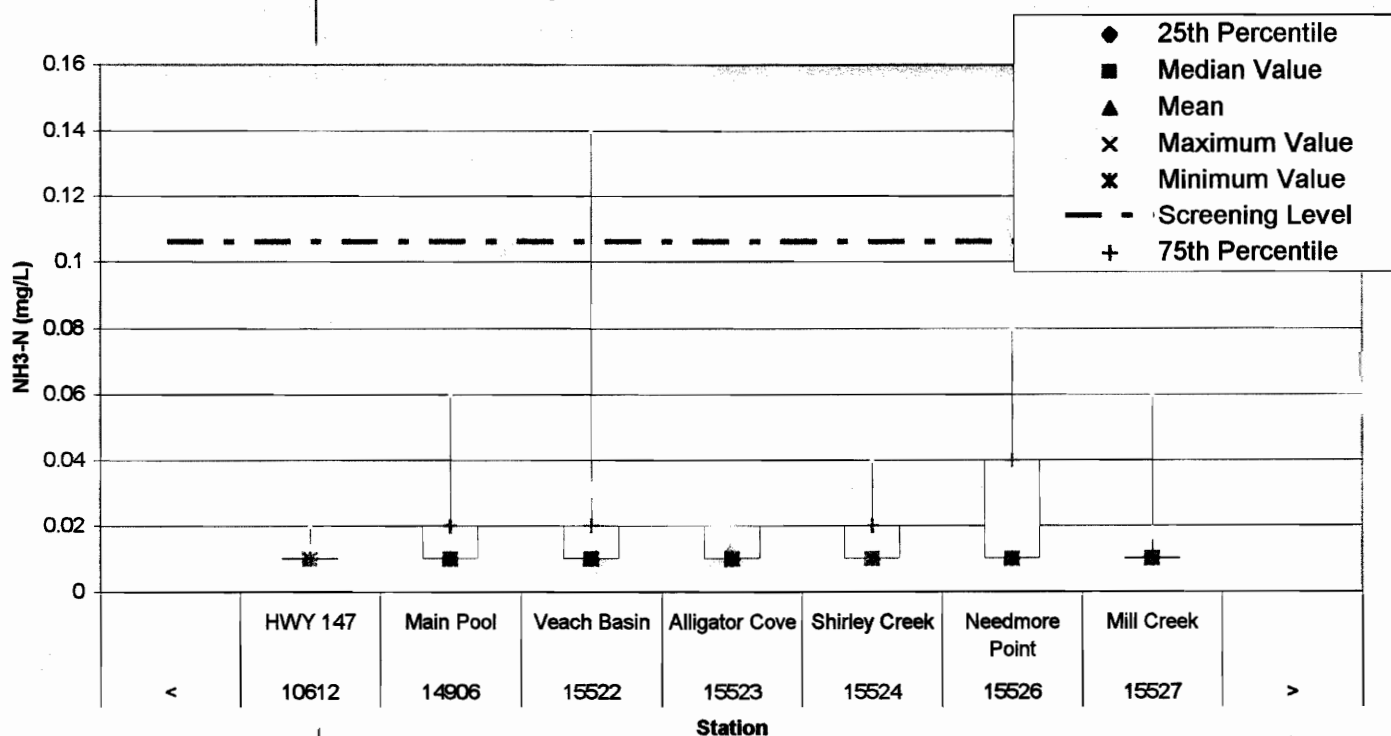
Nutrient Data for Sam Rayburn Reservoir-The box and whisker plots on pp 13-14 represent the results of the nutrient data collected during 2001 for the Sam Rayburn Water Quality Monitoring Program. The boxes show the 25th-75th percentile of results while the hi-low lines show the min and max values of the data set. There are nine samples from seven stations throughout Sam Rayburn. The tables on pp. 13-14 depict the number of samples that exceed the state screening level for reservoirs. Overall, based on this data, Sam Rayburn Reservoir would have concerns for nutrients at many sites. This could be due to normal conditions resulting from seasonal changes. Please note that this data is from less than one year and may not be representative of natural conditions. ANRA plans to continue monitoring these locations to see if this trend continues. Long-term monitoring will present a better picture of water quality.

Sam Rayburn Reservoir-Orthophosphate Data 2001



Station	HWY 147	Main Pool	Veach Basin	Alligator Cove	Shirley Creek	Needmore Pt	Mill Creek
Number Sxs	9	9	9	9	9	9	9
# Excds Criteria-Orthophos.	2	4	1	2	2	4	2
# Excds Criteria-Ammonia	0	0	1	0	0	0	0

Sam Rayburn Reservoir-Ammonia Data 2001



Segment 611-Angelina River Above Sam Rayburn Reservoir

Segment 611, the Angelina River above Sam Rayburn Reservoir extends 104 miles from Rusk County to Angelina/Nacogdoches county where it is impounded by Sam Rayburn Reservoir. Segment 611 has 2,008 square miles of drainage area. Major tributaries in Segment 611 include Mud Creek, West Mud Creek, East Fork Angelina River, Striker Creek, Loco

Bayou, and La Nana Bayou. ANRA monitors sites on the Angelina River and on Mud Creek, West Mud Creek, and La Nana Bayou. TNRCC Region 5 and Region 10 offices also monitor sites in Segment 611.

FY02 marks the end of a two year systematic subwatershed survey on Mud Creek and West Mud Creek. In FY01, ANRA

added five sites on Mud and West Mud Creek in order to better characterize water quality and to collect baseline data for future use in the development of Lake Eastex.

In FY03, ANRA plans to add monitoring sites on Lake Nacogdoches and on Lake Striker to better characterize water quality.

What the 305(b) Report says...

Segment Id	Seg Name	Station ID	Impairment or Concern	Support Code	Monitoring Priority
611	Angelina River	10633	Bacteria	NS	6
611	Angelina River	14470	Low pH	T1	1
611A	East Fork Angelina	10551	Bacteria	NS	6
611B	La Nana Bayou	10474	Bacteria	T2,NS	2,6
611B	La Nana Bayou	10474	Ammonia	C	3
611B	La Nana Bayou	10475	Bacteria	NS	6
611C	Mud Creek	10532	Bacteria	NS	6
611D	West Mud Creek	10540	Nitrate+Nitrite Nitrogen	C	3

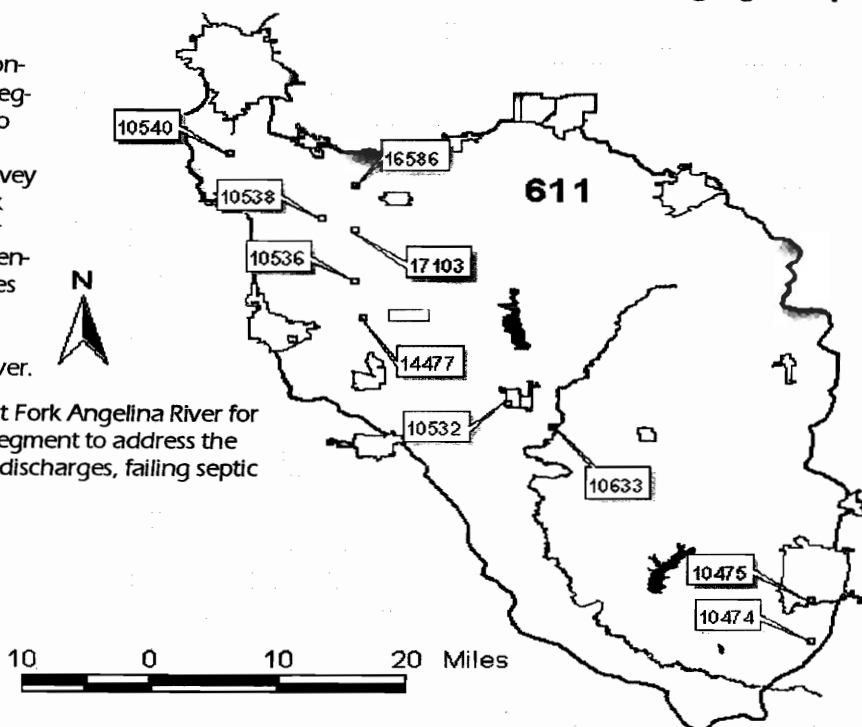
Segment 611 - ANRA FY 2002 Monitoring Schedule

ANRA Monitoring Stations									
Station ID	Station Description	Prog Code	Monitoring Parameters						
			24 HR DO	Metals Water	Metals Sed	Conv	Bacteria	Inst Flow	Field
10474	La Nana Bayou at CR 526	RT		2		4	4		4
10475	La Nana Bayou at Loop 224 S/Nacogdoches	RT		2		4	4	4	4
10532	Mud Creek at US 84	RT		2		4	4		4
10540	West Mud Creek at FM 346	RT		1		4	4	4	4
10633	Angelina River at SH 204	RT		2		4	4		4
10633	Angelina River at SH 204	DI	2						
10536	Mud Creek at FM 2064	IS		1	1	4	4		4
10538	West Mud Creek at FM 3052	IS		1	1	4	4		4
14477	Mud Creek at US 79	IS		1	1	4	4		4
14477	Mud Creek at US 79	DI	2						
16586	Mud Creek at SH 110	IS		1	1	4	4		4
17103	Mud Creek at SH 135	IS		1	1	4	4		4
17103	Mud Creek at SH 135	DI	2						

ANRA's Plan of Action...

To address the aforementioned issues, ANRA will continue monitoring at its current routine locations in segment 611. The goal of this data collection effort is to verify that concerns are ongoing. The end of FY02 will mark the end of the two year subwatershed survey of Mud Creek and West Mud Creek. The Mud Creek site at US 79 will be added as a routine site to better assess the conditions throughout Mud Creek. As mentioned, new sites will be added to Lake Nacogdoches since it is a high contact recreation area and public water supply lake. Lake Striker will also be added to determine effects on discharge into the Angelina River.

TNRCC Region 5 has been collecting data at the East Fork Angelina River for two years and will continue collecting data in that segment to address the impairments. Potential sources include wastewater discharges, failing septic systems, and stormwater runoff.



View of Segment 611-ANRA Monitoring Stations

ANRA staff demonstrate water quality monitoring techniques during a recent audit.

Segment 612-Attoyac Bayou

The Attoyac Bayou begins at FM 95 in Rusk County and extends until it is impounded by Sam Rayburn Reservoir in Nacogdoches/San Augustine County. The segment extends for approximately 121 miles and has a drainage area of 667 square miles.

Currently, ANRA only monitors one site in Segment 612 at US 59. Historically, ANRA

monitored sites on the Attoyac Bayou at SH 21 and at other sites in the watershed as part of a systematic study. In FY02, TNRCC Region 10 picked up the monitoring site at SH 21.

To address the impairments, ANRA will continue monitoring at its current locations in Segment 612. The goal of this data collection effort is to verify that concerns are

ongoing. If resources are available, ANRA will add additional monitoring sites on the Attoyac Bayou in FY03.

Potential sources of impairments consist primarily of agricultural stormwater run-off.

What the 305(b) Report says...

Segment Id	Seg Name	Station ID	Impairment or Concern	Support Code	Monitoring Priority
612	Attoyac Bayou	15253	Bacteria	T1	1
612	Attoyac Bayou	16076	Bacteria	T2	2
612B	Waffelow Creek	16083	Bacteria	NS	7
612B	Waffelow Creek	16085	Bacteria	NS	7

Segment 612 - ANRA FY 2002 Monitoring Schedule

ANRA Monitoring Stations									
Station ID	Station Description	Prog Code	Monitoring Parameters						
			24 HR DO	Metals Water	Metals Sed	Conv	Bacteria	Inst Flow	Field
16076	Attoyac Bayou at US 59	RT		1		4	4		4

Segment 613-Lake Tyler/Lake Tyler East & Segment 614-Lake Jacksonville

Segment 613-Lake Tyler and Lake Tyler East impound Prairie Creek and Mud Creek in Smith County and have a combined surface area of 4,870 acres.

Segment 614-Lake Jacksonville impounds Gum Creek and has a surface area of 1,312 acres.

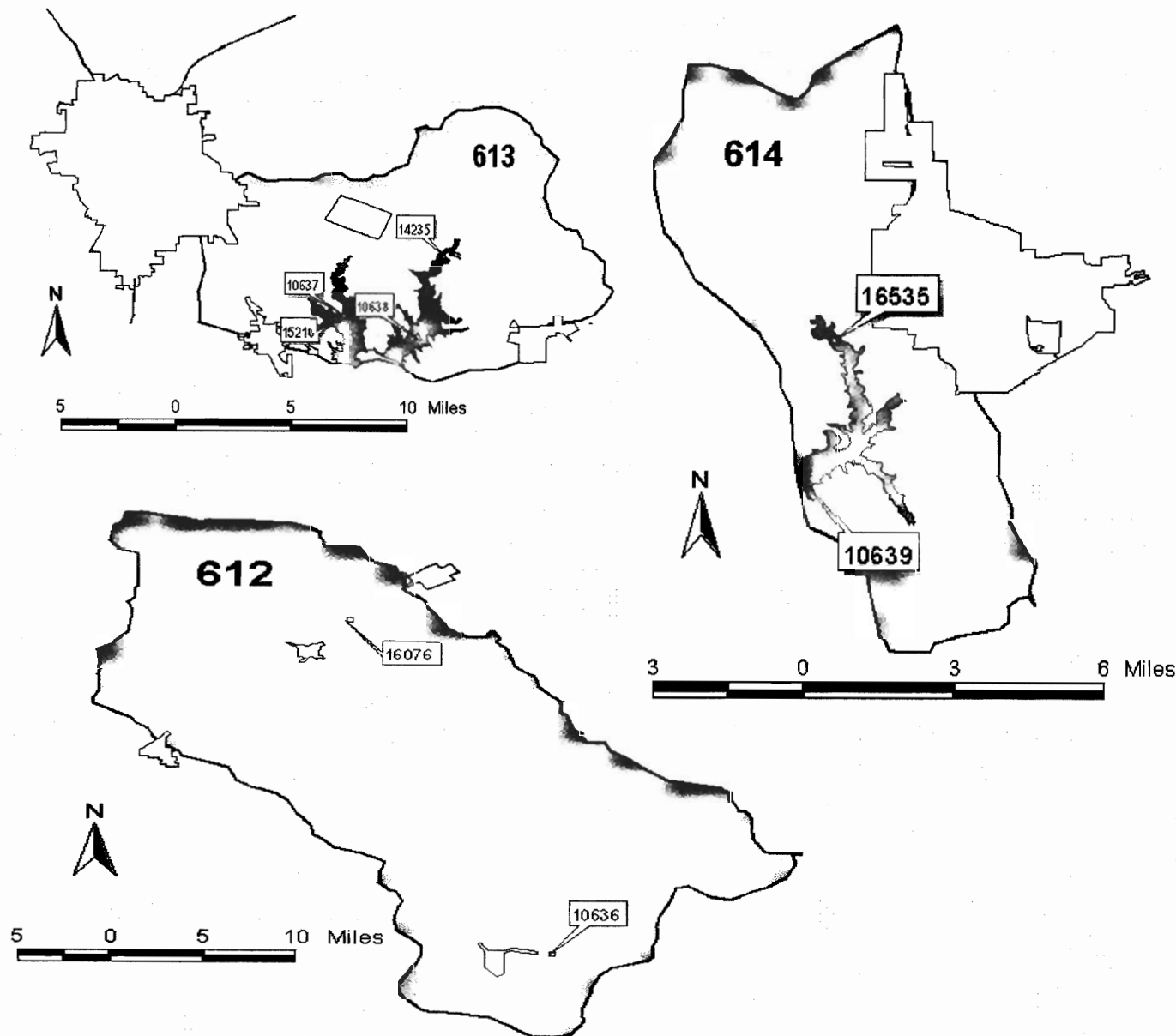
TNRCC Region 5 has historically collected data on these two segments. ANRA has not monitored on these two segments and has no future plans for conducting monitoring at these segments.

To address the impairments in Segment 613, TNRCC Region 5 will continue monitoring. Segment 614 has no impairments.

Of note, the source of the low pH in Segment 613 is thought to be naturally occurring.

ANRA's Plan of Action...**What the 305(b) Report says...**

Segment Id	Seg Name	Station ID	Impairment or Concern	Support Code	Monitoring Priority
613	Lake Tyler	15210	Low pH	T2	2
613	Lake Tyler East	14235	Low pH	T1, NS	1,7

View of Segments 612, 613 & 614-ANRA & TNRCC Monitoring Stations

Water Quality Events Inventory

One-time and seasonal events that occur during a specified period of time in a watershed can influence water quality in a positive or negative manner. These events and issues data are collected for the entire Upper Neches River Basin and is used to link water quality changes to specific events. Several sources are used to collect events and issues data which include federal, state, and local government entities, news media, steering committee input, concerned citizens, and the general public. Examples of events include, but are not limited to:

- ♦ Floods and Droughts
- ♦ New wastewater treatment plants or improvements to existing facilities
- ♦ Chemical Spills
- ♦ Fish Kills
- ♦ Significant legislation, ordinance, or federal regulation
- ♦ Individuals demonstrating "Best Management Practices"
- ♦ Failing Septic/Sewer Systems, etc

In 2001, the City of Nacogdoches received funding to make improvements to their wastewater collection system. This should help prevent overloading in the future. Another event was discovered with the help of a concerned citizen. A logger working in a remote area discovered a large sewer line that had ruptured and was discharging a large amount of raw sewer into an area that ultimately drained into one of ANRA's monitoring locations. This finding was reported to ANRA and local officials and was repaired immediately. This event was significant because the affected monitoring location in segment 611 had significant counts of E. Coli bacteria. Apparently, this raw sewage had been affecting this monitoring location for several months. Since the repair was conducted, bacteria counts have dropped significantly at the monitoring location. This case is an example of a negative situation changing to a positive outcome. It also shows how important public involvement is. Also of recent

significance, in May of 2002, a fish consumption advisory was issued for Ratcliff Lake. The advisory was due to high concentrations of mercury in fish tissue. Mercury can bioaccumulate in fish and other aquatic organisms as it moves up the food chain. Mercury often enters waterbodies from air emissions of methyl-mercury. These emissions can be generated from power plants or other industrial sources. Because they are emitted as a gas, the pollutants can travel long distances from where they originated.

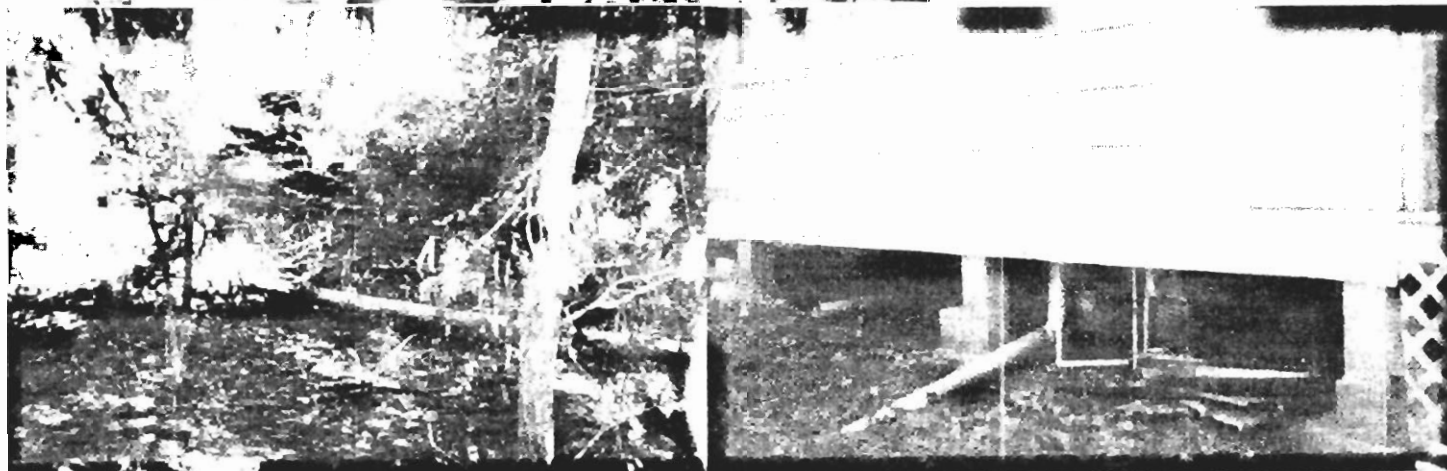
ANRA encourages steering committee members and the general public to provide information on water quality events, both positive and negative. Also, as a public service, ANRA provides water quality information upon request. If you would like information about water quality events, contact ANRA at 936/632-7795 or by email at info@anra.org.

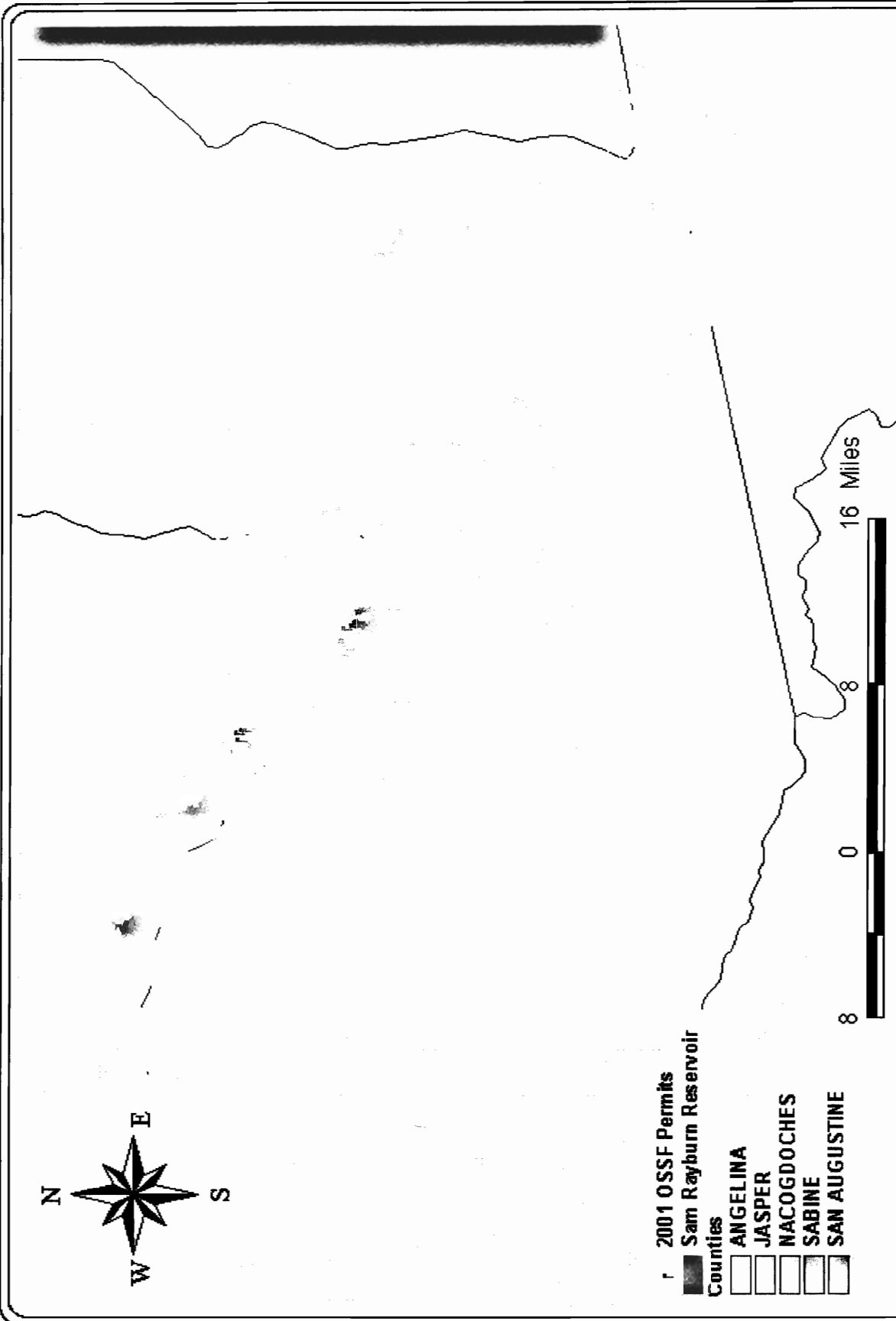


Left: Local authorities repair sewer line that had ruptured and was leaking untreated sewage into a tributary which flowed into an area upstream of an ANRA monitoring location in segment 611. Since the repair, bacterial counts have dropped significantly.

Bottom/bottom left: Sam Rayburn sewer complaint. House below has no septic system and discharges untreated sewage directly onto land. During heavy rainfall, this raw sewage can run into Sam Rayburn Reservoir only a short distance away.

See page 19 for a map detailing licensed septic systems (OSSFs) installed around Sam Rayburn Reservoir during 2001. This information is incorporated into ANRA's water quality events inventory





Sam Rayburn Reservoir 2001 On-Site Sewage Facilities (OSSF)

Prepared by:



ANGELINA & NECHES RIVER AUTHORITY

Public Outreach Activities

Many people assume that all the Clean Rivers Program does is collect water quality information, but that is only one element of the program. Public outreach and involvement is a very important part of the Clean Rivers Program. The goal of our public outreach is to try to make the public aware of water quality issues that will be pressing in the future. ANRA's public outreach program also gives concerned citizens an opportunity to get involved and make a difference in their part of Texas.

ANRA's public outreach activities consist of volunteer monitoring programs, environmental education events, Steering Committee Meetings, and the ANRA Web Page.

Volunteer Monitoring

Volunteer monitoring through the Texas Watch program based out of Southwest Texas State University allows concerned citizens, educators, and groups to conduct water quality monitoring on areas close to home. ANRA serves as the Texas Watch regional partner for the Upper Neches Basin and provides training, monitoring kits, and replacement reagents to Texas Watch volunteer monitors. During 2001, ANRA

held a phase I, II, and III training session for a group on West Mud Creek near Troup, TX. Another on-site phase III training was completed during the summer for a new volunteer/teacher at Martinsville ISD.

Environmental Education Events

As part of its public outreach efforts, ANRA conducts presentations discussing water quality and the Clean Rivers Program whenever the opportunity arises. During 2001, ANRA staff performed environmental education sessions at five separate locations consisting of middle school, high school, and university students and conservation groups. ANRA staff presented talks to well over 100 individuals in the past year, and the majority of these individuals were students. ANRA believes in environmental education as a means of disseminating information to the public about water quality.

CRP Steering Committee Meeting

In August, 2001 ANRA held a meeting for the CRP Upper Neches Steering Committee members at the ANRA conference center in Lufkin. The meeting was held to discuss the previous years activities and to receive input on future

plans. Anyone interested in participating on the Upper Neches Steering Committee may contact ANRA for more information.

ANRA Web Page

Another means of water quality information available to anyone with internet access is the ANRA web page at www.anra.org. The ANRA web page is a great place to find information about the Clean Rivers Program, helpful links to other planning agencies, reports for the Upper Neches Basin, and lots of water quality data. During 2001, the ANRA web page underwent major reconstruction and now includes not only information about the Clean Rivers Program, but information on all of ANRA's programs. Go and check it out at www.anra.org.

The Angelina & Neches River Authority strives to involve the public in its activities, whether it is through volunteer programs or public outreach events. In a world where water becomes more important everyday, so does the need for everyone to get involved. Please contact us at 936/632-7795 or email info@anra.org.



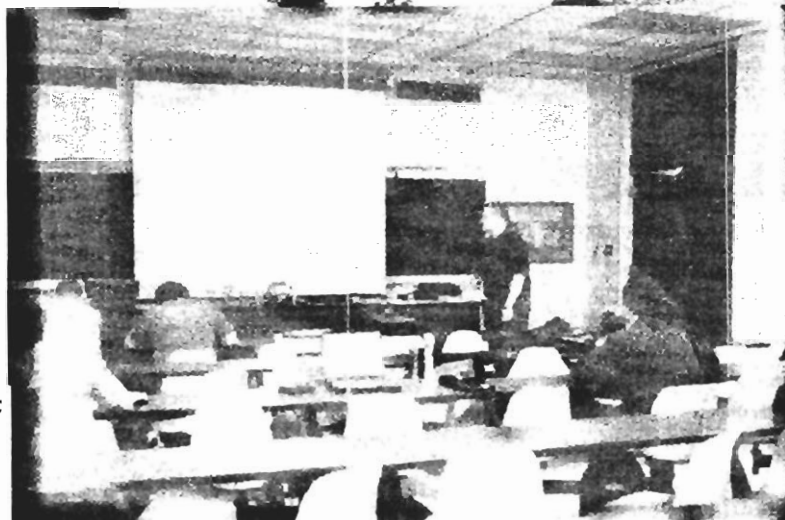
Clean Rivers

What is the Clean Rivers Program?

The Texas Clean Rivers Act of 1991 was enacted by the Texas State Legislature to ensure the comprehensive regional assessment of water quality in each river basin. As a partner in the Texas Clean Rivers Program (CRP), the Angelina & Neches River Authority is the lead agency for regional water quality assessments in the Upper Neches River Basin Study Area. The CRP is funded through fees from wastewater discharge permits and water rights permits. A steering committee with representatives from government, industry, and public interests throughout the basin provide guidance and policy at regular meetings. These meetings also provide a forum for citizens to participate with ideas and express any concerns involving water quality issues.

Above: Excerpt from the new Clean Rivers Web Page at www.anra.org.

Top Right: Texas Watch phase III at West Mud Creek.
Right: Water Quality Presentation conducted at SFASU.



Other Special Projects in the Upper Neches River Basin

There are several organizations and groups in the Deep East Texas area conducting water quality studies other than ANRA. This section is meant to highlight important special projects that will provide needed water quality information including the following study currently underway in Alto, TX by Stephen F. Austin State University.

Texas Intensive Forestry Study

The Texas Intensive Forestry Study: Alto Watershed Project is a research study currently underway. The Texas Intensive Forestry Study is a cooperative study with partners including the Stephen F. Austin State University Arthur Temple College of Forestry, Temple-Inland Forest Products Corporation, and the National Council for Air and Stream Improvement.

The Alto Watershed Project consists of a number of small watersheds west of Alto in Cherokee County, which drain into the Neches River.

One of the primary focuses of this study is to measure the impacts that current silviculture practices have on non-point source water pollution. The study includes collecting baseline and storm-water runoff data as

intensive forest management practices occur. Water quality information collected includes sediment and nutrient loading, as well as analysis of herbicides. Analyzing the effects of applying herbicides is significant since there is currently a lack of data.

Researchers hope to accomplish much with this study. Data collected will be used to develop a water quality model for forestry application. This study will also be used to

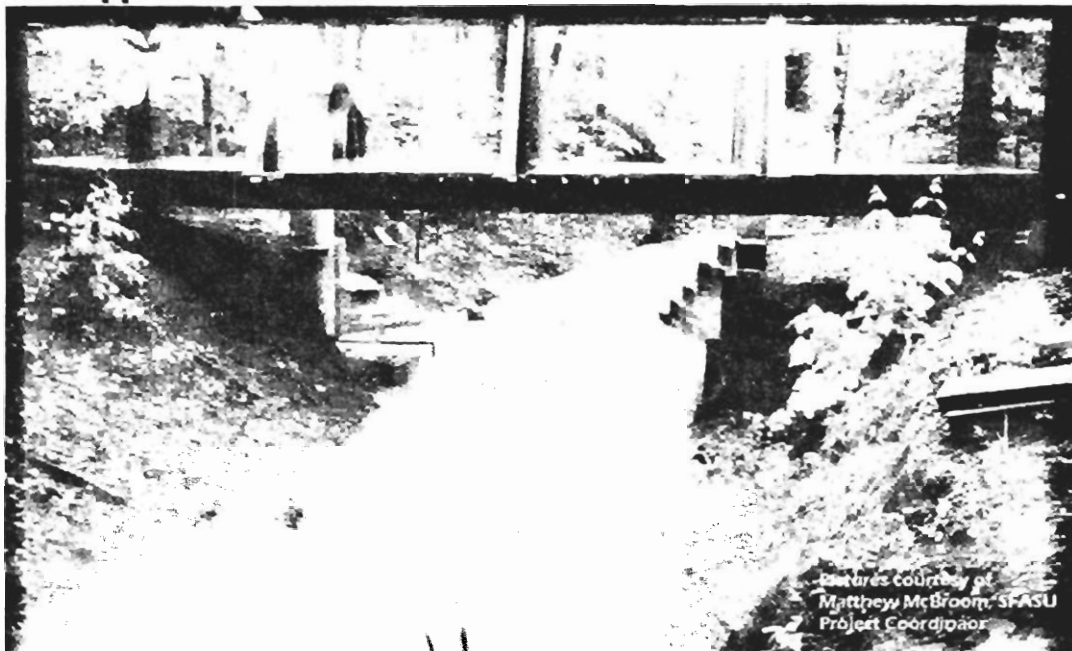
compare against a similar historical study done in the 1970's and 80's. This current research will help evaluate the progress of current "Best Management Practices" as compared to the historical study. For more information visit <http://fri.sfasu.edu/projects/alto/alto.html>

Texas Intensive Forestry Study

Right: Small watershed with "H" Flume and Coshocton wheel sampler

Top Right: Large Watershed during a rain event

Bottom: Forest harvesting





ANGELINA & NECHES RIVER AUTHORITY

DATE: August 2, 2002

TO: Upper Neches Basin Steering Committee
Clean Rivers Program

FROM: David R. Hancock *DRH*
Environmental Division Manager

SUBJECT: Steering Committee Meeting &
2002 Upper Neches Basin Highlights Report

The Angelina & Neches River Authority (ANRA) will conduct a Clean Rivers Program (CRP) Steering Committee Meeting on Wednesday, August 21, 2002 at 1:00 p.m. The meeting will be held at The Fredonia Hotel and Convention Center in Nacogdoches, TX. The Fredonia Hotel is located at 200 North Fredonia Street in downtown Nacogdoches. The meeting will take place in the Raguet Room. A buffet lunch is available at the hotel restaurant for \$10 per person. We will eat in the Raguet Room prior to the meeting. For those of you that would like to come early and eat lunch with us, plan to arrive by 12:00 p.m.

The ANRA staff will provide you with an update of the Clean Rivers Program in the Upper Neches Basin and plans for fiscal year 2003. The topics to be discussed include the basin-wide water quality monitoring programs, a special study on dissolved metals in water, Sam Rayburn Reservoir watershed program, and the new Texas Water Quality Monitoring and Assessment Report. We will also give an update on the Lake Eastex Water Supply Project. In addition, the TNRCC Project Manager for the Sam Rayburn Reservoir Total Maximum Daily Loads (TMDL) Project will be giving an overview of this important water quality study that will begin soon.

The 2002 Upper Neches Basin Highlights Report has been completed and is available on the ANRA web site at www.anra.org. The 2002 Highlights Report includes a review by river segment of the Texas water quality inventory report, maps of the watersheds, special projects in the basin, and public outreach activities.

I appreciate those that responded to my recent letter concerning participation on the CRP Steering Committee. I look forward to meeting the new committee members. If you did not receive your letter or have not yet responded, please call or e-mail so that I may complete the list. My phone number is (936) 633-7541 and my e-mail is dhancock@anra.org. If you have any questions about the meeting, please contact me.