2003 Lower Neches River Basin and Neches-Trinity Coastal Basin Highlights Report Draft

Prepared in cooperation with the Texas Commission on Environmental Quality

The 2003 lower Neches River Basin and Neches-Trinity Coastal Basin Highlights Report was prepared by the Lower Neches Valley Authority (LNVA) in cooperation with the Texas Commission on Environmental Quality's (TCEQ's) Clean Rivers Program. This report provides an update of Clean Rivers activities that took place in LNVA's assessment area for fiscal year 2002.

The goals of the Clean Rivers Program (CRP) at LNVA revolve around continued coordinated monitoring efforts throughout the lower Neches River Basin and the adjacent Neches-Trinity Coastal Basin. These goals are accomplished through data collection and data analysis so that water quality concerns can be identified. Once identified, the LNVA in conjunction with TCEQ, local industry and government, and citizens can work together to improve the water quality in those designated areas.

The Texas Clean Rivers Program (CRP) was created in 1991 by the state legislature to assess, maintain and improve the quality of water resources within each river basin in Texas. Through an ongoing partnership between the Texas Commission on Environmental Quality (TCEQ), river authorities, regional entities, industry, citizens and other local, state and federal agencies, CRP utilizes a watershed management approach to identify and evaluate water quality issues, establish priorities for corrective action, and work to implement those actions.

Summary of Year's Highlights

The goals of this Basin Highlights Report are to provide information about CRP's water quality monitoring program, provide an analysis of the basin's overall water quality including special studies, and provide information on other Clean Rivers activities for the past year.

The report begins with an overview of LNVA's assessment area as well as general information about the land and economy in these areas. It continues with an explanation of the *Texas Water Quality Inventory and 303(d) List*, previously called the 305(b) Report, and the 303(d) List (List of Impaired Waters). A Basin Action Summary table outlines water quality conditions throughout the basin and provides LNVA's recommendations for future action.

The Highlights Report then looks at the monitoring activities that took place in fiscal year 2002. Some of the changes that took place regarding the monitoring include shifting from a bi-monthly to a quarterly monitoring frequency. In addition, the LNVA has employed a new ultra-clean metals sampling technique as opposed to the clean hands/dirty hands technique previously utilized. The section on routine monitoring includes data summaries grouped by segment numbers. The segment numbers are essentially numbers given to watersheds within the basin for easier classification. The next section of the report discusses systematic monitoring, why it is necessary, and what direction it will take in the future. Included in this section is 24 hr. dissolved oxygen (D.O.) data collected during the index period of 2002.

The 2003 Highlights Report includes a section on public outreach activities that occurred in 2002. This part of the Clean Rivers Program provides a variety of educational opportunities, including an internship program and the Texas Rivers Exhibit, that teach citizens the importance of good water quality. LNVA continues to participate in the environmental Round-Robin for elementary and middle school students held at Martin Dies Jr. State Park.

LNVA

THE TEXAS CLEAN RIVERS PROGRAM

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Public Participation	**20**

REPORT HIGHLIGHTS

Basin Action Summary: *Table summarizing current water quality conditions with recommendations for future corrective actions.* ***Page 4***

Monitoring Stations: *Map of LNVA's CRP monitoring stations.* ***Page 7***

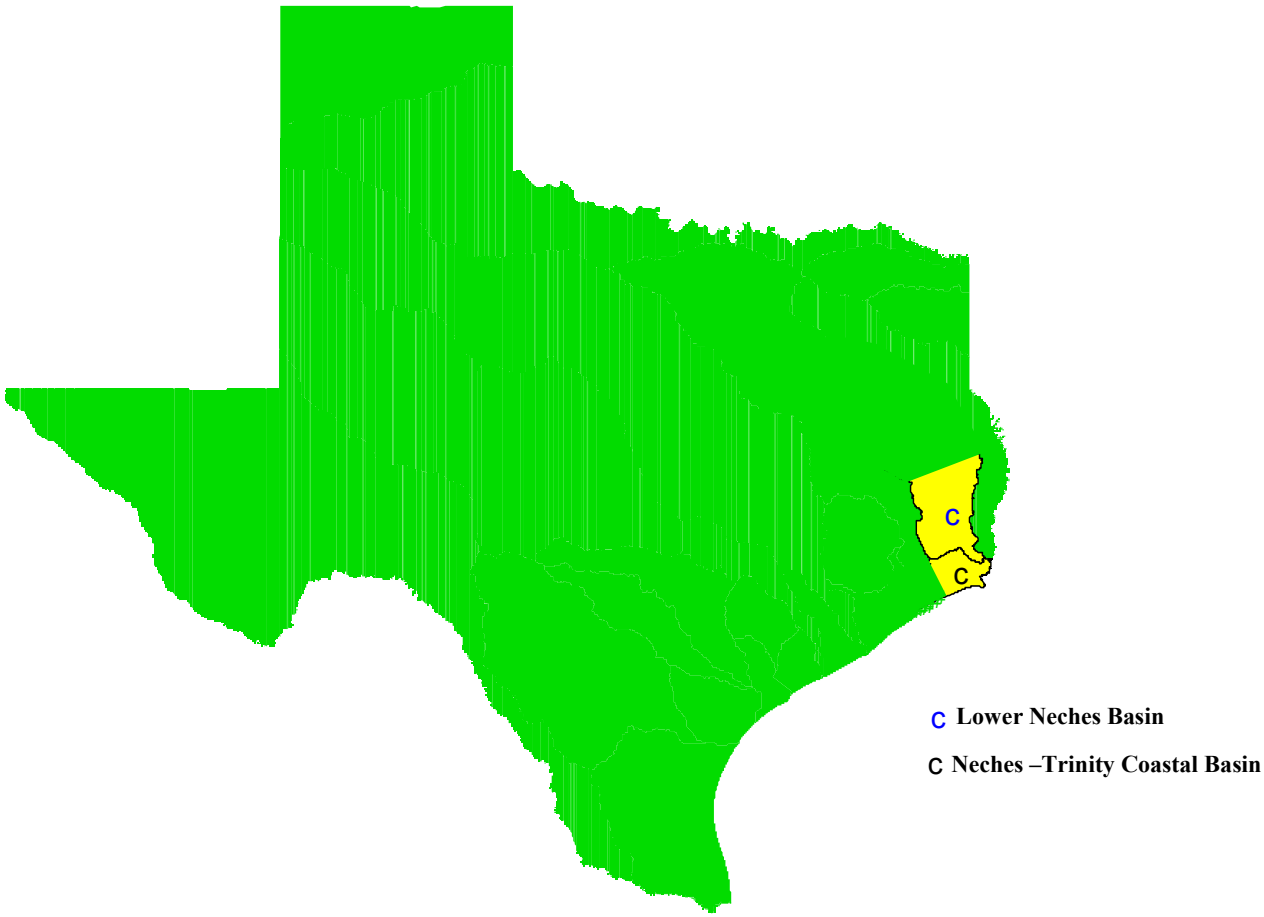
Systematic Monitoring: *Water quality assessment using diurnal studies throughout segment 607 and 608's monitoring area.* ***Page 16***

Basin Overview

The LNVA has responsibility for assessing water quality in the lower Neches River Basin and the eastern portion of the Neches-Trinity Coastal Basin. Consisting of all of Hardin County, as well as portions of Tyler, Jasper, Jefferson, Liberty, Polk, and Orange Counties, the Lower Neches River Basin encompasses approximately 3,000 sq. miles. Urbanized areas include Port Neches, Jasper, Silsbee, Kountze, Lumberton, Sour Lake and the northern section of Beaumont. Non-urban regions, including pastures, marsh, cropland and the East Texas region commonly known as the "Piney Woods," account for a major portion of the assessment area.

The approximately 769 square mile Neches-Trinity Coastal Basin lies southwest of the Lower Neches River Basin and southeast of the Trinity River Basin, reaching into Jefferson, Chambers and Liberty Counties. This watershed includes the cities of Port Arthur, Groves, Nederland, Winnie and most of Beaumont. The economy of this area is centered on petrochemical and related industries, shipping and rice farming. Figure 1 below identifies LNVA's area of responsibility.

Figure 1: Lower Neches Valley Authority Assessment Area



2002 Water Quality Assessment

The Lower Neches Valley Authority participates in the Clean Rivers Program to assist the TCEQ in assessing the surface water quality in the lower Neches Basin and Neches-Trinity Coastal Basin. In an effort to assess the states' waters, TCEQ drafted the *Texas Water Quality Inventory and 303(d) List*. This document satisfies the requirements of the federal Clean Water Act for both the Section 305(b) water quality inventory and Section 303(d) list. Section 305(b) requires a summary of the state's surface water quality including concerns for public health, fitness for use by aquatic species and other wildlife, and specific pollutants. Section 303(d) establishes a list identifying water bodies that do not meet, or are not expected to meet applicable water quality standards. Based on the 303(d) List, TCEQ must either review water quality standards for the water body, collect additional data on the water body, or schedule a Total Maximum Daily Load (TMDL) for the water body. The goal of a TMDL program is to restore and maintain the beneficial uses of impaired water bodies.

Through data collection and review of the *Draft 2002 Water Quality Inventory and 303(d) List*, LNVA has found that some water bodies have good water quality while others have persistent problems. To address these issues, LNVA has developed a Basin Action Summary to use as a resource for water quality management planning. The Basin Action Summary lists CRP assessment findings and identifies parameters of concern, previous actions taken, and recommends future actions. Impaired water bodies are given a high (H), medium (M), or low (L) priority and addressed accordingly.

The Basin Action Summary is reviewed and revised if necessary each year. With LNVA's Basin Steering Committee and stakeholder input, priorities are set to meet local needs and recommendations are made to address water quality concerns. Due to limited funding, only the highest priority water bodies will be addressed in the next monitoring period. LNVA will use this summary to establish monitoring priorities at the fiscal year 2004 coordinated monitoring meeting. It will also be used as a basis for work plan development for the fiscal year 2004– 2005 contract period.

B.A. Steinhagen Reservoir

Table 1: Basin Action Summary

Water Body	Impairment	Identified Parameters	Explanation of Water Quality	Actions Taken	Recommended Actions	Priority
Pine Island Bayou and Tributaries	Aquatic Life Use	Low dissolved oxygen	Natural Occurrence	Completed 1 of 2-yr. 24 hr. intensive D.O. data collection	Schedule UAA with TCEQ or review standards	H
Village Creek and Tributaries	Aquatic Life Use	1. Low dissolved oxygen 2. Metals 3. Bacteria	1. Natural Occurrence 2. Not enough data 3. Inconclusive	1. DO Study 2. Routine Monitoring 3. Special Study	1. Schedule UAA with TCEQ or review standards 2. Continued metals monitoring 3. Develop strategy with TCEQ to address this issue	1. L 2. H 3. M
Hillebrandt Bayou	Public Use	Nutrient Enrichment	Nonpoint source pollution	N/A	FY 2004-2005 Special Study	H
Sandy Creek	Contact Recreation	Bacteria	Nonpoint source pollution	LNVA routine monitoring	Further Data Analysis	L
Booger Branch	N/A	N/A	Drainage Ditch - Limited Aquatic Life Use	N/A	N/A	N/A
Neches River Tidal	Aquatic Life Use	Malathion	N/A	TCEQ Region 10 routine monitoring	Evaluate Region 10 monitoring of organics	M
Shallow Prong Lake	Aquatic Life Use	Low dissolved oxygen	Possible Natural Occurrence	TCEQ Region 10 routine monitoring	Reassess 303(d) listing	N/A
Taylor Bayou	Aquatic Life Use	Low DO (Partially supports DO criteria)	Natural Occurrence	Recommended Aquatic Habitat Study	Aquatic Habitat Study to be scheduled by TCEQ Region 10	H
Star Lake Canal	Aquatic Life Use	Low dissolved oxygen	Possible Natural Occurrence	TCEQ Region 10 routine monitoring	Continued monitoring by TCEQ Region 10	N/A
B.A. Steinhagen Lake	Public Use	Mercury in Fish Tissue	Air Deposition	TCEQ Special Study	N/A	N/A
Lake Kimball	Public Use	Mercury in Fish Tissue	Air Deposition	TCEQ Special Study	N/A	N/A
Alligator Bayou	Aquatic Life Use	Toxicity in sediment and water/impaired fish community	Point source pollution	TMDL near completion	N/A	N/A

CRP Monitoring Activities

Once LNVA has developed the Basin Action Summary, a monitoring schedule for the assessment area is developed. In order to coordinate monitoring efforts in the basin for maximum coverage area while minimizing duplication of effort, the Lower Neches Valley Authority works in conjunction with the Texas Commission on Environmental Quality's Region 10 office. This collaboration takes place each spring at LNVA's coordinated monitoring meeting.

Together LNVA and TCEQ Region 10 monitor water quality in twelve segments of the lower portion of the Neches River Basin (Basin 6), the Neches-Trinity Coastal Basin to East Bay (Basin 7), and Sabine Lake and Sabine Pass (Basin 24). LNVA's monitoring area in Basin 6 extends from the Angelina River below the Sam Rayburn Reservoir in Jasper County to the Neches River near Lakeview in Orange County. Basin 6 includes B.A. Steinhagen Reservoir and the entire Pine Island Bayou and Village Creek watersheds. Basin 7 extends through parts of Jefferson, Chambers, and Liberty Counties and includes Taylor and Hillebrandt Bayous. For a map of the LNVA CRP monitoring stations, see page 6.

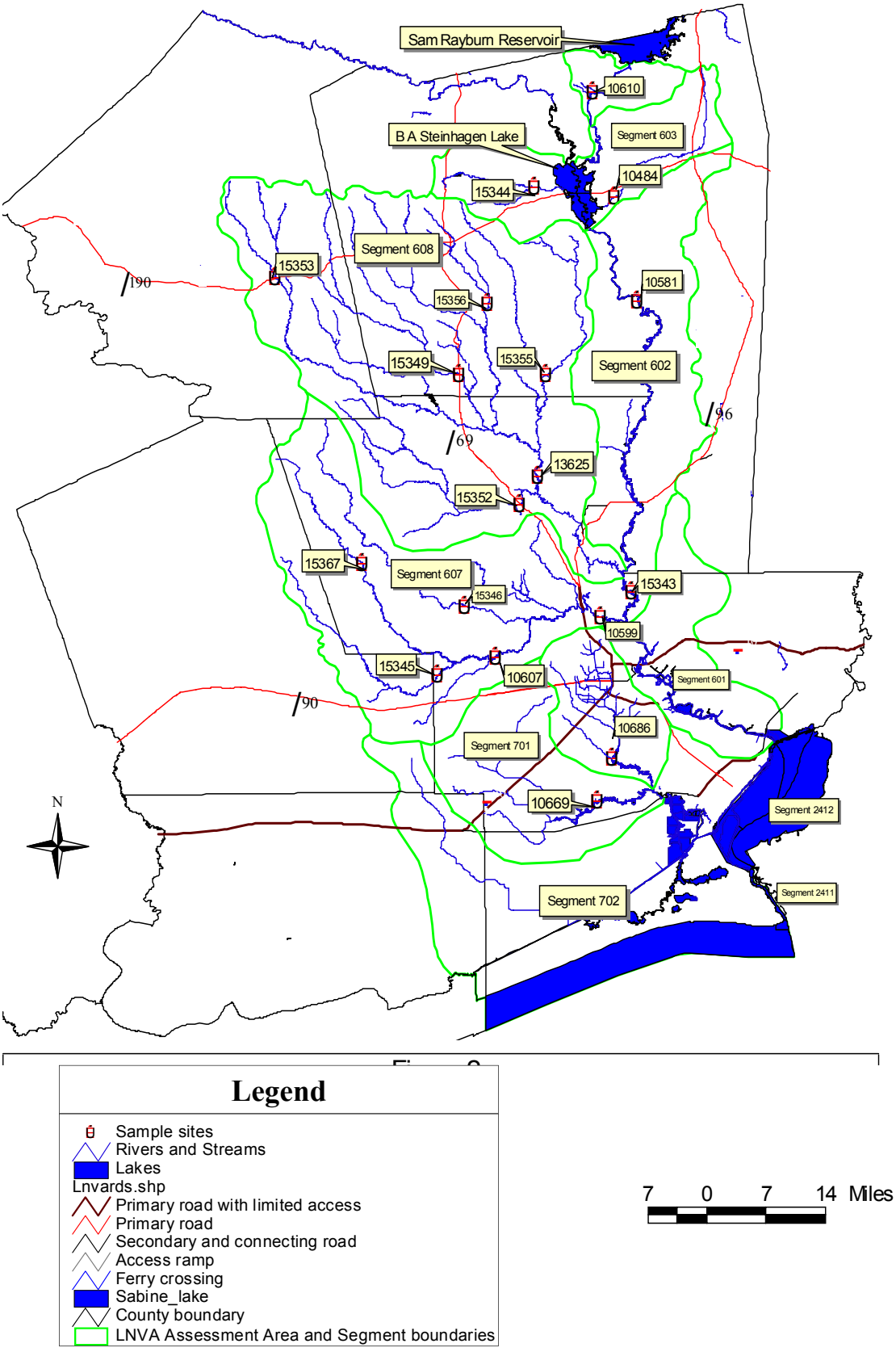
In addition, LNVA funds the Sam Rayburn Reservoir On-Site Systems Management and Watershed Protection Program conducted by the Angelina & Neches River Authority. The data from this program are supplied to CRP.

The LNVA is currently conducting routine monitoring at 19 sites in Basins 6 & 7 and systematic monitoring in Segments 607 and 608. See Appendix A at the end of this report for a summary table of LNVA Monitoring Sites and parameter sampling frequency for 2003.

Routine monitoring site on Angelina River at Hwy 63

Routine monitoring site on Wolf Creek at FM 256

Figure 2: Lower Neches Valley Authority Routine Monitoring Sites



Routine Monitoring

Routine sampling provides baseline data used to assess water bodies of the state. These assessments identify problems and concerns within each segment, in order to determine where future systematic monitoring efforts will be directed. During sampling events, field measurements such as dissolved oxygen, pH, specific conductance, temperature, and secchi depth are observed and recorded at each site. Samples are also collected for laboratory analysis of conventional parameters and bacteria (fecal coliform and *E. coli*). A list of parameters by group can be found in appendix B. Stream flow is recorded in cubic feet per second along with the number of days since the last one half inch rainfall. This information is used to compare flow with fluctuations in certain parameters.

LNVA's routine monitoring frequency for fiscal year 2003 has changed. Water quality monitoring at 19 locations are being conducted on a quarterly basis instead of bi-monthly. Quarterly sampling will allow LNVA additional time for systematic monitoring to assess problem areas identified in previous basin reports while continuing to adequately monitor stream characteristics throughout all seasonal changes.

In September of 2001, LNVA began collecting *E. coli* bacteria samples in addition to fecal coliform as part of routine monitoring due to revisions to the *Texas Surface Water Quality Standards*. Historically, fecal coliform bacteria analysis have been used to detect contamination in water bodies due to improperly treated wastewater. TCEQ uses the data to assess if contact recreation is impacted by bacteria levels. *E. coli* will eventually replace fecal coliform in the *Texas Surface Water Quality Standards* as the contact recreational use standard, but both fecal coliform and *E. coli* will be collected until such time. By August of 2003, the ten *E. coli* data points sample set needed for contact recreational use assessment will have been collected. Early analysis of data indicate only one site exceeds the contact recreation use support limit.

Another change to LNVA's routine monitoring is the way in which metals samples are collected and analyzed. Screening levels for many metals are based on the total hardness of the water. East Texas surface waters are relatively soft when compared statewide and as such, the screening levels can be less than 0.5 parts per billion (ppb). To detect the presence of metals at such low levels, a new ultra-clean sampling technique is utilized. Developed by Albion Environmental, the new technique is beneficial to the CRP because sample contamination during collection is greatly reduced and the reporting limits (ppb) required by CRP are easily attained.

Ultra-Clean metals sampling at routine monitoring site

Water Quality Data Screening for Routine Monitoring

Data collected for the Clean Rivers Program by LNVA from January 1997 through December 2002 were screened for this report according to TCEQ guidance for the assessment of surface water. The data are screened to identify use support for aquatic life use, contact recreation, general use support, and concerns due to pollution impacts or nutrient loading. Tables 2, 3, and 4 delineate the level of use support or concern based on the percentage of data exceeding individual parameter criterion. Specific criteria per segment can be found in the segment summaries on pages 9-15. The segment summaries are also presented with a map to show location of the water body and sampling sites, segment number and name with the designated uses, and facts about the segment with significant findings from the screened data. For river and stream segments a seven-day, two-year low flow (7Q2) criteria is calculated from historical United States Geological Survey stream flow records. Individual parameter concentrations that exceed criteria or screening levels collected when stream flow was less than 7Q2 are omitted from screening.

Table 2: Use Support Criteria

Use	Parameter/Criteria or Screening Levels	Fully Supporting	Partially Supporting	Not Supporting
Aquatic Life Use	Dissolved Oxygen	0-10% of data does not meet screening level.	11-25% of data do not meet screening level.	>25% of data do not meet screening level.
Aquatic Life Use	Toxicants (metals and organics): Acute - short term exposure Chronic - long term exposure	0-10%, for any individual parameter, are less than the acute criterion and/or the mean do not exceed the chronic criterion.	11-25%, for any individual parameter, are less than the acute criterion and/or the mean does not exceed the chronic criterion.	>25%, for any individual parameter, are less than the acute criterion and/or the mean does not exceed the chronic criterion.
Contact Recreation	Fecal Coliform 400 colonies/100 mL	0-25% of data does not meet screening level.	Partial support is not assessed.	>25% does not meet screening level.

Table 3: Water Quality Concerns Due To Nutrients

Category Stream	Parameter/Screening Levels		No Concern	Concern
Freshwater Streams	NH3-N	0.16 mg/L	For any one parameter, the screening level is exceeded 25% or less of the time	For any parameter, the screening level is exceeded greater than 25% of the time
	NO2-N + NO3-N	3.50 mg/L		
	OP	0.90 mg/L		
	TP	1.10 mg/L		
	Chlorophyll *a*	13.7 µg/L		
Tidal Streams	NH3-N	0.44 mg/L		
	NO2-N + NO3-N	2.34 mg/L		
	OP	0.90 mg/L		
	TP	1.11 mg/L		
	Chlorophyll *a*	23.0 µg/L		
Estuaries	NH3-N	0.12 mg/L		
	NO2-N + NO3-N	3.26 mg/L		
	OP	0.18 mg/L		
	TP	0.23 mg/L		
	Chlorophyll *a*	14.6 µg/L		

Table 4: General Use Support

Parameter	Units/Criteria	Fully Supporting	Partially Supporting	Not Supporting
Water Temperature	ºC, segment specific	0-10% of data does meet criterion	11-25% of data does not meet criterion	>25% of data does not meet criterion
pH	Standard Units, segment specific	0-10% of data does not meet criteria	11-25% of data does not meet criteria	>25% of data does not meet criteria
Chloride	mg/L, segment specific	Segment average less than criterion	Partial support is not assessed	Segment average exceeds criterion
Sulfate	mg/L, segment specific	Segment average less than criterion	Partial support is not assessed	Segment average exceeds criterion
Total Dissolved Solids	mg/L, segment specific	Segment average less than criterion	Partial support is not assessed	Segment average exceeds criterion

Segment No. 0602	USES			CRITERIA							Nutrient Screening Levels			
Neches River below B. A. Steinhagen Lake	Recreation	Aquatic Life	Domestic Water Supply	Average Chloride (mg/L)	Average Sulfate (mg/L)	Average TDS (mg/L)	Dissolved oxygen (mg/L)	pH range (SU)	Indicator Bacteria (#/100mL)	Temperature (°C)	Nitrate + Nitrite (mg/L)	Ammonia-Nitrogen (mg/L)	Total Phosphate (mg/L)	ortho-Phosphate (mg/L)
	Contact	High	Public Supply	≤ 50	≤ 50	≤ 200	≥ 5	6.0-8.5	≤ 400	≤ 33 (91°F)	≤ 3.5	≤ 0.16	≤1.1	≤ 0.9

QUICK FACTS:

Segment 0602 includes the Neches River from a point 7.0 miles upstream of IH-10 in Orange/Jefferson County to Town Bluff Dam in Jasper/Tyler County. Historical trace metals data were listed as a concern in previous assessments for cadmium, copper, lead, and zinc. The findings for this assessment show that there is no longer a concern for these metals in this segment.

SIGNIFICANT FINDINGS:

Designated Use Support:

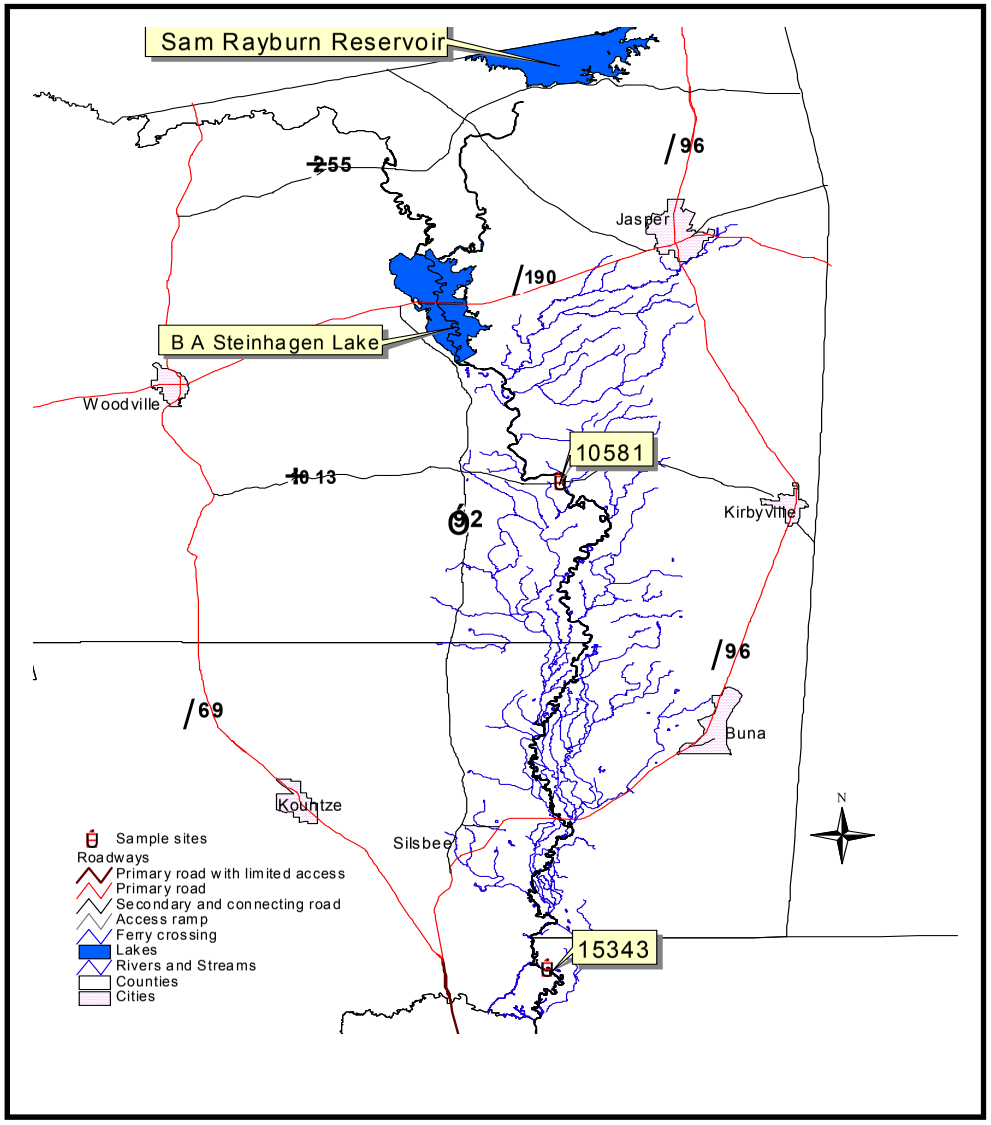
* Fully supports the aquatic life use.
* Fully supports the contact recreation use.
* Fully supports the acute and chronic criteria for aluminum, cadmium, copper, lead and zinc in water.

General Criteria:

* Fully supports the general criteria.

Pollution Impacts (nutrients):

* There are no concerns due to nutrient enrichment.



Segment No. 0603	USES			CRITERIA							Nutrient Screening Levels			
B. A. Steinhagen Lake	Recreation	Aquatic Life	Domestic Water Supply	Average Chloride (mg/L)	Average Sulfate (mg/L)	Average TDS (mg/L)	Dissolved oxygen (mg/L)	pH range (SU)	Indicator Bacteria (#/100mL)	Temperature (ºC)	Nitrate + Nitrite (mg/L)	Ammonia-Nitrogen (mg/L)	Total Phosphate (mg/L)	ortho-Phosphate (mg/L)
	Contact	High	Public Supply	≤50	≤50	≤200	≥5	6.0-8.5	≤400	≤34 (93ºF)	≤3.5	≤0.16	≤1.1	≤0.9

QUICK FACTS:

The reservoir constitutes the segment up to the normal pool elevation of 83 feet. Major tributaries to the segment include the Neches and Angelina Rivers, Segments 604 and 609, respectively. Monitoring for the Clean Rivers Program in Segment 603 are on Sandy Creek and Wolf Creek. The Texas Commission on Environmental Quality monitors one site near the dam on the main pool. The Texas Department of Health issued a fish consumption advisory in 1995 after elevated levels of mercury were found in largemouth bass, freshwater drum, white bass or hybrid/striped bass. This segment on the 303(d) as a moderate priority for a TMDL due to mercury in fish tissue.

SIGNIFICANT FINDINGS:

Designated Use Support:

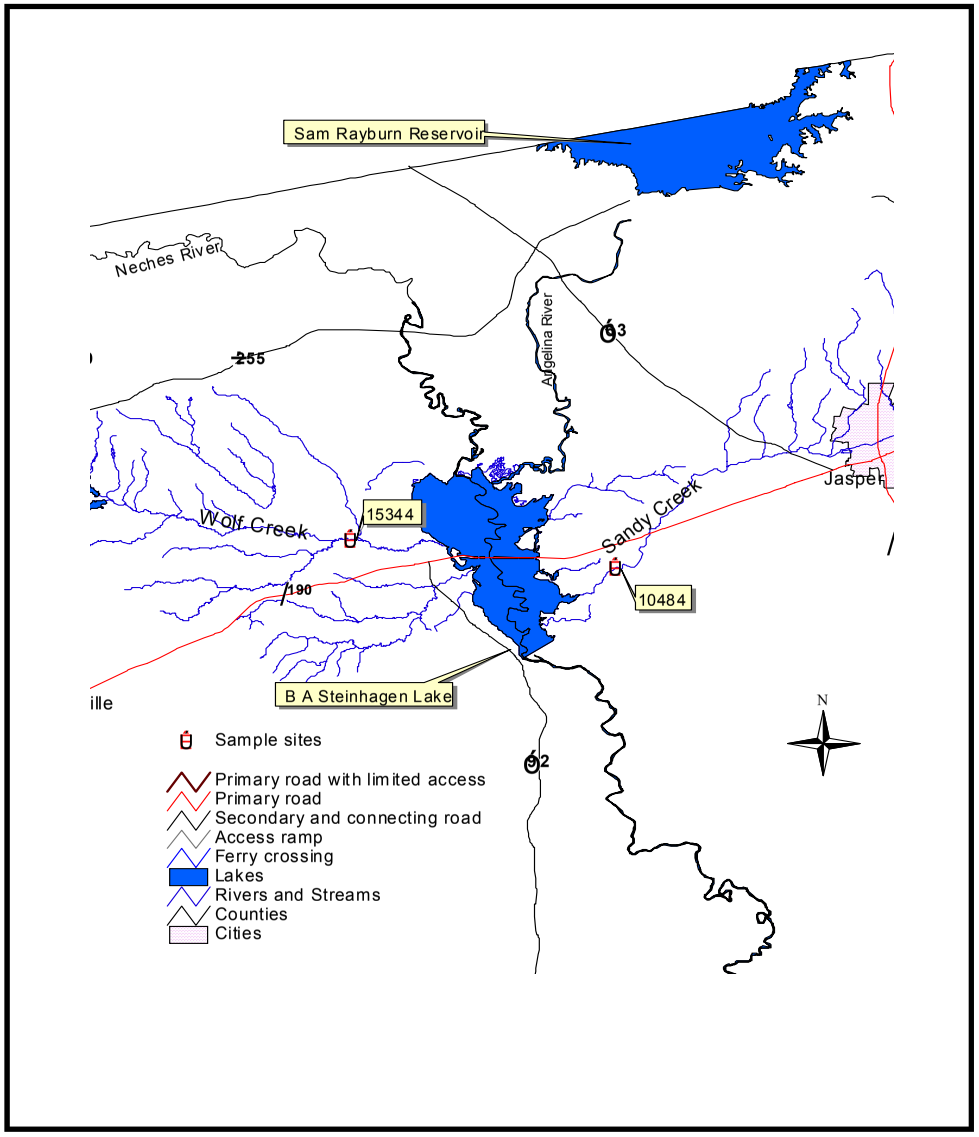
* Not supporting the contact recreation use for site 10484 on Sandy Creek.
* Fully supports the acute and chronic criteria for aluminum, cadmium, copper, lead and zinc in water.

General Criteria:

* Not applicable to off segment sites.

Pollution Impacts (nutrients):

* No concerns.



Segment No. 0607	USES			CRITERIA							Nutrient Screening Levels			
Pine Island Bayou	Recreation	Aquatic Life	Domestic Water Supply	Average Chloride (mg/L)	Average Sulfate (mg/L)	Average TDS (mg/L)	Dissolved oxygen (mg/L)	pH range (SU)	Indicator Bacteria (#/100mL)	Temperature (ºC)	Nitrate + Nitrite (mg/L)	Ammonia-Nitrogen (mg/L)	Total Phosphate (mg/L)	ortho-Phosphate (mg/L)
	Contact	High	Public Supply	≤150	≤50	≤300	≥5	6.0-8.5	≤400	≤34 (93ºF)	≤3.5	≤0.16	≤1.1	≤0.9

QUICK FACTS:

The segment consists of low gradient, sluggish streams with discharge subject to seasonal variance in rainfall. Six sites are monitored quarterly, two of which are off segment. Previous data assessments have found concerns for bacteria, pH and dissolved oxygen (DO). Low DO values persist throughout the segment, especially the tributaries and upstream sites. LNVA began dissolved oxygen sampling for aquatic life use standard compliance, see Systematic Monitoring page 16. Results of this study will help TCEQ determine if a Use Attainability Analysis (UAA) is needed to adjust the DO stream standard. Aquatic Life Use concerns and limited data for cadmium (chronic) and zinc (acute) criteria in water were reported in the 2002 305(b) water quality inventory. However, more data were available for screening in this report and were found to fully support this use. See below for other screening results.

SIGNIFICANT FINDINGS:

Designated Use Support:

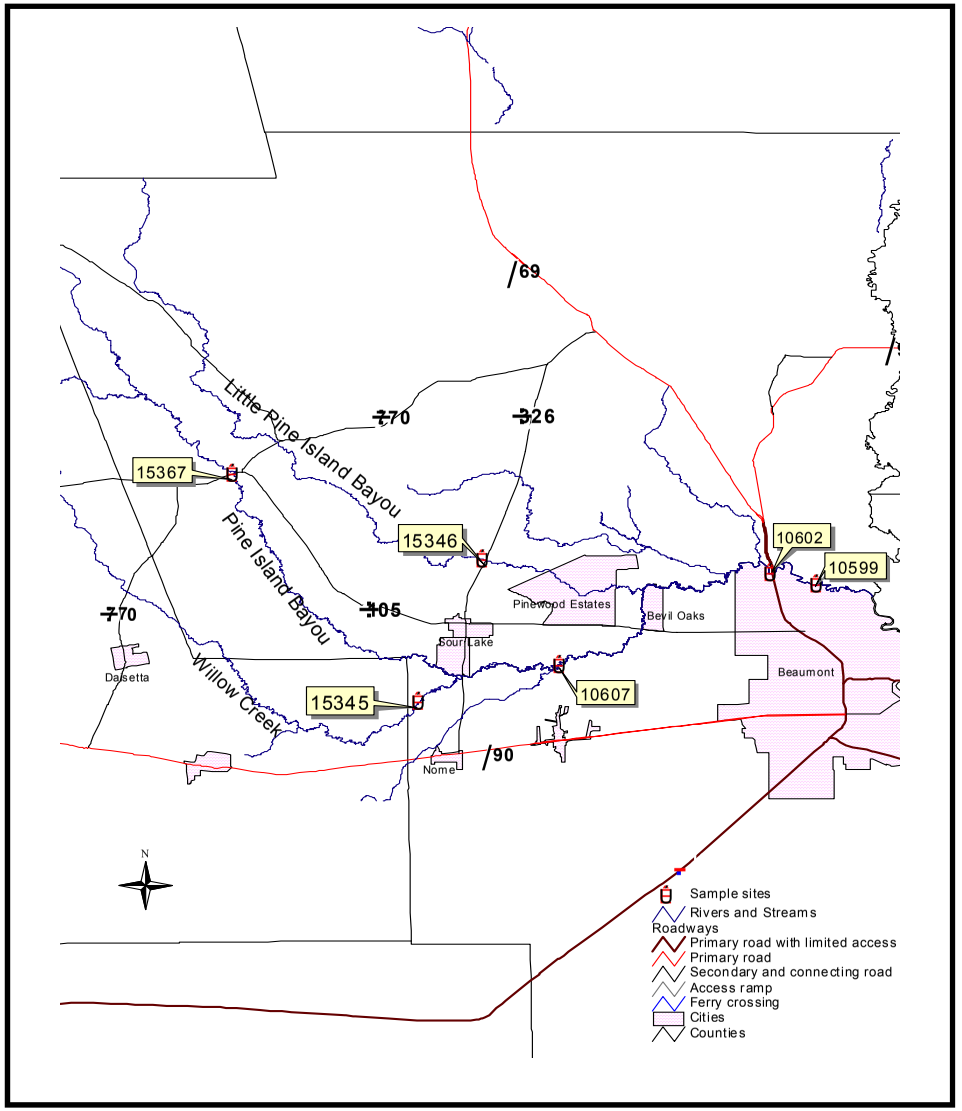
* Stations 10599 and 10602 partially support the aquatic life use for dissolved oxygen.
* Sites 15367, 15345, 15346 and 10607 do not support the aquatic life use for dissolved oxygen, as determined by analyzing grab sample data.
* Aluminum (acute) criterion partially supported at sites 10607 and 15367.
* Fully support acute and chronic criteria for zinc, lead, copper and cadmium.

General Criteria:

* Fully Supporting

Pollution Impacts (nutrients):

* No concerns.



Segment No. 0608	USES			CRITERIA							Nutrient Screening Levels			
Village Creek	Recreation	Aquatic Life	Domestic Water Supply	Average Chloride (mg/L)	Average Sulfate (mg/L)	Average TDS (mg/L)	Dissolved oxygen (mg/L)	pH range (SU)	Indicator Bacteria (#/100mL)	Temperature (ºC)	Nitrate + Nitrite (mg/L)	Ammonia-Nitrogen (mg/L)	Total Phosphate (mg/L)	ortho-Phosphate (mg/L)
	Contact	High	Public Supply	≤150	≤75	≤300	≥5	6.0-8.5	≤400	≤32 (90 ºF)	≤3.5	≤0.16	≤1.1	≤0.9

QUICK FACTS:

The Village Creek watershed is approximately 1,113 square miles with LNVA monitoring six sites, one on segment and five off segment or unclassified streams. Previous assessments found concerns for pH, dissolved oxygen (DO) and bacteria. The pH and DO concern are probably due to natural conditions. Factors contributing to elevated bacteria are inconclusive. The 2002 305(b) listed concerns for the aquatic life use due to metals exceeding criteria on the following water bodies: Village Cr. for aluminum (acute) and lead (chronic), Big Sandy Cr. for cadmium (chronic) and copper (acute), Cypress Cr. for aluminum (acute), cadmium (chronic and acute) and zinc (acute), Hickory Cr. and Turkey Cr. for cadmium (chronic). Current data analysis are listed below.

SIGNIFICANT FINDINGS:

Designated Use Support:

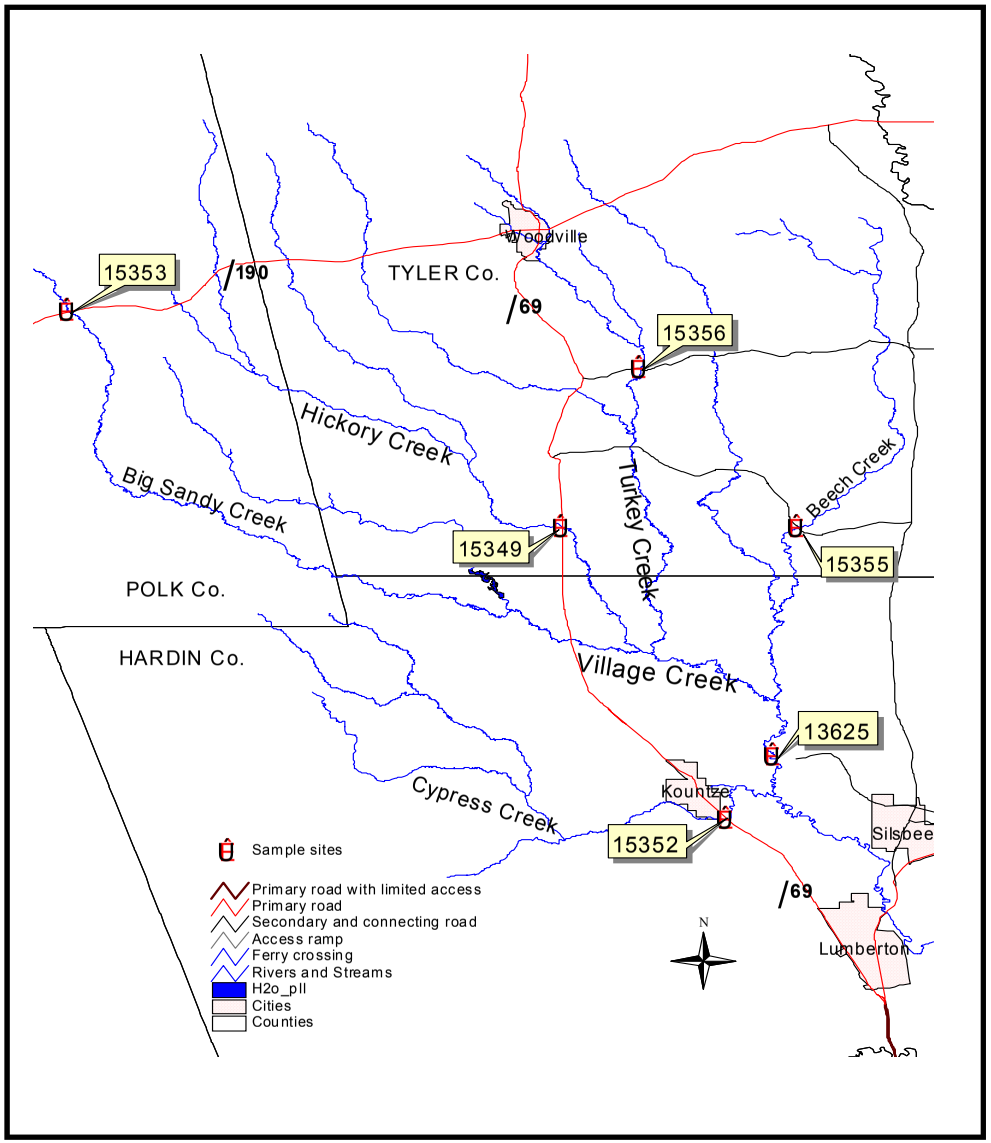
* Site 15352 on Cypress Creek does not support the high aquatic life use for dissolved oxygen.
* Site 15355 on Beech Creek partially supports the high aquatic life use for dissolved oxygen.
* Sites 15353 on Big Sandy Creek and 15356 on TurkeyCreek do not support the contact recreation use for bacteria.
* Not supporting the aquatic life use for cadmium (chronic) criterion on Cypress and Big Sandy creeks.
* Not supporting the aquatic life use for lead (chronic) criterion on Cypress Creek.
* Partial support for copper (acute) criterion on Big Sandy Creek.
* Not supporting and partially supporting the aquatic life use for Al (acute) on Cypress and Village Creeks, respectively.

General Criteria:

* Site 13625 on Village Creek @ FM 418 partially supports the general criterion for pH.

Pollution Impacts (nutrients):

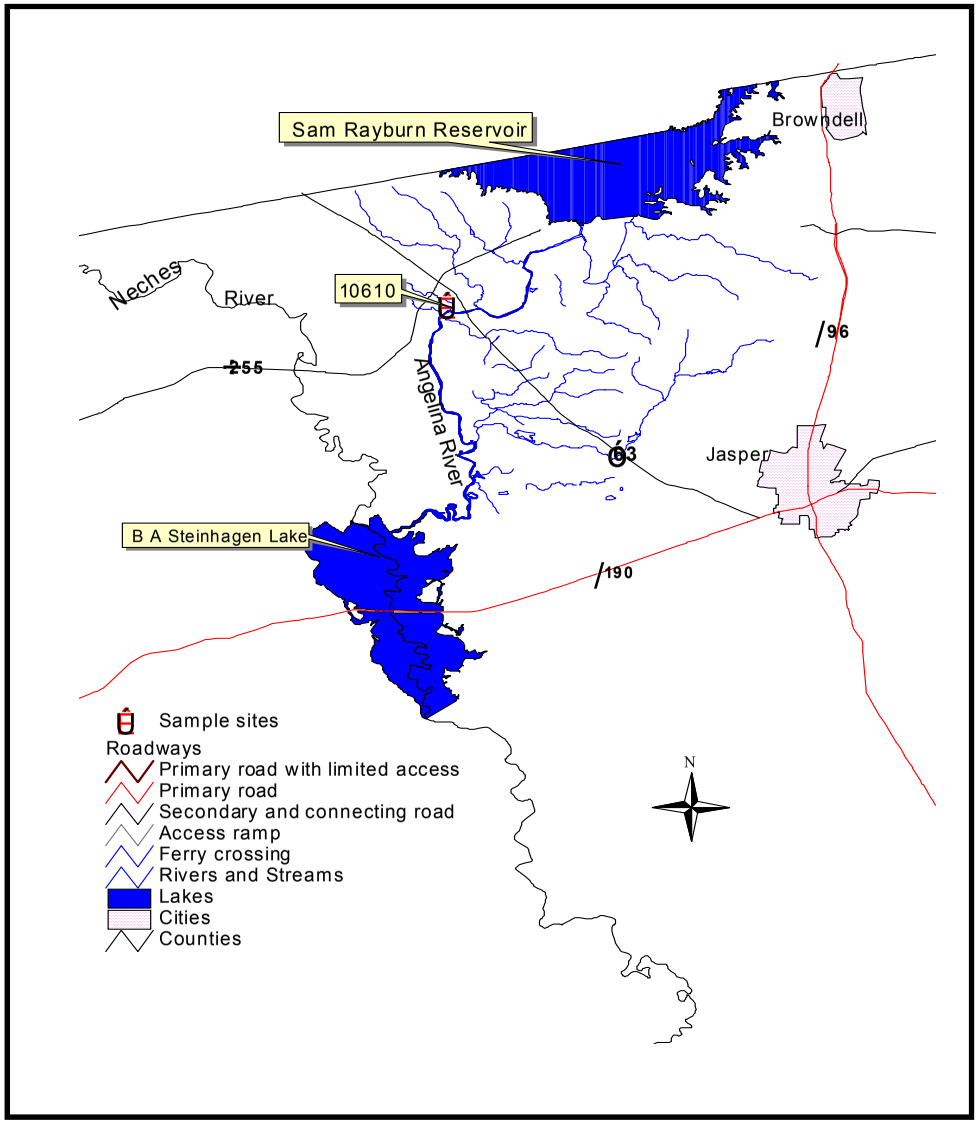
* No concerns.



Segment No. 0609	USES			CRITERIA							Nutrient Screening Levels			
Angelina River below Sam Rayburn Reservoir	Recreation	Aquatic Life	Domestic Water Supply	Average Chloride (mg/L)	Average Sulfate (mg/L)	Average TDS (mg/L)	Dissolved oxygen (mg/L)	pH range (SU)	Indicator Bacteria (#/100mL)	Temperature (ºC)	Nitrate + Nitrite (mg/L)	Ammonia-Nitrogen (mg/L)	Total Phosphate (mg/L)	ortho-Phosphate (mg/L)
	Contact	High	Public Supply	≤70	≤50	≤250	≥5	6.0-8.5	≤400	≤32 (90ºF)	≤3.5	≤0.16	≤1.1	≤0.9

QUICK FACTS:

The water quality in this segment is good. Historical assessments have expressed a possible concern for low dissolved oxygen (DO) concentrations; however, current data analysis indicates only 6% of DO data are less than the criterion listed above.



SIGNIFICANT FINDINGS:

Designated Use Support:

* Segment fully supports the designated uses.
* Fully supports the acute and chronic criteria for aluminum, cadmium, copper, lead and zinc in water.

General Criteria:

* Segment fully supports the general criteria.

Pollution Impacts (nutrients):

* There are no concerns due to nutrient enrichment

Segment No. 0701	USES			CRITERIA							Nutrient Screening Levels			
Taylor Bayou	Recreation	Aquatic Life	Domestic Water Supply	Average Chloride (mg/L)	Average Sulfate (mg/L)	Average TDS (mg/L)	Dissolved oxygen (mg/L)	pH range (SU)	Indicator Bacteria (#/100mL)	Temperature (ºC)	Nitrate + Nitrite (mg/L)	Ammonia-Nitrogen (mg/L)	Total Phosphate (mg/L)	ortho-Phosphate (mg/L)
	Contact	Intermediate	-	≤400	≤100	≤1100	≥4	6.5-9.0	≤400	≤35 (95ºF)	≤3.5	≤0.16	≤1.1	≤0.9

Systematic Monitoring

The purpose of systematic monitoring is to further investigate specific concerns within a watershed and is usually performed on a rotating watershed basis, with data collection lasting 1-2 years. Typically Systematic monitoring focuses on a watershed's smaller "unclassified" streams to collect additional data and to help identify specific areas where problems are occurring. By comparing and evaluating data from systematic "sub-watershed" sites against Routine monitoring data on larger water bodies, water quality issues are more easily isolated for further investigation.

A monitoring priority was set at the FY 2003 coordinated monitoring meeting to focus on the partial and/or non-support of the aquatic life use for dissolved oxygen in Segments 607 and 608. To address this issue, LNVA is conducting additional intensive monitoring for aquatic life use standards compliance. The monitoring began April, 2002 and will run through September, 2003. Five sites in the Pine Island Bayou watershed (Segment 607) and two sites in the Village Creek watershed (Segment 608) were chosen due to their identified use concern.

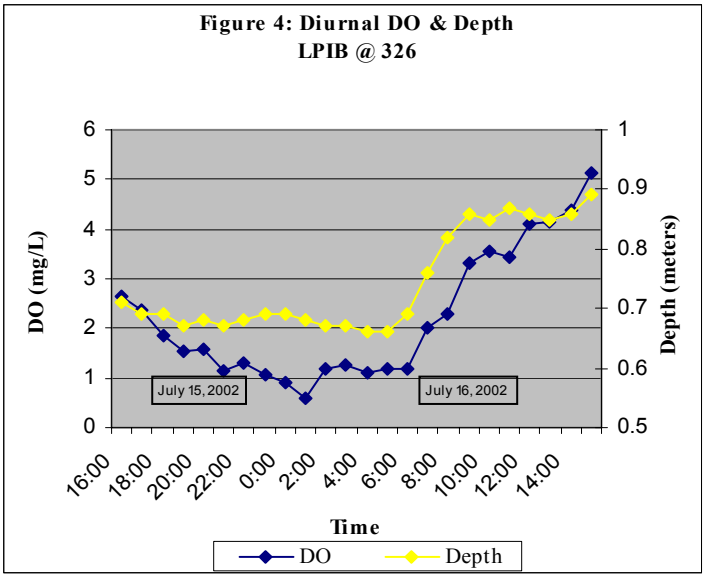
LNVA will collect 24-hour dissolved oxygen data at each site four times during the index period (March 15-October 15), with at least half of the sampling events during the critical period (July 1-September 30). The index period represents the time of the year when aquatic biological activity increases. The critical period is the time of year when stream flows are at a minimum and water temperatures are high. These factors can contribute to low dissolved oxygen concentrations critical to aquatic life. Support of the aquatic life use is based on the 24 hour dissolved oxygen average standard. In Segments 607 and 608, the DO standard is set at 5 mg/L. Data are collected every hour for 24 hours and the average is compared to the standard. Additionally, a stream flow measurement is made during the 24 hour period and is compared to the stream's seven-day, two-year low flow (7Q2).

Figure 3: Lower Neches Valley Authority Systematic Monitoring Sites

Segment 607 – Pine Island Bayou Watershed

Low dissolved oxygen (DO) concentrations are persistent segment wide and have repeatedly kept Segment 607 on the state's 303(d) list. Based on historical dissolved oxygen data and its continued presence on the 303(d) list, Segment 607 was given a high priority for more intensive monitoring at the FY 2003 coordinated monitoring meeting.

Average dissolved oxygen levels at sites located upstream, such as Pine Island Bayou @ SH 770 and Little Pine Island Bayou @ SH 326, failed to reach the stream standard throughout the study. These are small, sluggish reaches of Pine Island Bayou where DO is dependent on stream discharge. In Figure 4, increasing flow, represented by water depth, correlates with increasing DO. Data collected at Pine Island Bayou @ SH 770 are provided in this report for informational purposes. Only one data collection event had stream flow greater than the 7Q2, the remaining three sampling events cannot be used for stream assessment.



Downstream, Pine Island Bayou experiences flow most of the year. Flow helps maintain DO where the bayou crosses SH 105 and Old Sour Lake Road. Diurnal sampling showed it met the stream standard 50% of the time, see Table 5.

As Pine Island Bayou approaches US 69/96, the channel becomes wider and deeper and natural flow is tidally influenced contributing to the difficulty of maintaining DO greater than 5.0 mg/L. The July diurnal event was impacted by LNVA's pumping plant which effectively reverses flow pulling Neches River water up the bayou. Table 5 on the next page lists the average, minimum, and maximum DO concentrations collected in Segment 607 during FY 2002 index period.

Future Systematic Monitoring Action for Segment 607

Based on dissolved oxygen data collected, LNVA believes the non-support of aquatic life use in this segment is due to natural causes such as high water temperatures, low stream flow velocities, and decaying plant material. Historical data supports this position as well. In 1997, LNVA conducted biological sampling of the fish community on Boggy Creek. Boggy Creek is a tributary to Pine Island Bayou with similar low stream flow and low DO, which demonstrated a high aquatic life use. The need for a use attainability analysis (UAA) will be discussed with TCEQ at the FY 2004 coordinated monitoring meeting.

The purpose of a UAA is to determine if established aquatic life uses and dissolved oxygen criteria are appropriate and, if not, to adjust standards accordingly. To collect the appropriate data, a UAA is conducted over a two-year period. Data collected includes intensive monitoring of a wide range of physical and biological parameters such as instantaneous field measurements, routine water sample collection, flow measurements, fish and benthic community characterization, stream physical habitat assessment, and 24-hour DO monitoring.

Table 5: 24 hour DO Data in Segment 607

Site	Date	Minimum (mg/L)	Maximum (mg/L)	Average (mg/L) *
PIB@SH 770	4/22-23/02	1.2	5.5	2.3
	7/16-17/02	3.4	4.3	3.8
	9/4-5/02	0.5	3.9	2.2
	10/7-8/02	0.5	1.5	1.0
LPIB@SH 326	4/22-23/02	3.0	3.4	3.1
	7/15-16/02	0.6	5.1	2.2
	8/26-27/02	1.9	2.4	2.2
	10/1-2/02	2.8	4.0	3.4
PIB @ Old Sour Lake Rd	5/20-21/02	4.2	6.4	5.3
	7/15-16/02	5.4	6.3	5.8
	8/29-30/02	3.4	4.3	3.7
	10/7-8/02	4.2	5.1	4.6
PIB@SH105	5/21-22/02	4.3	5.7	4.8
	8/12-13/02	3.1	4.5	3.6
	9/12-13/02	5.6	5.8	5.7
	10/8-9/02	4.6	6.0	5.4
PIB@69/96	5/21-22/02	1.9	4.0	2.7
	7/31-8/1/02	5.6	6.4	6.1
	9/5-6/02	3.0	3.5	3.2
	10/7-8/02	2.4	3.9	3.2

This chart shows minimum, maximum, and mean DO concentrations in mg/L for sites located in segment 607. This data was collected during the 2002 index (March 15-October 15) and critical (July 1-September 30) periods using 24-hour logging equipment. Data is listed from upstream (top) to downstream (bottom). Results show upstream sites mean DO concentrations well below stream standards, while downstream sites reached stream standard part of the time. It should be noted that PIB @ 69/96 is influenced by tides and the occasional operation of LNVA's pumping plant located upstream.

* Surface Water Quality Monitoring Stream Standard for DO is 5 mg/L.

Segment 608 – Village Creek Watershed

Data collected in segment 608 since 1997 resulted in concerns for low dissolved oxygen in Beech Creek and Mill Creek. These sites were also prioritized by LNVA and TCEQ at the FY 2003 coordinated monitoring meeting for more intensive monitoring. Beech Creek is monitored at FM 1943 near Fred and lies in a heavily forested area. This low flowing, highly stained stream is a concern due to partial support of its aquatic life use. Dissolved oxygen data collected for aquatic life use standard compliance indicate Beech Creek supports its aquatic life use, see Table 6.

The Mill Creek site is located at FM 418 near Kountze and was monitored to collect stream flow and field parameters during FY 1998 -1999. On Mill Creek, low dissolved oxygen is a concern and was identified as such in Texas Water Quality Inventory [305(b)] report. Data collected during the 2002 index and critical periods indicated that oxygen levels were affected by flow conditions. Average dissolved oxygen levels collected over 24-hour periods usually remained well below the stream standard except when collected immediately after a rainfall event when water levels rose above normal levels, see Table 6.

Future Systematic Monitoring Action for Segment 608

Beech Creek will be monitored again during the FY 2003 index period to obtain the minimum data set to assess its support of the aquatic life use. If data collected during this time are similar to that collected in 2002, Beech Creek will be assessed as fully supporting its aquatic life use and LNVA will recommend its removal from the 303(d) list. Additional data is needed to fully assess if Mill Creek supports its aquatic life use. LNVA will accomplish this during the 2003 index period as well. However, if similar data are collected, Mill Creek will not be expected to support its aquatic life use.

Table 6: 24-hour DO Data in Segment 608

Site	Date	Minimum (mg/L)	Maximum (mg/L)	Average (mg/L) *
Beech Creek	6/10-11/02	5.5	5.8	5.6
	8/13-14/02	4.9	5.5	5.3
	9/12-13/02	5.4	6.0	5.7
	10/10-11/02	6.2	6.8	6.4
Mill Creek	6/5-6/02	1.6	2.0	1.8
	7/17-18/02	4.2	5.3	4.7
	8/27-28/02	4.6	5.4	5.1
	10/1-2/02	2.2	3.0	2.4

This chart shows minimum, maximum, and mean DO concentrations in mg/L for segment 608. Data was collected during the 2002 index (March 15-October 15) and critical (July 1-September 30) periods using 24-hour logging equipment. Oxygen levels at Beech Creek consistently met stream standards while Mill Creek's oxygen levels struggled under normal conditions. Mill Creek is a shallow, narrow stream with little to no flow during summer months.

* Surface Water Quality Stream Standard for DO is 5 mg/L

Public Participation

One way to ensure that the goals of the Clean Rivers Program are accomplished is to make the public aware of what role they play in protecting our water resources. LNVA accomplishes this through activities and programs that are geared toward students and adults of all ages.

One program in which LNVA continues to participate in is the Environmental Round Robin held at Martin Dies, Jr. State Park. This event, held in the spring of last year, provided elementary students from Woodville ISD with an opportunity to learn about the importance of water quality. Participants learned about the physical, chemical, and biological characteristics of water and some simple ways to observe these characteristics for themselves. At the end of the demonstration, each student was presented with a certificate stating they were "Honorary Water Quality Analysts." Over 100 students participated in this event. The Game Warden, the Martin Dies State Park Ranger, and representatives from the Forest Service and the Department of Public Safety were also in attendance for this event.

Another educational outreach venue included a student internship program. This program provides the students with valuable field and laboratory experience in many aspects of environmental work which are not otherwise covered by their degree. The internship program continues throughout the year.

Large Mouth Bass at Fisheries Center

One event new to LNVA is the Texas Parks and Wildlife's Texas Rivers Exhibit held at the Texas Freshwater Fisheries Center in Athens, Texas. A display about LNVA and the Clean Rivers Program was set up, and a wide range of pamphlets and educational information was available for all ages. Other river authorities such as lower Colorado River Authority and the Guadalupe-Blanco River Authority participated as well. 600 students were expected to participate in this event. A total of 1406 people visited the facility throughout the month of February. This was the Fisheries first year to host the event and it is anticipated that it will assist in bringing more visitors to the center throughout the year.

LNVA Steering Committee

Under the Clean Rivers Program LNVA has the responsibility to organize and lead a basin-wide Steering Committee that serves as the focus of public in put and assists with: creation of specific achievable water quality objectives and basin priorities, review and development of work plans and allocation of resources, and establishing monitoring priorities.

To achieve this, LNVA has established a diverse and representative basin-wide Steering Committee that helps ensure that the different interests, concerns, and priorities of each watershed are addressed. LNVA's Steering Committee includes "stakeholder" volunteers from across the basin representing the general public, institutions, government, industry, and fee payers. Participation in the Steering Committee is encouraged, and while members may have their own local and/or regional concerns, Steering Committee members should also be willing to consider and represent the interests of the entire basin. Because the general public is often the least well represented stakeholder group, private citizens are especially encouraged to participate.

The LNVA Basin Steering Committee meets publicly at least once per year and any individual or entity that has a vested interest in the basin's waters is invited to attend. LNVA welcomes additional stakeholder and public participation at the meeting to help ensure the various interests of each basin are represented. For more information on Steering Committee Meeting dates or how to become involved, contact LNVA's Andrew Bruno at 898-0561.

LNVA Web Site

As the data clearinghouse for the assessment area, Clean Rivers data can be directly accessed at LNVA's web site. This will be a useful tool for anyone with interests in the water quality of a particular stream. This data sharing can help open the lines of communication between LNVA and other local agencies in order to better assess the water quality in the basin. LNVA also made its canal water quality monitoring data available on the website as well. Local industry and municipalities are especially interested in the data, as they can get an idea of the quality of the water headed their way and adjust their operations accordingly. In addition to water quality monitoring data, the website also includes: the Quality Assurance Project Plan (or summary), Coordinated Monitoring Schedule (with maps), Basin Highlights Reports and Basin Summary Reports, announcements and agendas of Steering Committee and other public meetings, Special Studies project reports, descriptions and explanations of CRP, the Planning Agency, program goals, contact information, and links to outside resources.

By helping the public recognize that they play a role in protecting water resources, the Clean Rivers Program at LNVA is helping to ensure that stream impairments due to human activities stay to a minimum. In order to learn more about LNVA, its programs, and upcoming events please visit **www.lnva.dst.tx.us** or call us at **(409) 898-0561**.

Appendix A

LNVA Monitoring Sites And Sampling Parameters

Segment	Station Description	StationID	Monitoring Type	24 hr DO	Metals	Conventionals	Bacteria	Inst.Flow	Field
602	Neches River@1013	10581	RT	N/A	2	4	4	4	4
602	Neches River nr LKVW	15343	RT	N/A	2	4	4	4	4
603	Sandy Creek @ FM 777	10484	RT	N/A	2	4	4	4	4
603	Wolf Creek @ 256	15344	RT	N/A	2	4	4	4	4
607	Little Pine Island Bayou@326	15346	RT/DI	4	2	4	4	8	4
607	Pine Island Bayou@LNVA 1st Lift	10599	RT	N/A	2	4	4	N/A	4
607	Pine Island Bayou @ Old Sour Lake Rd	10607	RT/DI	4	2	4	4	4	4
607	PIB@ SH 770	15367	RT/DI	4	2	4	4	4	4
607	PIB @ 69	10602	RT/DI	4	2	4	4	N/A	4
607	PIB@SH105	10606	DI	4	N/A	N/A	N/A	4	N/A
607	Willow Creek nr. Nome	15345	RT	N/A	2	4	4	4	4
608	Beech Cr @ 1943	15355	RT/DI	4	2	4	4	8	4
608	Big Sandy @ 190	15353	RT	N/A	2	4	4	4	4
608	Cypress @ 69	15352	RT	N/A	2	4	4	4	4
608	Hickory @ 69	15349	RT	N/A	2	4	4	4	4
608	Turkey @1013	15356	RT	N/A	2	4	4	4	4
608	Village @ 418	13625	RT	N/A	2	4	4	4	4
608	Mill @ 418	16126	DI	4	N/A	N/A	N/A	4	N/A
609	Angelina R @ SH63	10610	RT	N/A	2	4	4	4	4
701	Taylor Bayou@Labelle	10669	RT	N/A	2	4	4	4	4
704	Hillebrandt Bayou@ Humble Rd	10686	RT	N/A	2	4	4	4	4

Appendix B

Sampling Parameters

Field Parameters— provide *in situ* physical information regarding the water body and its local environment. The parameters included in this group are as follows:

- pH
- Dissolved Oxygen (D.O.) - mg/l and % saturation
- Conductivity
- Temperature
- Secchi Depth
- Days since last significant rainfall
- Flow/Flow Estimate
- Flow Measurement Method
- Flow Severity
- Air Temperature
- Present Weather
- Wind Intensity
- Wind Direction
- Water Color
- Water Odor

Conventional and Bacteriological Parameters— provides quantitative laboratory data used to screen for elevated toxicant levels. The parameters included in this group are as follows:

- Alkalinity
- TDR
- Turbidity
- Sulfate
- Chloride
- *E. coli*, IDEXX Colilert
- Fecal coliform
- Ammonia-N
- Hardness
- Nitrate/nitrite-N
- O-phosphate-P
- Total phosphate-P

Metals in Water— analyzed to determine concentrations of metals in various water bodies. The parameters included in this group are as follows:

- Aluminum
- Arsenic
- Barium
- Chromium
- Cadmium
- Copper
- Nickel
- Lead
- Selenium
- Silver
- Zinc

24-Hour DO— provides data for current aquatic life use to determine standards compliance. The parameters included in this group are as follows:

- 24-hr. DO avg.
- Max. daily DO
- Min. daily DO
- 24-hr. DO # of measurements
- 24-hr. avg. water temperature
- Max. daily water temperature
- Min. daily water temperature
- 24-hr. avg. conductivity
- Max. daily conductivity
- Min. daily conductivity
- 24-hr. conductivity # of measurements
- Max. daily pH
- Min. daily pH
- 24-hr. pH # of measurements