2005 Basin Highlights Report
Lower Neches River Basin and Neches-Trinity Coastal Basin

With the passage of Senate Bill 818 in 1991, the Texas Legislature created the Texas Clean Rivers Program (CRP). The goal of the program is to preserve and improve the quality of water resources in Texas River Basins. This takes place through an ongoing partnership involving the Texas Commission on Environmental Quality (TCEQ), river authorities, regional entities, industry, municipalities and other local, state and federal agencies.

Lower Neches Valley Authority (LNVA) coordinates the CRP for the assessment area encompassing the lower Neches River Basin and Neches-Trinity Coastal Basin. Figure 1 is a map of the LNVA designated CRP assessment area with monitoring locations identified.

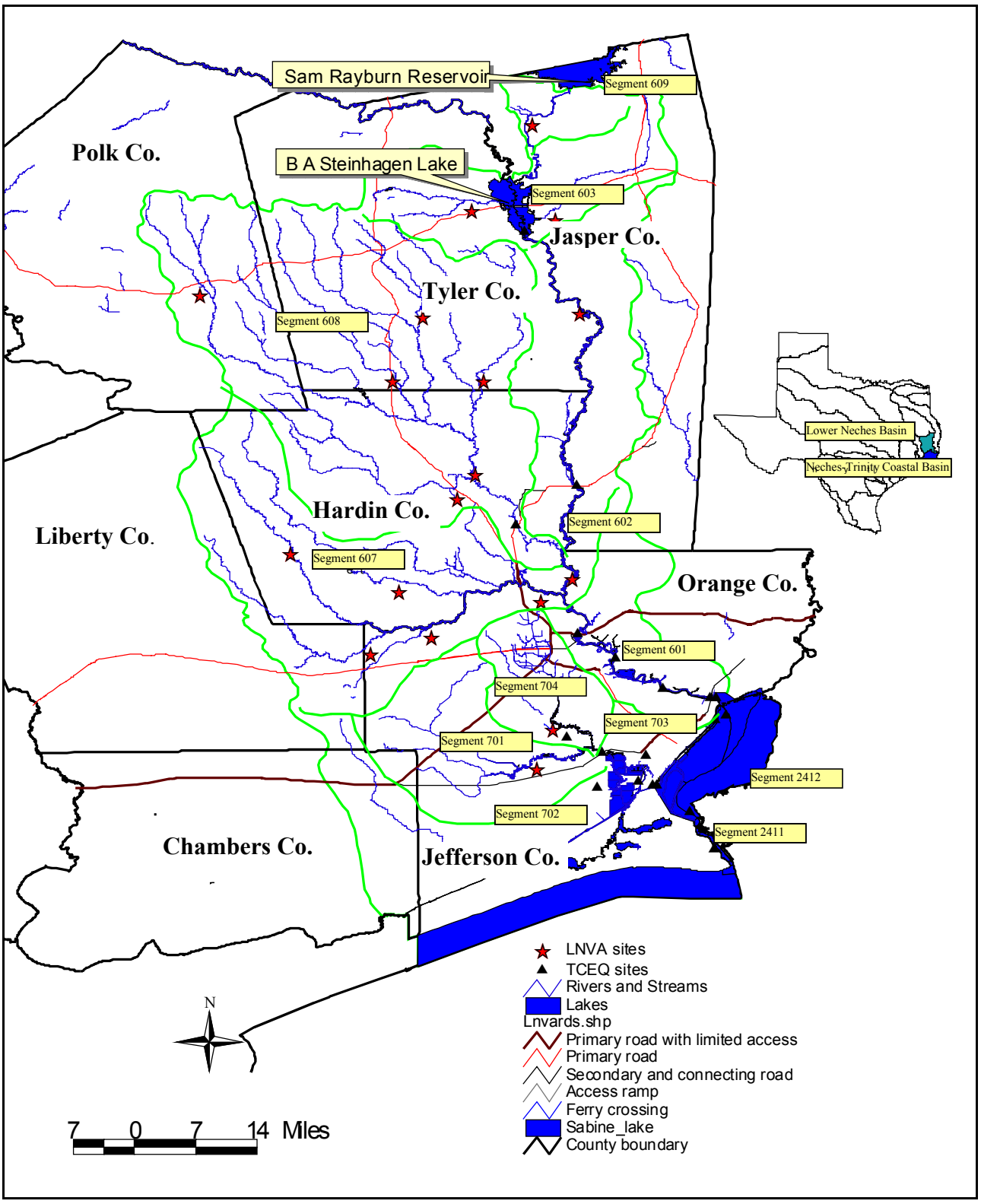
LNVA prepared this 2005 Basin Highlights Report to communicate CRP activities in the assessment area during the past year. The current CRP contract is effective from September 1, 2003 to August 31, 2005 with a program budget of $ 342,392. Over 75% of the budget is dedicated to data collection, quality assurance and data management. This allocation of funds ensures the following LNVA Clean Rivers Program goals are met:

- ⇒ Continue baseline monitoring of the lower Neches River & Neches-Trinity Coastal Basins
- ⇒ Minimize duplicative monitoring efforts through coordination
- ⇒ Manage the program efficiently
- ⇒ Set water quality priorities as the data clearinghouse for the region
- ⇒ Provide a forum for citizens and stakeholders to express their concerns on water quality issues and
- ⇒ Maintain a public outreach program

The results of LNVA monitoring efforts in 2004 were very similar to findings in the years past; overall, water quality in our assessment area is good. The most notable change has been the more consistent occurrence of dissolved metals such as aluminum, cadmium, lead, and zinc. These results and possible sources are discussed in more detail on page 6 of this report. Low dissolved oxygen concentrations in the Pine Island Bayou watershed and elevated ammonia-nitrogen in Hillebrandt Bayou have been ongoing concerns that are currently being investigated by LNVA. LNVA will continue routine monitoring, investigating concerns in our basin, and striving to keep stakeholders updated on water quality issues through annual reports and meetings.

Figure 1

Lower Neches River Basin and Neches-Trinity Coastal Basin CRP Assessment Area



In addition to sampling and analyzing surface water quality during the past year, LNVA continued work on the following priority projects that are highlighted in this report:

- ⇒ Completed 2004 Basin Summary Report
- ⇒ Prepared for Use Attainability Analysis on Pine Island Bayou
- ⇒ Investigated high dissolved metal concentrations results
- ⇒ Launched a stakeholder workgroup to address elevated ammonia in Hillebrandt Bayou
- ⇒ Participated in the Academy of Natural Sciences Study of the tidal portion of the Lower Neches River
- ⇒ Continued Public Outreach Program

Highlight: 2004 Basin Summary Report

In July 2004, LNVA completed the Basin Summary Report of the Lower Neches River Basin and Neches-Trinity Coastal Basin. The Basin Summary Report is an assessment of the most recent five years of water quality data. Coordination between LNVA and TCEQ Region 10 was essential to water quality monitoring at 38 sites on 12 stream segments in the assessment area. For more information on LNVA's monitoring schedule, go to http://lnva.dst.tx.us.

For an update of data screenings for each segment see Appendix A on pages 12-19. The water quality data review lists parameter concerns identified in the TCEQ 2004 Texas Water Quality Inventory and LNVA's own data assessment for the 2004 lower Neches Basin and Neches-Trinity Coastal Basin Summary report. Both data assessments use data collected over a five-year period, although, date ranges may vary and result in impairments being identified in one, but not the other.

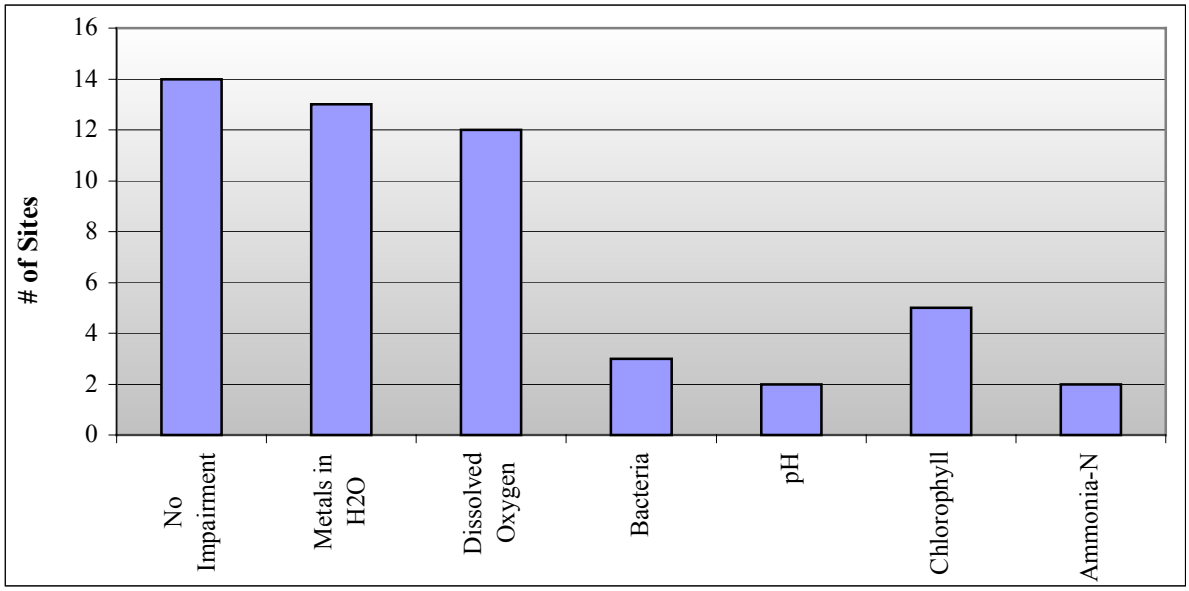
Over 12,600 individual data points were screened and analyzed for the report. The data included:

General Use Support parameters	Nutrient parameters	Use Support parameters
Temperature	Ammonia	Dissolved oxygen (DO)
pH	Nitrate + Nitrite	Bacteria
Chloride	Total Phosphorous	Metals in water
Sulfate	Chlorophyll	
Total Dissolved Solid		

For an explanation of each parameter, see the water quality Parameter Glossary on pages 20-21.

Several problems identified in 2004 have been previously documented. These include depressed DO, elevated bacteria, and low pH. Depressed DO and low pH are natural occurrences and are not uncommon in Southeast Texas. Regional characteristics of sluggish low gradient streams with limited aeration capacity are common in areas distinguished by low DO levels; while the typical tea colored water created by the natural decay of leaf material and the leaching of tannic acids into the stream is indicative of locations with low pH levels. In contrast, elevated bacteria levels did not correlate to stream flow or seasonal factors and their cause remains undetermined. A notable result was the high number of non-support because of dissolved metals in water for both acute and chronic screening levels. Figure 2 illustrates the number of monitoring sites impaired by parameter.

Figure 2 Distribution of Impairments Identified in 2004 Basin Summary Report



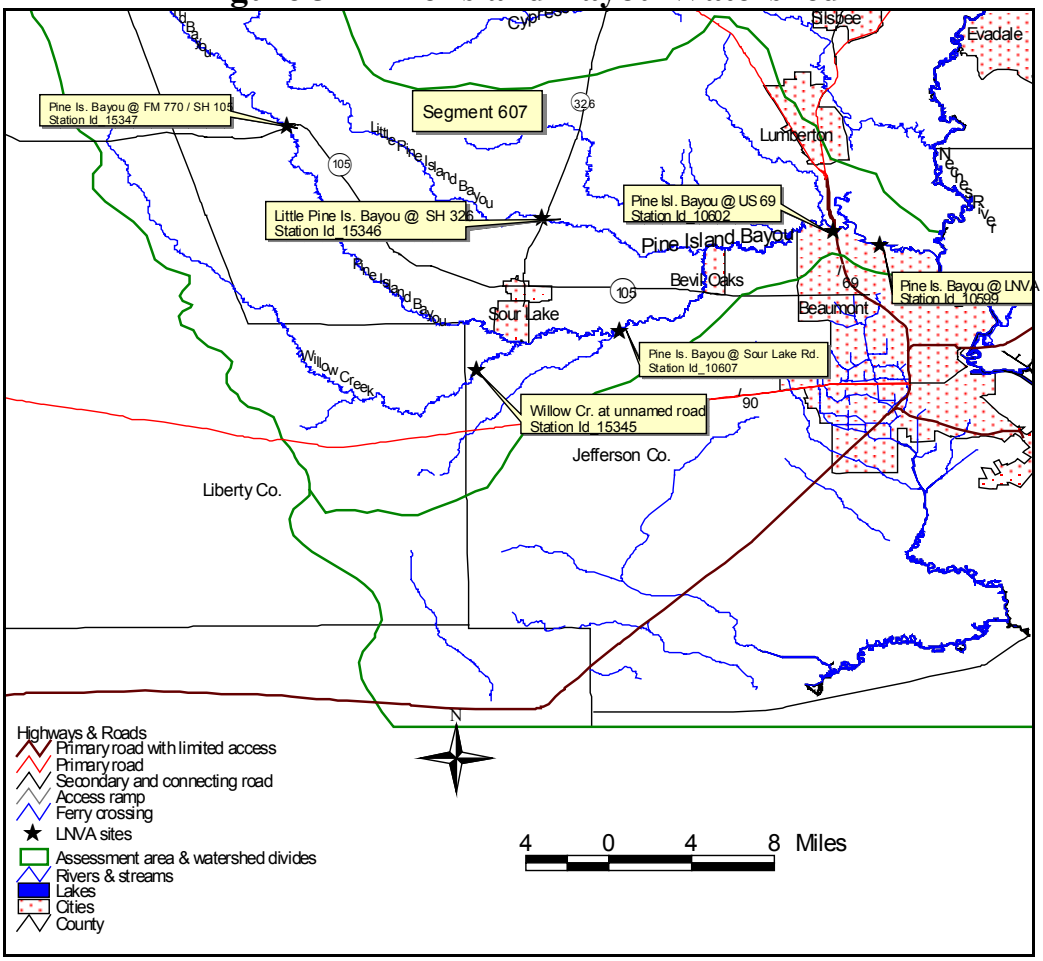
To address the results of the 2004 Basin Summary Report, LNVA recommended for the next biennium (2006-07 contract period) working closely with TCEQ on the following.

- ⇒ Address low dissolved oxygen impairment on Pine Island Bayou with a Use Attainability Analysis to decide appropriateness of the stream standard.
- ⇒ In Spring 2004, hold first meeting with stakeholder workgroup to address elevated ammonia-nitrogen concentrations in Hillebrandt Bayou.
- ⇒ Increase metals in water sampling and analysis to determine sources of lead, cadmium, and zinc in the Village Creek and Pine Island Bayou watersheds.
- ⇒ Recommend a Special Study to evaluate the low dissolved oxygen levels in Taylor Bayou.
- ⇒ Continue organics sampling in Segment 0601 to assess the pesticide Malathion.

Highlight: Use Attainability Analysis on Pine Island Bayou

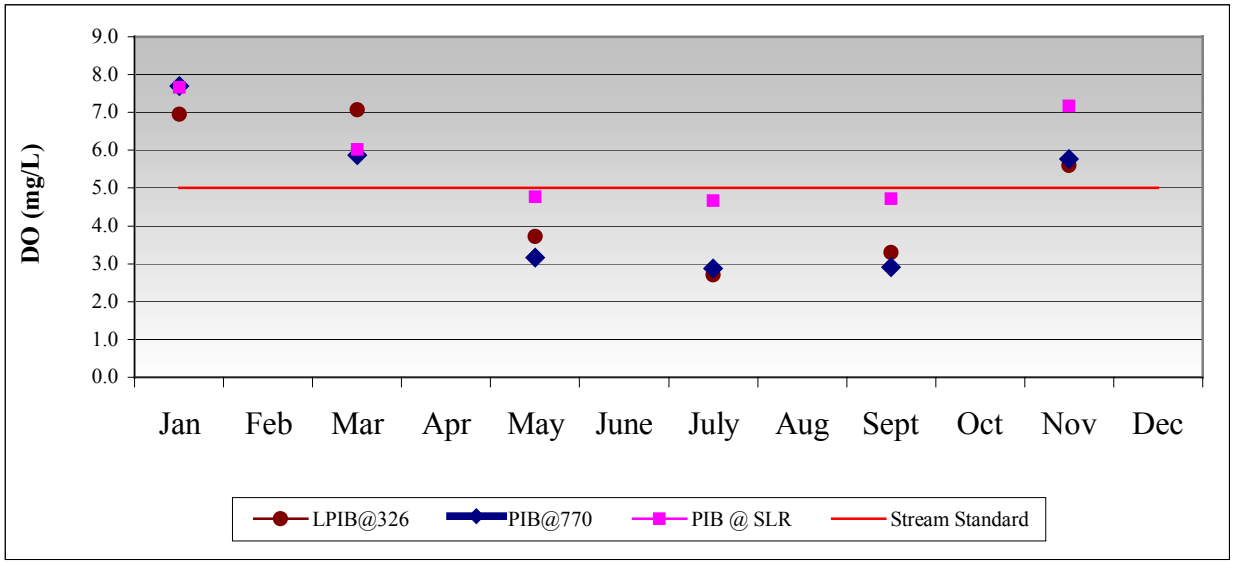
The need for a Use Attainability Analysis (UAA) of the 657 square mile Pine Island Bayou watershed was discussed and scheduled at LNVA's FY 2004 coordinated monitoirng meeting. The purpose of a UAA, a 2-year study, is to find out if established aquatic life use designation and DO criterion are suitable for a particular segment, and if not, adjust the stream standard for the segment accordingly. Figure 3 is a map of Pine Island Bayou watershed and VA routine monitoring sites.

Figure 3 – Pine Island Bayou Watershed



The segment consists of low gradient, sluggish streams where dissolved oxygen levels are subject to seasonal variance, see Figure 4. Values plotted are monthly averages of DO measurements for three sites from 1997 to 2003. The graph clearly shows the depressed DO through the warmest and driest months of each year.

Figure 4-Seasonality of Dissolved Oxygen



In April 2002 LNVA began a two-year DO study to collect 24-hour data and corroborate nonsupport of the DO standard. Because the data set collected so far is fewer than the minimum 10 set required, the aquatic life use for 24-hour DO cannot be assessed. However, prelimenary results of the study reveal the upper portion of the segment typically failed to reach the stream standard, while the midsegment sites maintained average DO levels above 5 mg/L about 50% of the time. The lower most site monitored was influenced by tidal variations pushing Neches River water up Pine Island Bayou. See Figure 5

Figure 5-24 Hour D.O. Data Collected Between 2002-2004

	PIB @ 770	LPIB @ 326	PIB @ OSL	PIB @ 105	PIB @ 69
24 Hour D.O. Mean per Event (mg/L)	*2.3*	*3.3*	*4.5*	*4.7*	*4.3*
% Time Attaining Standard (5mg/L)	*0*	*25*	*38*	*50*	*25*

Because natural conditions may be controlling the occurrence of low dissolved oxygen (DO) levels, a total maximum daily load (TMDL) project producing strict limits on permittees in the watershed would not relieve the problem. Unlike a TMDL project, the completion of a UAA would more accurately assess the natural state of the segment and provide a segment specific set of criteria to better identify true pollution or man-made impairments. Unfortunetly, unseasonabley high stream flows during the summer of 2004 delayed the scheduled commencement of the proposed UAA. TCEQ, with help from LNVA, will attempt to collect data to support the UAA during the summers of 2005 and 2006.

Highlight: Investigation of High Dissolved Metals Levels in Water

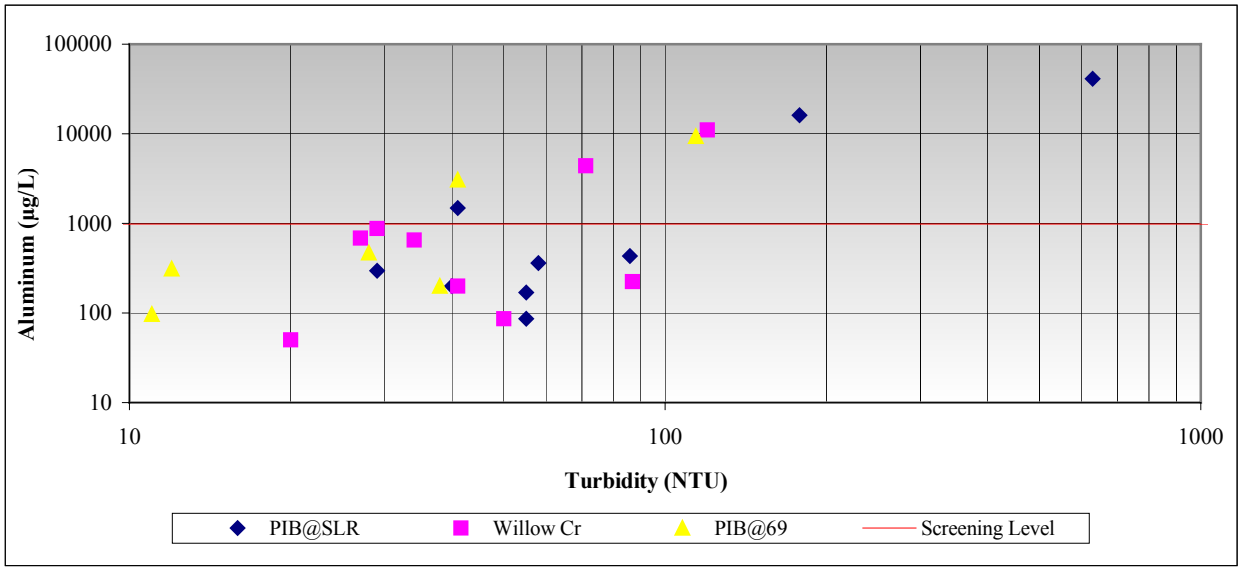
As documented in the 2004 Lower Neches Basin and Neches Trinity Coastal Basin Summary Report, the metals aluminum, cadmium, lead, and zinc exceeded the aquatic life use screening levels at 13 sites.

Aluminum is a common element in clay and clay soils that are prevalent throughout Southeast Texas. The screening level of Aluminum is 991 parts per billion. The following are the results of LNVA's analysis of screened aluminum data:

- ⇒ Six sites in the Pine Island Bayou watershed exceeded the screening level in 11% to 33% of samples
- ⇒ Three sites in Village Creek watershed exceeded screening level in 13% to 25% of samples

Figure 6 shows a positive corrrelation between aluminum content in the water column and the suspended clay sediment as measured by turbidity. The naturally low pH of the water may provide a pathway for aluminum to dissolve out of the suspended clay particles directly into the water column.

Figure 6-Aluminum vs. Turbidity Plot



Other dissolved metals identified in the 2004 Basin Summary Report include cadmium, lead and zinc. Natural sources of cadmium, lead and zinc are not as easily identified in the assessment area. Some manufactured products contain these metals and are listed below.

Cadmium	**Lead**	**Zinc**
Batteries	Paint chips/dust	Household appliances
Stabilizer for PVC	from buildings, bridges	Galvanized steel
Pigments in plastics and paint	and other metal structures	Tires and rubber goods
Electroplating	Industrial emissions	Automotive equipment

LNVA secured additional funding to increase the frequency of metals sampling as well as have the samples analyzed by more than one laboratory to confirm the results.

Highlight: Stakeholder Workgroup to Address Elevated Ammonia

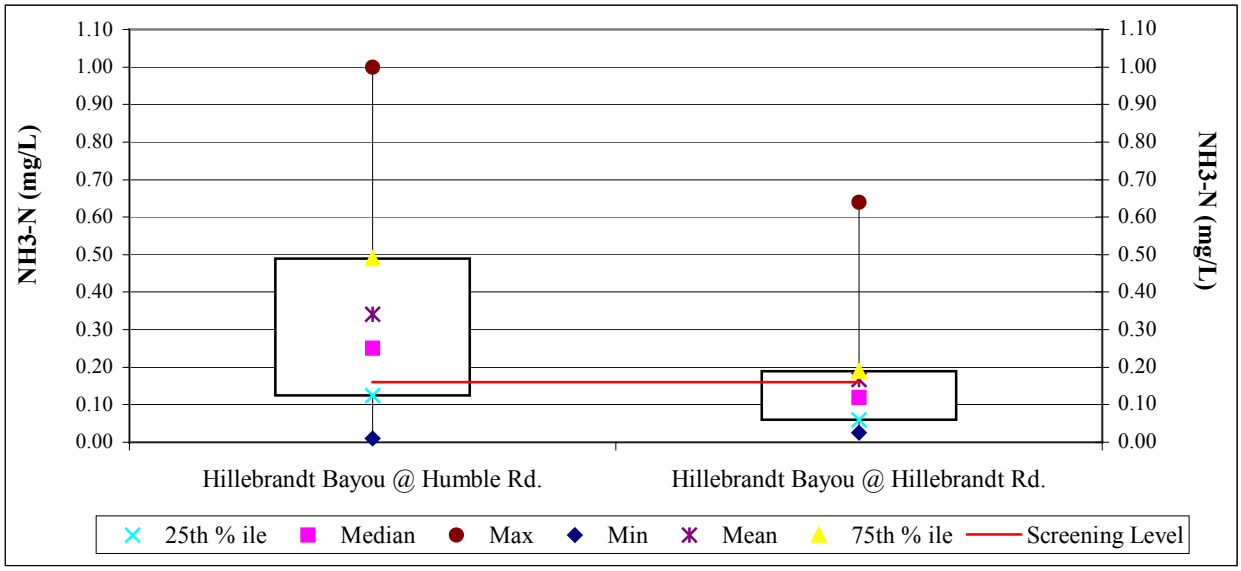
Hillebrandt Bayou serves as the primary receiving stream for storm drainage within the city of Beaumont, accepting rainfall runoff from roughly 70% of the city. Willow Marsh Bayou, Kidd Gully and Pevitot Gully are tributaries transporting additional flows from agricultural land.

The 2001and 2004 assessment identified Hillebrandt Bayou as impaired with elevated levels of ammonia-nitrogen:

- ⇒ The ammonia-nitrogen screening level on the bayou is 0.17 mg/L
- ⇒ Data collected from the two sites on the bayou exceeded the screening level 29% - 57% of the time

Figure 7 shows the range of ammonia-nitrogen concentrations measured in Hillebrandt Bayou.

Figure 7-Range of NH3 Concentrations



A wide range of ammonia concentrations was found to occur at the upstream site at Humble Road. The average concentration is 0.34 mg/L (parts per million) at the upstream site, and decreases to 0.17 mg/L at the downstream site on Hillebrandt Road. No correlation with pH, temperature, DO or bacteria was found.

LNVA formed a stakeholder's workgroup to study the possible sources of the high ammonia levels. The workgroup consist of members of LNVA's Clean Rivers Program Steering Committee and members of the community with an interest in water quality issues. The objective is to discover the origin, and develop a water quality management approach that will help lower instream ammonia-nitrogen levels.

Early work on this project will be to identify all entities currently monitoring on the bayou and analyze the data. Next, LNVA will develop a segment wide inventory of permitted discharges and obtain updated landuse coverage for the watershed. Based on the findings, LNVA will coordinate future activity with TCEQ Region 10, the stakeholder workgroup and other local agencies.

On April 29, 2004 an organizational workgroup meeting was held in conjunction with the annual CRP Steering Committee meeting.

Highlight: Academy of Natural Science Study on the Neches River

LNVA staff examines fish caught during study

The Academy of Natural Sciences' Patrick Center for Environmental Research completed a study of the lower Neches River from the Neches River Saltwater Barrier to Port Neches Park. This study, sponsored by LNVA, the Jefferson County Waterway & Navigation District, Exxon Mobil, and DuPont, is the sixth in a series of studies that have taken place on this portion of the Neches River since 1953. This study included extensive biological and water quality sample collection on four stations on the Neches River.

The Academy's report is still in draft form but results show wide improvement in water quality and biological diversity in the study area from previous studies. According to the Academy, the lower Neches River supports populations of algae, macroinvertebrates, and fish that are indicators of a healthy aquatic environment.

With continued efforts made by citizens, industry, and agricultural entities, the lower Neches River will remain a valuable resource for future generations.

LNVA staff collecting metals samples during study

Highlight: Public Outreach

The Lower Neches Valley Authority's Clean Rivers Program (CRP) public participation and outreach program includes several activities and events that ensure the public understands the role they play in protecting water resources. These target audiences of all ages. Public involvement is essential to ensuring the Clean Rivers Program meets its goals for water quality.

CRP Steering Committee

A major part of the Clean Rivers Outreach Program at LNVA is the CRP Steering Committee. LNVA's CRP Steering committee consists of 28 members representing local industry and municipalities, TCEQ, Texas Parks and Wildlife, Texas Forest Service, Southeast Texas Regional Planning Commission, environmental groups, and the public. A diverse basin wide committee ensures attention to the different interests, concerns, and priorities of each watershed are represented.

Steering Committee Meeting in Progress

The main objectives of the committee are to help with creation of realistic water quality goals, the review and development of work plans, sharing of resources, and establishing monitoring priorities. Members voice any local or regional concerns they may have as well to consider the interests of the basin as a whole. The CRP Steering Committee meets publicly at least once a year and has covered a wide range of topics.

Some of these topics highlighted at 2004's meeting were:

- ⇒ Update on LNVA's recently completed Neches River Saltwater Barrier
- ⇒ Additional funding needs for metals sampling and flow monitoring
- ⇒ Update of the proposed UAA on Pine Island Bayou
- ⇒ Hillebrandt Bayou Special Study workgroup

For more information on LNVA's CRP Steering Committee, how to become involved, or when the meetings are scheduled, visit LNVA's website at http://lnva.dst.tx.us or contact Jesse Caillier by e-mail at jessec@lnva.dst.tx.us or by phone at (409) 898-0561.

LNVA Web Site (http://lnva.dst.tx.us)

LNVA is the CRP data clearinghouse for the lower Neches River Basin and Neches Trinity Coastal Basin and maintains a web page for easy public access. This web site not only includes information about LNVA and its current projects, but it also is a source of information for the Clean Rivers Program.

As the data clearinghouse for the Clean Rivers assessment area, water quality data are available on the web site. When the LNVA page is accessed, users can query the Clean Rivers Program Data through a list of monitoring stations. The user can select the query results as raw data or summary statistics. Clean Rivers Program data are updated twice a year.

In addition to water quality monitoring data, the Clean Rivers section of the website also includes:

- ⇒ The Quality Assurance Project Plan
- ⇒ Coordinated Monitoring Schedule
- ⇒ Past Basin Highlights Reports and Summary Reports
- ⇒ Meeting Announcements
- ⇒ Special Studies
- ⇒ Links to outside resources

For more information please visit the web site or call (409) 898- 0561.

Outreach Events and Programs

Sand castle at Beach Cleanup

LNVA staff picking up trash

The Adopt-A-Beach Cleanup was held last spring along the Texas Coastline. This event takes place several times a year with check-in stations at all major beaches along the coast. LNVA Clean Rivers Staff volunteered at McFaddin Beach in Jefferson County.

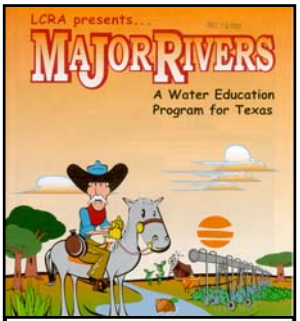
Some of the statistics for this cleanup were as follows:

- ⇒ Jefferson County had 447 of the 5174 total volunteers in Texas
- ⇒ 9,050 pounds of trash was picked up in Jefferson County and 286,256 pounds total along the coast.

In addition to picking up trash, LNVA CRP staff handed out Clean Rivers Program information and pamphlets to other volunteers.

LNVA continued the student internship program this past year. This program provides college students with valuable field and laboratory experience in environmental work not covered by their degree. This is a valuable tool for learning outside the controlled environment of a classroom and has led several participants to careers in water quality.

The Clean Rivers Program and LNVA were sponsors of book covers for the 2004-05 school year for all Beaumont Independent School District elementary schools. The book cover provided educational word games and puzzles on the subject of water quality. LNVA CRP staff received letters from students from many of the schools in appreciation of the book covers.



Front cover of workbooks

A popular educational tool for 4th grade students in the assessment area has been the Major Rivers Program. Each class receives an introductory video, student workbooks, a teacher's guide, and information students can share with their families filled with tips on efficient home water use and water conservation.

For the 2004-05 school year, LNVA delivered Major Rivers to approximately 1000 area 4th graders.

By continuing to keep the public involved in the Clean Rivers Program, LNVA is ensuring that its program will be successful and achieve its water quality goals. To learn more about LNVA's programs and events, please visit www.lnva.dst.tx.us or call at (409) 898-0561.

Appendix A

Water Quality Data Review

Segment No. 0602	USES			CRITERIA							Pollution Impacts (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 (ºC)	Nitrate + Nitrite (mg/L)	Ammonia-Nitrogen (mg/L)	Total Phosphate (mg/L)
	Contact	High	Public Supply	≤50	≤50	≤200	≥5	6.0-8.5	≤400	≤33 (91ºF)	≤3.50	≤0.16	≤1.10

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. Based on data assessed for the LNVA 2004 Basin Summary Report there is a concern for aluminum (acute) in this segment. Although, limited data was available, therefore more data must be collected to fully assess this concern.

SIGNIFICANT FINDINGS:

Designated Use Support:

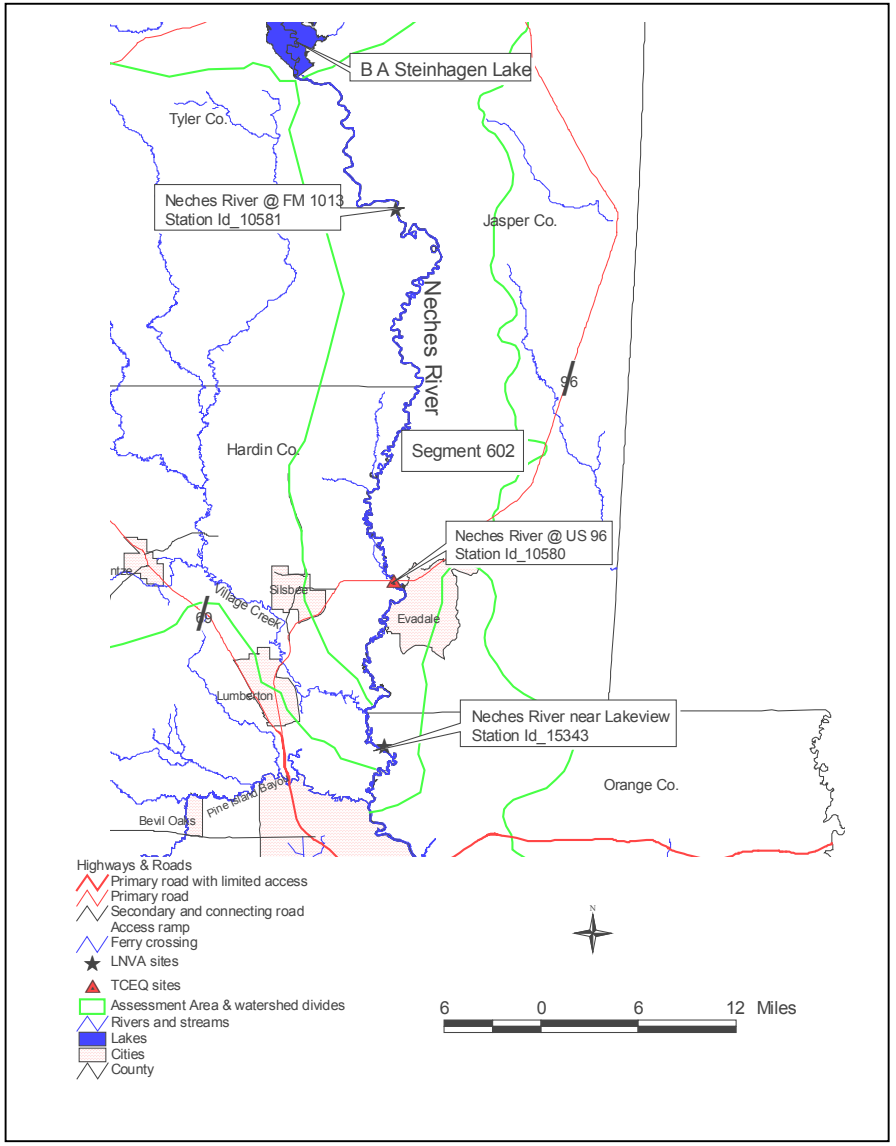
* Fully supports the aquatic life use.
* Fully supports the contact recreation use.
* Aluminum (acute) criterion is partially supported at station 10581.

General Criteria:

* Fully supports the general criteria.

Pollution Impacts (nutrients):

* There are no concerns due to nutrient enrichment.



Segment No. 0603	USES			CRITERIA							Pollution Impacts (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)
	Contact	High	Public Supply	≤50	≤50	≤200	≥5	6.0-8.5	≤400	≤34 (93ºF)	≤3.50	≤0.16	≤1.10

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 is on the 303(d) as a moderate priority for a TMDL due to mercury in fish tissue.

SIGNIFICANT FINDINGS:

Designated Use Support:

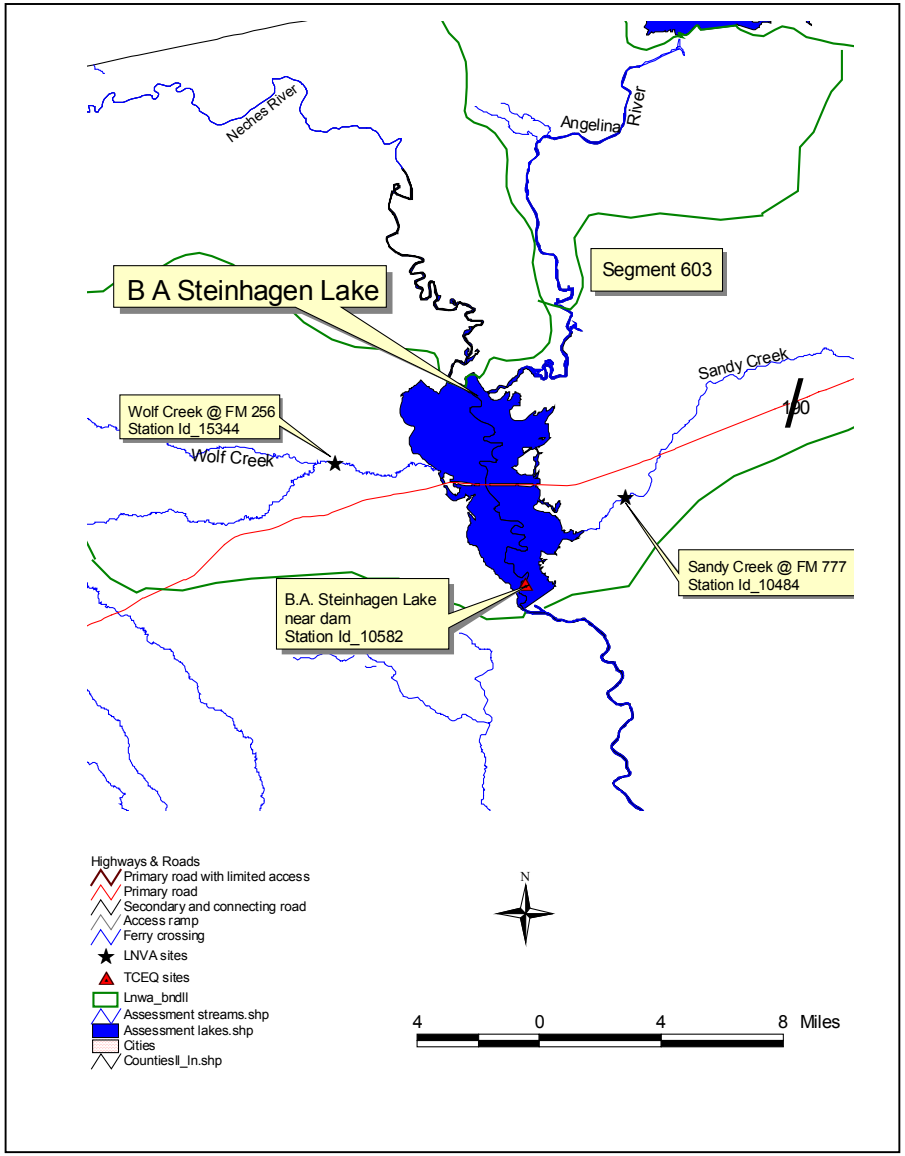
* Not supporting the contact recreation use for site 10484 on Sandy Creek.
* Fully supports the acute and chronic criteria for aluminum, cadmium, copper, lead and zinc in water.

General Criteria:

* Not applicable to off segment sites.

Pollution Impacts (nutrients):

* There are no concerns due to nutrient enrichment.



Segment No. 0607	USES			CRITERIA							Pollution Impacts (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)
	Contact	High	Public Supply	≤150	≤50	≤300	≥5	6.0-8.5	≤400	≤34 (93ºF)	≤3.50	≤0.16	≤1.10

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. Due to the results of 24 hr. dissolved oxygen data collected by LNVA, TCEQ has scheduled a Use Attainability Analysis (UAA) to determine if the current DO stream standard is appropriate. Recent data screened for the LNVA 2004 Basin Summary Report shows Aquatic Life Use concerns exist for aluminum(acute), cadmium (chronic), lead(chronic), and zinc (acute) throughout the segment.

SIGNIFICANT FINDINGS:

Designated Use Support:

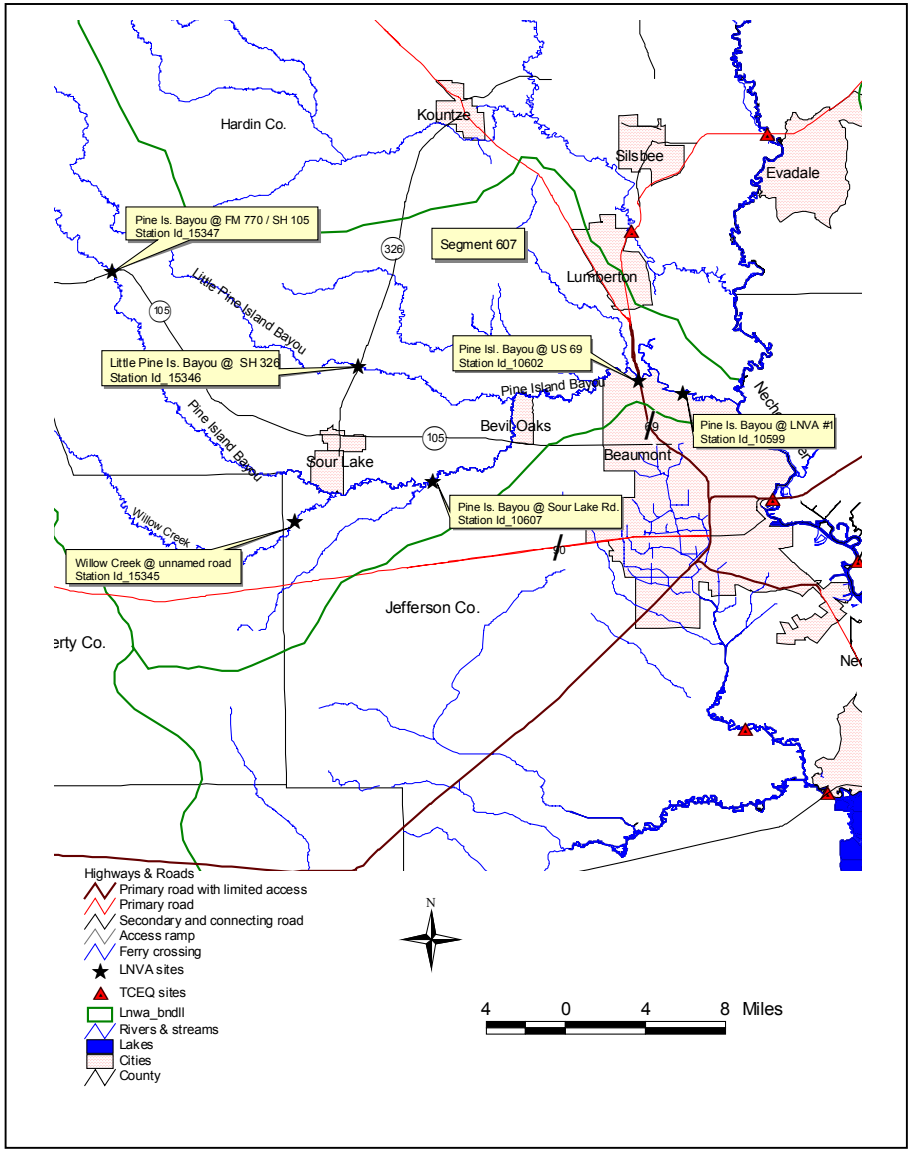
* Stations 10599 and 15346 partially support the aquatic life use for dissolved oxygen.
* Sites 15367, 15345, 10602,10606 and 10607 do not support the aquatic life use for dissolved oxygen.
* Aluminum (acute) criterion is partially supported at sites 10599 and not supported at all other sites in this segment.
* Cadmium (chronic) criterion is not supported at sites 10607, 10602, 15345 and 15367.
* All sites in this segment are not supporting for lead (chronic).
* Zinc (acute) is partially supported at sites 10607 and 10602.

General Criteria:

* Fully Supporting

Pollution Impacts (nutrients):

* No concerns.



Segment No. 0608	USES			CRITERIA							Pollution Impacts (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)
	Contact	High	Public Supply	≤150	≤75	≤300	≥5	6.0-8.5	≤400	≤32 (90ºF)	≤3.50	≤0.16	≤1.10

QUICK FACTS:

The Village Creek watershed is approximately 1,113 square miles with LNVA monitoring six sites, one on segment and five off the main segment. Recent data 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 LNVA 2004 Basin Summary Report listed concerns for the aquatic life use due to exceedances of the metals in water criteria at most of the stations in this segment. Current screening results are listed below.

SIGNIFICANT FINDINGS:

Designated Use Support:

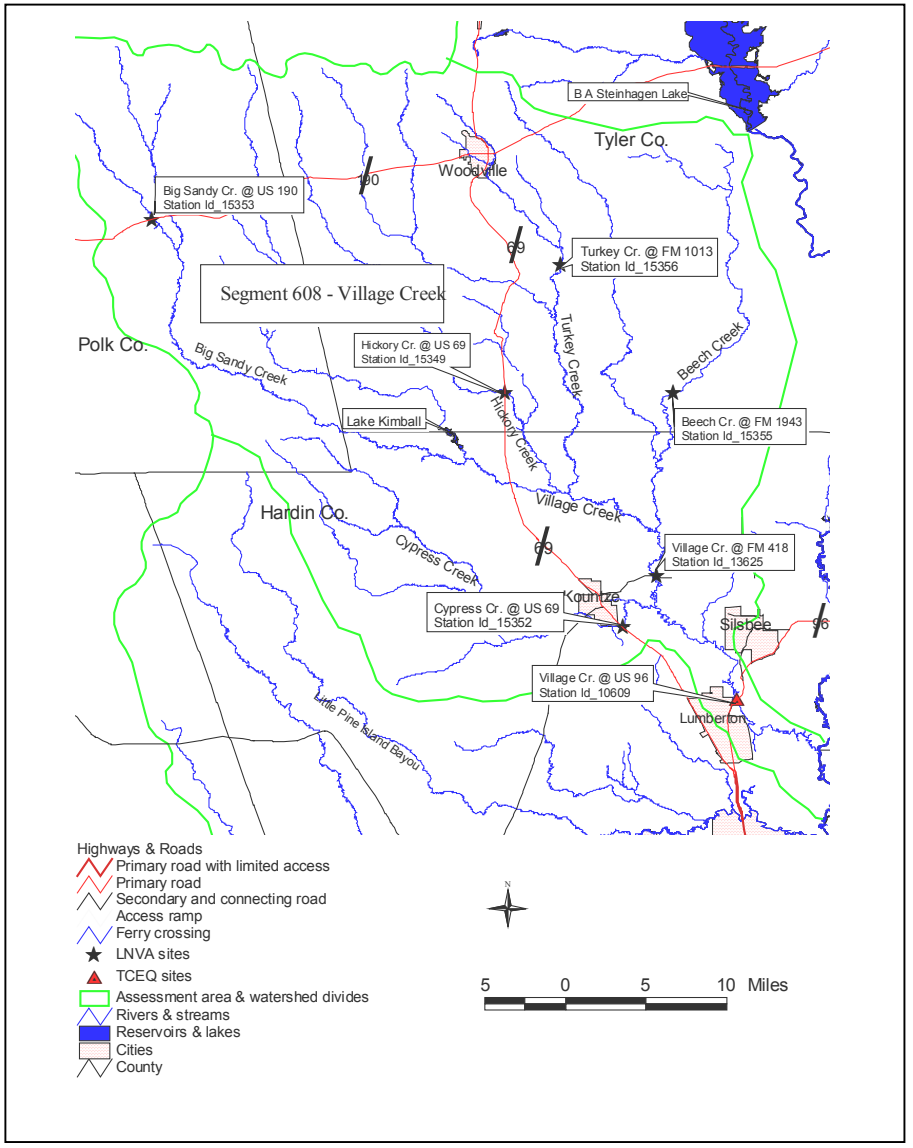
* Site 15352 on Cypress Creek does not support the high aquatic life use for dissolved oxygen, lead (chronic), zinc (acute), cadmium(chronic and acute) and only partially supports the aluminum (acute) criteria.
* Site 15355 on Beech Creek partially supports the high aquatic life use for dissolved oxygen.
* 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 at sites 15349, 15356 and 15353.
* Partial support for copper (acute) criterion on Big Sandy Creek.
* Partially supporting the aquatic life use for Al (acute) on 13625 and 15349.

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							Pollution Impacts (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)
	Contact	High	Public Supply	≤70	≤50	≤250	≥5	6.0-8.5	≤400	≤32 (90ºF)	≤3.50	≤0.16	≤1.10

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:

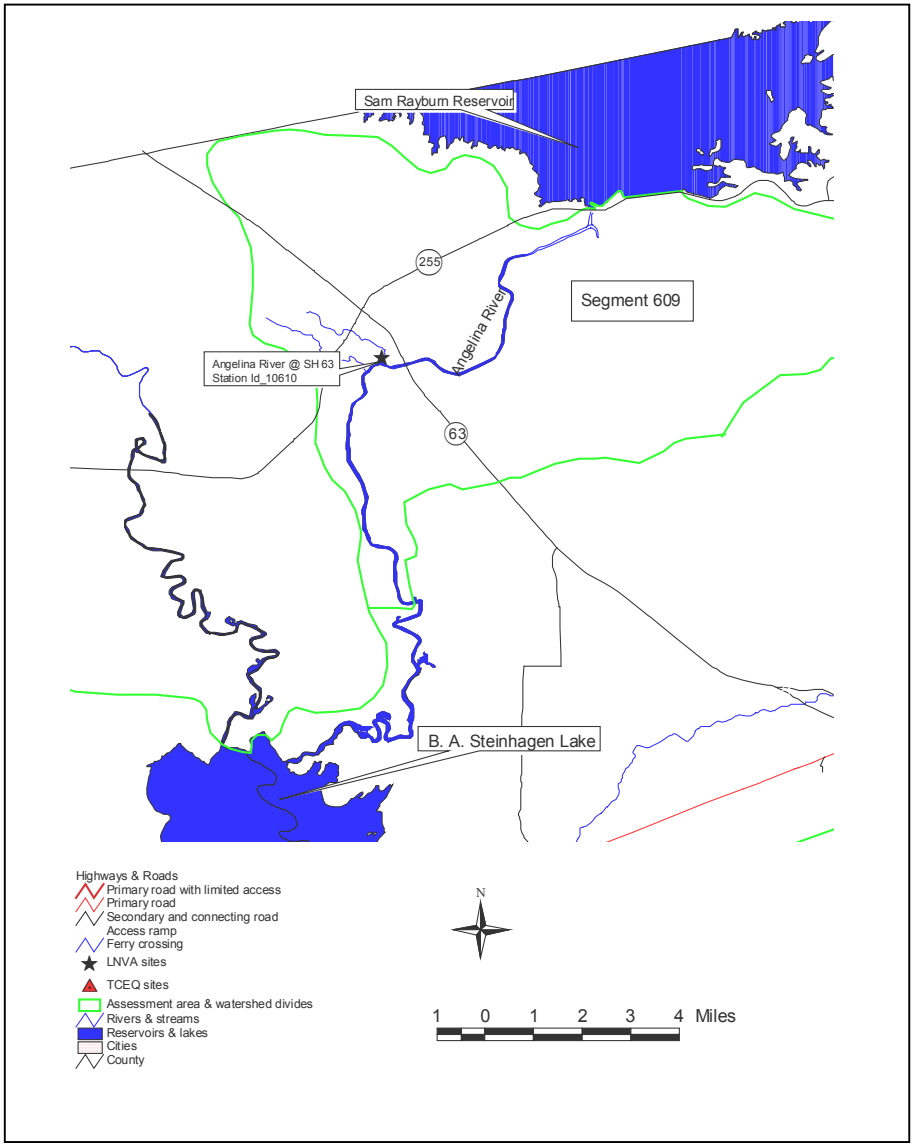
* Segment fully supports the designated uses.
* Fully supports the acute and chronic criteria for aluminum, cadmium, copper, lead and zinc in water.

General Criteria:

* Segment fully supports the general criteria.

Pollution Impacts (nutrients):

* There are no concerns due to nutrient enrichment



Segment No. 0701	USES			CRITERIA							Pollution Impacts (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)	Chlorophyll a
	Contact	Intermediate	-	≤400	≤100	≤1100	≥4	6.5-9.0	≤400	≤35 (95ºF)	≤3.50	≤0.16	≤1.10	≤11.6

QUICK FACTS:

The waterbody is relatively deep (8-13 ft.) and low gradient with sluggish flow. Most current data screenings are indicating the segment partially supports the aquatic life use for dissolved oxygen (DO). Other findings in this segment include concerns for aluminum in water and chlorophyll a.

SIGNIFICANT FINDINGS:

Designated Use Support:

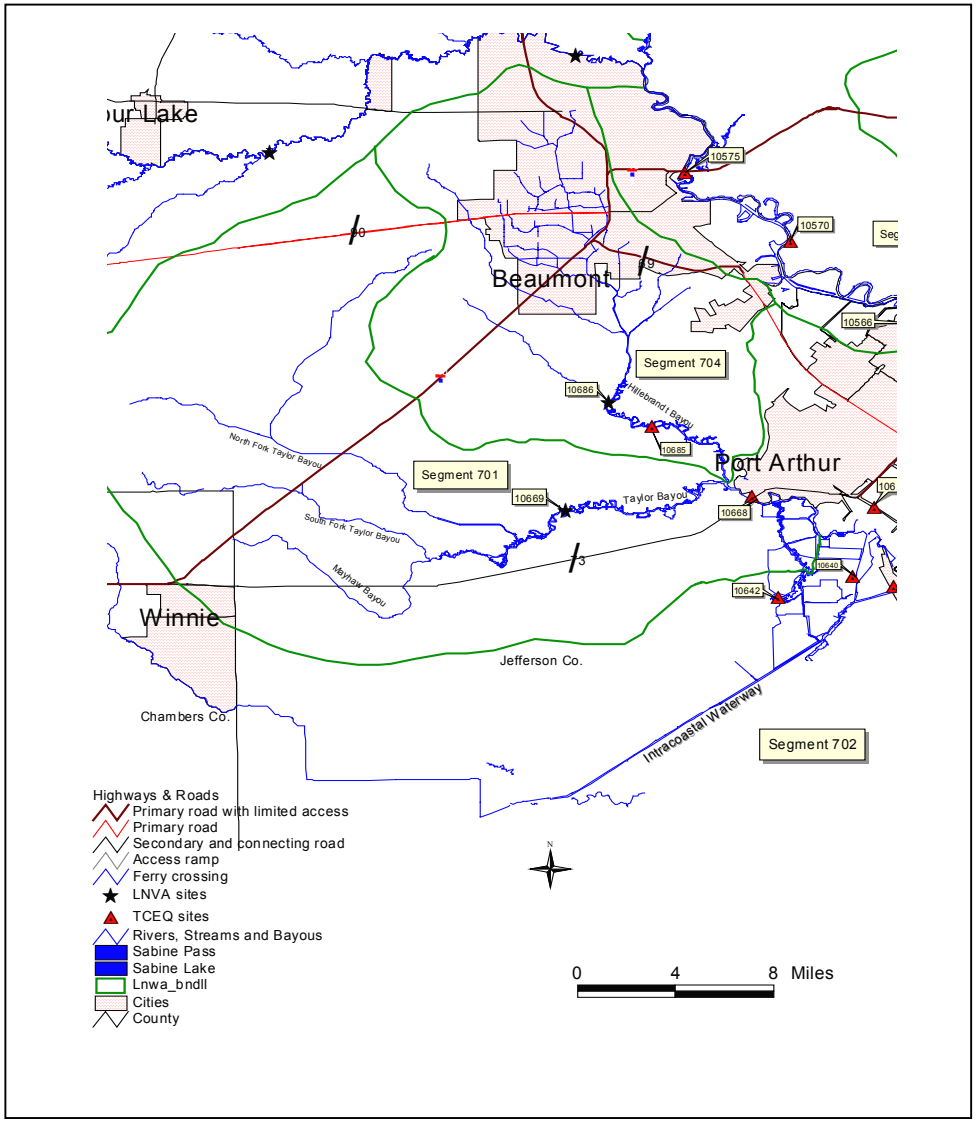
* Site 10669 and 10668 partially supports the aquatic life use for DO.
* Fully supports the contact recreation use.
* Site 10669 non-support for aluminum (acute) criterion in water.
* Fully supports acute and chronic criteria for cadmium, copper, lead and zinc in water.

General Criteria:

* Fully supports the general criteria.

Pollution Impacts (nutrients):

* Concern for chlorophyll at site 10668



Segment No. 0704	USES			CRITERIA							Pollution Impacts (Nutrient Screening Levels)			
Hillebrandt 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)	Chlorophyll a
	Contact	Intermediate	-	≤250	≤100	≤600	≥4	6.5-9.0	≤400	≤35 (95ºF)	≤3.50	≤0.17	≤1.10	≤11.6

QUICK FACTS:

Hillebrandt Bayou receives storm runoff from approximately 68% of the City of Beaumont. Tributaries carry additional flows from agricultural areas, with base flow contributed from the City of Beaumont's wastewater treatment operations. Assessment reports indicate the segment partially supports the aquatic life use for dissolved oxygen (DO) at site 10685 where Hillebrandt Bayou intersects Hillebrandt Rd. There is also a concern for ammonia-nitrogen, and LNVA has formed a workgroup to determine the cause.

SIGNIFICANT FINDINGS:

Designated Use Support:

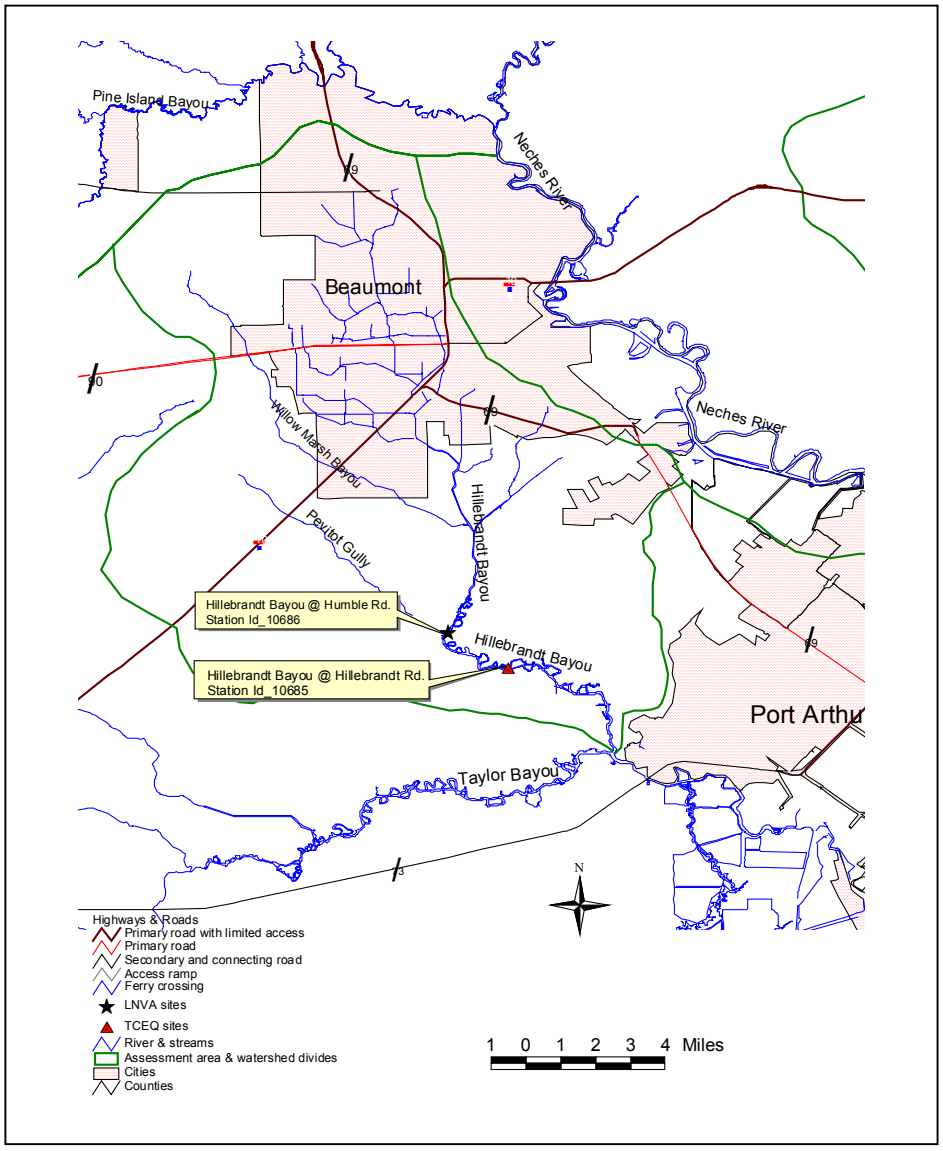
* Site 10685 partially supports the aquatic life use for dissolved oxygen.
* Fully supports the contact recreation use for bacteria.
* Fully supports the acute and chronic criteria for aluminum, cadmium, copper, lead and zinc in water.

General Criteria:

* Fully supports the general criteria.

Pollution Impacts (nutrients):

* Concern due to nutrient enrichment of ammonia-nitrogen.
* Concern for chlorophyll at site 10685.



Parameter Glossary

Ammonia-Nitrogen (NH3) – a colorless gas compound that is very soluble in water and has a pungent odor. It forms as a result of the decomposition of most nitrogenous organic material and is also used as a fertilizer. Elevated concentrations are indicative to pollution.

Bacteria – Microorganisms that can cause infections or diseases in plants and animals. Bacteria form the base of food webs by transforming inorganic materials into complex compounds and breaking complex compounds into inorganic materials. By shifting matter back and forth between simple and complex forms, bacteria make food available for other organisms.

Chloride – Chloride is the negatively charged chlorine ion present in water. Chlorides in reasonable concentrations are not harmful to humans. At concentrations above 250 mg/L they impart a salty taste to water. External sources of chloride include septic systems, animal wastes, oil field brines, and potassium chloride fertilizer.

Chlorophyll – Chlorophyll is the green pigment present in all plant life necessary for photosynthesis. The amount present in a water body is proportional to the amount of algae in the water. Chlorophyll is commonly used as an indicator of water quality with high levels of nutrients.

Dissolved Oxygen (DO) – The amount of oxygen dissolved in water. DO is supplied to a water body through diffusion of atmospheric oxygen in the water and the photosynthetic production of oxygen by algae and aquatic plants. Respiratory processes, oxidation of inorganic waste, and the decomposition of organic matter decrease oxygen concentrations in water.

E. coli (Escherichia coli) – A bacterium common to the human intestinal tract.

Fecal coliform bacteria – Indicator microorganism that typically inhabits the intestinal tracts of animals such as cattle, pigs, waterfowl, deer, and humans. Fecal coliform is generally assumed to be an indicator of septic tank contamination.

Nitrate-Nitrogen (NO3-N) – This nitrogen compound is readily utilized by algae and aquatic plants; however, because it must be reduced before it can be metabolically used, most algae and aquatic plants prefer ammonia to nitrate.

Nutrients – Any material that organisms take in and assimilate for growth and maintenance. In water, nutrients can act as fertilizing compounds and stimulate and sustain growth and development of aquatic plants and algae. Nitrogen and phosphorus compounds are the two most important nutrients.

pH –The negative logarithm of the hydrogen ion concentration. The pH scale ranges from zero to 14 with 7 as the neutral point, indicating the presence of equal concentrations of free hydrogen and hydroxide ions. pH values below 7.0 indicate acidity, with 0 being a pure acid; pH values above 7 indicate basicity, with 14 being the most basic, or alkaline.

Sulfates- Sulfates are a combination of sulfur and oxygen and are a part of naturally occurring minerals in some soil and rock formations that contain groundwater. The mineral dissolves over time and is released into groundwater. Sulfates can be difficult to remove during water treatment.

Temperature - measured in degrees Celsius

Total Dissolved Solids - The weight of solids per unit volume of water, which are in true solution, usually determined by the evaporation of a measured volume of filtered water, and determination of the residue weight.

Total Phosphorus – A measure of the sum of all phosphorus forms, including dissolved, and particulate organic phosphates from algae and other organisms, inorganic particulate phosphorus.