

# Trinity River Basin CRP 2003 Basin Highlights Report

## Clean Rivers Program

- Created by Senate Bill 818 in 1991.
- Managed by Texas Commission on Environmental Quality.
- Conducted by River Authorities and other governmental agencies in each river basin.
- Funded by fees assessed to water and wastewater permits.

## Trinity Basin CRP

- Water Quality Monitoring
- Special Studies
- Public Outreach

## Program Meetings

- **Steering Committee**—meets annually to provide input and set priorities
- **Coordinated Monitoring Meetings**—meets annually to create coherent basin-wide monitoring plan
- **Water Quality Monitoring Committee**—not strictly CRP; meets as necessary to discuss various water quality issues of importance

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## Trinity River Basin Clean Rivers Program Enters 12th Year

The Basin Highlights Report is an annual report that provides an overview of the activities of the Texas Clean Rivers Program in the Trinity River basin. The goal of the CRP is to maintain and improve the quality of our precious water resources. In the Trinity River basin, the Trinity River Authority conducts the Clean Rivers Program under contract with the Texas Commission on Environmental Quality. The Trinity River Basin Clean Rivers Program emphasizes three key components: routine monitoring, spe-

cial studies and public outreach. During 2002, the eleventh year of the Clean Rivers Program, these three components, each of these is discussed in a separate section, were again the major focus. In addition to the three major focal points, this report also discusses water quality data that have been collected through the Clean Rivers Program.



The Trinity River Authority is a political subdivision of the State of Texas created by an act of the 54th Legislature in 1955.

## Water Quality Monitoring

One of the most important functions of the Trinity Basin Clean Rivers Program is the maintenance of a routine water quality monitoring network. This network is composed primarily of local agencies who voluntarily work with the Clean Rivers Program to collect and submit data to the State's water quality database. This database is utilized in a biannual assessment of Texas' rivers, streams, wetlands and estuaries to identify any potential water quality problems. Over the past year, TRA has con-

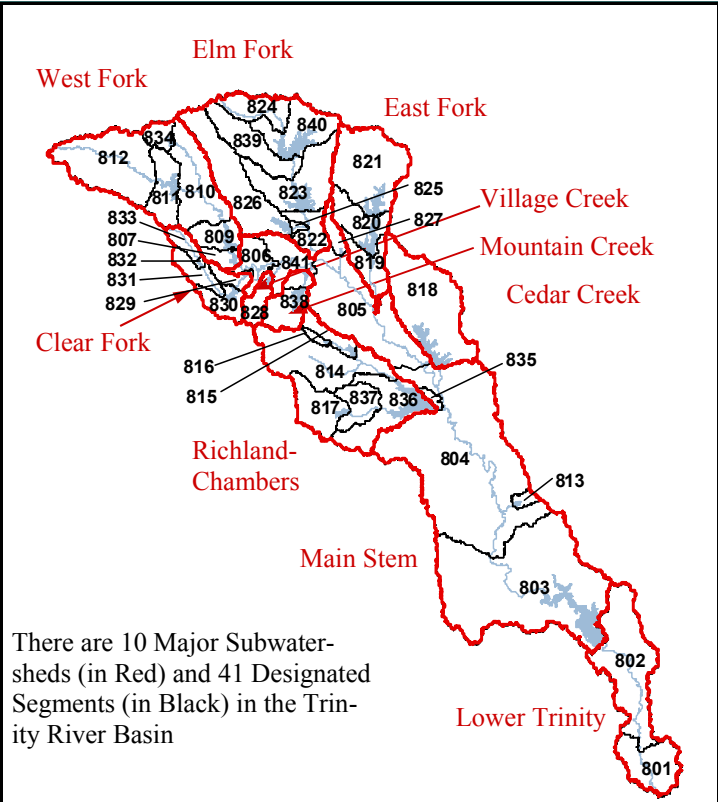
tinued to work to strengthen the coalition of agencies involved in the Trinity basin CRP. Agencies currently involved in monitoring include the cities of Arlington, Dallas, Fort Worth, Grand Prairie, Irving and the Tarrant Regional Water District. These CRP partners have in some instances been monitoring for decades, for reasons ranging from drinking water supply protection to meeting the requirements of municipal storm water permits. In addition, TRA samples the Main Stem of the Trinity

at seven locations from Fort Worth in the upper portion of the basin to Oakwood in the mid portion. The river south of Oakwood, including Lake Livingston, is monitored regularly by TRA Southern Region personnel officed at the TRA Lake Livingston dam complex. For a detailed map of water quality monitoring stations in the Trinity Basin, please see the map in the center of this report.

To help coordinate monitoring efforts, annual coordinated monitoring meetings are held. Meeting participants discuss in detail monitoring locations, specific types of data that are needed and how data gaps can be filled. Although this monitoring network is fairly comprehensive, it is best suited for long term routine monitoring at fixed stations. Due to the fact that each agency is autonomous and monitors primarily for reasons other than the Clean Rivers Program, this volunteer monitoring network is not well suited to temporary changes aimed at addressing specific, short-term data needs. These issues are best addressed via TCEQ regional offices, which have in recent years been relieved of much of the burden of routine monitoring through the efforts of the Clean Rivers Program. When specific issues immerge from

data reviews, by either the Trinity Basin CRP or the State, special studies can be initiated to address them. This marriage of static routine monitoring, flexible regional office monitoring and special studies has worked well in the Trinity.

In order to participate in the CRP monitoring network, participating agencies must comply with a comprehensive quality assurance program. The requirements of the program and each agency's willingness to participate in it along with the specifics of when, where and how each monitors is documented in a Quality



Assurance Project Plan, or QAPP. The QAPP is updated annually or more often as needed to reflect changes in sampling programs, monitoring stations, etc.

Trinity Basin Volunteer CRP Monitoring Partners				
Agency	Water Bodies Sampled	Segment	Number Stations	Monitoring Objective
Tarrant Regional Water District	Lake Bridgeport	811	3	Watershed Protection
	Eagle Mountain Reservoir	809	6	
	Lake Worth	807	4	
	Lake Arlington	828	4	
	Benbrook Reservoir	830	3	
	Cedar Creek Reservoir	818	7	
	West Fork Trinity River	806	1	
City of Dallas	Richland Chambers Reservoir	836	6	Reservoir Protection
	Ray Roberts Reservoir and Tributaries	840	5	
	Lake Lewisville and Tributaries	823	6	
	Grapevine Lake and Tributaries	826	5	
	Lake Lavon	821	1	
	Lake Ray Hubbard and Tributaries	820	6	
	Lake Tawakoni and Tributaries	507	7	
City of Grand Prairie	Elm Fork above Ray Roberts	824	1	Storm Water Monitoring
	Elm Fork Below Lewisville	822	4	
	Elm Fork Below Ray Roberts	839	1	
City of Irving	Tributaries of West Fork	841	19	Storm Water Monitoring
	West Fork	841	1	
	Tributaries of Mountain Creek	838	3	
City of Fort Worth	West Fork	841	2	Long Term Special Study
	Tributaries of West Fork	841	11	
	Elm Fork	822	3	
City of Arlington	Tributaries of Elm Fork	822	8	Storm Water Monitoring
	West Fork in Fort Worth	806	3	
TRA Southern Region	Tributaries of West Fork	806	2	Reservoir Protection
	Village Creek	828	1	
	West Fork	841	11	
TRA CRP	Lake Livingston and Tributaries	803	13	Water Quality Monitoring
	Trinity River Above Livingston	804	1	
	Trinity River Below Livingston	802	7	
	West Fork Trinity River in Fort Worth	806	1	
	Main Stem Trinity River in Dallas	841/805	2	
	Main Stem Trinity River below Dallas	805	2	
	Main Stem Trinity River mid-basin	804	2	

Routine monitoring usually involves the collection of both field and conventional parameters. Field parameters are those that can be measured directly in the field, such as dissolved oxygen, temperature, pH and conductivity. These parameters are measured with sophisticated pieces of equipment called multi-probe water quality meters or data sondes. Conventional parameters include nutrients such as nitrogen and phosphorus, cations and anions (the amount of positively charged and negatively charged ions in the water) and total dissolved and suspended sediments. These samples are collected in small containers, or cubitainers, and sent to laboratories for analyses. Other parameters sampled for at various locations include dissolved metals like chromium and lead, and organics like insecticides and herbicides. These constituents can be very important but are much more expensive to analyze and require specialized sample collection procedures to make sure the water is not contaminated, which could lead to false detections.

## Special Studies

The highly developed nature of the upper Trinity watershed, primarily the Dallas-Fort Worth area, has historically meant that the river is highly impacted. Although the most severe pollution problems have been greatly re-



Electrofishing is a non-lethal means of capturing fish for identification

duced or eliminated over the previous couple of decades, concerns persist. Special studies are short-term detailed investigations into these real or perceived concerns, helping to gather information about their nature, source and potential solutions. In addition to addressing spe-

cific problems, special studies are also used to gain greater knowledge in areas of interest and help us understand environmental issues. In 2003, five special studies were initiated. These studies, which are described in the following paragraphs, will be concluded this summer.

### Coordinating Routine and Storm Water Monitoring

Storm water originates from rain events and runs off the land before entering waterways. This water carries with it pollutants such as oil and grease from streets, fertilizers and pesticides from both urban lawns and rural cropland, and a variety of metals and organic substances from industrial areas. In 1990 the EPA published regulations requiring municipalities to acquire permits for storm water leav-

ing each city. As a requirement of these storm water permits (or MS4 permits) cities collect and analyze samples of storm water. At the same time, there is an abundance of data being collected on the rivers and streams into which storm water flows. Unfortunately, there has been little coordination between these two sampling regimes. The North Central Texas Council of Governments coordinates MS4 permit ac-

tivities in the Dallas-Fort Worth area with seven municipalities, all of which have populations greater than 100,000. The NCTCOG, on behalf of these cities, requested that the Trinity Basin CRP investigate ways of coordinating the sampling of storm water and ambient water so that a better picture of the potential impact of storm water on streams and rivers can be determined.

### Investigating Seasonal Impacts of Municipal Discharges

Rainfall in most of the Trinity basin is highly seasonal, with wet springs and winters and dry summers and falls. Accordingly, much of the rainfall received on an annual basis occurs in a relatively few number of storms, giving credence to the old saying "when it rains it pours!" The result is highly variable flows in most small stream systems with sharp rises in flow following storm events and low or even no flow during our long hot summers. Streams that go dry during the summer are called intermittent streams, and usually do not support the same level of aquatic life as perennial streams (those that flow year round). Municipal water reclamation plants that treat and discharge wastewater into streams provide a constant source of water. Although reclaimed water is clearer and in some ways cleaner than

natural river water, it does contain some constituents that may negatively impact aquatic communities. Traditionally, it is assumed that this impact will be greatest during the summer, when natural flows are lowest. However if there is little natural flow, the reclaimed water may provide some benefit to aquatic communities by producing a base flow and thus habitat and better conditions. This study addresses the question of the impact of return flows by monitoring water quality, flow and biological communities, including fish and macroinvertebrates on the upper Elm Fork

of the Trinity. Originally four sample runs were planned; one for each season. However rainfall during the summer sampling may have affected results, and therefore a second summer sample run is scheduled for July or August of 2003.



TRA CRP Staff sort benthic macroinvertebrates. Once sorted the bugs are sent to aquatic entomologists for counting and identification.

Results-to-date indicate the fish and benthic invertebrate communities may be affected to a greater extent by differences in natural habitats than the wastewater treatment

plant discharges.

## Relating Nutrient Concentrations to Uses

In 1997 President Clinton signed the Clean Water Action Plan. Among other things, this plan requires the EPA to develop numeric nutrient criteria for rivers, lakes and reservoirs, wetlands and estuaries. Since that time, the EPA has published guidance documents that outline a methodology for developing numeric criteria based upon a statistical evaluation of existing data. The methodology proposed by EPA would likely identify most water bodies in Texas as having nutrient problems while ignoring the link between nutrients and uses such as swimming, fishing and drinking. Without understanding this link, it is likely that millions of

dollars would be spent in an effort to clean up water bodies that might not have any problems. The Texas Commission on Environmental Quality has been working hard to come up with an alternative methodology that will result in more appropriate numeric criteria. In order to assist in this endeavor, the Trinity Basin CRP hired PBS&J to investigate the relationships between actual uses and nutrient concentrations. An oversight committee of Trinity Basin stakeholders was formed to provide direction. Nine



Excess nutrients can lead to algal blooms. The green color of the water pictured above is the result of an algal bloom that occurred in the headwaters of Ray Roberts during the spring of 2002.

Trinity River reservoirs were selected, based on factors such as the different types of uses they support, the amount of eutrophication believed to exist in the reservoir and the land uses occurring in the watershed. Thus far the study has focused on acquiring water chemistry data and identifying measures of use. Current and future efforts will focus on analyses of the data to determine if any relationships exist between uses and nutrient concentrations. The study is scheduled for completion in August of 2003.

## Algal Succession

As it flows through Fort Worth and Dallas, the Trinity River receives around 600 million gallons per day of reclaimed water. During the summer of 2002, a study was conducted to investigate how algal communities change in the Trinity River as a result of the progressive inputs of this reclaimed water. Under the study, samples were collected in two phases from 19 different locations. The sites sampled stretch from Fort

Worth, above all major municipal discharges, to just above Lake Livingston near the bottom of the basin. During phase I, samples were collected from all 19 locations and sent to the University of Texas at Arlington where the structures of algal community were determined. Changes in algal communities are assumed to be a result of changes in water chemistry created by the addition of reclaimed water. The results from phase one sampling indicated that there were two portions of the river where algal community transitions are greatest. One of the

reaches is between Fort Worth and Dallas and the other between the Malloy Bridge south of Dallas and Highway 31 near Trinidad. During the second phase of the study, samples were collected at three locations within each reach, on three separate days. Water chemistry samples from each location were also collected and analyzed. Results from these analyses will be compared with algal succession data, providing information on the health of the river.

## Dissolved Oxygen in Lake Livingston

Lake Livingston first appeared on the State's list of impaired water bodies in 1998 due to dissolved oxygen concentrations that were below the criterion established for the lake. Dissolved oxygen, or DO, is important to maintaining healthy aquatic communities. If levels of DO drop too low, fish and other aquatic organisms can suffocate. One factor that can

cause occasional low DO values involves algae. During the day, algae, like plants, create oxygen through photosynthesis. This process creates carbohydrates which the algae eat through a process known as respiration. At night, if algae are present in sufficient numbers, algal respiration can lower the amount of oxygen in the water. This twenty-four hour cycle of high and low DO, driven by algae photosynthesis and respira-

tion, is known as the diurnal DO cycle. In order to understand the severity of these swings and in order to determine if this is causing water quality problems in Lake Livingston, TRA Southern Region personnel will be monitoring DO concentrations at eight locations along the reservoir. Sampling will begin in April of 2003 and will continue through the summer of the same year. Additional sampling may be planned if needed.

# Water Quality

At the very heart of the Clean Rivers Program is water quality; the vital data that tell us the conditions of our lakes, streams, estuaries and wetlands. Water quality information is collected through the extensive monitoring network that has been established with the assistance of other local agencies. Some of the more common and important parameters sampled include:

- Field measurements like dissolved oxygen, temperature, pH and conductivity
- Nutrients, such as nitrogen and phosphorus
- and Dissolved Metals, like copper, lead and chromium

Each of these groups of parameters is important for assuring that the water bodies are able to be used for their intended purposes which include recreational activities, aquatic life support and as a source of drinking water.

Information on a number of these parameters is presented on the following pages. These graphs contain a plethora of information and reward a careful study. Two sets of graphs, tables and maps have been prepared: one for rivers and one for reservoirs. The graphs represent frequency distributions for key parameters from a select number of

sites across the basin. The tables under each of these graphs provide additional statistical information for a handful of related parameters. The statistics provided include the number of measurements available for each parameter and the minimum, average and maximum values recorded. At the bottom of each set of graphs and tables is a map locating stations from which data were taken. The maps also provide information on land uses in regards to lakes and point sources in regards to rivers.

## Upper West Fork of the Trinity River

**Segments:** 807, 808, 809, 810, 811, 812

**Watershed Size:** 2,044 mi<sup>2</sup>

**Water Quality Issues:** Legacy pollutants in Lake Worth, eutrophication in Eagle Mountain Lake, bacteria in the West Fork below Bridgeport and low dis-

solved oxygen and elevated concentrations of chloride and dissolved solids in the West Fork above Lake Bridgeport.

**Primary Land Uses:** Rural, pasture, limited row-crop

**Reservoirs:** Amon G. Carter, Bridgeport, Eagle Mountain, Lake Worth

The Upper West Fork is intermittent above Lake Bridgeport. Lakes Bridgeport and Amon G. Carter have exceptionally high water quality. Eagle Mountain has some evidence of eutrophication making nutrients a concern while Lake Worth, a source of drinking water for Fort Worth, has a fishing ban as a result of legacy pollutants in fish tissue.

## Elm Fork of the Trinity River

**Segments:** 822, 823, 824, 825, 826, 839, 840

**Watershed Size:** 2,572 mi<sup>2</sup>

**Water Quality Issues:** Bacteria in Little Elm Creek and the Elm Fork above Lake Ray Roberts; eutrophication in lakes Ray Roberts and Lewisville and the river above Ray Roberts.

**Primary Land Uses:** Rural with row crop and dairy farming

**Reservoirs:** Lakes Ray Roberts, Grapevine and Lewisville

The Elm Fork is intermittent above the city of Gainesville. Between

Gainesville and Lake Ray Roberts, it is effluent dominated with apparently significant impacts from agricultural activities. The Elm Fork arm of Ray Roberts does show signs of eutrophication, however water quality in the main pool and other water bodies throughout the subwatershed is good.



## Clear Fork Trinity

**Segments:** 829, 830, 831, 832, 833

**Watershed Size:** 517 mi<sup>2</sup>

**Water Quality Issues:** bacteria and low dissolved oxygen in the Clear Fork below Lake

Weatherford and low dissolved oxygen in the Clear Fork above Lake Weatherford.

**Primary Land Uses:** Rural, grazing

**Reservoirs:** Lakes Weatherford and Benbrook

It is believed that the low dissolved oxygen concentrations seen in the river above and below Lake Weatherford are the result of natural conditions. To determine if this is indeed the case, a TMDL study has been initiated and is currently nearing completion. Preliminary results indicate that existing standards, at least for the river above the lake, should probably be changed to reflect the naturally occurring low dissolved oxygen.