THE TEXAS CLEAN RIVERS PROGRAM

BASIN HIGHLIGHTS REPORT

GUADALUPE RIVER BASIN
and the
LAVACA-GUADALUPE COASTAL BASIN

GBRA

UPPER GUADALUPE RIVER AUTHORITY

SPRING 2002

BASIN HIGHLIGHTS REPORT

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GUADALUPE RIVER BASIN

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LAVACA-GUADALUPE COASTAL BASIN

INTRODUCTION

This report highlights recent activities in the Guadalupe River Basin and the Lavaca-Guadalupe Coastal Basin under the Clean Rivers Program (CRP). The CRP is managed by the Texas Natural Resource Conservation Commission (TNRCC), and funded entirely by fees assessed to wastewater discharge and water rights permit holders. The Guadalupe-Blanco River Authority (GBRA) together with the Upper Guadalupe River Authority (UGRA) carry out the water quality management efforts in these basins under contract to the TNRCC. The activities described in this report include water quality monitoring, a review of water quality data, special studies, and public communication efforts.

Major CRP Topics of The Past Year

The weather patterns in 2001 and early 2002 have been relatively normal leading to a typical year for stream flows and lake levels. The GBRA and the UGRA have not noted any appreciable/significant changes in urban development, agricultural operations, reservoir management, or recreational activities that could impact water quality.

In the last year the major focus of the CRP in the basins has been in three main areas: monitoring, special studies, and public involvement and outreach. Of these, the monitoring efforts represent the largest component. These monitoring efforts, described in detail in the next section, provide the raw data and information needed to address a number of significant water quality issues in the basin. It is also the basis for the data review efforts described later in the report. In particular, a number of actions were taken in response to needs in the river basin:

- Complying with the request of Comal County Judge to add a monitoring site in Canyon Reservoir in the vicinity of the Canyon Park Estates wastewater treatment plant.
- Adding monitoring sites downstream of the landowner under executive order to remove lead shots from Joshua Creek.
- Adding a site on upper Plum Creek to monitor the effects of growth in Hays County.
- Mon[illegible] requ[illegible]

Canyon Lake at Jacob Creek Park – One of the monitoring sites added last year

In January of this year the TNRCC completed its 2002 Clean Water Act (CWA) Section 305(b) Water Quality Inventory and 303(d) List of water bodies that are not meeting water quality standards. These assessments were conducted for all water quality samples collected between March 1, 1996 and February 28, 2001. While water quality in the basins is generally good, a number of locations have been identified with water quality issues due to nutrient enrichment, elevated bacteria levels, or depressed dissolved oxygen. A more detailed discussion of these issues is provided in the *Water Quality Data Review* section of this report.

In addition, special studies were performed to get a better understanding of complex water quality issues such as nutrient stream standards and the dynamics of small stream. Training and equipment were provided to citizen monitoring groups so that the overall level of water quality analysis is enhanced.

OVERVIEW OF WATER QUALITY MONITORING

One of the key roles of the CRP is fostering coordination and cooperation in monitoring efforts. Coordinated Monitoring meetings are held once a year to bring all the monitoring agencies and entities together to discuss streamlining and coordinating efforts. This year's Coordinated Monitoring meeting was conducted April 9, 2002. The table below outlines the types and amounts of water quality monitoring conducted in the Guadalupe River Basin and the Lavaca-Guadalupe Coastal Basin under a TNRCC-approved Quality Assurance Project Plan for September 2001 through August 2002.

FY 2002 (Sept. 2001 through Aug. 2002) Summary of Sampling for the Guadalupe & Lavaca-Guadalupe Basins

Sampling Entity	Field	Conventional	Bacteria	Biological and Habitat	24 Hr DO	Metals in Water	Metals in Sediment	Organics in Water
GBRA	20 sites monthly; 8 sites quarterly	20 sites monthly; 8 sites quarterly	20 sites monthly; 8 sites quarterly	10 sites semi-annually	1 site	9 sites annually; 1 site semi-annually		2 sites semi-annually; 2 sites quarterly

UGRA (Kerr Co.)	11 sites quarterly	11 sites quarterly	11 sites quarterly; 19 sites weekly (May - Aug)	9 sites semi-annually	1 site	2 sites annually		
TNRCC	23 sites quarterly	23 sites quarterly	21 sites quarterly; 2 sites bimonthly		4 sites	1 site annually; 6 sites semi-annually	5 sites annually; 4 sites semi-annually	1 site semi-annually

Description of Water Quality Parameters

Fish Sampling by Electroshocking

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be affected by the pH. pH can be influenced by dissolved constituents, such as carbon dioxide and by point and non-point source contributions to the stream.

Temperature of the water can impact the ability of the water to hold dissolved oxygen. It also has an impact on the biological functions of aquatic organisms.

Stream flow is an important parameter affecting water quality. Low flow conditions common in the warm summer months create critical conditions for aquatic organisms. Under these conditions, the stream has a lower assimilative capacity for inputs from point and non-point sources.

Secchi disc transparency is a measure of the depth to which one may see into the water, and thus the depth at which aquatic plants can grow.

Conventional parameters are typical water quality constituents that require laboratory analysis and generally include: nutrients, chlorophyll a, total suspended solids, turbidity, hardness, chloride, and sulfate.

Nutrients include the various forms of nitrogen and phosphorus. Elevated nutrient concentrations may result in excessive aquatic plant growth and can make a water body unfit for its intended use(s).

Chlorophyll a is a plant pigment whose concentration is an indicator of the amount of algal biomass and growth in the water.

Total Suspended Solids indicate the amount of particulate matter suspended in the water column.

Turbidity is a measure of the water turbidity or light transmitting properties. It is caused by suspended and colloidal matter such as clay, silt, finely divided organic and inorganic matter, plankton and other microscopic organisms.

Hardness is a composite measure of certain ions in the water, primarily calcium and magnesium. The hardness of the water is critical due to its effect on the toxicity of certain metals. Typically, higher hardness concentrations in the receiving stream can result in greater reduction of toxicity from concentrations of heavy metals.

Chloride and *Sulfate* are major inorganic anions in water and wastewater. Numeric stream standards for chloride and sulfate have been set on all of the classified stream segments in the basin. Both inorganic constituents can impact the designated uses and can come from point and non-point sources, such as wastewater discharges, and abandoned flowing wells from groundwater with elevated concentrations.

Bacteria The *E. coli* test is now used as an indicator of possible fecal contamination and presence of disease-causing organisms such as pathogens and viruses.

Biological and Habitat assessment includes collection of fish community data, benthic macroinvertebrate (bugs) data, and measurement of physical habitat parameters. These data are used to determine the health of the stream. The physical, chemical and biological data are used together to provide an integrated assessment of aquatic life support.

24 Hr DO studies perform measurements of DO in frequent intervals (e.g. 30-minute) in a 24-hour period. The average and minimum concentrations in the 24-hour period are compared to corresponding criteria. This type of monitoring takes into account the diurnal variation of DO and avoids the bias in samples taken only at certain times of the day.

Metals in Water, such as mercury or dissolved lead, typically exist in low concentrations, but can be toxic to aquatic life or human health when certain levels are exceeded. To obtain accurate data at low concentrations, the GBRA uses special clean methods that minimize the chance for sample contamination and provide high quality data.

Metals in Sediment could be a source of toxicants for the overlying water, though currently there are no numeric sediment standards.

Organics in Water, such as pesticides or fuels, can be toxic to aquatic life or human health when certain levels are exceeded.

Sampling at Peach Creek

The comp g schedule is updated frequently on the GBRA www.gbra.org. A map is attached showing tl f the monitoring sites plus areas of activities ect water quality, such as major communiti tewater discharges are located, areas with a concentration of poultry activity, and the locations of major oil and gas fields. The map is also available on the web page.

Quality Assurance Considerations

All data are collected under a Quality Assurance Project Plan (QAPP) developed and approved in coordination with the TNRCC. This plan exists to provide the level of consistency and scientific validity needed for environmental monitoring and decision making for river basins across the state. The QAPP is a document required by the TNRCC that documents all aspects of sample collection, analysis and data management procedures. The QAPP includes sections on the project organization, background, quality objectives, training requirements, record keeping, methodologies, and equipment maintenance.

Also included are sections outlining data management, validation, and verification. By having the important details specified, it has been possible to consider the monitoring data from all agencies together, enhancing the overall value of the data collected. Although QAPPs for the CRP do not require the approval of the US Environmental Protection Agency (USEPA), the TNRCC requires that data collection under the CRP be comparable to other data collected by the TNRCC and be consistent with the USEPA's requirements.

WATER QUALITY DATA REVIEW

Summary and Explanation of Ongoing Water Quality Issues

While water quality in the two basins (Basin 18, Guadalupe and Basin 17, Lavaca-Guadalupe) is generally good, a number of water bodies have been assessed by the TNRCC to have water quality issues due mainly to nutrient enrichment, elevated bacteria levels, or depressed dissolved oxygen. The TNRCC assesses the state's water bodies on a periodic basis under Clean Water Act Section 305(b). The resulting listing is called the Water Quality Inventory and it is comprised of a complete listing of all water quality issues in the State. As required by the Clean Water Act, the Inventory is updated every 2 years and consists of a review of the past 5 years worth of data. The 2002 Water Quality Inventory provides an assessment of water quality samples collected between March 1, 1996 and February 28, 2001. This inventory is available on the TNRCC web page. (www.tnrcc.state.tx.us/water/quality)

The term ***Impairment*** is assigned to a portion of a water body when certain water quality constituents reach threshold concentrations (as specified in the Texas Surface Water Quality Standards) for a minimum number of times over a period of five years. This designation indicates that the uses of the water body (drinking, recreation, fishing, aquatic life, etc.) may have been *impaired*. In other words, the fish may not be able to get enough oxygen to survive, the people swimming in the water may be exposed to human-introduced pathogens that can cause illness, or the water may not be fit to be used as a public drinking water supply. Streams that are shown to have an *Impairment* for one or more constituents are placed on the TNRCC's CWA Section 303(d) list.

Once a portion of a stream is placed on the list, a series of actions may be taken by the TNRCC, including, but not limited to: denial of increases in wastewater permit effluent limits; a Total Maximum Daily Load (TMDL) study to allocate pollutant loads to certain sources; and instituting a strategy for reducing loads from all sources.

The term ***Concern*** is assigned to a portion of a water body under a number of less rigorous requirements for frequency and concentration of the constituent. If there is only a small amount of data available, or there are only a few samples not meeting the Standards (and other Water Quality Criteria), then the stream cannot be assessed as *Impaired* with enough

CWA Section 303(d) List of *Impaired* Water Bodies for the Guadalupe River Basin

Water Body ID	Water Body	Parameter of *Impairment*	2000 List	Proposed 2002 List	Expected to be Delisted
1801	Guadalupe River Tidal (entire segment)	DO	X	X	
1803A	Elm Creek (entire water body)	DO, Bacteria	X	X	
1803B	Sandies Creek (lower 25 miles)	DO	X	X	
1803B	Sandies Creek (entire water body)	Bacteria		X	
1803C	Peach Creek (previously 1804B) (lower 25 miles)	Bacteria	X	X	
1806	Guadalupe River Above Canyon Lake (from 1 mile upstream of Flat Rock Dam to confluence with Camp Meeting Creek)	Bacteria		X	
1806A	Camp Meeting Creek (lower 4 miles)	DO	X	X	
1811A	Dry Comal Creek (lower 25 miles)	Bacteria	X		X
1814	Upper San Marcos River (entire segment)	Sulfate	X		X
1815	Cypress Creek (entire segment)	DO	X	X	
1818	South Fork Guadalupe River (from lower 1.5 mi to approx 0.5 mile upstream of Lange Ravine)	Bacteria		X	

The map on the next page shows the location of all the existing and proposed *Impaired* water bodies as well as those with *Concerns* (minus the proposed delistings). A complete listing of such water bodies is provided in Attachment A with information on criteria exceedance.

The table above shows the 2000 303(d) List of *Impaired* Water Bodies with proposed additions and deletions for the 2002 List.

Comments on the TNRCC Listed *Impairments* and *Concerns*

Nutrients

In many cases, nutrient enrichment *Concerns* appear to be a transitional issue. Currently assessment is based on statewide screening criteria with no consideration of site-specific conditions. The USEPA is promoting numeric nutrient criteria development for all US waters. A special study is being conducted by the CRP to evaluate techniques to establish numeric nutrient criteria (see Special Studies section of this report). When site-specific numeric nutrient criteria are developed, these listings will need to be re-evaluated.

Bacteria and Dissolved Oxygen in Small Streams

A number of the segments listed for elevated bacteria levels and depressed dissolved oxygen are unclassified water bodies. These are small streams that have not been designated as segments and are assessed based on the criteria and screening levels assigned to the designated stream segment (e.g. river) that the small stream eventually flows into. These small systems are significantly different from the waters for which the screening levels and criteria were developed.

A special study has been completed through the CRP that demonstrates smaller streams generally tend to have higher bacteria levels and lower dissolved oxygen. A variety of reasons may be involved such as more light shading, closer sediment interactions, and the hydrology of small streams. Flows in small streams are extremely low, or dry, during summer months causing dissolved oxygen to be reduced by factors such as temperature. In addition, these streams are dominated by run-off events and the stream has very little base flow to assimilate the water coming off the land.

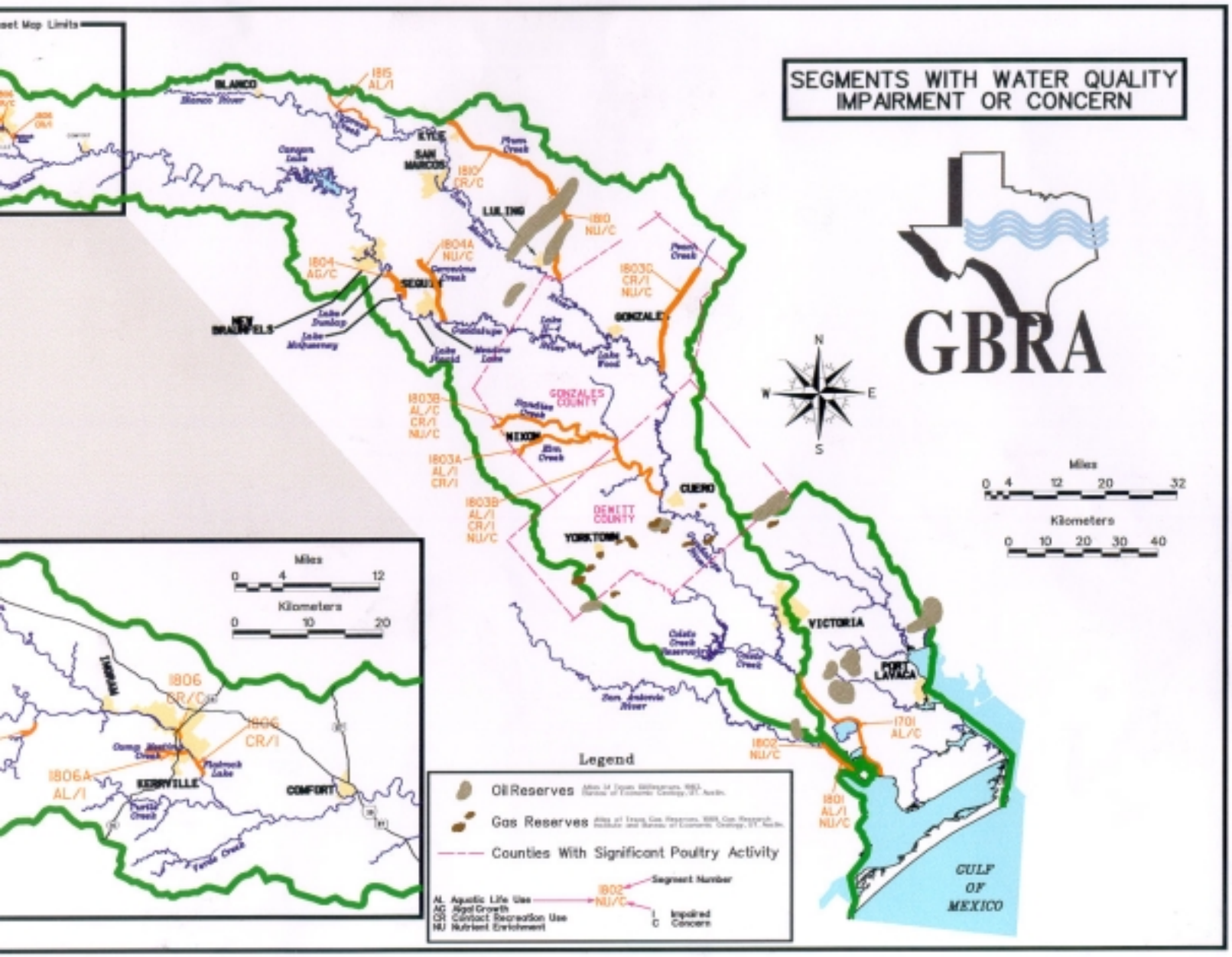
A solution would be to develop site specific criteria for smaller waters. In addition, for bacteria, a significant step to resolve the issue would be to implement the recommendation in the Statewide Bacteria Indicator Study to screen data that were collected when conditions were actually suitable for contact recreation.

Kerrville Area Bacteria Issues

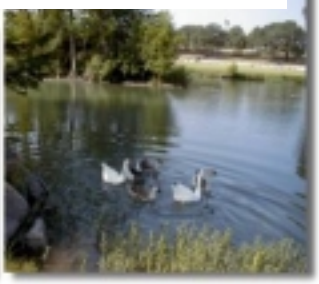
A number of stations in the Kerrville area consistently show elevated bacteria levels. Further investigation is needed to identify the source of the bacteria.

The data used in screening bacteria levels for Segments 1806 and 1818 did not include data from 1998 and 1999, and additional data from 2001 that have been recently supplied. Including these data may or may not change the outcome of the assessment. The UGRA is looking carefully to insure that the cause of the slightly elevated bacterial levels in Segment 1818 is not a human wastewater system that could be corrected.

UGRA has been monitoring the bacteria levels in the Upper Guadalupe River from May through August in approximately weekly intervals for a number of years. The data at the stations on the main stem of the river from Hunt to Comfort


SEGMENTS WITH WATER QUALITY IMPAIRMENT OR CONCERN
GBRA
Sheet Map Limits
1815 AL/I
BLANCO
Blanco River
KYLE
SAN MARCOS
1810 CR/C
Plum Creek
LULING
1810 NU/C
1804A NU/C
Cottonwood Creek
1804 AG/C
SEGUIN
NEW BRAUNFELS
Lake Dunlap
Lake McQueeney
Guadalupe River
Lake Placid
Meadow Lake
1803G CR/I NU/C
GONZALES
Lake Wood
1803B AL/C CR/I NU/C
GONZALES COUNTY
Sandies Creek
NIXON
Elm Creek
1803A AL/I CR/I
1803B AL/I CR/I NU/C
DEWITT COUNTY
CUERO
YORKTOWN
San Antonio River
Miles
0 4 12 20 32
Kilometers
0 10 20 30 40
VICTORIA
Coleto Creek Reservoir
Coleto Creek
PORT LAVACA
1701 AL/C
1802 NU/C
1801 AL/I NU/C
GULF OF MEXICO
Miles
0 4 12
Kilometers
0 10 20
1806 CR/C
1806 CR/I
1806A AL/I
KERRVILLE
COMFORT
Guadalupe River
Ivy Creek
Flatrock Lake
Turtle Creek
Legend
Oil Reserves
Gas Reserves
Counties With Significant Poultry Activity
1802 NU/C
Segment Number
AL Aquatic Life Use
AG Algal Growth
CR Contact Recreation Use
NU Nutrient Enrichment
I Impaired
C Concern

Cypress Creek at Wimberley



and 2001 for Cypress Creek, Camp Meeting Creek, Elm Creek and Sandies Creek. The data from these monitoring events are presented in Attachment C.

All the 24-hour average or minimum concentrations for Cypress Creek are above criteria. Out of the six monitoring events in Camp Meeting Creek, only one failed to meet both the average and minimum criteria, and another failed to meet the average criterion. More additional 24-hour monitoring events have been scheduled for FY 2002 for these water bodies. With the additional data, it appears that these water bodies will be delisted.

There were seven diurnal DO monitoring events conducted in Sandies Creek. Average DO concentrations of five of the seven events were below the criterion of 5 mg/L. One event had an average DO concentration of only 2.3 mg/L and a minimum DO concentration of 0.11 mg/L. GBRA attempted to collect diurnal DO data in Elm Creek in the summers of 2000 and 2001, but had limited success due to low flow at the site. No additional monitoring has been scheduled because of sampling difficulty. As discussed above, criteria specific to these water bodies should be developed.

The tidal section of the Guadalupe River, Segment 1801, is listed for depressed dissolved oxygen based on data from the SH-35 bridge (station number 12577). Further monitoring has been scheduled for this site.

The Basin Action Summary

The Basin Action Summary presents each water body with a water quality issue and a summary of actions taken in the last year to protect basin water quality. It includes a summary of project administration, planning, monitoring and analysis efforts, water quality information clearinghouse details, actions taken on special studies, and coordination efforts with the public and advisory committees. It is updated annually and can be found on the GBRA web page at www.gbra.org.

Dissolved Oxygen Issues Throughout the Basin

There are five water bodies listed for DO on the 2000 303(d) list. These are Cypress Creek (segment 1815), Camp Meeting Creek (segment 1806A), Elm Creek (segment 1803A), Sandies Creek (segment 1803B), and Guadalupe River Tidal (segment 1801). The draft 2002 305(b) Inventory noted that an insufficient number of 24-hour DO values were available to determine if the criterion was supported so that these water bodies are included on the 2002 303(d) list for DO.

Intensive 24-hour DO monitoring has been conducted in 2000

SPECIAL STUDIES

Special Studies are an integral component of the Clean Rivers Program. Through coordinated monitoring meetings and active public communication, the GBRA determined specific needs for targeted assessment. Two studies have been completed and three are in progress since 1999. The studies are listed below and discussed in more detail under separate headings.

- Sediment Conditions in the Hydro-lakes - with particular emphasis on the effect of the October 1998 flood
- Water Quality Conditions in Small Streams
- Evaluation of the Nutrient Criteria Development - including techniques proposed by the U.S. Environmental Protection Agency
- Sulfate Study of the Upper Blanco River
- Nonpoint Source Study of Oil Field Impacts in Caldwell County

Sediment Characteristics for Run-of-River Impoundments

The Guadalupe River basin has a substantial number of run-of-river impoundments that provide many functions including aquatic habitat and habitat diversity, hydroelectric power, groundwater recharge, providing points for water diversion, recreation, and aesthetic appreciation. In recent years many of these impoundments have been impacted by nuisance aquatic plant growth, primarily macrophytes such as hydrilla, water lettuce and water hyacinth. In 1998 the Clean Rivers Program supported a study of the problem and the effects of nutrient conditions in Lake Dunlap, the first of six hydroelectric impoundments. One of the findings of that study was that reducing nutrient concentrations in the water might not be an effective vegetation control measure because these aquatic plants have the ability to obtain their nutrients from lake sediments.

Recognizing that sediments play a major role in water quality conditions in these shallow impoundments, the Clean Rivers Program Steering Committee authorized a study of sediment nutrient concentrations in the small upper basin impoundments. The primary goals were to characterize sediment concentrations of important nutrients and sediment types over a wide geographic range. Also, because the earlier study had involved one round of sediment collection on Lake Dunlap in 1997, there was the opportunity to examine the effects of the major flood of October, 1998.

The sediment monitoring took place on a quarterly basis, beginning in the fall of 1999. All the study sampling objectives were met, with the exceptions of stations that were scoured of sediments by higher flows during the winter of 2000. Impoundments sampled included two reservoirs in the Kerrville area (UGRA and Flat Rock) and four of the main hydro reservoirs in the lower river, Lakes Dunlap, McQueeney, Placid and Wood. While these impoundments differed in size, they all had very similar hydraulic residence times.

One spatial trend noted was that there appears to be a trend of increasing phosphorus concentrations and decreasing nitrogen concentrations moving from upstream to downstream. Also the clay content of sediments increased towards the lower basin, as might be expected from the differences between Hill Country and Coastal Plain soils. The data did not reveal any marked differences in sediment concentrations in relation to point source wastewater discharges. The October 1998 flood event had a major impact on the sediment patterns in Lake Dunlap. Future studies to compare conditions over a longer period of time allowing for the lakes to acclimate after the floods may shed further light on the situation.

Overall, this initial attempt at measuring lake sediment concentrations appears to have been successful in documenting levels and suggesting patterns affecting water quality conditions in the system. The amount and type of additional sediment work depends on the degree of concern with nuisance aquatic plant growth.

Water Quality Conditions in Small Streams

Screening of water quality data to determine compliance with standards has been conducted for many years. The current list of water bodies in the Guadalupe River basin, that has been determined to not meet standards for dissolved oxygen (DO) and indicator bacteria, has a disproportionate share that are small creeks, many of which are not classified stream segments. While the possibility exists that there are actual manmade waste discharges that are the cause of these listings, it is also possible that the listings are a result of the unique physical conditions associated with small stream systems. Stated very simply, it appears that stream size may be a factor.

This study reviewed and analyzed the empirical monitoring data that are the basis for the listings, and the physical conditions for each of the stations. It was found that smaller streams in general tend to have the lowest DO and the highest indicator bacteria levels. The special study report outlines possible physical reasons for these results and provides suggestions on the types of more detailed study that would be needed to document and ultimately correct for these physical aspects.

A closely related dimension of the situation is the Texas Surface Water Quality Standards themselves, which currently make no allowances for physical scale or size. A review of procedures for setting DO criteria is presented in the study report. A recommendation of the study is to consider basing DO criteria on the actual biological needs of the indigenous biological community. Presumably the biological community in a smaller stream is better adapted to the stresses of highly variable conditions than the community in larger waterways, and could thus tolerate lower natural DO levels. Another recommendation made is to implement the recommendation

Confluence of Blanco River and Big Creek – a monitoring site of the sulfate study

of the Statewide Bacterial Indicator Study for dealing with smaller highly variable streams. Briefly, that recommendation is to perform monitoring in the routine manner, but only screen data that were collected when conditions were actually suitable for contact recreation.

Nutrient Criteria Study

The USEPA has made it a goal to have numeric nutrient criteria for all US waters by 2004. USEPA has prepared technical guidance manuals for lakes and reservoirs, streams and rivers, and estuarine and coastal marine waters. The basic methodology proposed by USEPA is to assign criteria values at the 25th percentile of the data at all similar systems, or the 75th percentile of a select group of higher quality waters. While recognizing that the ecological or scientific basis behind such methods is not robust, USEPA has expressed the int)4. C ng le

GBRA, UGRA and the TNRCC recognize that the issue of nutrient criteria is very complex and variable. A special study is being conducted to evaluate the techniques proposed by USEPA to establish numeric nutrient criteria and to assess other approaches that may have greater utility. Historical data have been retrieved from the TNRCC Surface Water Quality Monitoring database and are being analyzed. This study is scheduled to be completed by August 2002.

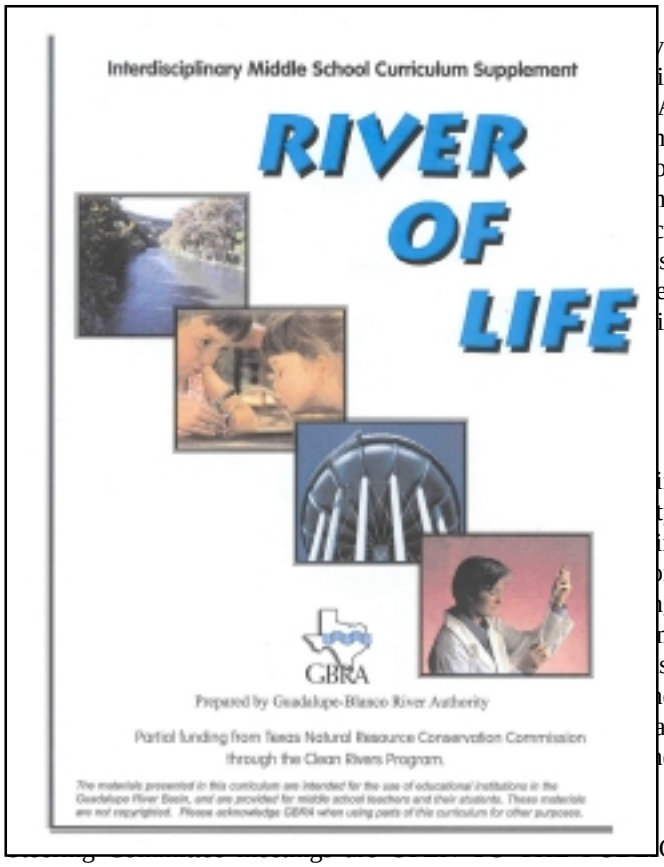
Nonpoint Source Study of Oil Field Impacts in Caldwell County

In Caldwell County there is a history of oil and gas activities. Occasional spills occur in oil transportation and handling. To better document spill effects on water quality, monitoring will be conducted on the San Marcos River above Luling and on Plum Creek near Lockhart. The monitoring would include the conventional parameters and also the major volatile and semi-volatile parameters that are components of crude oil.

Sulfate Study of the Upper Blanco River

The Blanco River at FM 165 (station 12668) has exhibited unusually high sulfate concentrations during late 1999 and 2000. Monitoring sites have been added in the contributing subwatersheds upstream of this site in Blanco County to locate the source(s) of the elevated concentrations. Monthly monitoring began in January 2002, and will continue through December 2002. The data will be assessed to further identify the source, or enhance monitoring in select subwatersheds that appear to be a potential source. If no apparent source can be found, the data could be used to provide support for a criterion adjustment.

PUBLIC INVOLVEMENT AND OUTREACH ACTIVITIES



with the primary purpose of reviewing and approving achievable basin water quality objectives and priorities, considering available technology and economic impacts, and guiding work plans and the allocation of available resources. Notice of meetings of the Steering Committee is made available by way of mailed notices, as well as on the meeting page of the GBRA website (www.gbra.org).

HOW CAN YOU GET INVOLVED? Send an email addressed to dmagin@gbra.org or write a letter to Ms. Debbie Magin, 933 East Court Street, Seguin, Texas 78155. Indicate what topics you are interested in and provide enough information so that you can receive mailed notices of meetings and reports. In addition, the information you provide will help us develop sub-watershed groups that have specific interests and may become involved in designing and providing input on special studies. We highly encourage all participation in our meetings and input on water quality issues in the basin.

Special Sub-committees for Local Water Quality Issues

In addition to the Basin Steering Committee for the CRP, the GBRA has established the Hydroelectric Lake Citizens Advisory Committee and the Coleto Creek Reservoir Public Advisory Committee. The committees represent the user groups impacted by aquatic vegetation and by control measures that may be implemented by GBRA. They are given the opportunity to hear, question and give input on activities to control nuisance, non-native aquatic vegetation each year. The committees have representatives from homeowners associations, potable water systems, bass clubs, boating sales companies, and industries, as well as the Texas Parks and Wildlife Department and Texas Department of Agriculture. These committees receive invitations to the CRP steering committee meetings as well.

Public Education and Volunteer Monitoring Activities

One of the outreach activities by GBRA is the development of a middle school curriculum that includes discussion on the Clean Rivers Program, water quality, and water and wastewater treatment. The curriculum will be distributed to all of the middle schools in the basin.

Mike McCall of GBRA giving a presentation on fishery to students

Other outreach activities include presentations to groups and classes Center to sup d the training of volunteer monitoring groups.

Texas Watch

Texas Watch is a cooperative program of environmental monitoring and communication about the environment. It includes volunteers, the TNRCC and Texas Watch partners. GBRA and UGRA are partners in the Texas Watch program in the basin. The goals of the Texas Watch program are to collect environmental information needed to make environmentally-sound decisions, and to improve communications about environmental issues. The program encourages everyone to ask:

- What questions do we want to answer about the environment?
- What part of the environment are we most concerned with?
- What can I do to help preserve and protect the environment?

GBRA and UGRA support Texas Watch in the Guadalupe River Basin by:

- Providing informational sessions to promote and help establish monitoring groups.
- Providing training to monitors.
- Providing quality control sessions.
- Providing technical expertise to support, expand and maintain monitoring groups.

For information or scheduling contact:
Mike McCall (GBRA) mmcall@gbra.org
Scott Loveland (UGRA) ugrasal@ugra.org
Link to Texas Watch website:
www.texaswatch.geo.swt.edu

WEB SITES

Another mechanism used to keep the public informed is the Internet. Both authorities have Internet web pages (www.gbra.org and www.ugra.org) that provide information to the public on topics of interest in the basin.

The GBRA web page provides links to a range of information on river flows and quality conditions, including:

- Water quality data
  - Data of water quality samples collected by the two river authorities over the years along with data collected by the TNRCC and the USGS.
  - These files can be easily downloaded in either Excel or pdf format.
- Special Studies Reports
  - Available for download in pdf format.
- Schedule of Monitoring Activities
  - A list of all the monitoring sites under a TNRCC-approved QAPP.
- Interactive Map of the Monitoring Sites
  - Click on each site and find out which information is being collected for that location.
- Quality Assurance Information
  - Detailed information on the type of constituents (pollutants) collected by the river authorities.
- Events Inventory
  - A listing of events related to water quality in the Guadalupe and Lavaca-Guadalupe Basins.

ATTACHMENT A

SUMMARY OF DRAFT 2002 305(b) ASSESSMENT OF GUADALUPE RIVER BASIN AND LAVACA-GUADALUPE COASTAL BASIN

Water Body ID	Water Body Name	Impairment/Concern Location	Use/Water Quality Concern	Impairment/ Concern	Parameter of Impairment/Concern	Criterion exceedance
1701	Victoria Barge Canal	Entire segment	Aquatic Life Use	Use Concern	depressed dissolved oxygen	1 of 8 exceed criterion
1801	Guadalupe River Tidal	Entire segment	Aquatic Life Use	Impaired	depressed dissolved oxygen	Listed on 2000 303(d). Insufficient number of 24-hr DO values to determine if criterion supported.
1801	Guadalupe River Tidal	Entire segment	Nutrient Enrichment Concern	Concern	nitrate+nitrite nitrogen	11 of 20 exceed criterion
1802	Guadalupe River Below San Antonio River	Entire segment	Nutrient Enrichment Concern	Concern	nitrate+nitrite nitrogen	17 of 64 exceed criterion
1803A	Elm Creek (unclassified water body)	Entire water body	Aquatic Life Use	Impaired	depressed dissolved oxygen	Listed on 2000 303(d). Insufficient number of 24-hr DO values to determine if criterion supported.
1803A	Elm Creek (unclassified water body)	Entire water body	Contact Recreation Use	Impaired	bacteria	Listed on 2000 303(d). Insufficient data to evaluate changes in water
1803A	Elm Creek (unclassified water body)	Entire water body	Narrative Criteria Concern	Concern	depressed dissolved oxygen	
1803B	Sandies Creek (unclassified water body)	Lower 25 miles of water body	Aquatic Life Use	Impaired	depressed dissolved oxygen	Listed on 2000 303(d). Insufficient number of 24-hr DO values to determine if criterion supported.
1803B	Sandies Creek (unclassified water body)	From the confluence with Elm Creek to upper end of water body	Contact Recreation Use	Impaired	bacteria	GM: EC=131, FC = 336. 10 of 25 single FC samples exceed criterion.
1803B	Sandies Creek (unclassified water body)	From the confluence with Elm Creek to upper end of water body	Aquatic Life Use	Use Concern	depressed dissolved oxygen	10 of 26 exceed criterion. Stream is perennial. High ALU.
1803B	Sandies Creek (unclassified water body)	From the confluence with Elm Creek to upper end of water body	Nutrient Enrichment Concern	Concern	ammonia	12 of 19 exceed criterion.
1803B	Sandies Creek (unclassified water body)	From the confluence with the Guadalupe River to the confluence with Elm Creek	Contact Recreation Use	Impaired	bacteria	GM: EC=174, FC = 311.
1803B	Sandies Creek (unclassified water body)	From the confluence with the Guadalupe River to the confluence with Elm Creek	Contact Recreation Use	Use Concern	bacteria	7 of 25 single FC samples exceed criterion.
1803B	Sandies Creek (unclassified water body)	From the confluence with the Guadalupe River to the confluence with Elm Creek	Aquatic Life Use	Use Concern	depressed dissolved oxygen	16 of 46 exceed criterion. Stream is perennial. High ALU.
1803B	Sandies Creek (unclassified water body)	From the confluence with the Guadalupe River to the confluence with Elm Creek	Nutrient Enrichment Concern	Concern	ammonia	5 of 13 exceed criterion.
1803C	Peach Creek (unclassified water body)	Lower 25 miles of water body	Contact Recreation Use	Impaired	bacteria	GM: EC=135, FC = 266. 17 of 54 single FC samples exceed criterion.
1803C	Peach Creek (unclassified water body)	Lower 25 miles of water body	Nutrient Enrichment Concern	Concern	ammonia	15 of 29 exceed criterion.

ATTACHMENT A (CONCLUDED)

MARY OF DRAFT 2002 305(b) ASSESSMENT OF GUADALUPE RIVER BASIN AND LAVACA-GUADALUPE COASTAL BASIN

	Water Body Name	Impairment/Concern Location	Use/Water Quality Concern	Impairment/ Concern	Parameter of Impairment/Concern	Criterion exceedance
	Guadalupe River Below Comal River	From McQueeney Dam upstream approximately 5 miles	Algal Growth Concern	Concern	excessive algal growth	12 of 41 exceed criterion.
	Geronimo Creek (unclassified water body)	Entire water body	Nutrient Enrichment Concern	Concern	nitrate+nitrite nitrogen	54 of 54 exceed criterion.
	Guadalupe River Above Canyon Lake	From 1 mile upstream Flat Rock Dam to confluence with Camp Meeting Creek	Contact Recreation Use	Impaired	bacteria	GM: EC=238, FC = 423.
	Guadalupe River Above Canyon Lake	From 1 mile upstream Flat Rock Dam to confluence with Camp Meeting Creek	Contact Recreation Use	Use Concern	bacteria	3 of 10 single EC samples exceed criterion. 4 of 10 single FC samples exceed criterion.
	Guadalupe River Above Canyon Lake	From RR 394 1 mile downstream	Contact Recreation Use	Use Concern-Limited Data	bacteria	GM: EC=283, FC = 491. 5 of 8 single FC samples exceed criterion.
	Camp Meeting Creek (unclassified water body)	Lower 4 miles of water body	Aquatic Life Use	Impaired	depressed dissolved oxygen	Listed on 2000 303(d). Insufficient number of 24-hr DO values to determine if criterion supported.
	Plum Creek	Confluence with San Marcos River to confluence with Clear Fork Plum Creek	Nutrient Enrichment Concern	Concern	ammonia	6 of 22 exceed criterion.
	Plum Creek	Confluence with San Marcos River to confluence with Clear Fork Plum Creek	Nutrient Enrichment Concern	Concern	nitrate+nitrite nitrogen	12 of 40 exceed criterion.
	Plum Creek	From approx. 1 mi downstream of Caldwell CR 202 to upper end of segment	Contact Recreation Use	Use Concern-Limited Data	bacteria	GM: FC = 268.
	Plum Creek	From confluence Clear Fork Plum Creek to approx. 1 mi downstream of Caldwell CR 202	Nutrient Enrichment Concern	Concern	nitrate+nitrite nitrogen	11 of 16 exceed criterion.
	Plum Creek	From confluence Clear Fork Plum Creek to approx. 1 mi downstream of Caldwell CR 202	Nutrient Enrichment Concern	Concern	total phosphorus	8 of 16 exceed criterion.
	Cypress Creek	Entire segment	Aquatic Life Use	Impaired	depressed dissolved oxygen	Listed on 2000 303(d). Insufficient number of 24-hr DO values to determine if criterion supported.
	South Fork Guadalupe River	From lower 1.5 mi to approx 0.5 mile upstream of Lange Ravine	Contact Recreation Use	Impaired	bacteria	GM: EC=168 FC = 304. 7 of 19 single FC samples exceed criterion.

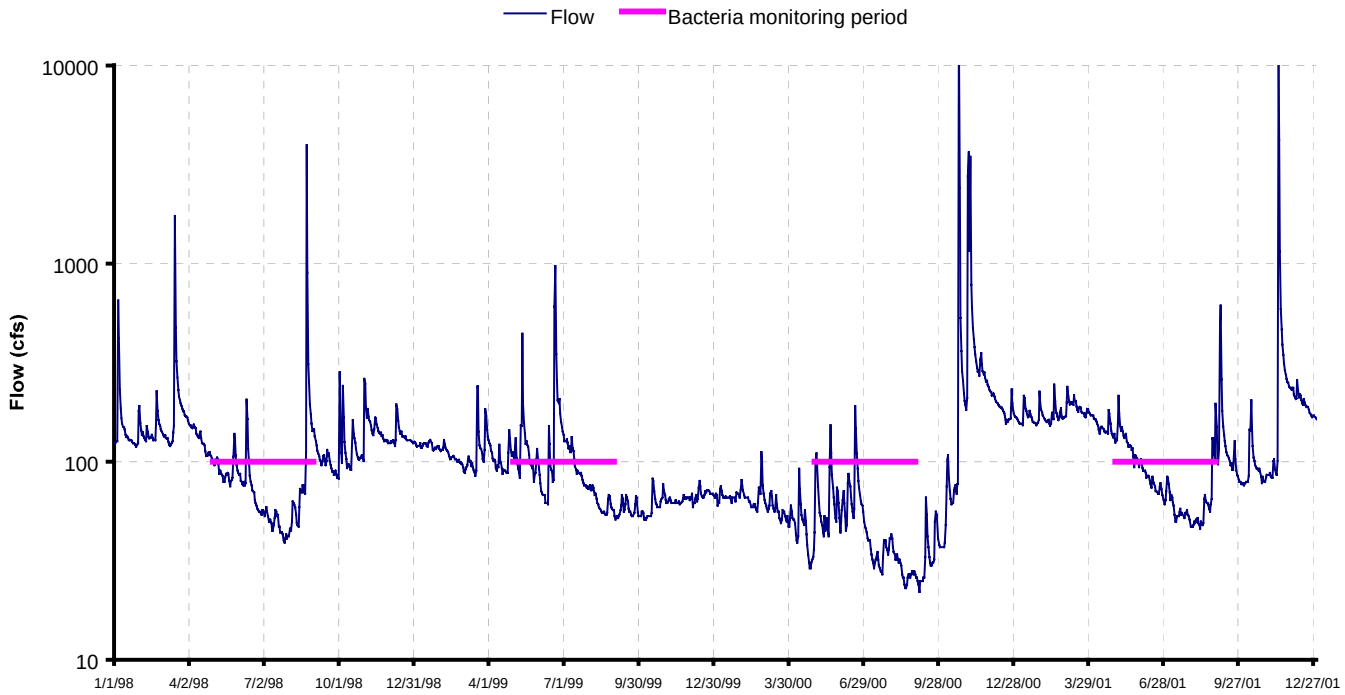
eometric Mean
cal Coliform
Coli

MAY THROUGH AUGUST BACTERIA DATA OF UPPER GUADALUPE RIVER AT FLOW BELOW 100 CFS
(Geometric Mean, GM, in cfu/dL)

Station ID	Location on Guadalupe River	1998 data				1999 data				2000 data				2001 data			
		FC		EC		FC		EC		FC		EC		FC		EC	
		Num	GM	Num	GM	Num	GM	Num	GM	Num	GM	Num	GM	Num	GM	Num	GM
12621	SH 39 NEAR HUNT	14	63	14	23	11	42	11	26	11	40	11	25	13	49	13	34
16241	KELLY CREEK ROAD	14	22	14	16	11	45	11	28	12	60	12	41	13	17	13	11
12620	INGRAM DAM	14	12	14	9	11	16	11	7	12	15	12	10	13	10	13	6
12619	BEAR CREEK ROAD	14	50	14	40	11	50	11	20	12	52	12	28	13	22	13	15
12618	UGRA LAKE DAM	14	14	14	11	11	9	11	6	12	19	12	13	13	11	13	7
16244	FOOTBRIDGE IN LOUISE HAYS PARK	14	122	14	82	11	142	11	90	12	**458**	12	**146**	13	**277**	13	78
12617	SH 16 BRIDGE	14	**707**	14	**526**	11	**842**	11	**541**	12	**1158**	12	**515**	13	**602**	13	**332**
16243	LOUISE HAYS PARK DAM	14	**214**	14	**167**	11	**239**	11	**140**	12	**308**	12	**195**	13	171	13	93
12615	KERRVILLE STATE PARK	14	**256**	14	**159**	12	**553**	12	**378**	12	**375**	12	**219**	13	**409**	13	**257**
12610	0.1 MI ABOVE TURTLE CREEK	14	48	14	24	12	53	12	23	13	46	13	26	13	73	13	27
12608	CENTER POINT LAKE	16	174	16	101	13	147	13	64	13	175	13	65	13	**246**	13	52
16242	RR1350	14	83	14	50	12	109	12	50	12	71	12	32	13	169	13	35
12605	HERMANN SONS' HOME	15	70	15	46	13	128	13	51	13	71	13	36	13	92	13	32
12603	IH 10 IN COMFORT	14	98	14	70	12	171	12	84	12	98	12	26	13	121	13	44

Notes:
1. FC = Fecal Coliform. FC criterion = 200 cfu/dL (colonies forming unit/deci-liter).
2. EC = E. Coli. EC criterion = 126 cfu/dL.
3. Flow measured at USGS gage number 08166200 at Kerrville.

USGS GAGED FLOW OF GUADALUPE RIVER AT KERRVILLE, 1998-2001



ATTACHMENT C
RESULTS OF INTENSIVE 24-HOUR DISSOLVED OXYGEN MONITORING EVENTS

Station ID	Location	Criteria (mg/L)		End date of measurements	24-hr avg (mg/L)	24-hr max (mg/L)	24-hr min (mg/L)	# measurements during 24-hr
		24-hr avg	Minimum					
12546	CAMP MEETING CREEK, 0.1 KM ABOVE CONFLUENCE WITH GUADALUPE IN KERRVILLE	6	4	3/21/01	11.48	14.74	9.32	25
				4/19/01	7.57	11.25	5.41	26
				5/17/01	6.34	9.01	5.13	22
				6/14/01	5.66	7.62	4.24	30
				7/18/01	6.42	9.89	4.23	25
				8/22/01	3.86	5.68	2.64	25
12674	CYPRESS CREEK AT FM 12 AT WIMBERLEY	6	4	3/20/01	11.59	12.50	11.03	24
				4/18/01	9.29	9.88	8.70	25
				5/16/01	8.43	8.97	8.08	25
				6/13/01	6.78	7.27	6.42	25
				7/17/01	8.09	9.01	7.61	24
				8/21/01	6.97	7.41	6.48	24
15997	ELM CREEK AT GONZALES CR534, APPROX. 6.7KM ESE OF NIXON	5	3	5/25/00	5.15	8.02	3.95	25
				6/29/00	5.14	8.06	3.94	25
				6/28/01	5.18	5.52	4.98	24
15998	SANDIES CREEK AT FM1116, 7.4KM EAST OF SMILEY AND APPROX. 3KM UPSTREAM OF CONFL. WITH ELM CREEK	5	3	5/25/00	5.18	5.32	4.80	25
				6/30/00	5.17	5.28	4.78	25
				7/22/00	4.47	5.55	3.82	25
				8/31/00	4.18	5.31	3.68	25
				9/10/00	4.25	5.02	3.68	25
				6/27/01	2.30	5.72	0.11	24
				7/24/01	4.42	5.08	4.02	24

This report was prepared by PBS&J in cooperation with the Texas Natural Resource Conservation Commission, the Guadalupe-Blanco River Authority and the Upper Guadalupe River Authority.