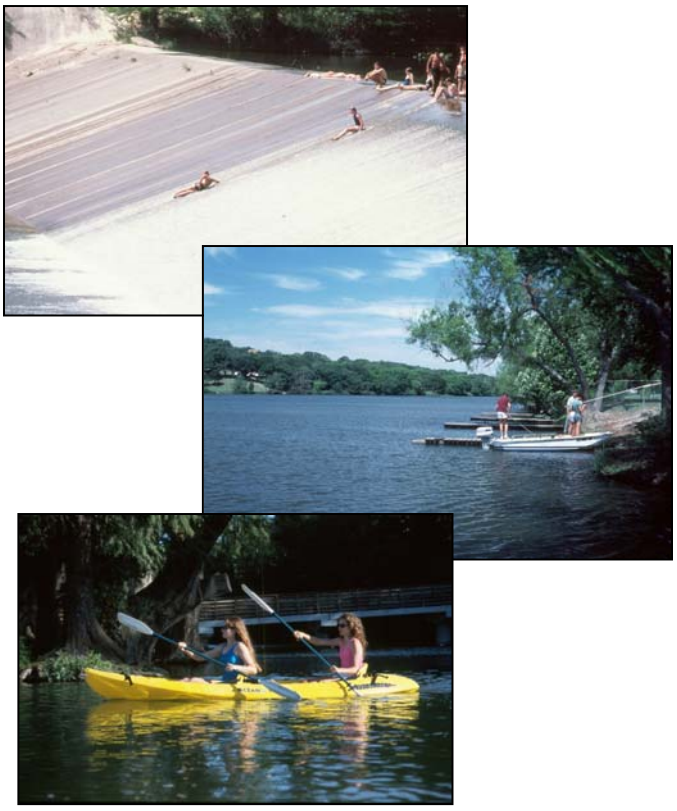
BASIN HIGHLIGHTS REPORT
SPRING 2005

GUADALUPE RIVER BASIN
and the
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 Commission on Environmental Quality (TCEQ), 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 TCEQ. The activities described in this report include water quality monitoring, a review of water quality data, and public communication efforts.



Major CRP Topics of The Past Year

The weather patterns in 2004 have been relatively wet leading to a year of higher stream flows and lake levels. The GBRA and the UGRA have not noted any significant changes in agricultural operations, reservoir management, or recreational activities that might impact water quality.

In the last year the major focus of the CRP in the basins has been in monitoring 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.

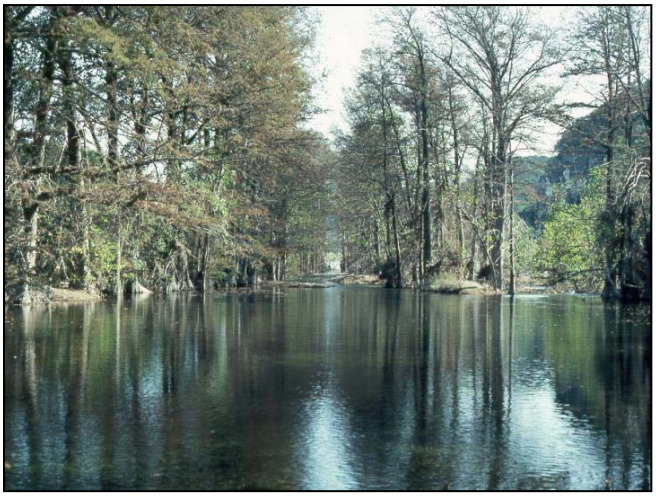
In November 2004 the TCEQ revised its draft 2004 Clean Water Act (CWA) Section 305(b) Water Quality Inventory and 303(d) List of water bodies that are not meeting water quality standards. The 2004 inventory provides an update on the status of 195 targeted water bodies (out of the 732 assessed in 2002). The assessments were conducted for water quality samples collected between March 1, 1998 and February 28, 2003. While water quality in the basins is generally good, a number of locations have been identified with water quality issues:

- Elevated nitrate-N level in the Guadalupe River below the San Antonio River confluence.
- High nitrate-N concentrations in Geronimo Creek.
- Concern of nutrient and chlorophyll *a* levels in Lakes Dunlap and McQueeney.
- Elevated bacteria and depressed dissolved oxygen levels at a number of smaller streams in the basin with Total Maximum Daily Load (TMDL) studies underway.
- A new TMDL study for bacteria has been initiated for Guadalupe River above Canyon Lake in the Kerr County area.

A more detailed discussion of these issues is provided in the *Water Quality Data Review* section of this report.

Portions of the basin continue to experience rapid urbanization. For example, the Eastern Hays County located in the upper Plum Creek Watershed has seen a population increase of 108% between 1990 and 2000. A water quality issue of urban development is non-point source (NPS) pollution. Urbanization tends to change the characteristics of runoff from the land and also introduces wastewater disposal issues. With a grant from the Texas Water Development Board (TWDB), GBRA has initiated a regional wastewater and water quality planning study for Eastern Hays County.

A major issue facing the region is the water supply for the San Antonio area, allowing compliance with restrictions on Edwards Aquifer pumping and thus protecting the Comal Springs and San Marcos Springs that are a major component of the Guadalupe River. GBRA has been an active member of the Region L Water Supply Planning effort. One of the water supply projects recommended in that planning effort is the Lower Guadalupe Water Supply Project. This project would divert water from the river downstream of the confluence of the San Antonio River and before it enters San Antonio Bay. GBRA has been working closely with the San Antonio River Authority (SARA) and the San Antonio Water System (SAWS) in the environmental studies for that project.



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. 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 TCEQ-approved Quality Assurance Project Plan for September 2004 through August 2005.

The Village of Wimberley (VOW), GBRA, and the Wimberley Valley Watershed Association (WVWA) are jointly conducting the Blanco River-Cypress Creek Water Quality Monitoring Study. The goals of this study include establishing a baseline of the water quality data, identifying potential pollution problems, documenting spatial and temporal changes, determining impacts of point and nonpoint source pollution, and assessing compliance with water quality standards. The study will also provide recommendations for local planning efforts to protect water quality. The GBRA is providing technical assistance and oversight of monitoring activities in addition to the laboratory analysis and quality assurance support.

The complete monitoring schedule is updated frequently on the GBRA web page at www.gbra.org. A map is attached showing the distribution of the monitoring sites plus activities that may affect water quality, such as major communities where wastewater discharges are located, areas with a concentration of poultry activity, and the locations of major oil and gas fields. The next map shows the locations of wastewater dischargers with changes from 2000 conditions highlighted, such as new permits and permits with increase in flow limit. Permits with a phosphorus limit are also indicated. The map also shows the locations of land application permits. These maps are available on the GBRA web page.

Quality Assurance Considerations

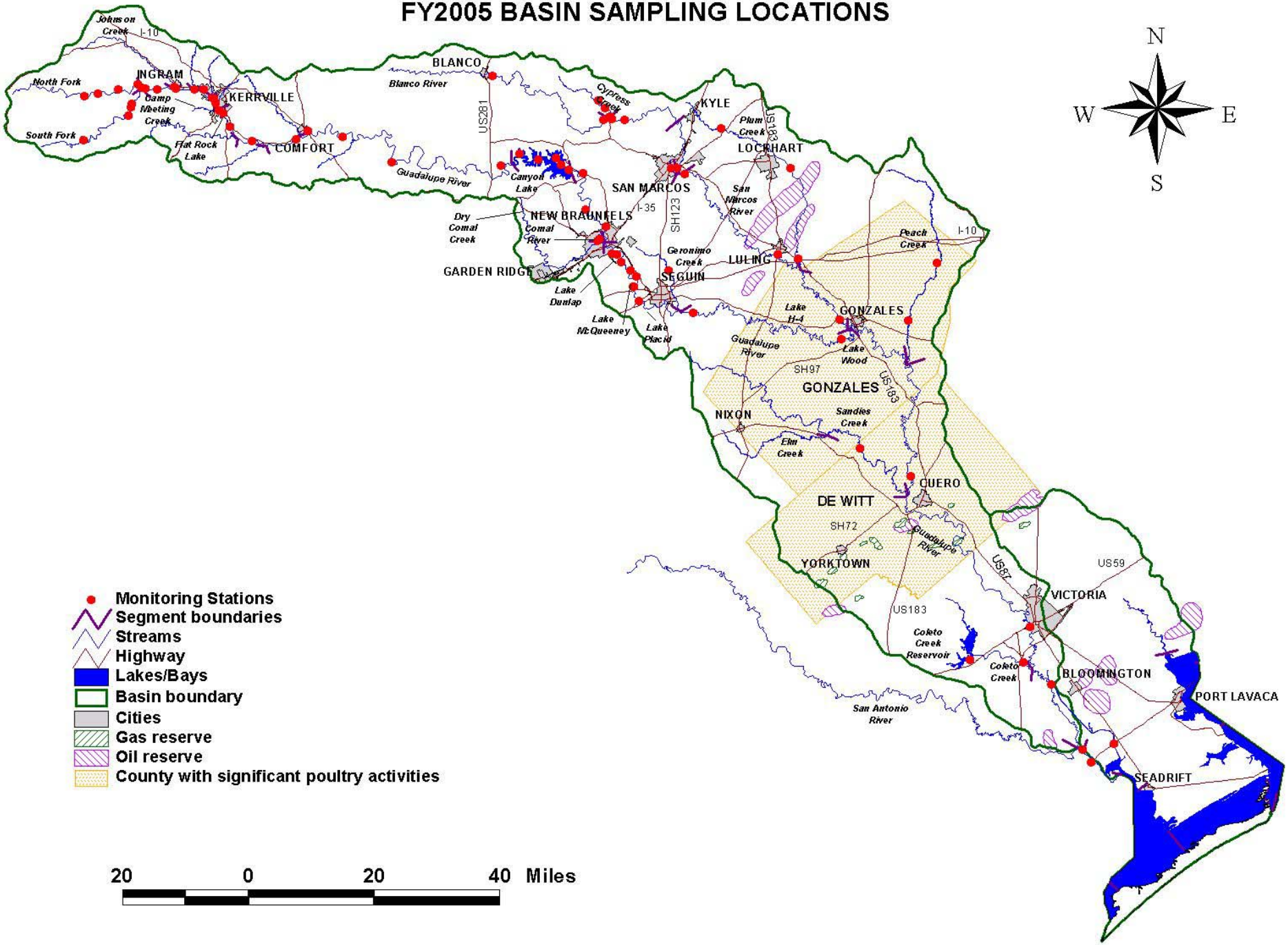
All data are collected under a Quality Assurance Project Plan (QAPP) developed and approved in coordination with the TCEQ. This plan exists to provide the level of consistency and scientific validity needed for environmental monitoring and decision making for river basins across the state. The QAPP is a document required by the TCEQ that documents and references all aspects of sample collection, analysis and data management procedures. The QAPP includes sections on the project organization, background, explanation of how the data will be used, training requirements, record keeping, data management, validation and verification, methodologies, and equipment maintenance. By having the important details specified, data collected by different agencies have consistent and comparable quality. Therefore, it has been possible to consider the monitoring data from all agencies together for statewide assessment, enhancing the overall value of the data collected.

FY 2005 (Sept. 2004 through Aug. 2005) Summary of Sampling for the Guadalupe & Lavaca-Guadalupe Basins

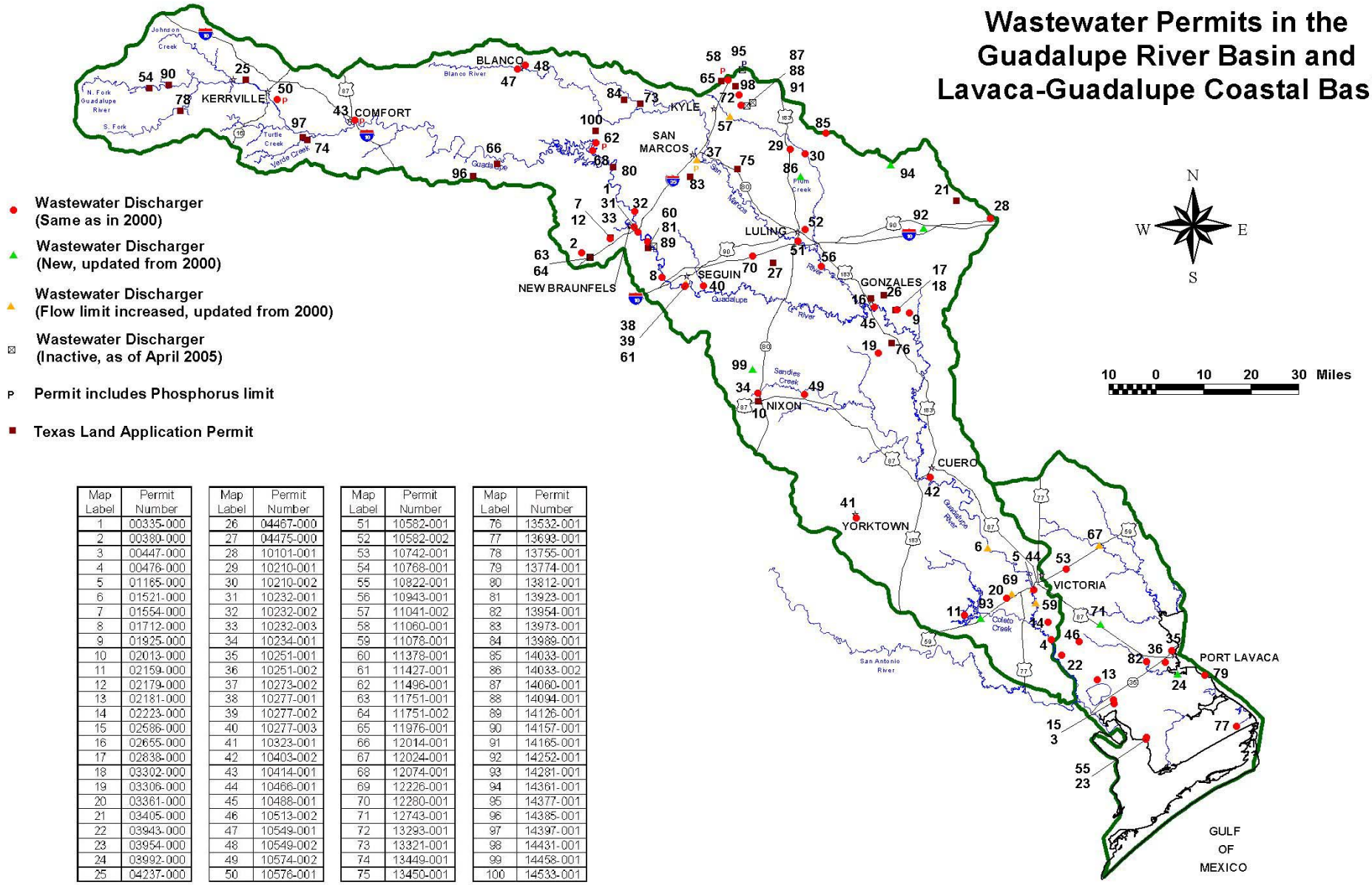
Sampling Entity	Field	Conventional	Bacteria	Biological and Habitat	24 Hr DO	Metals in Water	Metals in Sediment	Organics in Water	Fish Tissue
GBRA	18 sites monthly; 1 site bimonthly; 7 sites quarterly; 1 site semi-annually; 5 sites (8 times)	18 sites monthly; 1 site bimonthly; 7 sites quarterly; 5 sites (8 times)	18 sites monthly; 1 site bimonthly; 7 sites quarterly; 5 sites (8 times)	2 sites semi-annually; 3 sites annually	1 site (4 times); 1 site (2 times)	6 sites annually		2 sites annually	
UGRA (Kerr Co.)	10 sites quarterly	10 sites quarterly	10 sites quarterly; 19 sites weekly (May - Aug)	2 sites semi-annually		2 sites annually			
TCEQ	14 sites quarterly	14 sites quarterly	14 sites quarterly		1 site (4 times)	1 site semi-annually	1 site semi-annually		
Village of Wimberley	6 sites monthly	6 sites monthly	6 sites monthly		1 site (12 times)				
TPWD									1 site annually

Descriptions for sampling types are included on page 5.

FY2005 BASIN SAMPLING LOCATIONS



Wastewater Permits in the Guadalupe River Basin and Lavaca-Guadalupe Coastal Basin



Map Label	Permit Number
1	00335-000
2	00380-000
3	00447-000
4	00476-000
5	01165-000
6	01521-000
7	01554-000
8	01712-000
9	01925-000
10	02013-000
11	02159-000
12	02179-000
13	02181-000
14	02223-000
15	02586-000
16	02655-000
17	02838-000
18	03302-000
19	03306-000
20	03361-000
21	03405-000
22	03943-000
23	03954-000
24	03992-000
25	04237-000

Map Label	Permit Number
26	04467-000
27	04475-000
28	10101-001
29	10210-001
30	10210-002
31	10232-001
32	10232-002
33	10232-003
34	10234-001
35	10251-001
36	10251-002
37	10273-002
38	10277-001
39	10277-002
40	10277-003
41	10323-001
42	10403-002
43	10414-001
44	10466-001
45	10488-001
46	10513-002
47	10549-001
48	10549-002
49	10574-002
50	10576-001

Map Label	Permit Number
51	10582-001
52	10582-002
53	10742-001
54	10768-001
55	10822-001
56	10943-001
57	11041-002
58	11060-001
59	11078-001
60	11378-001
61	11427-001
62	11496-001
63	11751-001
64	11751-002
65	11976-001
66	12014-001
67	12024-001
68	12074-001
69	12226-001
70	12280-001
71	12743-001
72	13293-001
73	13321-001
74	13449-001
75	13450-001

Map Label	Permit Number
76	13532-001
77	13693-001
78	13755-001
79	13774-001
80	13812-001
81	13923-001
82	13954-001
83	13973-001
84	13989-001
85	14033-001
86	14033-002
87	14060-001
88	14094-001
89	14126-001
90	14157-001
91	14165-001
92	14252-001
93	14281-001
94	14361-001
95	14377-001
96	14385-001
97	14397-001
98	14431-001
99	14458-001
100	14533-001

Map Label	Permit Number	Facility Name	Permitted flow (MGD)	Remark
1	00335-000	Mission Valley Fabrics Plant	3	
2	00380-000	Servtex Plant	0.058	
3	00447-000	Union Carbide Seadrift Plant	17.8	
4	00476-000	Invista Sarl Victoria Site	21.8	
5	01165-000	Victoria Power Station	203.2	Flow limit increased
6	01521-000	Sam Rayburn Plant	34.26	Flow limit increased
7	01554-000	Chemical Lime New Braunfels		TLAP
8	01712-000	Structural Metals	0.12	
9	01925-000	Kennard Clay Mine Blue & White		
10	02013-000	Holmes Foods Nixon Processing Plant		TLAP
11	02159-000	Coleto Creek Power Station	557	
12	02179-000	Balcones Plant		
13	02181-000	BP AMOCO Green Lake Complex	1.2	
14	02223-000	Briggs Plant	0.048	
15	02586-000	76 Seadrift Coke	0.193	
16	02655-000	Burleson Helms Mining Site		TLAP
17	02838-000	Kitchen Pride Mushroom Farms		TLAP
18	03302-000	Abercrombie Clay Mine		
19	03306-000	Johnson Clay Mines		
20	03361-000	Victoria Facility		
21	03405-000	Bentonite Clay Mine		TLAP
22	03943-000	Air Liquide America Victoria Air Separation Plant	0.13	
23	03954-000	Dallas Avenue Water Plant	0.2	
24	03992-000	R&G Shrimp Farm	3.3	New
25	04237-000	Equitech-Bio Inc		TLAP
26	04467-000	Gonzales Beneficial Land Use Site		TLAP
27	04475-000	K4 Ranches		TLAP
28	10101-001	City of Flatonia WWTP	0.25	
29	10210-001	City of Lockhart WWTP 1	1.1	
30	10210-002	Lockhart WWTP 2	1.5	
31	10232-001	South Kuehler	4.2	
32	10232-002	Gruene Road Plant	1.1	
33	10232-003	North Kuehler WWTP	3.1	
34	10234-001	City of Nixon WWTP	0.45	
35	10251-001	Lynn's Bayou WWTP	1.5	
36	10251-002	Blardone Plant	0.5	
37	10273-002	City of San Marcos WWTP 2	9	Flow limit increased, P limit = 1 mg/L
38	10277-001	Walnut Branch WWTP	4.9	Flow limit increased
39	10277-002	City of Seguin WWTP	0.04	
40	10277-003	Geronimo Creek WWTP	2.13	
41	10323-001	City of Yorktown	0.26	
42	10403-002	City of Cuero WWTP	1.5	
43	10414-001	Comfort WWTP	0.35	P limit = 1 mg/L
44	10466-001	Victoria Willow Street WWTP	2.5	
45	10488-001	City of Gonzales WWTP	1.5	
46	10513-002	Victoria CO WCID 1 WWTP	0.3	
47	10549-001	City of Blanco Water Treatment Plant	0.05	
48	10549-002	City of Blanco WWTP	0.225	
49	10574-002	Smiley WWTP	0.042	
50	10576-001	City of Kerrville WWTP	4.5	P limit = 1 mg/L
51	10582-001	Luling South WWTP	0.5	
52	10582-002	Luling North WWTP	0.9	
53	10742-001	Brentwood Manor Subd	0.05	
54	10768-001	Presbyterian Mo Ranch Assembly		TLAP
55	10822-001	City of Seadrift	0.3	
56	10943-001	TX Rehab Hospital	0.04	
57	11041-002	City of Kyle WWTP	1.5	Flow limit increased

Notes:
"New" or "Flow limit increased" - updated from 2000
Inactive - as of April 2005
TLAP - Texas Land Application Permit

Map Label	Permit Number	Facility Name	Permitted flow (MGD)	Remark
58	11060-001	City of Buda WWTP	0.3	P limit = 2 mg/L
59	11078-001	Victoria Regional WWTP	9.6	Flow limit increased
60	11378-001	GBRA Dunlap WWTP	0.16	
61	11427-001	Springs Hill WWTP	0.3	
62	11496-001	Canyon Park Estates WWTP	0.1	P limit = 1 mg/L
63	11751-001	GUADCO MUD 1 & 2		TLAP
64	11751-002	GUADCO MUD 1 & 2	0.35	Inactive
65	11976-001	Texas Lehigh Cement WWTP		TLAP
66	12014-001	Guadalupe River State Park		TLAP
67	12024-001	Victoria CO Southbound Rest Area	0.02	Flow limit increased
68	12074-001	Canyon Lake Recreational Area WWTP	0.013	
69	12226-001	Aloe Field WWTP	0.22	Flow limit increased
70	12280-001	Guadalupe County Rest Area	0.015	
71	12743-001	Victoria CO WCID 2	0.072	New
72	13293-001	Goforth WWTP	0.042	
73	13321-001	Blue Hole WWTP		TLAP
74	13449-001	The Camp Recovery WWTP		TLAP
75	13450-001	City of Martindale		TLAP
76	13532-001	Disciples Conference Center WWTP		TLAP
77	13693-001	Port O Connor MUD WWTP	0.6	
78	13755-001	River Inn WWTP		TLAP
79	13774-001	SCCCWCID 1	0.075	
80	13812-001	Mountain Valley Intermediate School		TLAP
81	13923-001	Sauder Farms Plant	0.08	Inactive
82	13954-001	Crestview Subdivision	0.03	
83	13973-001	Stokes MHP WWTP		TLAP
84	13989-001	Woodcreek WWTP		TLAP
85	14033-001	Dale Pump Station WTP	0.006	
86	14033-002	Brownsboro WTP	0.003	New
87	14060-001	Railyard WWTP	0.023	
88	14094-001	Brushy Creek WWTP	0.026	Inactive
89	14126-001	Lake Dunlap		TLAP
90	14157-001	Bear Creek Scout Reservation WWTP		TLAP
91	14165-001	Railyard Parklands Plant	0.08	Inactive
92	14252-001	City of Waelder WWTP	0.12	New
93	14281-001	Devereux Foundation	0.024	New
94	14361-001	Delhi Iron Removal Plant	0.027	New
95	14377-001	A & M Heep WWTP	0.25	Inactive, P limit = 1 mg/L
96	14385-001	Cordillera Ranch Water Recycling Facility		TLAP
97	14397-001	Elmwood MHP WTP		TLAP
98	14431-001	Castletop Capital Hays ABC WWTP		TLAP
99	14458-001	Schertz Seguin Local Government WTP	0.75	New
100	14533-001	Canyon Lake High School WWTP		TLAP

Notes:
"New" or "Flow limit increased" - updated from 2000
Inactive - as of April 2005
TLAP - Texas Land Application Permit

Description of Water Quality Parameters

Field parameters are those water quality constituents that can be obtained on-site and generally include: dissolved oxygen (DO), conductivity, pH, temperature, stream flow (not in reservoirs), and secchi disc depth (reservoirs only).

Dissolved oxygen indicates the amount of oxygen available in the stream to support aquatic life. DO can be reduced by the decomposition of organic matter.

Conductivity is a measure of the water body's ability to conduct electricity and it indicates the approximate levels of dissolved salts, such as chloride, sulfate and sodium in the stream. Elevated concentrations of dissolved salts can impact the water as a drinking water source and as a suitable aquatic habitat.

pH is a measure of the hydrogen ion concentration in an aqueous solution. It is a measure of the acidity or basic property of the water. Chemical and biological processes can 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 affects 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 waste inputs from point and non-point sources.

Secchi disc transparency is a measure of the depth to which light is transmitted through the water column, 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 clarity 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 reduced toxicity 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 of dissolved solids.

Bacteria The *E. coli* test is now used as an indicator of the possible presence of disease-causing organisms.

Biological and Habitat assessment includes collection of fish community data, benthic macroinvertebrate (insects) data, and measurement of physical habitat parameters. This information is used to determine whether the stream adequately supports a diverse and desirable biological community. The physical, chemical and biological data are used together to provide an integrated assessment of aquatic life support.

Fish Sampling by Electroshocking

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 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.

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 TCEQ to have water quality issues due mainly to nutrient enrichment, elevated bacteria levels, or depressed dissolved oxygen. The TCEQ 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 listing of 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 2004 Water Quality Inventory (revised in November 2004) provides an update on the status of 195 targeted water bodies. These water bodies were primarily those identified as having *Use Concern-Limited Data* (see section below) in 2002 because the data set for them was too small to allow for a full assessment, but a number of measurements did not meet the criteria defined in the standards. The updated inventory was based on water quality samples collected between March 1, 1998 and February 28, 2003. The draft inventory and the methodology for assessment are available on the TCEQ web page. (www.tnrcc.state.tx.us/water/quality/305_303.html)

The box below is a description of the different types of categories used by the TCEQ to describe water quality conditions. These categories are typically based upon whether a certain percentage of measurements do not meet the surface water quality criteria or screening levels set by the TCEQ.

Impairments and/or Concerns

The draft 2004 305(b) Water Quality Inventory identified the following numbers of areas with *Impairment* or *Concern*.

	Impairment	*Concern*
Nutrient enrichment		**10**
Depressed DO	**5**	**6**
Bacteria	**7**	**2**
Excessive algal growth		**1**

Categories of Water Quality Conditions

The term ***Impairment*** is assigned by TCEQ to a portion of a water body when certain water quality constituents reach threshold concentrations (as specified in the Texas Surface Water Quality Standards or screening procedure documents) for a minimum number of times over a period of five years. This designation indicates that TCEQ believes the uses of the water body (drinking water supply, recreation, aquatic life, etc.) may have been *impaired*. In other words, the fish may not be able to get enough oxygen to survive, the water may not be suitable for swimming, 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 TCEQ'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 TCEQ, 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.

Some water bodies are identified with ***Concerns for Use Attainment (primary concerns)***. These concerns are identified for parameters such as dissolved oxygen which are directly tied to support of designated uses and criteria adopted in the Texas Surface Water Quality Standards.

• ***Use Concerns-Limited Data*** are identified for parameters where less than 10 samples were available for assessment and some exceedances of the water quality criteria were identified.
• ***Use Concerns*** are identified for parameters that support the designated use as determined by an adequate number of samples, but a few reported exceedances of the water quality criteria indicated a potential water quality problem.

Water Quality or Secondary Concerns are identified for parameters such as nutrients that are not tied to support of a designated use with a quantitative criterion. Screening levels used to identify these concerns have generally not been adopted as standards with the exception of secondary drinking water standards.

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

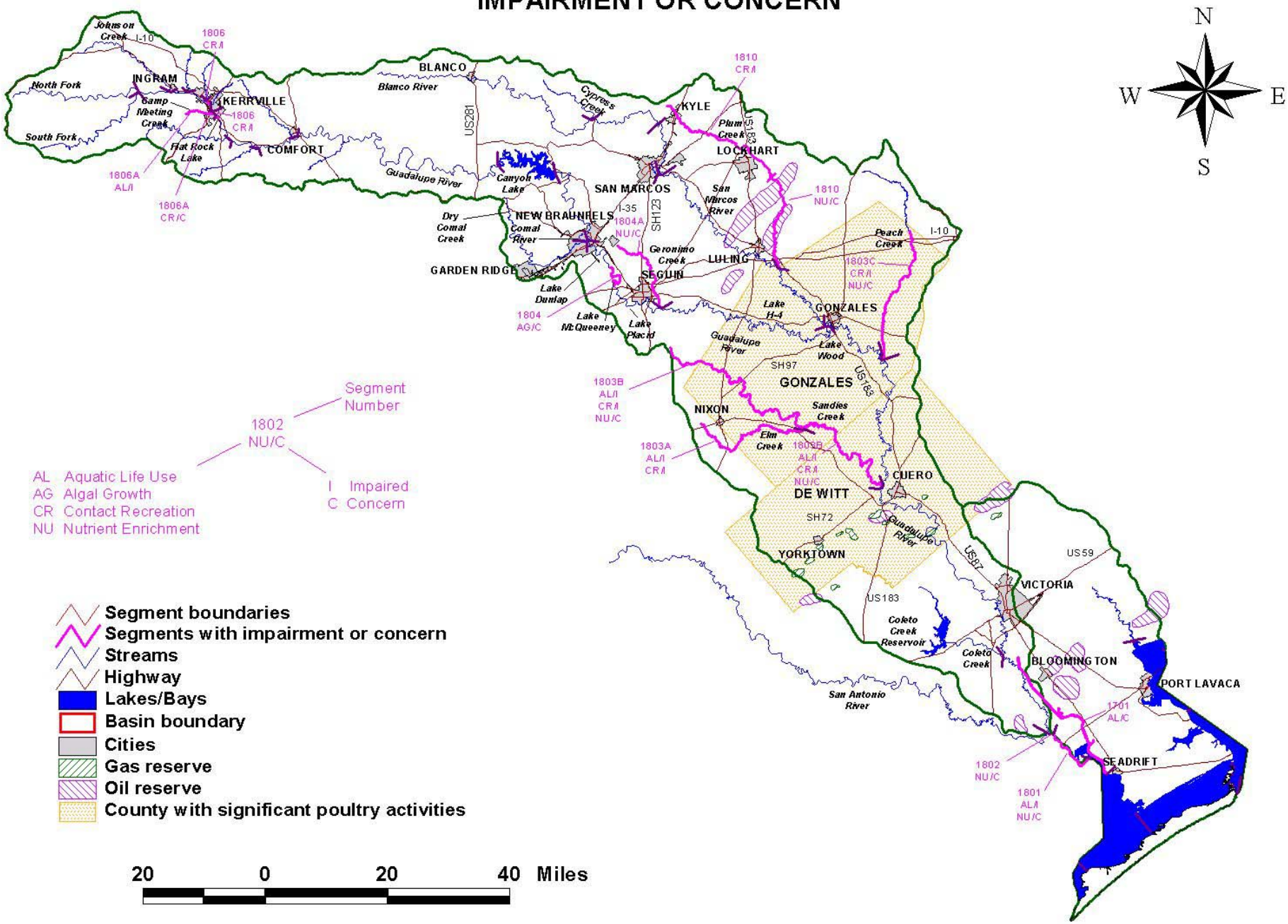
Water Body ID	Area	Parameter of *Impairment*	Draft 2002 List	Draft 2004 List
1801	Guadalupe River Tidal (entire segment)	DO	X	X
1803A	Elm Creek (entire water body)	DO, Bacteria	X	X
1803B	Sandies Creek (from the confluence with Elm Creek to upper end of water body)	DO		X
1803B	Sandies Creek (from the confluence with Elm Creek to upper end of water body)	Bacteria	X	X
1803B	Sandies Creek (from the confluence with the Guadalupe River to the confluence with Elm Ck)	DO	X	X
1803B	Sandies Creek (from the confluence with the Guadalupe River to the confluence with Elm Ck)	Bacteria	X	X
1803C	Peach Creek (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	X
1806	Guadalupe River Above Canyon Lake (from RR 394 1 mile downstream)	Bacteria	X	X
1806A	Camp Meeting Creek	DO	X (entire water body)	X (upper 9 miles)
1810	Plum Creek (from approx. 1 mile downstream of Caldwell CR202 to upper end of segment)	Bacteria		X
1815	Cypress Creek (lower and upper 7 miles of segment)	DO	X	

The reader should be aware that most of the waters so identified are small creeks, many of which are not designated water quality segments and therefore do not have water quality criteria developed for their unique hydrological conditions. They are assessed using the criteria applied to the nearest downstream designated segment. The nearest downstream segment is often the Guadalupe River which is significantly different in physical conditions from a small stream. Moreover, a small stream may be dry most of the time so that monitoring may be dominated by runoff samples. It is unclear how small streams should be assessed, but at the current time, the method used does not appear to reflect actual stream conditions.

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

Plum Creek at Plum Creek Road

SEGMENTS WITH WATER QUALITY IMPAIRMENT OR CONCERN



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

Dissolved Oxygen (Aquatic Life Use)

There are four water bodies listed for DO on the draft 2004 303(d) list. These are Camp Meeting Creek (segment 1806A), Elm Creek (segment 1803A), Sandies Creek (segment 1803B), and Guadalupe River Tidal (segment 1801).

For Camp Meeting Creek, Sandies Creek and Elm Creek, impairment has been verified with intensive monitoring. TMDL studies are underway for these water bodies.

UGRA, Kerr County, and the City of Kerrville have implemented a plan to abate the Camp Meeting Creek impairment. Over 250 mobile homes situated on very small lots along Camp Meeting Creek have historically had septic problems. There are strong indications that this septic load is degrading the Creeks water quality. Funds (Grants, matching funds) have been secured to service this area (outside the City Limits) with sewer service. This project includes 4 phases, with phase 1 completed including over 70 sewer connections. Phases 2 and 3 will be started in March 2005, and Phase 4 will be started in August 2005. UGRA continues to monitor the Creek with CRP funds, and hopes to see water quality improvements soon.

For Segment 1801, additional data and information will be collected before a TMDL is scheduled. Intensive 24-hour DO monitoring has been conducted 12 times from 2002 to 2004 at Station 12577, Guadalupe River Tidal Bridge at SH 35 NE of Tivoli. Only two 24-hr average results are below the segment criterion of 5 mg/L. Further monitoring has been scheduled in FY05.

In the 2002 assessment, a use concern has been identified for Segment 1701 due to depressed dissolved oxygen. This segment has a limited amount of data at the time of the assessment and the concern was based on one incident of low DO. Data since 2001 are all well above the segment criterion of 4 mg/L. TCEQ has commented that this segment will be reassessed in 2006 with the most current and available data.

Bacteria (Contact Recreation Use)

There are five water bodies listed for bacteria on the draft 2004 303(d) list. These are Elm Creek (segment 1803A), Sandies Creek (segment 1803B), Peach Creek (segment 1803C), Guadalupe River above Canyon Lake (segment 1806), and Plum Creek (segment 1810).

TMDL studies are underway for Elm Creek, Sandies Creek, Peach Creek, and Guadalupe River above Canyon Lake. Intensive monitoring has been conducted for Elm Creek and Sandies Creek for verification of impairment. Elm Creek was found not to be impaired but it is being considered in the overall load allocation for the Sandies Creek watershed. For Plum Creek, additional data and information will be collected before a TMDL is scheduled.

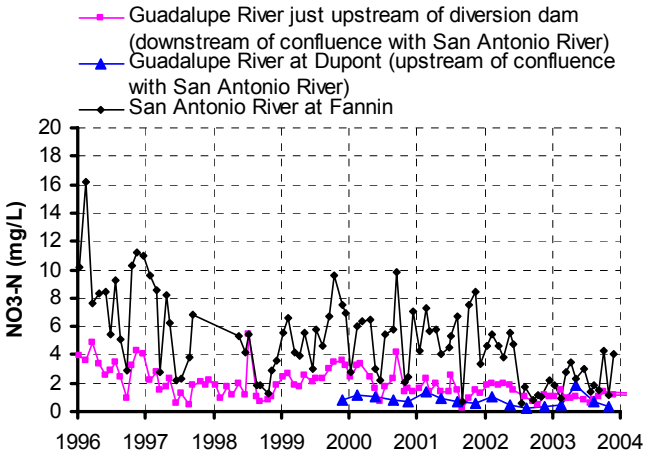
For many years, there has been an issue with elevated bacteria levels at a few stations in the Kerrville area. UGRA has been monitoring the bacteria levels in the Upper Guadalupe River from May through August in approximately weekly intervals for a number of years. The few stations with consistently high bacteria levels are all located in parks in Kerrville. All the investigations to date have indicated the cause is high bird populations under the bridges. UGRA staff are working with TxDOT personnel to install netting to limit the bird populations. UGRA continues its aggressive E.coli monitoring at the popular swimming areas in the County.

Bacterial Source Tracking (BST) will be employed in the TMDL study for Segment 1806. BST can assist in source identification, thus providing valuable information in the development of load allocation and implementation plan targeted at the specific sources of fecal wastes. BST has been used in 2004 in the TMDL study for Segment 1803C.

Nutrients

Historically there has been concern with infestations of aquatic vegetation in Lakes Dunlap and McQueeney. In the past TCEQ has identified a chlorophyll *a* concern on Lake McQueeney, but recent data are lower. This is a complex situation with many sources of nutrients. Those sources include background concentrations of nutrients in spring flows, reservoir releases, nutrient-rich sediments, septic tank inputs, and wastewater discharges. New Braunfels Utilities is in the process of renewing their wastewater discharge permit and some interests advocate placing phosphorus limitations on their permit. Because these are small run-of-river impoundments, the impacts of these sources can be intensified under low flow conditions. The Clean Rivers Program has studied these issues in the past. A new nutrient study of Lakes Dunlap and McQueeney has been initiated in early 2004. The study will collect data from the two impoundments to characterize lake conditions, identify sources of nutrients and better define relationships between flow and chlorophyll *a*.

Both Segments 1801 (Guadalupe River Tidal) and 1802 (Guadalupe River below San Antonio River) are identified with nutrient enrichment concerns with elevated NO_3+NO_2-N levels. The figure below shows the nitrate-N level of the Guadalupe River at several locations. Concentrations in the Guadalupe River above the confluence with the San Antonio River are low, while the San Antonio River levels are higher. A short distance downstream of the confluence with the San Antonio River the concentration is intermediate and tracks fairly well with the nitrate-N level of the San Antonio River at Fannin. The nitrate-N levels appear to be lower in the most recent years.



Monitoring has documented very high concentrations of nitrate-N in Geronimo Creek (Segment 1804A) at SH 123, often above 10 mg/L. Land use in the watershed upstream of the sampling location is primarily row-crop agriculture. The source appears to be groundwater seepage, but the reason for the high groundwater nitrate-N concentration is not known at this time. An investigation has been proposed to understand this situation better, but funds for this study were not available at this writing.

Geronimo Creek at SH 123

A number of the nutrient enrichment *Concerns* are due to elevated levels of ammonia nitrogen (NH_3-N). However, recent data show NH_3-N at much lower levels. It has been noted in the past that the difference was found to be due to a change in laboratory procedure. A comment in this regard has been submitted during the 30-day comment period for the January 2004 version of the Draft Water Quality Inventory. TCEQ responded that the accuracy of the ammonia data would be reviewed and the dataset adjusted for the 2006 assessment.

The remaining cases of nutrient enrichment *Concerns* appear to be transitional issues. Currently assessment is based on statewide screening criteria with no consideration of site-specific conditions. The EPA is promoting numeric nutrient criteria development for all US waters. When site-specific numeric nutrient criteria are developed, these listings will need to be re-evaluated.

PUBLIC INVOLVEMENT AND OUTREACH ACTIVITIES

The CRP in the Guadalupe Basin strives to maintain active communication with the public to pursue the goals of public involvement and education in water quality issues. The GBRA and UGRA maintain a number of communication mechanisms to support this CRP effort. GBRA develops opportunities for direct public participation to ensure that community concerns are addressed. These include quarterly Water Resource Reports, web sites, issuing press releases regarding various water topics, making public presentations to schools and other interested groups, and providing teacher workshops. The UGRA has a similar level of public outreach on water quality issues.

The Guadalupe River Basin Steering Committee

A major communication vehicle for the CRP is the Basin Steering Committee. This group, composed of community leaders and interested citizens from throughout the basin meets annually to review activities and advise the program on priorities for monitoring and special studies. The Steering Committee membership includes: representation from municipalities, counties, industries, homeowner organizations, Texas Soil and Water Conservation Board, Texas Parks and Wildlife Department, Texas Department of Agriculture, Texas Railroad Commission, League of Women Voters and chambers of commerce, local and regional environmental organizations.

Steering Committee meetings are OPEN TO THE PUBLIC 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 hydro operation. 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.

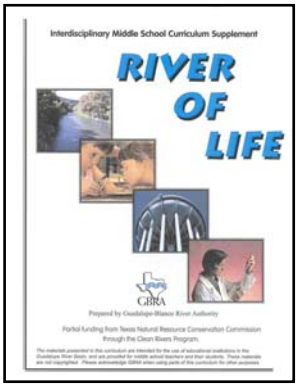
Public Education and Volunteer Monitoring Activities

GBRA

GBRA's *Journey Through the Guadalupe River Basin* 4th grade program is currently under revision. Plans are to include a heavier emphasis on watersheds and water quality.

GBRA collaborated with Texas Watch in 2004 to develop a Water Quality Monitoring booklet, targeting grades 4-6. The idea behind this effort was to encourage teachers to introduce students to the concept of water quality monitoring, even without the luxury of taking students out into the field. Samples can be brought into the classroom and tested for pH, turbidity, dissolved oxygen, and nitrates. Teachers who attend a short training session receive a class set of the booklets, and a low cost water monitoring kit.

A watershed model is available for GBRA staff to take to schools to demonstrate how a watershed works, and the impact of nonpoint source pollution to the watershed. This also provides an opportunity to discuss best management practices within a watershed. The science curriculum of fifth grade science seems the best fit to incorporate use of the model.



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

Other outreach activities include presentations to groups and classes, contributions to the Seguin Outdoor Learning Center to support water quality laboratory equipment, and the training of volunteer monitoring groups.

UGRA

UGRA has initiated a very active volunteer monitoring program. Last year over 15 volunteers monitored 18 locations on a weekly basis for *E.coli*. The additional data provided valuable information, especially those close to the TMDL-Sites. The volunteers were again called upon to assist with the Creeks, Springs & Seeps project which UGRA initiates every Fall.

For the past 2 years UGRA has distributed the Major Rivers Curriculum to all the 4th grade classes in the Kerr County. Feedback from the teachers has been very positive. UGRA plans to distribute the middle school curriculum (developed by GBRA) next year to all the Kerr County middle schools.

UGRA staff continues to educate area students on water quality issues. Last year over 600 students were taught the basics of water quality. The presentations are done for a wide range of audience, from pre-Kers to Schreiner University students. The presentations consist of a 1-hour course/talk (usually done on the River) emphasizing water quality, TCEQ/UGRA efforts, and what the students can do to make a difference in their community.

UGRA staff go-live on the local channel 10 (TV Station) about every other month to discuss water-related issues. The monitoring activities and water quality issues are almost always discussed.

This year UGRA has scheduled a "Community Water Quality" meeting for the month of August. This meeting is to better educate the public/stake-holders on the UGRA/TCEQ water quality activities and receive community input. It will be held at the Guadalupe Basin Natural Resources Center in Kerrville.

Other major UGRA Water Quality Related Projects include:

- Bank Stabilization Re-vegetation (Cypress Tree) Project
- Watershed Demonstration Project
- River Trails-Project
- Annual River Clean-up
- Low Water Crossing Weekly Clean-up @ 14 locations
- Guadalupe Bass (State Fish) restocking program
- HAZMAT boom VFD project
- Reservoir Monitoring

As part of UGRA's "Trash Free River Initiative", they have initiated two programs:

- Water Crossing Clean-up: UGRA has contracted with a Historically Underutilized Business (HUB) to clean 14 of the popular/visible water crossings in the Kerr County. The objective is to remove all rubbish/trash from these sites twice a week from May-September and twice a month from October-April. This has been a very successful program. UGRA has also been able to get local businesses to co-sponsor 5 of the sites.
- Annual River Clean-up: Last year's clean-up effort was very successful. Volunteer groups and co-sponsors included Hill Country Fly Fishermen, Ameri-Corp, Boy Scouts of America, Master Naturalist, Big Brothers and Big Sisters, Hill Country Paddlers, City of Kerrville, Kerr County. About 10 cubic yards of trash was collected (30% recycled). This year UGRA will expand the cleanup to include more paddlers so as to cover all sections of the River in Kerr County. TCEQ's "Keep Texas Beautiful Program" provided assistance with supplies & guidance.

Truck Load of Trash from Clean-up

Wimberly Valley Watershed Association (WVWA)

The WVWA is a non-profit organization with the mission to protect the water quality and quantity of the Wimberley Valley by promoting sustainable watershed management through community education, conservation, and land protection. As mentioned in Page 3, WVWA is a CRP partner in the Blanco River-Cypress Creek Water Quality Monitoring Study. This monitoring effort has the following objectives for 2005-2006:

- Establish USGS Gauging Station at Jacob's Well - CRP participation
- Conduct Dye Trace Study – University of Texas, Edwards Aquifer Authority (EAA), Texas Water Development Board (TWDB), Hays-Trinity Groundwater Conservation District (HTGCD), WVWA
- Develop a localized Groundwater Availability Model with an isotope study – TWDB funding sought
- Expand HTGCD Well Monitoring Program

Texas Watch

Texas Watch is a cooperative program of environmental monitoring and communication about the environment. It includes volunteers, the TCEQ 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:
Lee Gudgell (GBRA) lgudgell@gbra.org.
Gretchen Ruetzel (UGRA) ugragr@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 TCEQ and the USGS.
  - These files can be easily downloaded in pdf format.

- Special Studies Reports
  - Available for download in pdf format.

- Schedule of Monitoring Activities
  - A list of all the monitoring sites under a TCEQ-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 2004 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-Limited Data	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.
1801	Guadalupe River Tidal	Entire segment	Aquatic Life Use	Use Concern-Limited Data	depressed dissolved oxygen	1 of 4 exceed criterion (24-hr avg).
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)	From the confluence with Elm Creek to upper end of water body	Aquatic Life Use	Impaired	depressed dissolved oxygen	5 of 7 exceed criterion (24-hr avg), 4 of 7 exceed criterion (24-hr min).
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	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 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.

Notes: GM = Geometric Mean, FC = Fecal Coliform, EC = E. Coli.

ATTACHMENT A (CONTINUED)
SUMMARY OF DRAFT 2004 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
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.
1804	Guadalupe River Below Comal River	From McQueeney Dam upstream approximately 7 miles	Algal Growth Concern	Concern	excessive algal growth	12 of 41 exceed criterion.
1804A	Geronimo Creek (unclassified water body)	Entire water body	Nutrient Enrichment Concern	Concern	nitrate+nitrite nitrogen	54 of 54 exceed criterion.
1806	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=231, FC=363. 18 of 46 single FC samples exceed criterion.
1806	Guadalupe River Above Canyon Lake	From RR 394 1 mile downstream	Contact Recreation Use	Impaired	bacteria	GM: EC=193, FC=333. 49 of 127 single FC samples exceed criterion.
1806A	Camp Meeting Creek (unclassified water body)	Upper 9 miles	Aquatic Life Use	Impaired	depressed dissolved oxygen	3 of 8 exceed criterion (24-hr avg).
1806A	Camp Meeting Creek (unclassified water body)	Upper 9 miles	Aquatic Life Use	Use Concern-Limited Data	depressed dissolved oxygen	2 of 8 exceed criterion (24-hr min).
1806A	Camp Meeting Creek (unclassified water body)	Lower 9 miles	Contact Recreation Use	Use Concern	bacteria	6 of 20 exceed criterion (EC single sample).
1810	Plum Creek	From approx. 1 mi downstream of Caldwell CR 202 to upper end of segment	Contact Recreation Use	Impaired	bacteria	GM: EC = 183.
1810	Plum Creek	Confluence with San Marcos River to confluence with Clear Fork Plum Creek	Nutrient Enrichment Concern	Concern	ammonia	6 of 22 exceed criterion.
1810	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.
1810	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.
1810	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.

Notes: GM = Geometric Mean, FC = Fecal Coliform, EC = E. Coli.