BASIN HIGHLIGHTS REPORT
TEXAS CLEAN RIVERS PROGRAM

GUADALUPE RIVER BASIN
and the
LAVACA-GUADALUPE COASTAL BASIN
Spring 2000

This report highlights recent activities in the Guadalupe and Lavaca-Guadalupe River Basins under the Clean Rivers Program (CRP). The Texas 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.

Aside from administrative requirements there are four major elements to the CRP—data collection, special studies, data analysis, and communicating results. This brief report summarizes the program in each area.

DATA COLLECTION

Historically the TNRCC and predecessor state water quality agencies along with the United States Geological Survey (USGS) were the only groups routinely collecting monitoring data on the quality of Guadalupe River Basin waters. Additional data were collected through special studies, basin planning efforts and academic research, but these did not address the need for a consistent long-term quality assured monitoring effort that could allow detection of changes and trends. Starting in the 1980s, both the GBRA and the UGRA began routine water quality monitoring and also began to fund some of the USGS data collection efforts. When the CRP began operation in 1992, one of its priorities was to expand the monitoring role of river authorities. Starting in 1994, both authorities expanded and enhanced their monitoring programs. Table 1 lists the stations and parameters currently monitored by the two authorities, and Figure 1 shows their approximate locations.

While the routine water quality monitoring work of the two river authorities through the CRP is now substantial, it is only part of the work performed in the basin. Both the TNRCC and the USGS, under contract to the GBRA and UGRA, continue monitoring efforts. Table 2 lists the stations currently monitored by the TNRCC. These stations are shown in Figure 1 with a "T" following the station number. One of the key roles of the CRP is to foster coordination and cooperation of these monitoring efforts. To do this, coordination meetings are held in the spring of each year to insure balanced and representative monitoring coverage is achieved. Coincidentally, last year's meeting was held March 29,1999 and this year's will be held March 29, 2000.

TABLE 1 GBRA AND UGRA MONITORING STATIONS

Guadalupe River Basin Surface Water Quality Monitoring Program – 1999-2000								
TNRCC Station Id.	**Station Description**	**Latitude/ Longitude**	**County**	**Parameters**	**Frequency**	**Monitoring Types**	**Monitored By**	**Station Owner**
12570	**Dry Comal Creek at Seguin St., New Braunfels**	29°42'16" 98°07'45"	Comal	C[1] F[2] M[3] AC[4] RN[5]	Monthly Monthly Annually Semi-ann. Semi-ann.	Fixed	GBRA	NA[6]
12578	**Guadalupe River upstream of Lower Guadalupe Diversion Dam and Salt Water Barrier**	28°30'24" 96°53'09"	Calhoun	C M OW[7]	Monthly Annually Bimonthly	Fixed	GBRA	GBRA
12592	**Guadalupe River at FM 766 Bridge near Cuero**	29°08'49" 97°19'02"	DeWitt	C F M	Monthly Monthly Annually	Fixed	GBRA	NA

[1] The C symbol represents the following parameters and their TNRCC codes: 00010, Temperature, Water (Centigrade); 00094 Conductivity, Field (µmhos/cm @ 25C); 00300 Oxygen, Dissolved (mg/L); 00400 pH (standard units); 00631 Nitrate/Nitrite-Nitrogen (mg/L as N); 00665 Total Phosphorus (mg/L as P); 31616 Fecal Coliform (#/100 mL); 00530 Solids, Total Suspended (mg/L); 82079 Turbidity (NTU); 00945 Sulfate (mg/L); 00940 Chloride (mg/L); 32211 Chlorophyll-a (µg/L); 00900 Total Hardness (mg/L); and 31648 E. coli (#/100 mL).

[2] The F symbol means that a flow measurement will be provided. When possible, this information will be derived from U.S. Geological stream gages; at some sites, the proximity of a hydroelectric generating facility allows the calculation of flow based upon power generated; at the remainder of the sites field measurements will be made by GBRA Regional Laboratory personnel or UGRA personnel.

[3] The M symbol denotes metals. All M samples will be collected by the GBRA. The dissolved metals to be analyzed for are 01106 Aluminum (µg/L as Al); 01090 Zinc (µg/L as Zn); 01000 Arsenic (µg/L as As); 00915 Calcium (mg/L as Ca); 01025 Cadmium (µg/L as Cd); 00925 Magnesium (mg/L as Mg); 46570 Hardness, calc, (mg/L as $CaCO_3$); 01005 Barium (µg/L as Ba); 01030 Chromium (µg/L as Cr); 01040 Copper (µg/L as Cu); 01046 Iron (µg/L as Fe); 01049 Lead (µg/L as Pb); 01056 Manganese (µg/L as Mn); 01065 Nickel (µg/L as Ni); 01060 Molybdenum (µg/L as Mo); 01145 Selenium (µg/L as Se); 71890 Mercury, total (µg/L as Hg); and 01075 Silver (µg/L as Ag).

[4] AC means Aquatic Commun-Habitat.

[5] RN means Routine Nekton.

[6] NA means not applicable. The station is not owned by anyone and is accessible to the public.

[7] OW means Organics Water.

TABLE 1 GBRA AND UGRA MONITORING STATIONS (CONTINUED)

Guadalupe River Basin Surface Water Quality Monitoring Program – 1999-2000 (cont.)								
TNRCC Station Id.	**Station Description**	**Latitude/ Longitude**	**County**	**Parameters**	**Frequency**	**Monitoring Types**	**Monitored By**	**Station Owner**
12596	Lake Dunlap-Guadalupe River north bank at AC's Place at midpoint of Lone Star Drive	29°40'15" 98°04'48"	Guadalupe	C F M OW	Monthly Monthly Annually Bimonthly	Fixed	GBRA	NA
12598	Canyon Reservoir (Canyon Park Marina)	29°53'57" 98°13'24"	Comal	C	Monthly	Fixed	GBRA	NA
12623	Coleto Creek Reservoir at Boat Launching Ramp	28°43'16" 97°10'15"	Goliad	C	Monthly	Fixed	GBRA	GBRA
12626	San Marcos River at Luling Water Treatment Plant	29°40'02" 97°39'14"	Caldwell	C F M OW	Monthly Monthly Annually Bimonthly	Fixed	GBRA	GBRA
12640	Plum Creek at CR 135 SE of Luling	29°39'25" 97°36'00"	Caldwell	C F AC RN	Monthly Monthly Semi-ann. Semi-ann.	Fixed	GBRA	NA

TABLE 1 GBRA AND UGRA MONITORING STATIONS (CONTINUED)

Guadalupe River Basin Surface Water Quality Monitoring Program – 1999-2000 (cont.)								
TNRCC Station Id.	**Station Description**	**Latitude/ Longitude**	**County**	**Parameters**	**Frequency**	**Monitoring Types**	**Monitored By**	**Station Owner**
12653	Comal River at Hinman Island	29°42'29" 98°07'26"	Comal	C F	Monthly Monthly	Fixed	GBRA	NA
12658	Guadalupe River at River Road Second Crossing, upstream of New Braunfels	29°46'43" 98°09'37"	Comal	C F AC RB[8]	Monthly Monthly Semi-ann. Semi-ann.	Fixed	GBRA	NA
12668	Blanco River at FM 165 Bridge Crossing near City of Blanco	30°05'27" 98°24'06"	Blanco	C F AC RN	Monthly Monthly Semi-ann. Semi-ann.	Fixed	GBRA	NA
12672	Upper San Marcos River upstream of IH 35	29°52'31" 97°55'54"	Hays	C F	Quarterly Quarterly	Fixed	GBRA	NA
12674	Cypress Creek at FM 12 at Wimberley	29°59'46" 98°05'48"	Hays	C F	Quarterly Quarterly	Fixed	GBRA	NA

[8] RB means Routine Benthics.

TABLE 1 GBRA AND UGRA MONITORING STATIONS (CONTINUED)

Guadalupe River Basin Surface Water Quality Monitoring Program – 1999-2000 (cont.)								
TNRCC Station Id.	**Station Description**	**Latitude/ Longitude**	**County**	**Parameters**	**Frequency**	**Monitoring Types**	**Monitored By**	**Station Owner**
13700	Guadalupe River at RR 311, 1.9 mi SE of Spring Branch	29°53'00" 98°23'00"	Comal	C F	Monthly Monthly	Fixed	GBRA	NA
14932	Geronimo Creek at SH 123	29°40'12" 97°57'53"	Guadalupe	C F M AC RB	Monthly Monthly Annually Semi-ann. Semi-ann.	Fixed	GBRA	NA
15110	Guadalupe River at H-5 Dam near Gonzales	29°28'08" 97°29'24"	Gonzales	C F	Monthly Monthly	Fixed	GBRA	GBRA
15148	Guadalupe River at US 183, Gonzales	29°29'49" 97°27'17"	Gonzales	FI[9] F AC RB	Semi-ann. Semi-ann. Semi-ann. Semi-ann.	Fixed	GBRA	NA
15149	Lake McQueeney, 0.5 mile upstream of McQueeney dam on southeast bank	29°36'34" 98°02'10"	Guadalupe	C F BAC[10]	Monthly Monthly Semi-ann.	Fixed	GBRA	NA

[9] FI means Field parameters.

[10] BAC means TSWQS Bacteria sampling.

TABLE 1 GBRA AND UGRA MONITORING STATIONS (CONTINUED)

Guadalupe River Basin Surface Water Quality Monitoring Program – 1999-2000 (cont.)								
TNRCC Station Id.	**Station Description**	**Latitude/ Longitude**	**County**	**Parameters**	**Frequency**	**Monitoring Types**	**Monitored By**	**Station Owner**
12605	Guadalupe River at Co. Rd adjacent to Herman Sons Home, west of Comfort	29°56'56" 98°55'30"	Kerr	C F AC RB BAC	Quarterly Quarterly Semi-ann. Semi-ann. 5 times/yr	Fixed	UGRA	NA
12608	Guadalupe River, Center Point Lake	29°56'46" 99°02'31"	Kerr	C F AC RB BAC	Quarterly Quarterly Semi-ann. Semi-ann. 5 times/yr	Fixed	UGRA	NA
12678	Johnson Creek at SH 39 in Ingram	30°04'26" 99°14'49"	Kerr	C F AC RB BAC	Quarterly Quarterly Semi-ann. Semi-ann. 5 times/yr	Fixed	UGRA	NA
12682	North Fork Guadalupe River at Gaging Station near Camp Waldemar	30°03'29" 99°27'00"	Kerr	C F AC RB BAC	Quarterly Quarterly Semi-ann. Semi-ann. 5 times/yr	Fixed	UGRA	NA
12684	South Fork Guadalupe River, Hunts Lions Park	30°04'16" 99°19'59"	Kerr	C F AC RB	Quarterly Quarterly Semi-ann. Semi-ann.	Fixed	UGRA	NA

TABLE 1 GBRA AND UGRA MONITORING STATIONS (CONTINUED)

Guadalupe River Basin Surface Water Quality Monitoring Program – 1999-2000 (cont.)								
TNRCC Station Id.	**Station Description**	**Latitude/ Longitude**	**County**	**Parameters**	**Frequency**	**Monitoring Types**	**Monitored By**	**Station Owner**
15111	Guadalupe River at Riverview Rd., Ingram	30°04'10" 99°13'19"	Kerr	C F AC RB	Quarterly Quarterly Semi-ann. Semi-ann.	Fixed	UGRA	NA
15112	Guadalupe River at G St., Kerrville	30°02'06" 99°08'13"	Kerr	C F M AC RB	Quarterly Quarterly Annually Semi-ann. Semi-ann.	Fixed	UGRA GBRA	NA
15113	Guadalupe River at Split Rock Rd., downstream of Flatrock Dam	29°58'52" 99°05'57"	Kerr	C F M AC RB	Quarterly Quarterly Annually Semi-ann. Semi-ann.	Fixed	UGRA GBRA	NA
15998	Sandies Creek at FM 1116 7.4 km east of Smiley and approximately 3 km upstream of confluence with Elm Creek	29°15'37" 97°33'31"	Gonzales	C F AC RB DO[11]	Quarterly Quarterly Semi-ann. Semi-ann. 5 times/yr	Fixed	GBRA	NA

[11] DO means 24 hr DO sampling.

TABLE 1 GBRA AND UGRA MONITORING STATIONS (CONTINUED)

Guadalupe River Basin Surface Water Quality Monitoring Program – 1999-2000 (cont.)								
TNRCC Station Id.	**Station Description**	**Latitude/ Longitude**	**County**	**Parameters**	**Frequency**	**Monitoring Types**	**Monitored By**	**Station Owner**
14937	Peach Creek at CR 353	29°30'28" 97°18'49"	Gonzales	C F M AC RN	Monthly Monthly Annually Semi-ann. Semi-ann.	Fixed	GBRA	NA
16245	North Fork Guadalupe River Rock Bottom Rd	30°03'09" 99°29'04"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
12681	North Fork Guadalupe River at FM 1340	30°04'44" 99°20'38"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
12688	South Fork Guadalupe River adjacent to LynxHaven Lodge at SH 39	29°57'12" 99°28'57"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
12686	South Fork Guadalupe River adjacent to Camp Mystic	30°00'29" 99°22'08"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
16246	South Fork Guadalupe River Seago Rd Crossing	30°01'41" 99°21'42"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
12685	South Fork Guadalupe River adjacent to Camp Arrowhead	30°02'06" 99°21'28"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
12621	Guadalupe River at SH 39 near Hunt, 0.1 km below the North/South Fork Confluence	30°04'08" 99°19'23"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
16241	Guadalupe River Kelley Ck Rd off Hwy 39	30°04'02" 99°17'29"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
12620	Guadalupe River at Ingram Dam in Ingram	30°04'12" 99°14'31"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA

TABLE 1 GBRA AND UGRA MONITORING STATIONS (CONTINUED)

Guadalupe River Basin Surface Water Quality Monitoring Program – 1999-2000 (cont.)								
TNRCC Station Id.	Station Description	Latitude/ Longitude	County	Parameters	Frequency	Monitoring Types	Monitored By	Station Owner
12619	Guadalupe River at Bear Creek Road, 1 mi west of Kerrville	30°03'50" 99°11'34"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
12618	Guadalupe River at UGRA Lake Dam	30°03'50" 99°10'08"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
16244	Guadalupe River at Louise Hays Park Foot Bridge	30°02'47" 99°08'41"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
12617	Guadalupe River at SH 16 in Kerrville	30°02'42" 99°08'31"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
16243	Guadalupe River at Louise Hays Park Dam	30°02'41" 99°08'29"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
12615	Guadalupe River at Kerrville State Park, Segment km 174.4	30°00'40" 99°07'05"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
12610	Guadalupe River at Co.Rd., 0.1 mi above confluence of Turtle Creek at Segment km 166.2	29°57'12" 99°02'45"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
16242	Guadalupe River at Hwy 1350 Center Point Texas	29°56'22" 99°00'36"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
12603	Guadalupe River at IH 10 in Comfort	29°58'06" 98°53'32"	Kerr	BAC	5 times/yr	Fixed	UGRA	NA
16249	Guadalupe River Lake Placid in main body near dam	29°32'54" 97°59'58"	Guadalupe	OW	Bimonthly	Fixed	GBRA	NA
16250	Guadalupe River Lake Wood in main body near dam	29°28'07" 97°29'32"	Gonzales	OW	Bimonthly	Fixed	GBRA	GBRA

TABLE 1 GBRA AND UGRA MONITORING STATIONS (CONCLUDED)

Guadalupe River Basin Surface Water Quality Monitoring Program – 1999-2000 (concluded)								
TNRCC Station Id.	Station Description	Latitude/ Longitude	County	Parameters	Frequency	Monitoring Types	Monitored By	Station Owner
12543	Verde Creek, 0.2 km upstream of confluence with Guadalupe River near center point	29°55'59" 99°00'29"	Kerr	C F AC RB	Quarterly Quarterly Semi-ann. Semi-ann.	Fixed	UGRA	NA
12546	Camp Meeting Creek, 0.1 above confluence with Guadalupe River in Kerrville	30°01'08" 99°07'30"	Kerr	C F AC RB	Quarterly Quarterly Semi-ann. Semi-ann.	Fixed	UGRA	NA
12590	Guadalupe River at fm 447, west of nursery and upstream of South Texas Electric	28°47'35" 97°00'47"	Victoria	C F	Quarterly Quarterly	Fixed	GBRA	NA
12790	San Antonio River FM 2506 east of Fannin	28°36'43" 97°12'50"	Goliad	C F	Monthly Monthly	Fixed	GBRA	NA
16578	San Marcos River at Hwy 90A near city of Gonzales, 7 km upstream of confluence with Guadalupe River	29°30'50" 97°29'38"	Gonzales	C F	Quarterly Quarterly	Fixed	GBRA	NA
16579	Guadalupe River at Dupont, 0.3 km, downstream of confluence with Blue Bayou, Victoria co.	28°39'29" 96°57'47"	Victoria	C F	Quarterly Quarterly	Fixed	GBRA	NA
15997	Elm Creek at Gonzales cr 534, approx. 6.7km ESE of Nixon	29°14'06" 97°42'18"	Gonzales	FI F AC RB DO	5 times/yr 5 times/yr Semi-ann. Semi-ann. 5 times/yr	Fixed	GBRA	NA
13657	Sandies Creek 100 ft. downstream of county highway, 1.9 mi. upstream from Birds Creek, 2.0 mi. NE of Westoff	29°12'54" 97°26'56"	Gonzales	C F	8 times/yr 8 times/yr	Fixed	GBRA	NA

TABLE 2 TNRCC MONITORING SITES IN FY 2000

Station Id	Station Number	Parameter/ Frequency[1]	Latitude			Longitude			Description
			o	'	"	o	'	"	
12577	1801.01000	FdCh:4, Bact:4	28	28	36	96	51	48	GUADALUPE RIVER TIDAL BRIDGE AT SH 35 NE OF TIVOLI
12595	1804.01700	FdCh:4, Bact:4, Flow:4, DisMtW:2, MtSd:2	29	33	30	98	01	54	GUADALUPE RIVER TIDAL BRIDGE AT IH 10 WEST OF SEGUIN
12597	1805.00500	FdCh:4, Bact:4, OrW:4	29	52	19	98	12	11	CANYON LAKE AT CANYON DAM
12600	1805.03000	FdCh:2, Bact:2	29	53	45	98	16	57	CANYON LAKE MID-LAKE SOUTH OF POTTERS CREEK PARK AT WEST END OF PARK
12601	1805.04000	FdCh:4, Bact:4 MtSd:2	29	54	33	98	19	54	CANYON LAKE HEADWATERS ABOVE CRANES MILL PARK
12602	1806.01500	FdCh:4, Bact:4, Flow:4	29	57	14	98	48	04	GUADALUPE RIVER AT COUNTY RD IN WARING
12622	1807.01000	FdCh:4, Bact:4, Flow:4	28	42	42	97	02	03	COLETO CREEK AT US 77 SOUTH OF VICTORIA
12628	1808.02000	FdCh:4, Bact:4	29	51	25	97	53	46	LOWER SAN MARCOS RIVER AT COUNTY ROAD IMMEDIATELY BELOW CONFLUENCE OF SAN MARCOS AND BLANCO RIVERS
12660	1813.01000	FdCh:4, Flow:4	29	59	02	98	03	07	BLANCO RIVER AT LOW WATER CROSSING AT CR 174

[1]Abbreviations: FdCh:4= field/chemical(conventional) parameters are sampled four per year; Bact:4= Bacteria-4 per year; DisMtW:2= dissolved metals in water-two per year; MtSd:2= metals in sediment-two per year; 5xBact:2=geometric mean-5 samples/30 days-2 per year; 24hrDO:2= 24 hr continuous monitoring for dissolved oxygen-2 per year, OrgW:4=Organic Water-four per year.

TABLE 2 TNRCC MONITORING SITES IN FY 2000 (CONCLUDED)

Station Id	Station Number	Parameter/ Frequency[1]	Latitude			Longitude			Description
			o	'	"	o	'	"	
13383	2453.01000	FdCh:4, MtSd:1, Bact:4, 24hrDO:2	28	38	20	96	36	32	LAVACA BAY AT SH 35 CAUSEWAY
13384	2453.02000	FdCh:4, MtSd:1, Bact:4, 24hrDO:2	28	35	46	96	33	43	LAVACA BAY 'Y' INTERSECTION OF PORT LAVACA AND MATAGORDA SHIP CHANNELS AT MARKER 66
13511		FdCh:4, Flow:4, Bact:4	29	44	17	98	06	22	GUADALUPE RIVER AT GRUENE ROAD CROSSING APPROX. 0.8 KM SW OF RR 306 IN GRUENE
14726		FdCh:4, Bact:4	28	30	22	96	29	20	POWDERHORN LAKE
14951		FdCh:4, Bact:4	28	21	54	96	34	41	ESPIRITU SANTO BAY AT ICWW AT FULGRUMS FISHING CAMP
15273		FdCh:2, Bact:2, DisMtW:2, MtSd:2	29	35	56	98	02	20	LAKE MCQUEENEY IN MAIN POOL SOUTH OF TREASURE ISLAND, 1.2 KM. UPSTREAM OF DAM
16703		FdCh:4, Bact:4, Flow:4	29	51	47	98	09	50	GUADALUPE RIVER 200 YDS UPSTREAM OF BRIDGE ON FM306, 0.5 MI DOWNSTREAM OF HORSESHOE FALLS
R1305		FdCh:4, Bact:4, Flow:4							GUADALUPE RIVER AT FM 1117 RIVER CROSSING

A major part of the work to achieve this coordination has been the development and continued updating of a Quality Assurance Project Plan (QAPP). The QAPP is a document required by the TNRCC that provides very thorough documentation of all aspects of sample collection, analysis and data management procedures. By having the important details specified, it has been possible to consider the monitoring data from all agencies together, greatly enhancing the overall value of the data collected.

SPECIAL STUDIES

During the spring of 1999 a meeting with the Basin Steering Committee was held to obtain their guidance on how the program should be directed in the next 2-year period. To the extent possible and consistent with TNRCC requirements, Committee suggestions were incorporated in a draft work plan. This section briefly describes the special study projects. These included:

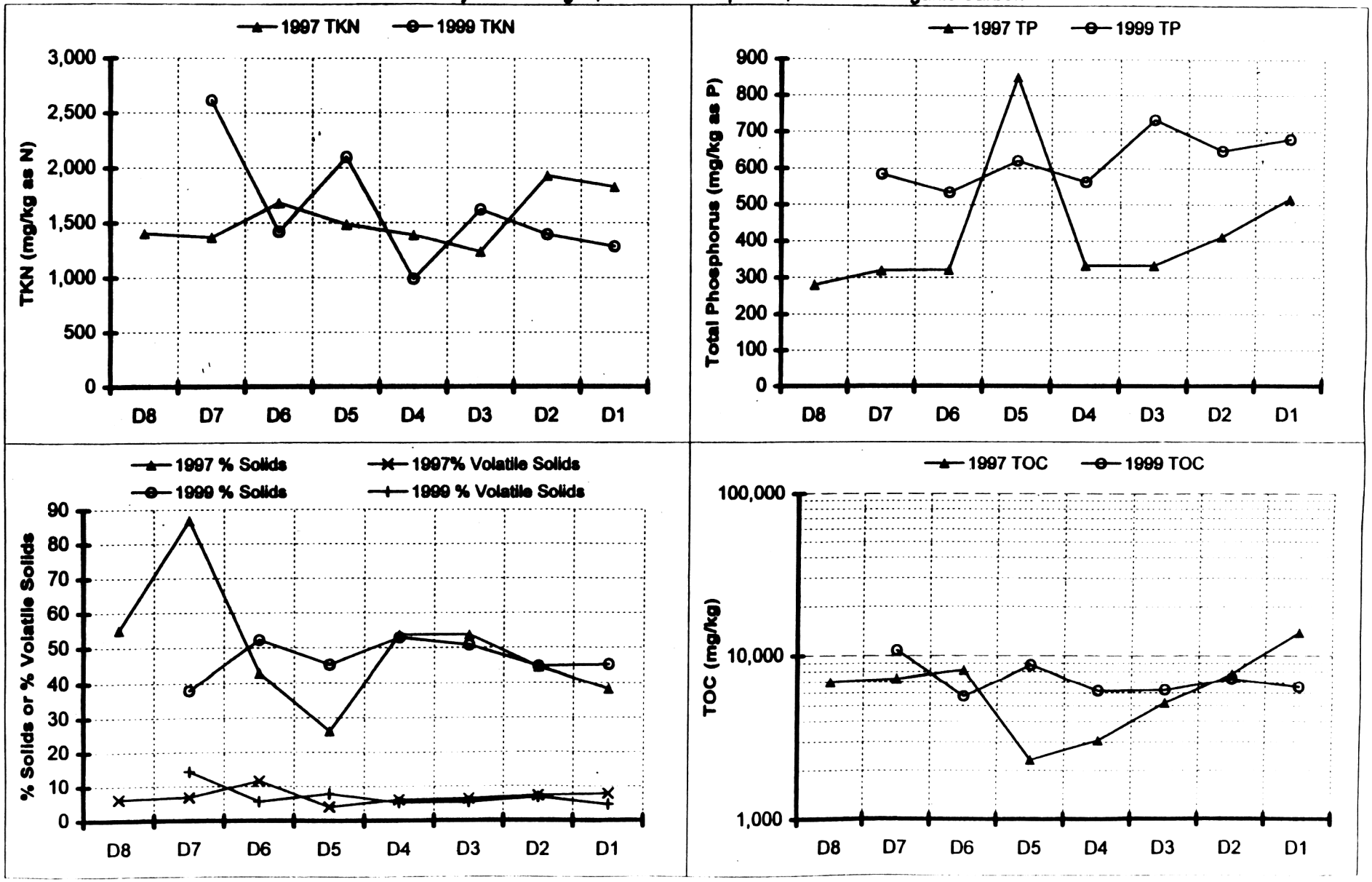
- a study of sediment conditions in the hydro-lakes with particular emphasis on the effect of the October, 1998 flood;
- an examination of development effects stormwater runoff in four of the major urban areas;
- special pathogen and herbicide monitoring (carried over from an earlier Steering Committee request); and
- an analysis of unique water quality conditions in small streams.

In the recent past the CRP has supported an analysis of the possible need for point source nutrient removal to help control accelerated aquatic plant growth on the hydro lakes. The basic conclusion of that work was that while wastewater nutrient removal would be desirable during low flow periods, it would be hard to justify because of the large cost and relatively infrequent need. However, use of the effluent for irrigation during dry periods does appear useful and cost-effective. One of the reasons that point source nutrient removal was of questionable value was that many of the problem plants could obtain nutrients from the sediments. Because of the significant role played by sediments in supplying nutrients to nuisance vegetation, the CRP has supported some basic data collection efforts in the basin lakes. These include the UGRA and Flat Rock lakes in Kerr County, and Lakes Dunlap, McQueeney, Placid and Wood (H-5) further downstream. This effort, begun in the fall of 1999 has completed two sampling runs, but only the data from the first run has been analyzed. Figure 2 shows results from Lake Dunlap along with data obtained during 1997, prior to the major flood. Station number D1 is near the dam at the downstream end of the lake and number D8 is upstream. One can't draw firm conclusions from this one comparison, but there do not appear to be major changes between the two sampling events.

Another project is special sampling of river waters for two pathogenic organisms that are a known concern in surface water systems, Cryptosporidium and Giardia, and selected herbicides that may be used in the basin. This sampling and analysis effort to determine if there was a concern with these parameters, was identified by the Steering Committee in 1997, but was delayed by funding availability. Water samples were collected four times (January, March, May and July of 1999) at five locations. These were near the intakes to the Canyon Regional Water Authority, the Spring Hill Water Supply Corp., the City of Gonzales, Gonzales County Water Supply Corp. and at the Salt

FIGURE 2
SEDIMENT QUALITY DATA COLLECTED FROM LAKE DUNLAP

TKN Total Kjeldahl Nitrogen, TP Total Phosphorus, TOC Total Organic Carbon



Water Barrier, the water supply for Port Lavaca. Only one viable giardia cyst was found in the sampling. This was at the City of Gonzales intake. Notification was provided to TNRCC and the City of this detection, but the overall conclusion was that the quality of the raw water supplies was quite good.

The third project is an analysis of urban growth effects in the major basin communities, New Braunfels, San Marcos, Seguin and Victoria. The work has focused on storm water runoff and receiving water quality using the extensive database compiled by the City of Austin over the last two decades. Growth in the urban areas, plus population growth in the city and county, is being used to estimate the increase in impervious cover. This in turn is being used to estimate the increases in runoff volume and the loading of various constituents. Figure 3 is an example of the increase in runoff loads of total suspended solids (TSS), total nitrogen (TN), total phosphorus (TP) and fecal coliform (FC) expected in Victoria as a result of the growth in population that has been projected.

The fourth special project, analysis of water quality conditions in small streams, is not scheduled to begin until the next fiscal year.

DATA ANALYSIS FOR TRENDS AND CONCERNS

The two river authorities have been collecting data for over a decade, and a number of special analyses have been performed. Although the full data analysis envisioned in the TNRCC's basin permitting cycle is not scheduled to begin until the year 2001, this section provides a short summary of findings on temporal trends. Figures 4-6 illustrate the long-term records of four key water quality parameters in the study area at three stations:

12658, Guadalupe River at River Road 2nd Crossing upstream of New Braunfels,
12596, Lake Dunlap-Guadalupe River North Bank at AC's Place at midpoint of Lone Star Drive, and
12626, San Marcos River at Luling Water Treatment Plant.

For each station the time history of conductivity, dissolved oxygen (DO), nitrite-nitrate-nitrogen (NO_2-NO_3-N), and fecal coliform bacteria (FC) is presented. In general, the data do not suggest a discernable temporal trend. It is believed this is because there have been no major changes in land use or wastewater discharges in the last decade.

One change that has occurred during the last several years has been the start of the Total Maximum Daily Load (TMDL) program. Very briefly, under the new program the state must determine what stream segments are not meeting water quality standards and place those segments on a list known as the 303(d) list. Where appropriate, a TMDL study would have to be conducted to determine what action is necessary to bring the segments into compliance with the standards.

The earlier draft 303(d) lists did not include any segments in the Guadalupe River Basin. However, the 1998 and 1999 lists included a number of basin segments, most listed because of DO being sometimes lower than the standard to assure optimum aquatic life, or FC levels that sometimes exceed the criterion for contact recreation:

FIGURE 3
PRPOJECTED PERCENTAGE INCREASES IN URBAN RUNOFF LOADS OF SELECTED PARAMETERS FROM THE CITY OF VICTORIA

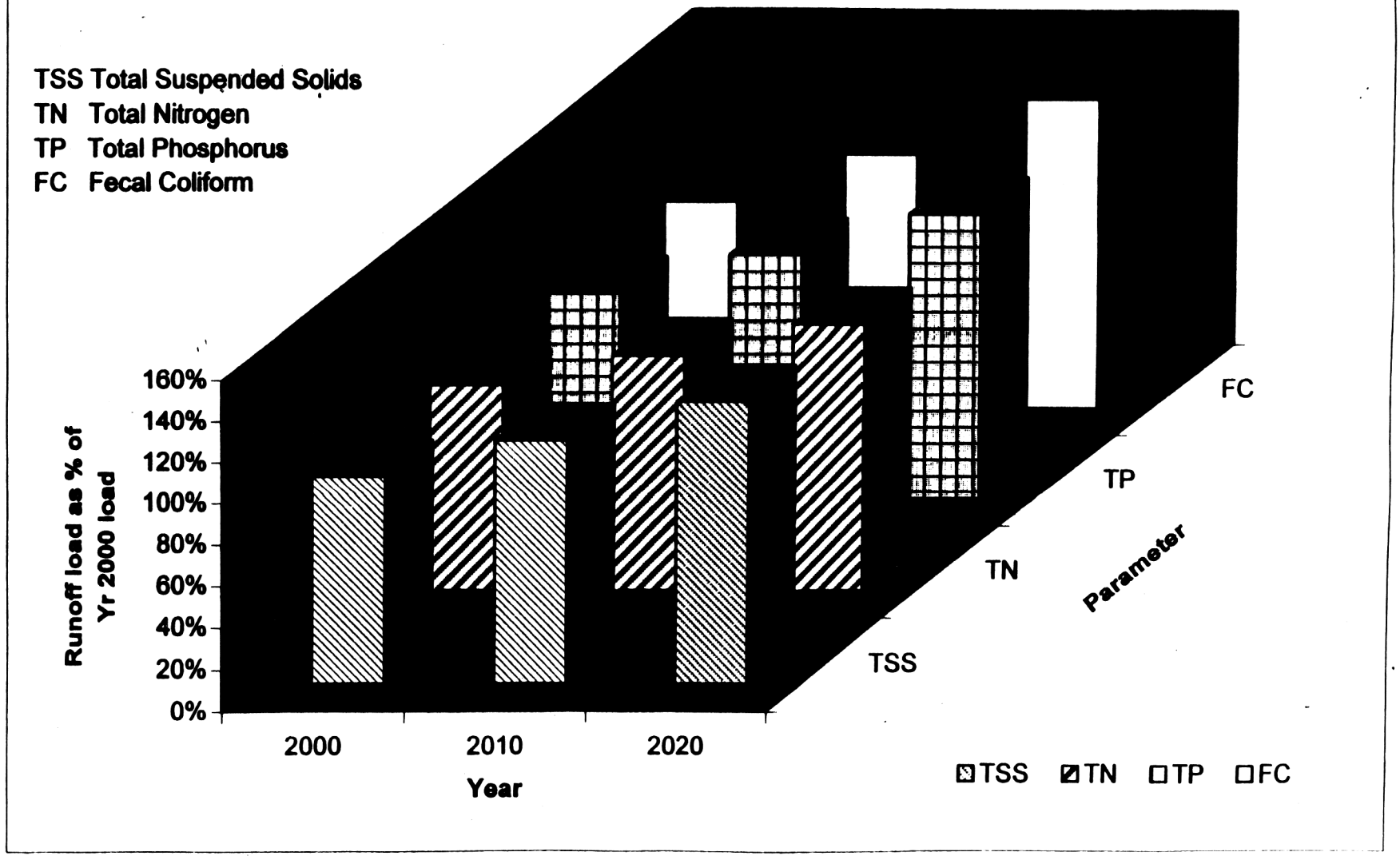


FIGURE 4

WQ DATA FROM GUADALUPE RIVER AT RIVER RD 2ND X'ING, U/S OF NEW BRAUNFELS (STATION 12658)

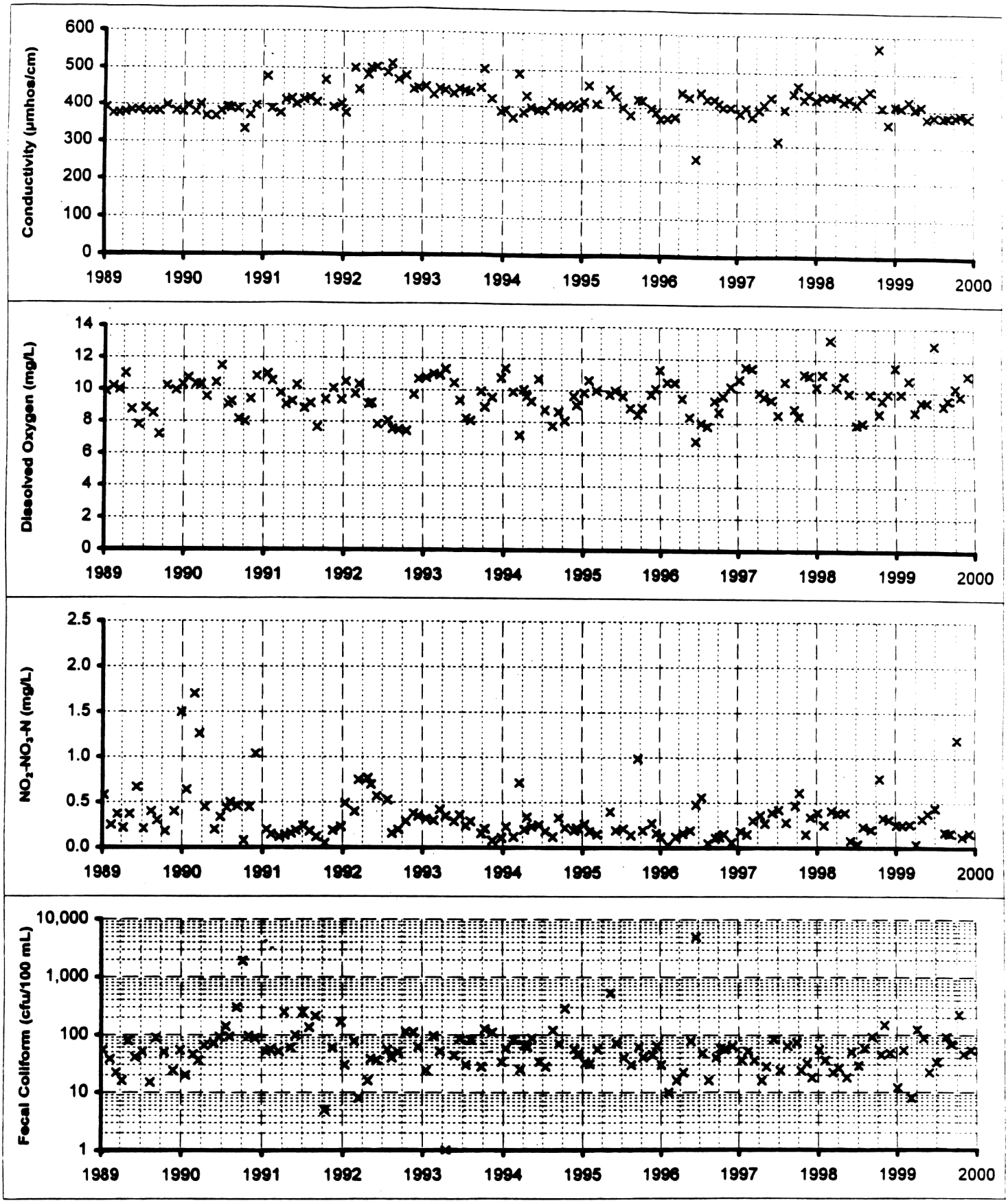
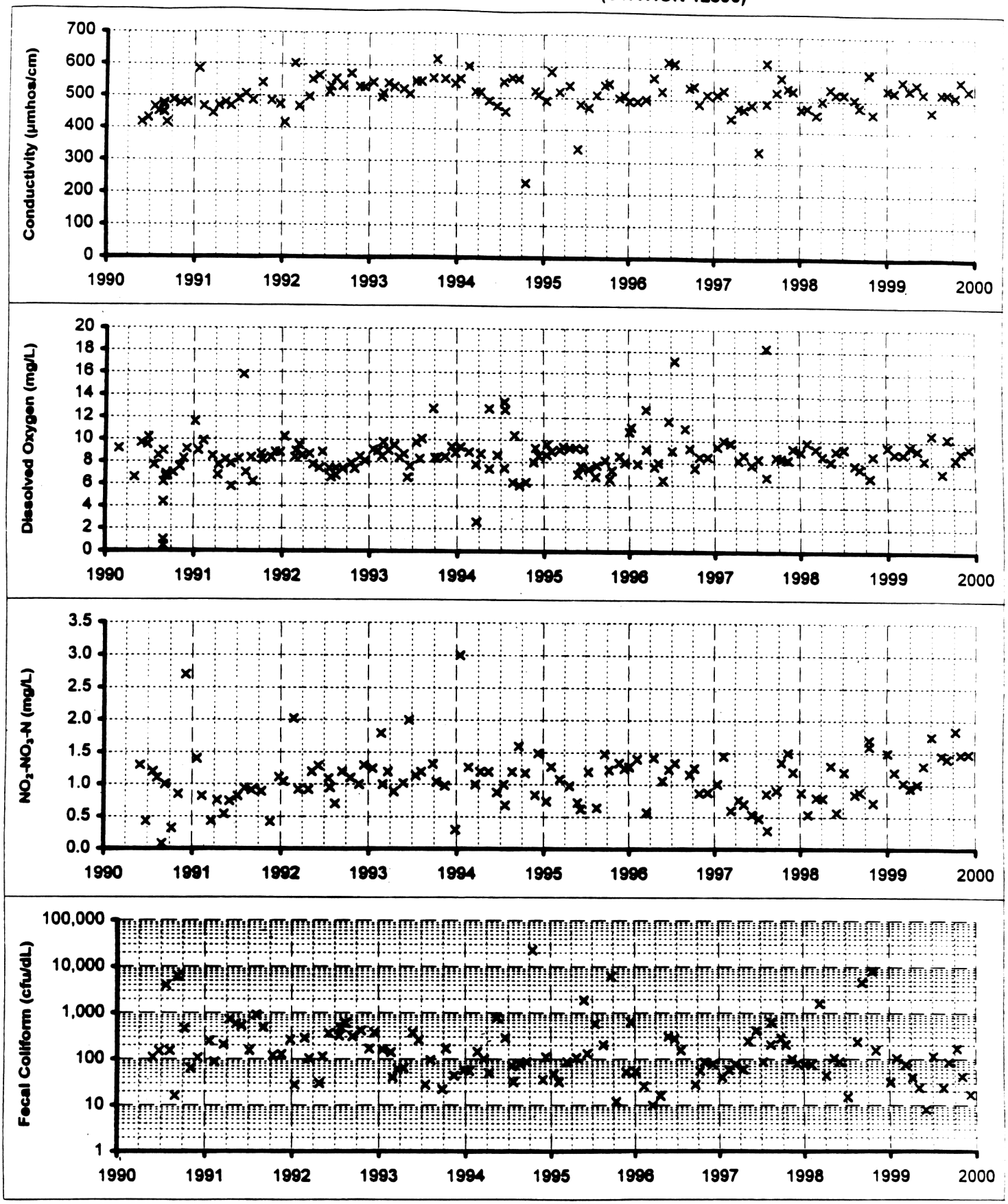
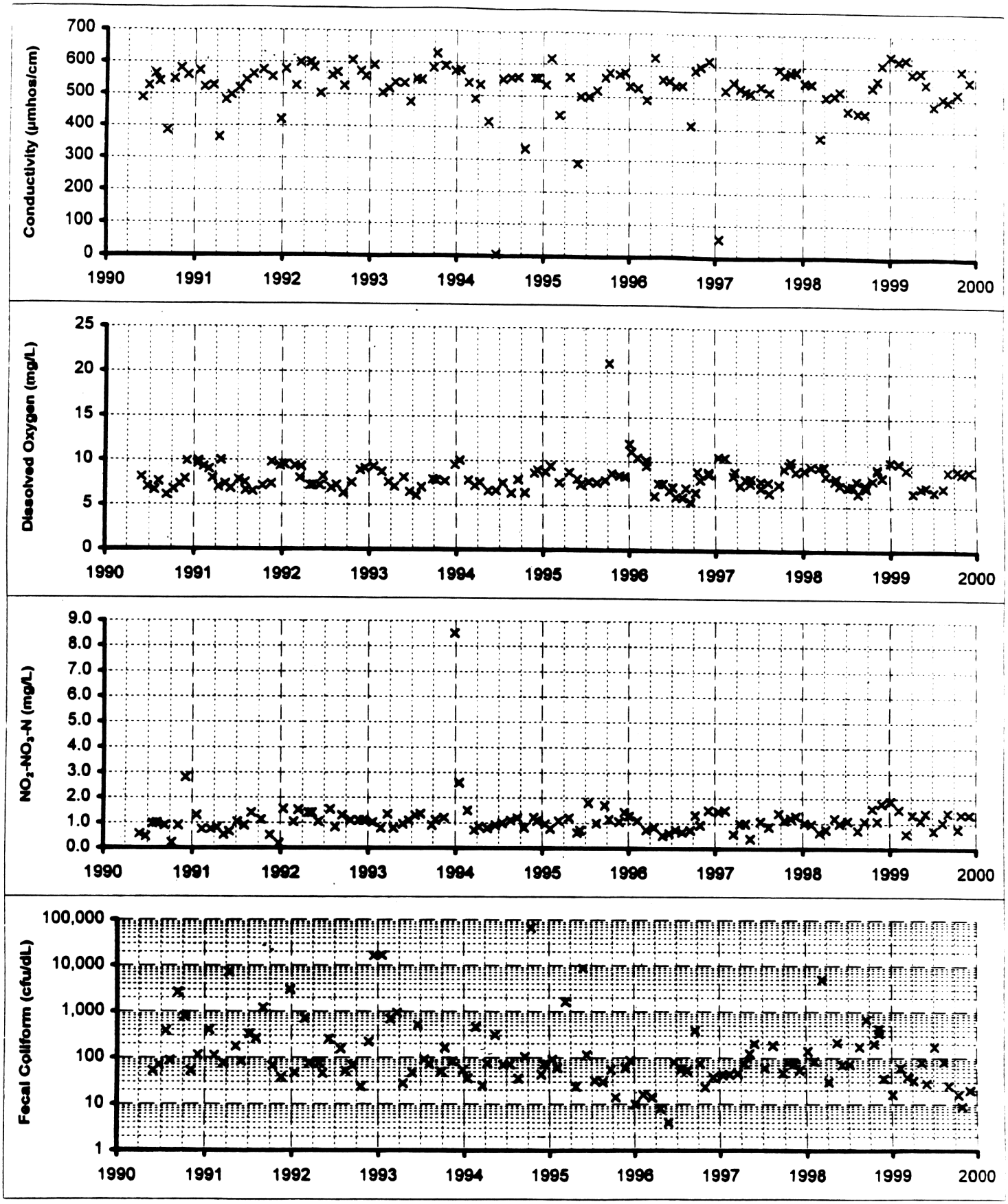


FIGURE 5
WATER QUALITY DATA FROM LAKE DUNLAP-GUADALUPE RIVER NORTH BANK AT AC'S PLACE AT MIDPOINT OF LONE STAR DRIVE (STATION 12596)



gbra00 Fig 5&6.xls 12596 3/28/00 4:25 PM KLL *PBS&J*

FIGURE 6
WQ DATA FROM SAN MARCOS RIVER AT LULING WATER TREATMENT PLANT (STATION 12626)



Stream Segments on 303(d) List

Segment	Name	Description
1801	Guadalupe River Tidal	DO
1803A	Elm Creek (Unclassified)	DO, FC
1803B	Sandies Creek (Unclassified)	DO
1804B	Peach Creek (Unclassified)	FC
1806A	Camp Meeting Creek (Unclassified)	DO
1806G	Verde Creek (Unclassified)	DO
1811A	Dry Comal Creek (Unclassified)	FC
1814	Upper San Marcos River	Sulfate
1815	Cypress Creek	DO

The GBRA has reviewed the information provided by the TNRCC and has requested that the draft listing be revised. With the unclassified waters, the screening was done using a limited amount of data from small creeks that do not have site-specific designated uses and criteria. Because of their size, these creek stations exhibit substantially more variation in flow and quality parameters than the main stem of the river where specific criteria have been assigned. The GBRA and UGRA do not believe that we have enough experience with these small creeks to allow an accurate determination of standards compliance, and propose to work closely with the TNRCC in the future to improve the level of understanding. One of the projects planned for the second year will be a more detailed analysis of the small stream situation. In addition, the TMDL program has indicated an interest in collecting additional data in a coordinated manner to help resolve these issues.

In the case of the sulfate level on the Upper San Marcos River, the TNRCC has proposed an adjustment to the Surface Water Quality Standards to better reflect natural background conditions. When the sulfate criterion in this segment is revised, the listing for the San Marcos River is expected to be removed.

Natural DO levels exhibit a great deal of variation in response to seasonal temperature changes, dissolved solids concentration, and biological conditions. During the screening process "hard" numbers are needed for some applications, but at the same time there needs to be a way to consider natural variability. The GBRA has made recommendations for changes in the screening levels and standards that would tend to reduce or eliminate these kinds of situations, and intends to work closely with the TNRCC to help the process function smoothly.

The FC data are similar in many ways. However, in this case the TNRCC has recognized the problem and has commissioned a statewide Bacterial Indicator Study to examine the entire issue including the standards, monitoring procedures and screening methods. This study is being managed by the GBRA and conducted by PBS&J.

The issues involved in 303(d) listing decisions are complex, with a continuing evolution of screening procedures anticipated. We expect the process to continue for a number of years, and the GBRA and UGRA are committed to working with the TNRCC

and seeing that good data and science are the basis for listing. Where there is an indication of human activities causing a water quality impact, or even a correctable natural water quality impairment, the GBRA and UGRA believe that the TMDL process may be an effective way to analyze a problem and lead to an improvement.

COMMUNICATING RESULTS

The CRP in the Guadalupe Basin continues a high profile of activity in public communication. The GBRA maintains a number of communication mechanisms to support the CRP. These include the quarterly Water Resource Reports, issuing press releases dealing with various water topics, and making public presentations to school and other interested groups. The UGRA has a similar level of public outreach on water quality issues. 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 regularly to review activity and advise the program on priorities for monitoring and studies. Information on the Steering Committee meetings is available through GBRA.

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. It provides access to water quality data that have been collected by the two authorities over the years along with data collected by the TNRCC and the USGS. In addition to developing the web pages, the two river authorities have updated the Guadalupe River basin water quality information and provided the new information to the TNRCC in computer database files.

Another means of further communication is through working with public advisory committees. In addition to the Basin Steering Committee for the CRP, the GBRA has established a Hydroelectric Lake Public Advisory Committee and a Coleto Creek Reservoir Public Advisory Committee. The committees represent the users groups that are 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 representation 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 will receive invitations to our CRP steering committee meetings as well.

Table 3 presents a summary of actions taken in the last year to protect basin water quality. It includes a summary of the 303(d) listing situation, the major study and monitoring efforts, actions taken on specific events, and coordination efforts through advisory committees.

TABLE 3 BASIN ACTION SUMMARY - 1999-2000
GUADALUPE RIVER BASIN

Segment No.	Segment Name	Impaired Use	Cause	Source	Actions Taken	Recommended Action	Rank	Funding Source(s)	Active Participants
Segments on 303d (April 1999):									
1801	Guadalupe River Tidal	Aquatic Life	Low Dissolved Oxygen	San Antonio River; Non-pt. Sources	Monitoring of San Antonio River at Fannin	Continued monitoring; Reinstate segment 1802; Transmittal of SA River data to TNRCC; refine stds. to consider DO deficit	L	GBRA; TNRCC	GBRA
1803A	Elm Creek (unclassified water body)	Aquatic Life & Contact Recreation	Low Dissolved Oxygen; Fecal Coliform	Non-point sources; Intermittent flow	None	Study to develop stds for unclassified stream sites with intermittent flow ; Apply new stds for contact recreation	M	TNRCC	GBRA
1803B	Sandies Creek (unclassified water body)	Aquatic Life	Low Dissolved Oxygen	Non-point sources; Intermittent flow	None	Study to develop stds for unclassified stream sites with intermittent flow	M	TNRCC	GBRA
1804B	Peach Creek (unclassifed water body)	Contact Recreation	Fecal Coliform	Non-point sources; Intermittent flow	Monitoring-routine	Continued monitoring; Apply new stream stds for contact recreation	L	TNRCC	GBRA
1806A	Camp Meeting Creek (unclassified water body)	Aquatic Life	Low Dissolved Oxygen	Intermittent flow; Non-pt source(OSF)	Historical data review and trend analysis	Continued monitoring; Study to develop stds for unclassified stream sites with intermittent flow	M	TNRCC; UGRA	UGRA
1806G	Verde Creek (unclassified water body)	Aquatic Life	Low Dissolved Oxygen	Intermittent flows	Historical data review	Historical data review and trend analysis; Study to develop stds for unclassified stream sites with intermittent flow	L	TNRCC	UGRA
1811A	Dry Comal (unclassified water body)	Contact Recreation	Fecal Coliform	Urban Runoff	Monitoring monthly	Continued monitoring; Apply new stream stds for contact recreation	L	TNRCC	GBRA
1814	Upper San Marcos River	General Water Quality	Sulfate Concentrations	Natural background concentrations	Quarterly monitoring; Review of historical data	Apply new stream stds for general water quality	L	TNRCC	GBRA
1815	Cypress Creek	Aquatic Life	Low Dissolved Oxygen	Urban runoff	Quarterly monitoring	Continued monitoring	L	TNRCC	GBRA

TABLE 3 BASIN ACTION SUMMARY - 1999-2000 (CONTINUED)
GUADALUPE RIVER BASIN

Segment No.	Segment Name	Possible Impaired Use	Cause	Source	Actions Taken	Recommended Action	Rank	Funding Source(s)	Active Participants
Special studies/monitoring:									
1801	Guadalupe River Tidal (raw water source-City of Port Lavaca)	Water Supply	Vunerable potable raw water source	Fuel spills, marine engines	Sampling for MTBE in Feb., April-August '00	Notification of results to steering committee and potable water systems	----	TNRCC	GBRA
1803	Guadalupe River - Victoria area	Contact Recreation & Aquatic Life	Stormwater runoff	Urban Development	Urbanization Study	Implement stormwater management practices	----	TNRCC	GBRA
1804	Guadalupe River Lake Dunlap in main body near dam (raw water source-Canyon RWA WTP)	Water Supply	Vunerable potable raw water source	Fuel spills, marine engines	Sampling for MTBE in Feb., April-August '00	Notification of results to steering committee and potable water systems	----	TNRCC	GBRA
1804	Guadalupe River Lake Placid in main body near dam (raw water source-Springs Hill WTP)	Water Supply	Vunerable potable raw water source	Fuel spills, marine engines	Sampling for MTBE in Feb., April-August '00	Notification of results to steering committee and potable water systems	----	TNRCC	GBRA
1804	Guadalupe River Lake Wood in main body near dam (raw water source-Gonzales Co. WSC WTP)	Water Supply	Vunerable potable raw water source	Fuel spills, marine engines	Sampling for MTBE in Feb., April-August '00	Notification of results to steering committee and potable water systems	----	TNRCC	GBRA
1804	Guadalupe River - New Braunfels area	Contact Recreation & Aquatic Life	Stormwater runoff	Urban Development	Urbanization Study	Implement stormwater management practices	----	TNRCC	GBRA
1804	Guadalupe River - Seguin area	Contact Recreation & Aquatic Life	Stormwater runoff	Urban Development	Urbanization Study	Implement stormwater management practices	----	TNRCC	GBRA
1808	San Marcos River - San Marcos area	Contact Recreation & Aquatic Life	Stormwater runoff	Urban Development	Urbanization Study	Implement stormwater management practices	----	TNRCC	GBRA
1808	San Marcos River at Luling WTP intake	Water Supply	Vunerable potable raw water source	Fuel spills, marine engines	Sampling for MTBE in Feb., April-August '00	Notification of results to steering committee and potable water systems	----	TNRCC	GBRA

TABLE 3 BASIN ACTION SUMMARY - 1999-2000 (CONTINUED)
GUADALUPE RIVER BASIN

Segment No.	Segment Name	Possible Impaired Use	Cause	Source	Actions Taken	Recommended Action	Rank	Funding Source(s)	Active Participants
Events to protect water quality:									
1804	Guadalupe River - New Braunfels area	———	———	———	Removed PCB contaminated containers	———	---	Mission Valley Mills	Mission Valley Mills
1804	Guadalupe River - Seguin area	———	———	———	Installed system to collect first flush runoff over plant site; diverted to wastewater system	———	---	Structural Metals of Texas	Structural Metals of Texas
1804	Guadalupe River - Hydroelectric lakes	———	———	———	Established committee made up of lake users that will serve to give public feedback concerning any vegetation control activities	———	---	GBRA	GBRA
1807	Coleto Creek Reservoir	———	———	———	Established committee made up of lake users that will serve to give public feedback concerning any vegetation control activities	———	---	GBRA	GBRA

TABLE 3 BASIN ACTION SUMMARY - 1999-2000 (CONCLUDED)
GUADALUPE RIVER BASIN

Segment No.	Segment Name	Possible Impaired Use	Cause	Source	Actions Taken	Recommended Action	Rank	Funding Source(s)	Active Participants
Events that could effect water quality:									
1810	Plum Creek	No impairment noted to date	Contamination of surrounding soil by petroleum transmission line near creek (TNRCC site no. 12840)-May, 1999	While laying a fiber optic cable line, a petroleum transmission line was ruptured	Repair of line; monitoring well required by TNRCC constructed between berditch and Plum Creek; TNRCC monitored creek for contamination	Request that TNRCC contact GBRA when a spill is investigated in basin and share data collected	----	TNRCC	TNRCC
	Edwards Aquifer Recharge Zone	Dyno Nobel 2600 Diesel Fuel spill(4 mi from Comal Springs)-Jan. 14-16, 2000	Contamination of soil around site and possibly groundwater	Below ground storage tank, valve was opened on weekend	EAA doing sampling of Comal Springs; have found low levels of naphthlenes and xylenes (ppb); Dyno have submitted a corrective action plan; EAA submitting criticisms of plan to TNRCC	EAA feels that Dyno Nobel should put in evaluate ground water under site	----	Dyno Nobel	Dyno Nobel