April 30, 2000

Basin Highlights Report: The Rio Grande Basin

U. S. International Boundary and Water Commission– Texas Clean Rivers Program

Building a foundation through:

- Partnerships with federal, state and local governments, and local citizens,
- Incorporating concerns through special studies,
- Developing a network for water quality monitoring, and
- Public education.

Inside this issue:

Texas Clean Rivers Program

In its first full year of administering the Texas Clean Rivers Program (CRP) for the Rio Grande Basin, the U.S. Section of the International Boundary and Water Commission (USIBWC) has been working with local communities to address water quality issues.

CRP partners throughout the basin have been participating in water quality monitoring and providing valuable input to help shape and direct the CRP. Federal, state and local governments, and private citizens are working side by side in the spirit of cooperation with a common goal to assess water quality and present information to educate people about the importance of protecting their water resources.

The Rio Grande on the Texas-New Mexico-Mexico Border.

The Texas Clean Rivers Program Rio Grande Basin Advisory Committees (BAC) provide a forum for the local community to interact directly with federal and state agencies and allow for the two-way exchange of information that is necessary for the CRP to succeed.

In February and March 2000, BAC meetings were held in Harlingen, Laredo, Pecos, and El Paso, Texas. Meeting topics included FY2000 program tasks, the Total Maximum Daily Load Program, the Texas Nonpoint Source Program, and coordinated monitoring. Issues that were of concern to individuals were addressed and recorded in the meeting minutes to insure follow-up discussions.

Special Studies

Special studies are incorporated into the CRP to address issues and concerns that are expressed at the BAC meetings. CRP staff solicit assistance from the BAC to prioritize the concerns and develop a scope of work that will be submitted to the Texas Natural Resource Conservation Commission (TNRCC) for approval. Currently there are six special studies that have been proposed to TNRCC. Of the six proposed, three have been approved and are in progress.

Page two of this report provides a brief description of the studies.

The Rio Conchos as it joins the Rio Grande in the Presidio/ Ojinaga area.

Historical and stochastic data assessment for the Lower Rio Grande (pending approval).

This study will be conducted in conjunction with Texas A&M–Kingsville. The objective of this study is to develop an understanding of the processes and factors affecting water quality in the Lower Rio Grande Valley by:

1. Conducting an assessment of historical data to determine correlations and relationships between in-stream water quality and loadings;
2. Developing a preliminary mathematical model to predict in-stream water quality; and
3. Using model predictions to assess gaps in monitoring data and determine the causal factors driving water quality in the basin.

Assessment of potential impacts of illegal dumping and discharges to the Lower Rio Grande (pending approval).

The objective of this assessment is to provide a preliminary evaluation of the magnitude and potential impacts of the illegal dumping of solid waste and unauthorized discharges into the Rio Grande Basin from Laredo to Brownsville. Such an assessment can provide valuable input information for understanding water and sediment quality characteristics within the river and baseline information for further river basin management planning.

The United States-Mexico border has unique problems related to water resources.

Assessment of water quality standards compliance and suggested alternatives in Rio Grande segments 2307 and 2308 (pending approval).

Current and historical water quality data will be evaluated to determine if the water quality standards established for segments 2307 and 2308 are representative of each reach. Additionally, further analysis will be conducted to assess current segment boundaries and propose amendments to the boundaries based on the information collected if needed.

Members of the CRP staff will be working on this project . Please see page 5 for further information on these two segments.

A study of chemical and microbial contamination in the Upper Rio Grande Basin (approved).

The potential for surface and groundwater contamination with infectious microorganisms and toxic chemicals as a result of agriculture, domestic and maquiladora activities is very high. El Paso Community College and New Mexico State University are conducting this study with assistance from CRP. Tests to determine if a correlation exists between chemical and microbial contamination, and indicator organisms such as fecal coliform can be correlated with the presence of the bacterium *Helicobacter pylori,* which is known to cause gastric ulcers.

Watershed program for the New Mexico-Texas Water Commission (approved).

The NM-TX Commission is actively engaged in development of a system of diversions and treatment of Rio Grande surface water to supply municipalities within the region from Elephant Butte Dam (Sierra County, New Mexico) to Ft. Quitman (Hudspeth County, Texas). In order to adequately respond to certain issues, the NM-TX Commission believes that a watershed component should be added to the project. The CRP staff will explore the possibility of expanding the CRP to fulfill the baseline data needs of the NM-TX Commission's Watershed Program.

Daniel Borunda, USIBWC, and Greg Larson, TNRCC, conducting a seine haul on the Pecos River.

Fish and macrobenthic community assessment (approved).

The study is being conducted to assess fish community structure and the macrobenthic community in relation to habitat and water quality on the Pecos River near Orla, Texas. CRP staff assisted Mr. Greg Larson, TNRCC Midland Office, in conducting the field work for this study. Data analysis and report writing will soon follow.

USIBWC Monitoring Activities

The USIBWC water quality monitoring program includes stations on the mainstem of the Rio Grande, its tributaries and reservoirs. Current CRP Basin-wide Monitoring Program partners include the City of Laredo, City of Brownsville, City of Del Rio, Zapata County Waterworks, Big Bend National Park, Rio Grande International Study Center, five TNRCC field offices, six USIBWC field offices, and the United States Geological Survey (USGS).

CRP partners have been collecting data for FY 2000 at fifty-nine monitoring stations throughout the basin. The data collected will help assess water quality to determine if it meets Texas surface water quality standards.

This year, two additional laboratories have been added to the CRP for the Rio Grande Basin. The **El Paso Water Utilities Laboratory (EPWU)**, El Paso, Texas provides lab support in the Upper Rio Grande sub-basin. The EPWU and USIBWC have had a successful, ongoing partnership for several years monitoring the Upper Rio Grande. A second laboratory, **Inter-Mountain Labs (IML)**, in College Station, Texas, has been contracted through the USIBWC to provide laboratory services for CRP partners in Texas. The **TNRCC Houston Laboratory** continues to provide laboratory support for CRP partners throughout the Rio Grande Basin.

Emphasis in FY2000 was placed on fixed routine monitoring. The data collected will be used to establish a baseline for future studies. The following list of parameters are currently being analyzed:

pH	Dissolved oxygen
Conductivity	Water temperature
Flow	Ammonia-nitrogen
Chloride	Nitrate-nitrite nitrogen
Sulfate	Chlorophyll-a
Phosphorus	Total dissolved solids
Fecal coliform	Total organic carbon
Alkalinity	Total suspended solids
Toxicity	Total/dissolved metals

A series of meetings were held throughout the basin to discuss current monitoring efforts and to develop the FY 2001 monitoring schedule. Topics that were covered included the addition/removal of stations, frequency of sampling, and addition/deletion of parameters. Sixty-eight stations will be monitored in FY 2001. Two CRP partners were added to the program this year, the **Upper Pecos Soil and Water Conservation District #213**, and the **City of Laredo's Engineering Department**. Welcome!

Meetings were held in Laredo, Harlingen, Pecos, and El Paso to discuss monitoring activities.

Analysis of unassessed areas in the Rio Grande

CRP staff prepared a report on areas in the Rio Grande Basin that did not have adequate information to assess the stream segments for their designated uses. Designated uses include contact recreation, domestic water supply, oyster waters and aquatic life. In conjunction with the coordinated monitoring meetings, additional monitoring will be added to help "fill-in" the data gaps that have been identified.

The report contains information on each monitoring station and the data that is required to make an assessment. Because the Rio Grande extends for over twelve hundred miles on the Texas-Mexico border, the report is divided into four sub-basins, the Upper, Middle, and Lower Rio Grande, and the Pecos River.

Also included in each sub-basin report is a summary on each individual monitoring station to determine if a station is meeting state surface water quality standards for its designated stream uses. Data from 1995 to 1999 was used in the screening analysis.

Upper Rio Grande And Pecos Sub-basin

Screening Analysis Criteria

Five years of data was compared to Texas Surface Water Quality Standards that are assigned to each stream segment to determine if segments were meeting the surface water quality standards. Data collected by CRP partners from 1995 through 1999 was used in the assessment. CRP and TNRCC staff only used data that met quality assurance criteria for this analysis. The TNRCC manual "Guidance for Screening and Assessing Texas Surface and Finished Drinking Water Quality Data" was used to insure the data met screening criteria. The TNRCC data management team also provided assistance and support for this assessment. Findings indicate segments that were listed on the EPA's 303(d) continue to exceed the standards for those parameters (toxicity and aquatic life use were not evaluated).

A concern is defined as a parameter with more than 25% of values exceeding the screening level. A possible concern is defined as 11-25% of values exceeding the screening level. No concern is defined as 10% or less of the values exceed the screening level. In the absence of established criteria, the TNRCC and CRP developed screening levels for these three water quality indicator groups in order to identify areas where elevated levels may constitute cause for concern.

The Upper Rio Grande Sub-basin represents the portion of the river from the New Mexico-Texas state line downstream to the International Amistad Reservoir. The Pecos River sub-basin begins at the Red Bluff Reservoir and empties into the Rio Grande in Val Verde County. The Pecos River will be addressed in future reports as a separate sub-basin to better address issues in that region. Please see Figure 1. (Map of stations and stream segments).

Segment 2314– Rio Grande Above International Dam

Five years of data was analyzed and compared to Texas surface water quality standards.

Land use includes dairies, agriculture, and some residential land use. The United States diverts its water allotment at American Dam into the American Canal, from which it is diverted for drinking water and agricultural use in the El Paso/Hudspeth County region.

There is not enough data to assess this segment for metals and organics in sediment and fish tissue. The two monitoring stations located on this segment were screened to determine if the segment was supporting its designated uses of contact recreation, high aquatic life, and domestic water supply. Station 13276 (Rio Grande upstream of east drain) showed a concern for chlorophyll-a (32% of the data exceeded the screening criteria). Station 13272 (Rio Grande at Courchesne Bridge) showed a concern for fecal coliform (44% exceeded criteria) and ammonia-nitrogen (39% exceeded criteria).

Segment 2308– Rio Grande Below International Dam

The water remaining in the Rio Grande, after diversion at American Dam, is diverted at International Dam into Mexico for agricultural use. Seepage from the dam, runoff, and return flows make up the flow in segment 2308.

Toxicity in water and sediment, metals, and organics in fish tissue require more monitoring for assessment. Segment 2308 is designated for non-contact recreation and low aquatic life use. Station 14465 (Rio Grande at Riverside Canal 1.8km downstream of Zaragosa International Bridge), station 15528 (Rio Grande 1.3km downstream of Haskell WWTP), and station 15529 (Rio Grande 2.4km above Haskell WWTP) exceeded the screening criteria for ammonia-nitrogen. The data also showed possible concerns for chloride at all three stations, and at station 15529, possible concerns for sulfate and fecal coliform.

Return flows from wastewater discharges that once entered the Rio Grande are now diverted into the American Canal in El Paso prior to this segment. The effects of no return flows are being studied to determine the impact to water quality in this segment.

Segment 2307– Rio Grande Below Riverside Diversion Dam

Return flows from Mexico and agricultural returns from the United States influence the upper portion of segment 2307. Low flow conditions affect the lower portion of the segment.

More data needs to be collected for metals, organics, and toxicity in water, toxicity in sediment, and metals and organics in fish tissue. Segment 2307 is designated for contact recreation, high aquatic life use, and as a domestic water supply. Station 13230 (Rio Grande 2.4 miles upstream from Rio Conchos confluence) and Station 13232 (Rio Grande at Neely Canyon, south of Fort Quitman) showed concerns for total dissolved solids-TDS (85 & 89% exceeded), chloride (88 & 89%), sulfate (47 & 72%), chlorophyll-a (43 & 44%), and total phosphorus (31 & 28%). There is also a possible concern for ammonia-nitrogen (12%) at station 13230. Station 15795 (Rio Grande at Alamo Control Structure, 9.7km upstream of Ft. Hancock port of entry) exceeded screening levels for ammonia-nitrogen (46%) and chloride (27%) with possible concerns for total dissolved solids (18%).

The Rio Grande as it flows through Big Bend State Park (Segment 2306).

Segment 2306- Rio Grande Above Amistad Reservoir

The upper portion of the segment is influenced by the cities of Presidio, Texas and Ojinaga, Chihuahua, and the Rio Conchos. Increased flow does not reduce the number of times samples exceed screening criteria when compared to segment 2307.

This segment is designated for contact recreation, high aquatic life use, and as a domestic water supply. More data is required for metals and organics in tissue for assessment of these parameters. In the lower portion of Segment 2306, data is needed to assess metals, organics, and toxicity in water, toxicity and organics in tissue, and metals in water. Station 13229 (Rio Grande below Rio Conchos) exceeded screening criteria for fecal coliform (52%), TDS (73%), chloride (83%), sulfate (56%), and chlorophyll-a (55%). There were also possible concerns for ammonia-nitrogen (14%) and total phosphorus (23%). Station 13228 (Rio Grande at the mouth of Santa Elena Canyon) and 13225 (Rio Grande at FM 2627) also showed concerns with TDS, chloride, sulfate, and possible concerns for total phosphorus. Station 13223 (Rio Grande at Foster Ranch west of Langtry off HWY 90W) showed possible concerns for chlorophyll-a and total phosphorus.

Texas has been in a drought for several years. Amistad has not been full since 1993 and is currently at 43% of its capacity.

Segment 2305– International Amistad Reservoir

Amistad Reservoir provides hydroelectric power to the region as well as helps to conserve water and deliver water for municipal and agricultural use.

There is insufficient data to assess metals, organics, and toxicity in water and sediment, and metals and organics in fish tissue. Designated uses include contact recreation, high aquatic life use, and domestic water supply.

International Amistad Reservoir

Upper Rio Grande and Pecos Sub-basin

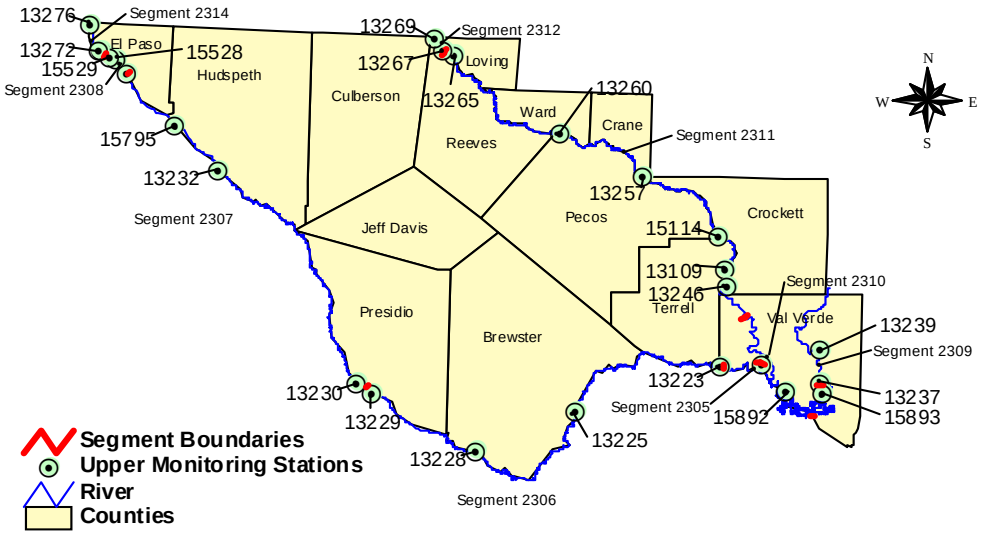

Figure 1. Map of stream segments and monitoring stations on the Rio Grande, Pecos River, and Devils River.

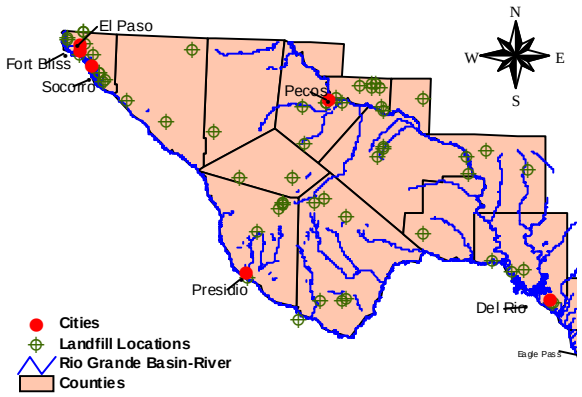

Figure 2. Location of landfills in the Upper Rio Grande/Pecos region.

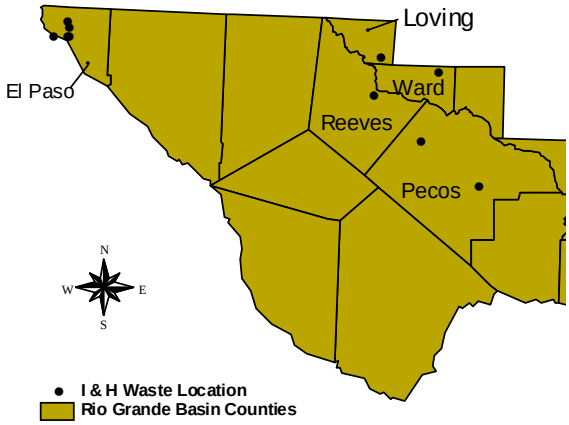

Figure 3. Permitted Industrial and Hazardous Waste Facilities in the Upper Rio Grande/Pecos Region by county.

Pecos River

Segment 2312– Red Bluff Reservoir

This segment is designated for contact recreation and high aquatic life use. The segment requires more data on metals and organics in fish tissue, and organics in sediment for assessment purposes. Station 13269 (Red Bluff Reservoir 1/2 mile south of Texas-New Mexico border) data shows concern in nitrate-nitrite nitrogen (56%). Possible concerns in chlorophyll-a and ortho-phosphorus were also seen. Segment 13267 (Red Bluff Reservoir above dam, north of Orla) shows possible concerns for ammonia-nitrogen and nitrate-nitrite nitrogen.

This picture shows how salt cedar has dominated the banks of the Pecos River. Salt cedar causes increased salinity of the soil and surrounding water, increased flooding due to increased sedimentation and decreased channel width, and increased water loss due to high evapotranspiration rates.

Segment 2311– Upper Pecos River

This section of the Pecos is designated for contact recreation and high aquatic life use. Information is needed to assess metals, organics, and toxicity in water, toxicity, metals, and organics in sediment, and metals and organics in fish tissue. Screening analysis on station 13265 (Pecos River at FM 652 Bridge NE of Orla) shows a possible concern for chlorophyll-a (15%). Station 13260 (Pecos River at FM 1776 SW of Monahans) shows a possible concern for dissolved oxygen (19%). Station 13257 (Pecos River at US 67 NE of Girvin) exceeds the criteria for sulfate (50%) and has possible concerns for dissolved oxygen (25%) and ammonia-nitrogen (14%).

The Pecos River in segments 2312 and 2311 contains high levels of dissolved salts. Naturally-occurring salt deposits and other factors such as the intrusion of the salt cedar tree result in a salt content 10 times as high as the water found in the Rio Grande. Efforts to address salinity are underway at this time.

Segment 2310– Lower Pecos River

This segment is designated to support contact recreation, high aquatic life use, and as a domestic water supply. Additional monitoring is required to assess metals, organics, and toxicity in water and sediment, plus metals and organics in fish tissue. Station 13246 (Pecos River 7.52 km upstream from the Val Verde/Terrell/Crockett County line convergence) shows concerns for TDS (60%), chloride (64%), and sulfate (93%). Station 13240 (Pecos River at gauging station 7.4 miles east of Langtry, 15 miles upstream from confluence with Rio Grande) has a concern for sulfate (36%), and possible concerns for chloride (20%) and TDS(11%). This segment is still impacted by the naturally occurring salt deposits but is diluted by the inflow from Independence Creek.

The Pecos River at HWY 90 bridge, in segment 2310, flows several hundred feet below the bridge. High canyon walls make accessibility to the river difficult.

The City of Del Rio's Water Operations team takes a flow measurement on San Felipe Creek.

Middle Rio Grande Sub-basin

The Middle Rio Grande Sub-basin represents the portion of the river below International Amistad Reservoir downstream to International Falcon Dam.

As is the case throughout the Texas-Mexico border, sister cities (United States and Mexico border cities located in the same area) located in this reach struggle to stay ahead of development and to provide the infrastructure to minimize the pollution going into the Rio Grande.

Segment 2304– Rio Grande Below Amistad Reservoir

Falcon Reservoir is at 39% of conservation level (full) and has not reached capacity since 1993.

Segment 2304's designated uses include contact recreation, high aquatic life, and domestic water supply. Currently, this segment is lacking data to assess toxicity, metals, and organics in sediment and water, and metals in fish tissue. Station 13208 (Rio Grande 12.8 miles below Amistad Dam) shows a concern for total-phosphorus (40%). Station 13560 (Rio Grande, 4.5 miles downstream of Del Rio at Moody Ranch) is exceeding the criteria for fecal coliform (30%) and total phosphorus (36%). Ammonia-nitrogen (18%) is a possible concern. Station 13206 (Rio Grande US 277 at Eagle Pass) and station 13205 (Rio Grande near irrigation canal lateral 50 US 277 bridge in Eagle Pass) show a concern for total-phosphorus (26% & 40 %) and a possible concern for ammonia-nitrogen (17% and 20%). Station 13202 (Rio Grande Laredo water treatment plant pump intake) shows a possible concern for total-phosphorus (17%). Station 13196 (Rio Grande at pipeline crossing, 13.9 km below Laredo) and station 15817 (Rio Grande at Webb/Zapata County line) exceeded the criteria for fecal coliform (86% & 94 %) and ammonia-nitrogen (72% & 70%), and show a possible concern for total-phosphorus (11% & 22%). There were seven stations on this segment that did not have enough data to conduct the screening analysis. Those stations will be addressed as more data is acquired.

The building of wastewater treatment plants such as in Nuevo Laredo, Tamaulipas, has reduced the amount of untreated sewage being discharged into the Rio Grande. Current monitoring and future studies will help determine if these improvements show a significant improvement in

International Falcon Reservoir

Segment 2303– International Falcon Reservoir

International Falcon Reservoir was dedicated on October 19, 1953. It was built to provide uses such as recreation, water conservation, and hydroelectric power. Falcon reservoir is designated for contact recreation, high aquatic life use, and domestic water supply. There are two stations on the reservoir but there is not enough current data to conduct the screening analysis.

Lower Rio Grande Sub-basin

The Lower Rio Grande Sub-basin represents the area below International Falcon Reservoir downstream to the Gulf of Mexico. There are currently eleven monitoring stations with ten of them located on segment 2302.

Over 680,000 people live in the three Texas counties that make up the Lower Rio Grande Sub-basin. Agriculture remains one of the top industries in the area. Agriculture, cities, and industry must work together to plan a sustainable future with the limited, finite water supply.

Segment 2302– Rio Grande Below Falcon Reservoir

The agricultural community relies on the delivery of water from the Rio Grande.

This segment's uses include contact recreation, high aquatic life use, and domestic water supply. It is lacking data to assess metals and organics in water and fish tissue. Station 13187 (Rio Grande 2.5 miles below Falcon Dam at diversion structure) shows a possible concern for pH (11%). Station 13186 (Rio Grande below Rio Alamo near Fronton) shows a concern for total phosphorus (34%) and possible concerns for TDS (11%), chlorophyll-a (22%), and ammonia-nitrogen (19%). Station 13185 (Rio Grande at Fort Ringhold 1 mile downstream from Rio Grande City) shows a possible concern for TDS. Station 13184 (Rio Grande at SH 886 near Los Ebanos) and 13664 (Rio Grande 0.5 miles below Anzalduas Dam, 12.2 miles from Hidalgo) exceed the criteria for TDS (30% & 28%). Station 13181 (Rio Grande International Bridge at US 281 at Hidalgo) data suggest possible concerns for TDS (13%), ammonia-nitrogen (14%), and total phosphorus (23%). Station 15808 (Rio Grande 200 meters upstream of Pharr International Bridge on US281) exceeds the total phosphorus criteria (31%) and shows possible concerns for fecal coliform (13%), TDS (13%), and ammonia-nitrogen (14%). Station 13177 (Rio Grande at El Jardin Pump Station near Brownsville) shows concerns for TDS (61%), fecal coliform (29%) and chlorophyll-a (42%), with possible concerns for chloride (22%), sulfate (16%), ammonia-nitrogen (12%) and total phosphorus (16%).

TNRCC Staff instruct CRP personnel on field techniques (Bandera 1999).

Segment 2301– Rio Grande Tidal

Segment 2301 designated uses include contact recreation and exceptional aquatic life use. Current data indicates chlorophyll-a is a concern (33% of the data exceeds the screening level).

Middle Rio Grande Sub-basin

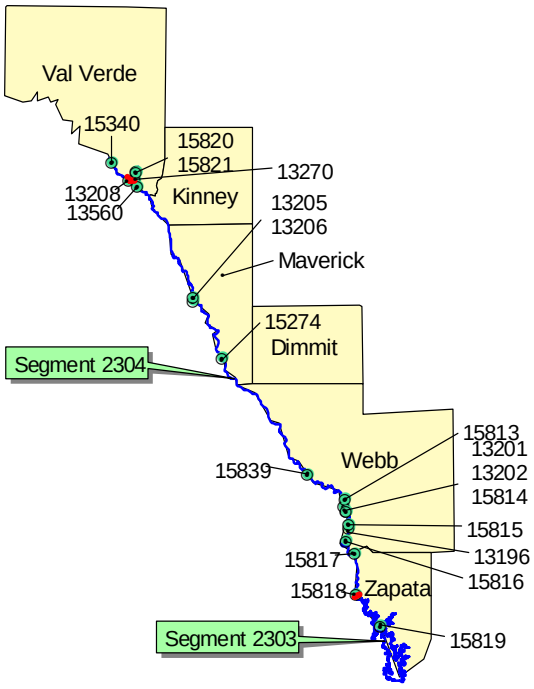

Figure 4. Location of monitoring stations in the Middle Rio Grande.

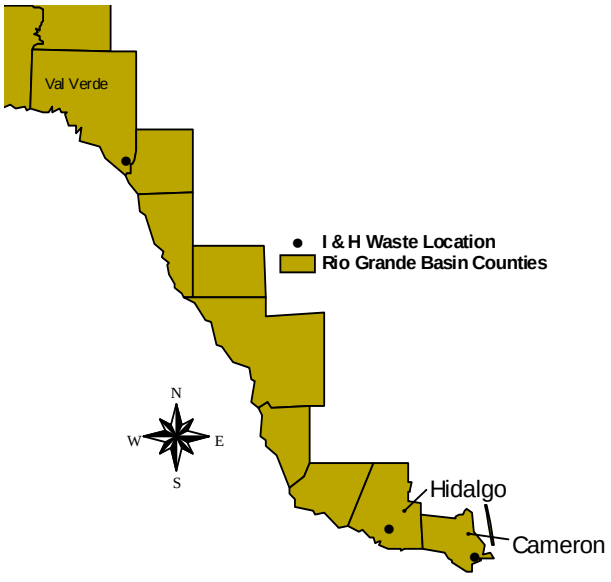

Figure 5. Locations of industrial and hazardous waste facilities in the Middle and Lower Rio Grande by county.

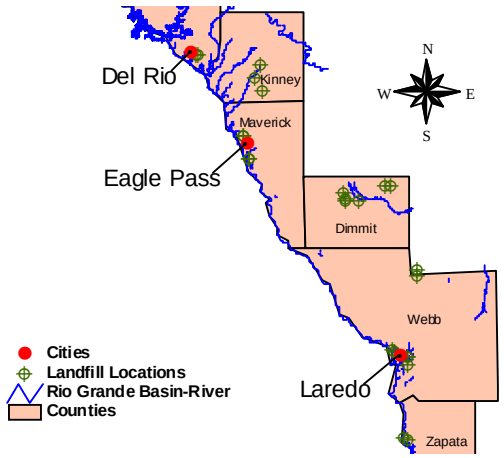

Figure 6. Location of landfills in the Middle Rio Grande

Lower Rio Grande Sub-basin

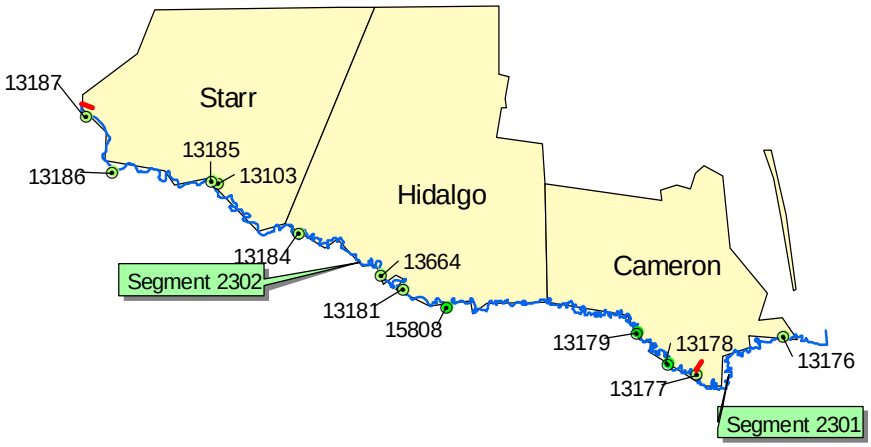

Figure 7. Location of monitoring stations on the Lower Rio Grande.

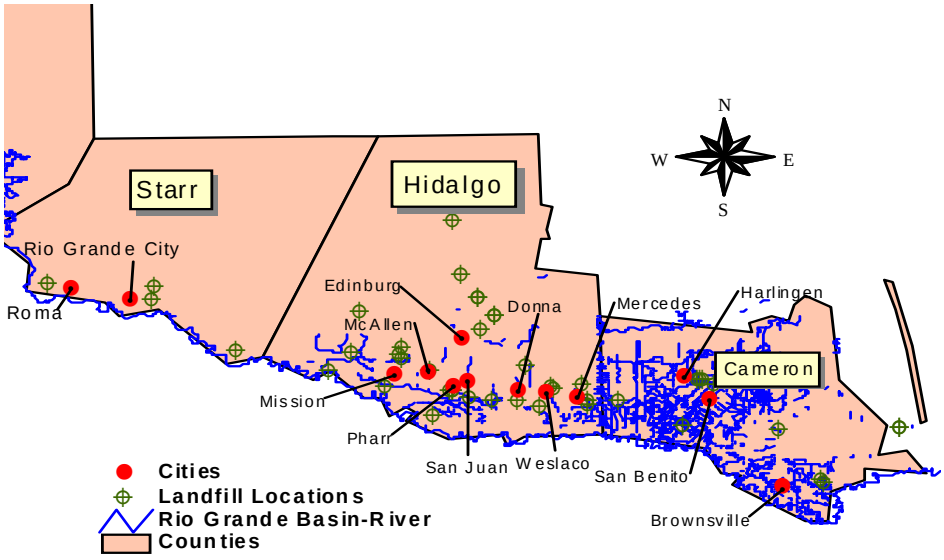

Figure 8. Location of landfills in the Lower Rio Grande.

Organization

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The International Boundary and Water Commission (IBWC) was created more than a century ago by the governments of the United States and Mexico to apply the provisions of various boundary and water treaties, and settle differences arising from such applications through a joint international commission located at the border.

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*Projected (P) Population (by county) for the Rio Grande Basin

NAME	P1990 Census	P2000	P2010	P2020	P2030	P2040	P2050
EL PASO	591,610	770,533	921,780	1,082,445	1,254,503	1,391,586	1,536,423
HUDSPETH	2,915	3,282	3,631	3,884	3,995	4,054	4,060
JEFF DAVIS	1,946	2,188	2,355	2,473	2,487	2,479	2,489
PRESIDIO	6,637	9,229	11,898	15,008	18,268	19,233	20,211
BREWSTER	8,681	10,330	12,374	14,262	15,777	17,203	18,059
TERRELL	1,410	1,482	1,582	1,603	1,581	1,561	1,541
VAL VERDE	38,721	47,276	51,550	55,033	56,895	61,625	66,846
LOVING	107	105	98	84	74	62	49
REEVES	15,852	17,580	19,356	20,812	21,541	22,127	22,546
WARD	13,115	13,969	14,822	15,206	14,956	14,508	13,885
WINKLER	8,626	9,282	10,042	10,599	10,764	10,875	10,820
ECTOR	118,934	132,388	147,606	164,226	183,457	198,174	209,008
CRANE	4,652	5,062	5,864	6,471	7,014	7,348	7,681
UPTON	4,447	4,894	5,411	5,728	5,812	5,847	5,837
PECOS	14,675	16,598	18,415	19,584	19,941	20,154	20,150
CROCKETT	4,078	4,716	4,931	5,146	5,299	5,387	5,464
UPTON	4,447	4,894	5,411	5,728	5,812	5,847	5,837
KINNEY	3,119	4,615	4,821	4,937	4,937	4,937	4,937
MAVERICK	36,378	48,180	57,618	65,517	71,699	80,082	90,351
DIMMIT	10,433	12,072	13,925	15,791	17,902	20,112	22,546
WEBB	133,239	219,725	293,939	384,260	501,318	527,244	571,916
ZAPATA	9,279	13,567	19,218	26,827	35,955	49,008	67,272
HIDALGO	383,545	559,922	712,383	879,381	1,078,637	1,256,080	1,435,319
CAMERON	260,120	337,689	405,463	476,992	554,513	614,396	652,931
STARR	40,518	58,158	80,333	109,240	146,407	169,917	188,576

*population data collected from Texas Water Development Board website: www.twdb.state.tx.us