2015 Basin Highlights Report

May 2015

Texas Rio Grande Basin Program Update

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

Introduction

In 1991, the Texas Legislature passed the Texas Clean Rivers Act (Senate Bill 818) to address water resources in an integrated, systematic manner, creating the Texas Clean Rivers Program (CRP). CRP is a state fee-funded program specifically for water quality monitoring, assessment, and public outreach, and aims to improve the quality of water within each river basin in Texas through partnerships with the Texas Commission on Environmental Quality and participating entities. The CRP for the Rio Grande Basin was originally administered by the Border Environment Assessment team of the TCEQ, which at that time was called the Texas Natural Resources Conservation Commission (TNRCC).

In 1998, the State of Texas contracted with the U.S. Section of the International Boundary and Water Commission (USIBWC) to administer and implement the CRP for the Rio Grande Basin in Texas to monitor and address water quality issues unique to an international water boundary. The USIBWC Clean Rivers Program is responsible for collecting water quality data throughout the portion of the Rio Grande Basin that lies within the State of Texas.

The USIBWC Clean Rivers Program relies on multiple partners throughout the Rio Grande basin to collect water samples and field data from 91 stations along the Rio Grande and Pecos rivers. At this time, the program is partnered with 4 laboratories and 16 volunteer partners, without which much of the work could not be accomplished.

About the cover: Picture taken by USIBWC CRP staff at the Webb/Zapata County line in Laredo, TX, which is Station 15817, 2011

Pictured from left: TCEQ CRP RG Basin Project Manager Sarah Eagle, TCEQ SWQM Assesor Robin Cypher and USIBWC CRP RG Basin Program Manager Leslie Grijalva at the Webb/Zapata County line in Laredo, TX, Station 15817, 2014

Aspects of the Clean Rivers Program

The USIBWC is one of 15 partner agencies that collaborate with TCEQ to administer the Texas Clean Rivers Program in the 23 river and coastal basins in Texas. The main goals of CRP from the long-term plan include:

- Maintain a basin-wide routine water quality monitoring program and maintain a water quality database.
- Provide quality-assured data to TCEQ for use in water quality decision-making.
- Identify and evaluate water quality issues and summarize in reports.
- Promote cooperative watershed planning (such as conducting Coordinated Monitoring Meetings and collaborating on watershed plans and water quality initiatives).
- Inform and engage stakeholders (for example, conducting Basin Advisory meetings, watershed education activities, maintain an updated website, and print our annual reports).
- Maintain an efficient use of public funds.

Table of Contents

The Rio Grande Basin

The Rio Grande/Rio Bravo watershed covers approximately 335,000 square miles, with half of the watershed in the United States and the other half in Mexico. (Figure 1) Roughly 50,000 square miles of the watershed are within the State of Texas.

The Rio Grande river runs 1,255 miles along the international boundary with Mexico. The study area of the USIBWC CRP is the portion of the basin that falls within Texas (Figure 1), which includes the international reach of the Rio Grande/Rio Bravo from the New Mexico/Texas/Chihuahua border (El Paso/Ciudad Juarez area) to the Gulf of Mexico (Brownsville/Matamoros area).

For the purpose of coordination and planning, the USIBWC CRP has divided the Rio Grande into four sub-basins (maps are on the following pages). Descriptions of the sub-basins are below:

The Upper Sub- Basin (Figures 2 and 3), extending from the New Mexico/Texas state line downstream to International Amistad Reservoir (Segments 2314, 2308, 2307,2306);

The Pecos Sub-Basin (shown on Figure 3), extending from the New Mexico/Texas state line to its confluence with the Rio Grande upstream of Amistad Reservoir (Segments 2312, 2311, 2310, 2309);

The Middle Sub-Basin (Figure 4), extending from International Amistad Reservoir downstream to International Falcon Reservoir and including the Devil's River (Segments 2305, 2304); and

The Lower Sub-Basin (Figure 5), extending from International Falcon Reservoir downstream to the Gulf of Mexico (Segments 2303, 2302, 2301).

Due to the basin's large size, the USIBWC CRP depends on sampling partners to collect the necessary water quality data for the State of Texas. CRP partners are a valuable asset throughout the basin. They participate in water quality monitoring, providing advice and suggestions on improving the program and the basin, developing and assisting in special studies, and communicating with and educating the general public.

Coordinated Monitoring Meetings and Basin Advisory Committee Meetings

CRP holds several types of meetings, including an important series of annual meetings called Coordinated Monitoring Meetings. The purpose of the meetings is to plan and coordinate water quality monitoring efforts among different entities and partners. These meetings allow for more efficient use of agency resources, and take into consideration concerns from the public gathered throughout the year. They provide an opportunity for CRP to hear about local water quality interests and problems, and allows attendees to bring up any questions or concerns they may have about their area to CRP staff. Additionally, USIBWC CRP typically hosts trainings for sampling partners in conjunction with these meetings. Basin Advisory Committee meetings are held twice a year, and usually revolve around presenting an annual water quality update to the public, as well as updates about important issues in the area. This might include fish kills, water quality concerns, and projects in the area.

Figure 1. Map of the Rio Grande Basin

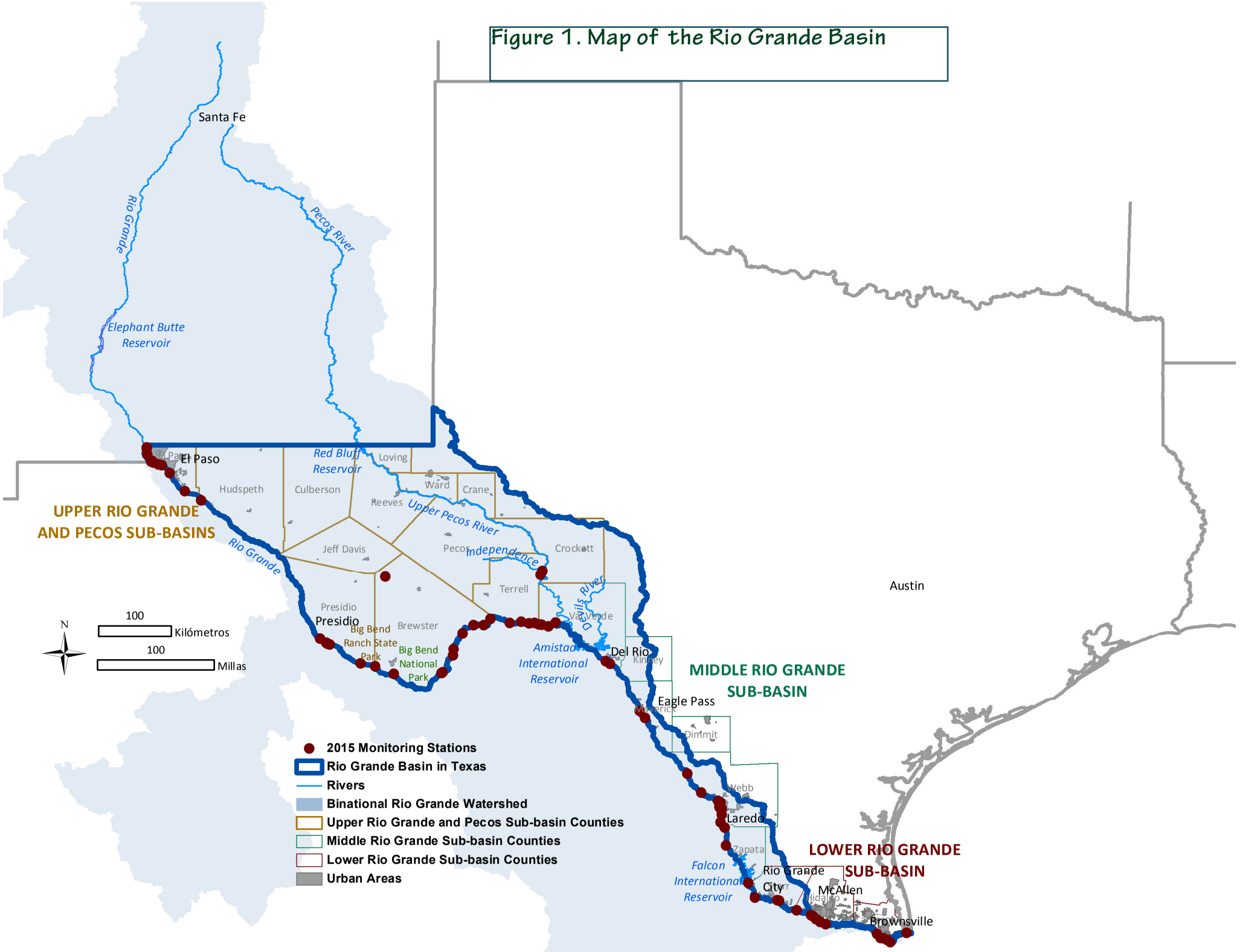
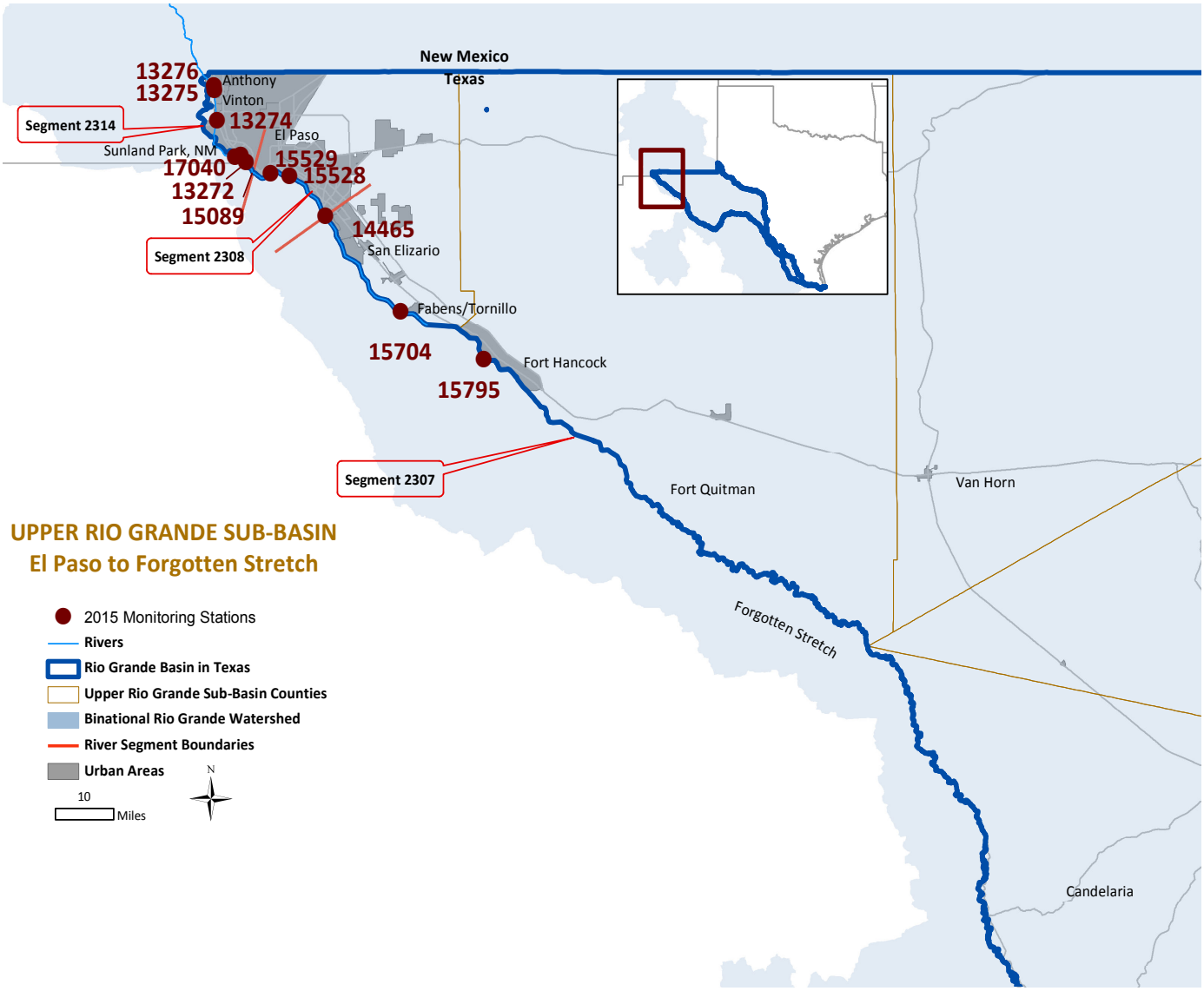


Figure 2. Upper 1 Rio Grande Stations



On this page: Upper 1 encompasses the area from El Paso, TX to the Forgotten Stretch, which is past Fort Quitman. (Segments 2314, 2308, 2307)

On the following page: Upper 2 encompasses the area from the Forgotten Stretch to Amistad International Resservoir, and includes the pecos River. (Segments 2306, 2305, 2309, 2310)

At left: Station 13276, Rio Grande Above Anthony Drain, at sunset during water deliveries.

Figure 3.Upper 2 Rio Grande and Pecos Stations

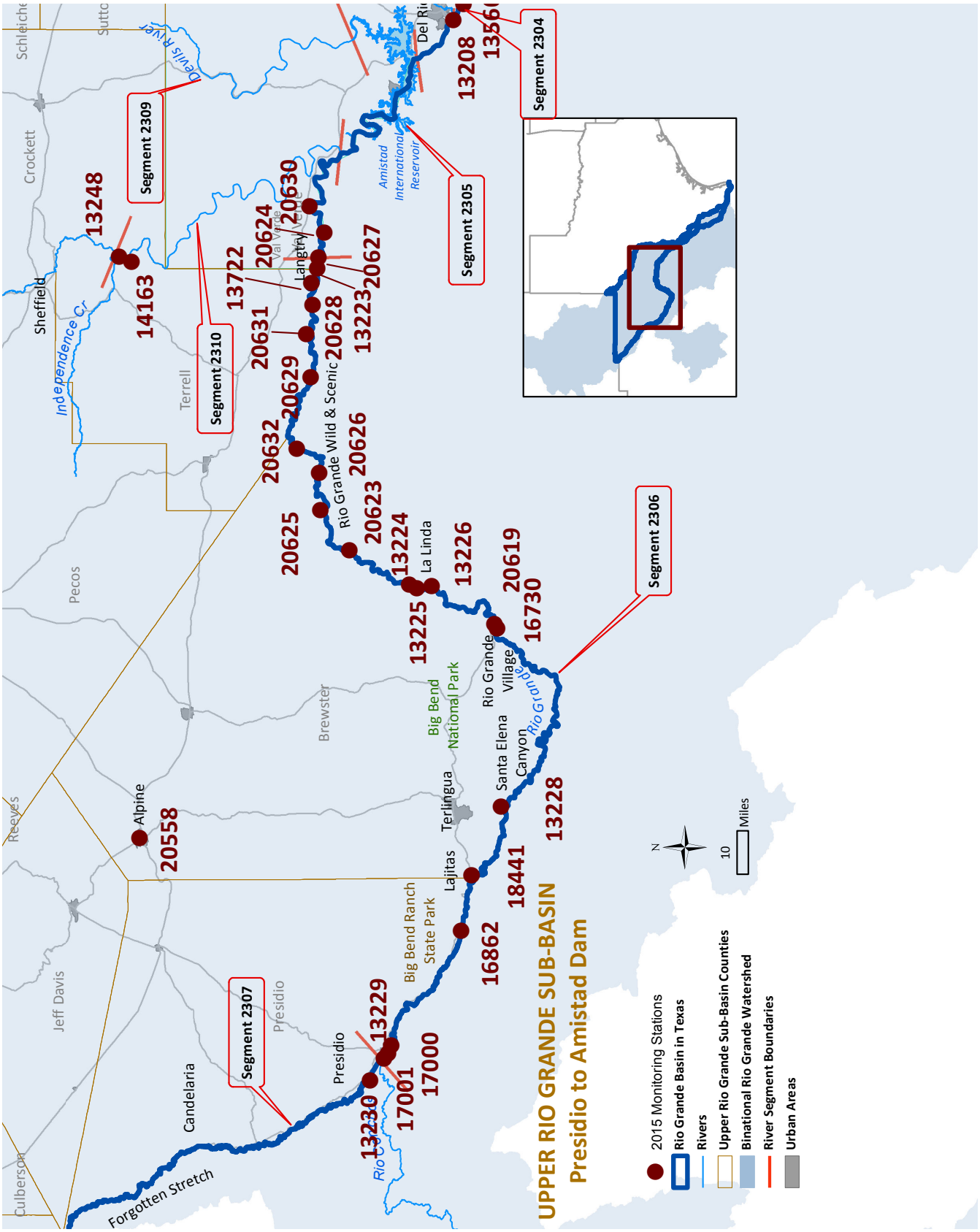


Figure 4. Middle Rio Grande Stations

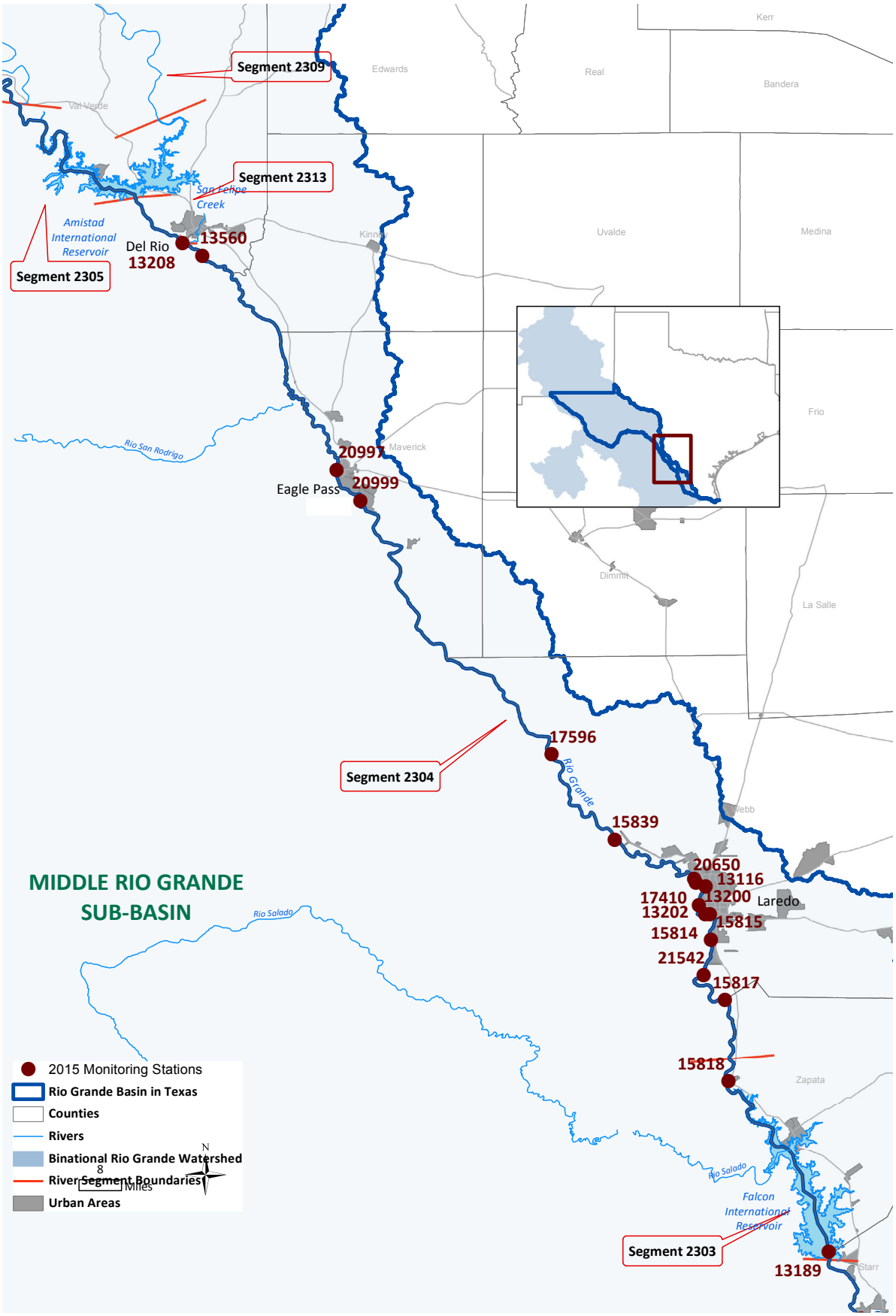
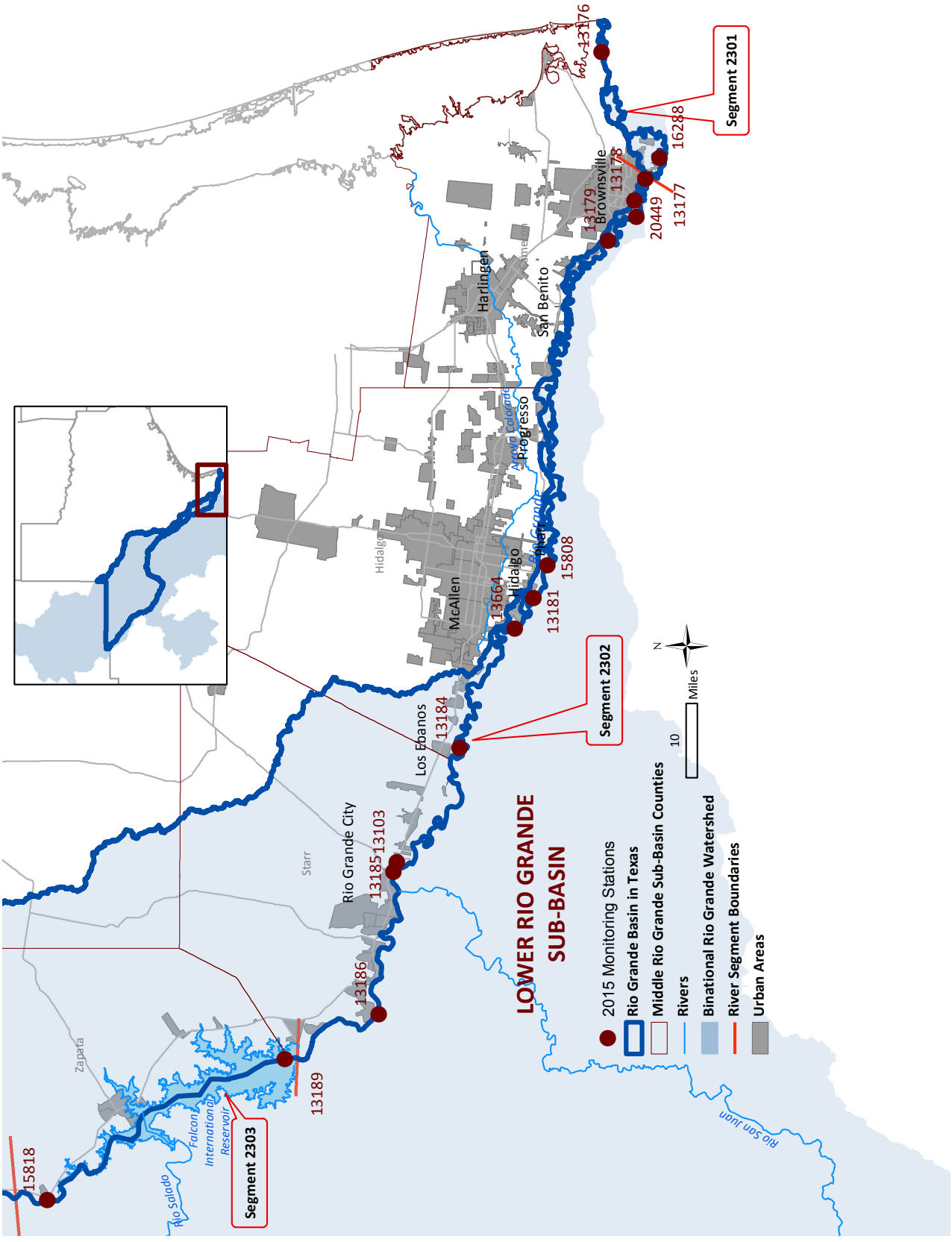


Figure 5. Lower Rio Grande Stations



Overview of Water Quality Monitoring

How do we tell the quality of water?

During the past year, the USIBWC CRP continued to maintain its large network of water quality stations. CRP and TCEQ gain an understanding of the conditions of the water quality through routine monitoring, which is performed at fixed locations at regular intervals throughout the year. Table 1 shows the kinds of data that we analyze during routine monitoring and why.

Routine monitoring helps us understand questions about how the river can be used (Table 3), such as:

- Is it swimmable?
- Is it drinkable?
- Is it fishable?
- Is it healthy for aquatic life?

CRP partners throughout the basin collect water quality and sediment samples at about 80 routine monitoring stations. When these samples are collected for laboratory analysis, personnel also make field observations to record conditions at the time the sample was taken. Field observations include things such as weather conditions at the time of collection, recent rain events in the area, water color, and other general notes related to water quality and stream uses. Important field measurements are made using different pieces of equipment. Measurements include: water and air temperature, water depth, Secchi disk, stream flow and how that flow compares to the normal flow for that water body. Three of the most important water quality parameters in a water body are pH, specific conductance, and dissolved oxygen (DO). These field parameters are described in more detail in Table 1.

The routine collection of field parameters together with laboratory parameters, also described in Table 1, allow us to determine the health of the river ecosystem and what potential human and ecological issues we should focus on. Data is compared with TSWQS criteria and screening levels in Tables 2 and 3; these steps are described in the next section.

From top: Midland College, Laredo Health Dept, and Sul Ross partners sampling

When routine monitoring shows a water quality issue or trend, we begin more intensive monitoring and special studies, which are created to gather information to address a specific water quality issue.

Table 1. Water Quality Parameters

Field Parameters		
Parameter	**Description**	**Effects to Water body**
pH	Measure of how acidic or basic the water is. The values range from 0 to 14, with 7 being neutral. pH values less than 7 indicate acidity, whereas a pH greater than 7 indicates a base.	Values greater than 9.0 and less than 5.0 can have detrimental affects on the health of aquatic life, wildlife, and humans.
Specific Conductance	Indicator of how well the water conducts electricity. Pure water does not conduct electricity; impurities of water are what allow electricity to pass through the water. These impurities are salts and metals. Since total and dissolved metal values are very low, conductivity primarily measures how much salt is in the water.	High conductivity can cause physiological effects in animals and plants. It also has negative implications for TDS.
Dissolved Oxygen (DO)	Measure of the oxygen in the water. DO is one of the most important water quality parameters.	Low DO values can lead to reduced numbers of aquatic life in a water body. Very low levels (<2) can be indicative of higher levels of oxygen-demanding pollutants that use up DO during the decay process.
Secchi Depth	A measure of the transparency of water - the maximum depth at which a black and white disk is visible.	Higher transparency leads to healthier aquatic plant life (particles in water block sunlight for photosynthesis).
Stream Flow	Volume of water moving over a location over a period of time. Low flow conditions common in the warm summer months create critical conditions for aquatic organisms.	At low flows, the stream has a lower assimilative capacity for waste inputs from point and nonpoint sources.
Conventional Laboratory Parameters		
Parameter	**Description**	**Effects to Water body**
Solids	Total and dissolved materials of any kind (calcium, magnesium, potassium, sodium, bicarbonates, chlorides, and sulfates).	High total dissolved solids indicate higher amounts of dissolved salts which can reduce the diversity of aquatic life and can render the water unusable for human consumption, industry and agriculture.
Nutrients	Nutrients include nitrogen compounds, ammonia, and phosphorus.	High levels can cause excessive plant growth, which can lead to reduced dissolved oxygen and fish kills, reduced stream flow and reduced navigability of the waters. Elevated ammonia can also be toxic to aquatic life.
Chlorophyll-a	Chlorophyll-a is an indicator of excessive plant and algal growth in the water.	High levels for long periods indicate low water quality and are indicative of excess nutrient levels.
Non-conventional Laboratory Parameters		
Parameter	**Description**	**Effects to Water body**
Metals	Aluminum, arsenic, barium, chromium, copper, lead, mercury, nickel, silver, and zinc. Metals can be tested as total or dissolved metals in water or metals in sediment to determine long-term accumulation.	High concentrations can result in long- and short-term effects on aquatic life and human health.
Organics	Chemicals containing carbon and hydrogen. Organic compounds analyzed are herbicides, pesticides and industrial compounds both in water and in sediment.	Organics can result in long- and short-term effects on aquatic life and human health.
Biological Parameters		
Parameter	**Description**	**Effects to Water body**
Nekton	Fish captured in the river during biological surveys using both electrofishing and seining methods	Using Index of Biologicial Integrity (IBI), Indicate biodiversity and overall health of river.
Benthics	Freshwater macroinvertebrates collected during a five-minute kick net method	Using IBI, Indicate biodiversity and overall health of river. Excellent indicators of water quality.

How is the Water Quality?

What are Impaired Waters?

The State of Texas publishes the Texas Surface Water Quality Standards (TSWQS) for each river basin. USIBWC Clean Rivers Program water quality data is used to help determine whether stream segments are meeting the standards. Not every parameter of concern in the Rio Grande Basin has standards associated with it; however, screening levels exist for parameters that have historically led to environmental issues in the area. A water body is listed as "impaired" in the Texas Integrated Report if the data shows the standards are not being met. A water body is described as having a concern if it is near non-attainment to the standard (CN) or is not meeting the screening levels (CS). The EPA must approve the 2014 TSWQS, which were sent to them for review and approval in April 2014 but has not yet been approved. The TSWQS for the Rio Grande Basin and the draft 2014 Integrated Report can be found at the following links.

TSWQS **https://www.tceq.texas.gov/waterquality/standards/2014standards.html**

Integrated Report: **https://www.tceq.texas.gov/waterquality/assessment/public_comment**

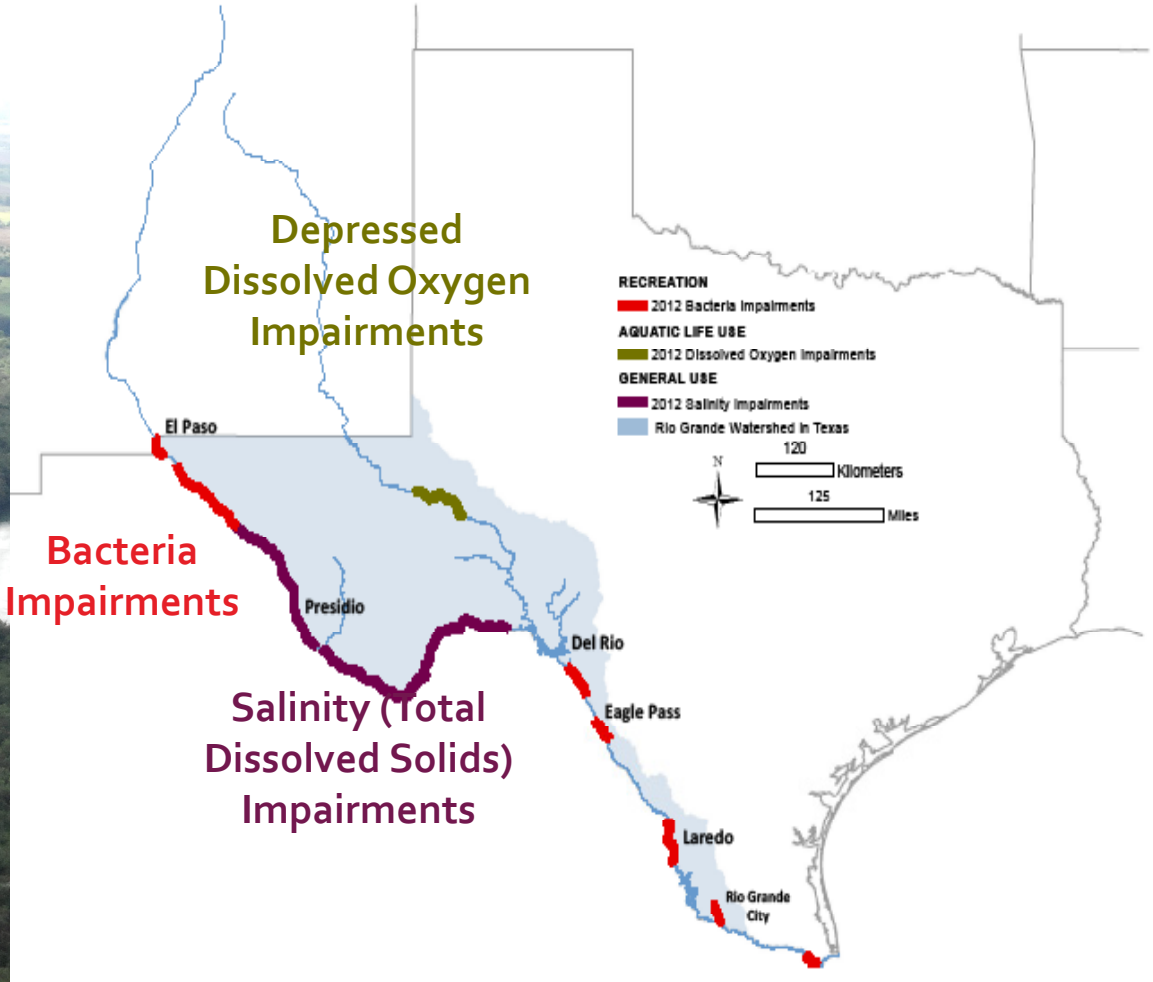


Figure 6. Impairments in the Rio Grande Basin

Table 2. Primary Surface Water Quality Standards for the Rio Grande Basin*

2014 Texas Surface Water Quality Standards for the Rio Grande Basin											
SEGMENT		USES			CRITERIA						
Segment	Segment Name	Recreation	Aquatic Life	Domestic Water Supply	Cl^- (mg/l)	$SO4^{2-}$ (mg/l)	TDS (mg/l)	DO (mg/l)	pH range (SU)	Bacteria geomean (#/100ml)	Temperature (deg F)
2301	**Rio Grande Tidal**	PCR1	E	-	-	-	-	5.0	6.5-9.0	35	95
2302	**RG Below Falcon Reservoir**	PCR1	H	PS**	270	350	880	5.0	6.5-9.0	126	90
2303	**Falcon International Reservoir**	PCR	H	PS**	200	300	1,000	5.0	6.5-9.0	126	93
2304	**RG Below Amistad International Reservoir**	PCR	H	PS**	200	300	1,000	5.0	6.5-9.0	126	95
2305	**International Amistad Reservoir**	PCR	H	PS	150	270	800	5.0	6.5-9.0	126	88
2306	**RG Above Amistad International Reservoir**	PCR	H	PS	200	450	1,400	5.0	6.5-9.0	126	93
2307	**RG Below Riverside Diversion Dam**	PCR	H	PS	300	550	1,500	5.0	6.5-9.0	126	93
2308	**RG Below International Dam**	NCR	L	-	250	450	1,400	3.0	6.5-9.0	605	95
2309	**Devils River**	PCR	E	PS	50	50	300	6.0	6.5-9.0	126	90
2310	**Lower Pecos River**	PCR	H	PS	1,700	1,000	4,000	5.0	6.5-9.0	126	92
2311	**Upper Pecos River**	PCR	H	-	7,000	3,500	15,000	5.0	6.5-9.0	33	92
2312	**Red Bluff Reservoir**	PCR	H	-	3,200	2,200	9,400	5.0	6.5-9.0	33	90
2313	**San Felipe Creek**	PCR	H	PS	50	50	400	5.0	6.5-9.0	126	90
2314	**RG Above International Dam**	PCR	H	PS	340	600	1,800	5.0	6.5-9.0	126	92
2315	**Rio Grande Below Rio Conchos**	PCR	H		450	750	2100	5.0	6.5-9.0	126	93

PCR - Primary Contact Recreation ALU - Aquatic Life Use NCR - Noncontact Recreation PS - Public Water Supply
E - Exceptional Aquatic Life L - Limited Aquatic Life H - High Aquatic Life TDS - Total Dissolved Solids geomean
- geometric mean Cl^- - chloride $SO4^{2-}$ - sulfate DO - Dissolved Oxygen

The indicator bacteria for freshwater is *E. coli* and Enterococci for saltwater (2301, 2312, 2311).
The DO criterion in the upper reach of Segment 2307 (Riverside Diversion Dam to the end of the rectified channel below Fort Quitman) is 3.0 mg/L when headwater flow over the Riverside Diversion Dam is less than 35 cfs.
The critical low-flow for Segments 2309 and 2313 is calculated according to §307.8(a)(2)(A) of the TSWQS.
A 24-hr minimum dissolved oxygen criterion of 1.0 mg/L applies to Segment 2311.

* The Standards listed above are the Proposed 2014 Revisions to the Texas Surface Water Quality Standards (TSWQS). The revisions were approved by TCEQ in April 2014 but are considered draft until approved by the EPA. More information on primary standards can be found at TCEQ's TSWQS website (http://www.tceq.texas.gov/permitting/water_quality/wq_assessment/standards/eq_swqs.html). Major changes from the 2010 Standards include the addition of a new segment and lower TDS standard in Segment 2306.
**Designated in the 2014 TSWQS as a sole-source surface drinking water supply, as provided by the TCEQ Drinking Water Protection Team.

Table 3. 2010 Texas Nutrient Criteria for the Rio Grande Basin

Segment	Segment Name	Station ID	Chlorophyll-a Criteria (µg/L)
2312	**Red Bluff Reservoir**	13267	25.14***

*** Criteria for chlorophyll-a are attained when they are not exceeded by the median of monitoring data results.
The nutrient criteria has not changed since the 2010 TSWQS.

Designated Uses

The State of Texas assigns designated uses to specific water bodies. Typical uses include public water supply, categories of aquatic life use, recreation categories, and aquifer protection. Table 3 describes the designated uses for the Rio Grande Basin, and Table 2 lists the uses and standards for each segment. Designated uses and water quality standards are defined in the TSWQS. For more info, see TSWQS website.

Contact recreation (CR) – Fishing, swimming, wading, boating, and direct water contact. *E. Coli* and Enterococci bacteria are used as indicators. The draft 2014 revisions to the TSWQS created subcategories of Primary (PCR) and Secondary Contact Recreation (SCR). PCR refers to activities such as swimming, and SCR refers to non-immersing recreation activities such as canoeing and fishing.

Public water supply (PS) – As a drinking water source, the primary concern is total dissolved solids (TDS). The TSWQS include a list of parameters that are screened to ensure domestic water supply use.

Aquatic life use (ALU) – To protect aquatic species. This designated use has four levels depending on the ability of a water body to support aquatic life such as fish and benthic macroinvertebrates (aquatic insects). The primary parameter is DO. The four aquatic life use categories are exceptional, high, intermediate, and limited.

Fish consumption (FC) – This applies to all water bodies where citizens may collect and consume fish. The TSWQS include a list of parameters that are screened to ensure the fish consumption use is met.

General use – To safeguard general water quality rather than for protection of one specific use.

Aquatic life studies, such as this one in the Lower Pecos River, evaluate the health and diversity of organisms such as fish and insects that live in the water.

Table 4. Designated Uses for Freshwater

Designated Uses			
Designated Use	**Description**	**Primary Parameter**	**Criteria**
Contact Recreation (CR)	3 levels depending on the use of the water:Fishing, swimming, wading, boating, etc	Bacteria: *E. Coli* Tidal and saline- Enterococcus (Entero)	Primary Contact Recreation (significant possibility of water ingestion, i.e. swimming) Geometric mean: 126 colony forming units (CFU) for *E. Coli* 35 CFU Entero
			Secondary Contact Recreation (limited body contact that poses a less significant risk of ingestion of water, i.e. fishing, boating) Geometric mean 630 colony forming units (CFU) for *E. Coli* 175 CFU Entero
			Non- Contact Recreation: Unsuitable for contact recreation
Public Water Supply (PS)	Drinking water source	See full list of Human Health Criteria in Table 3 of the TSWQS	

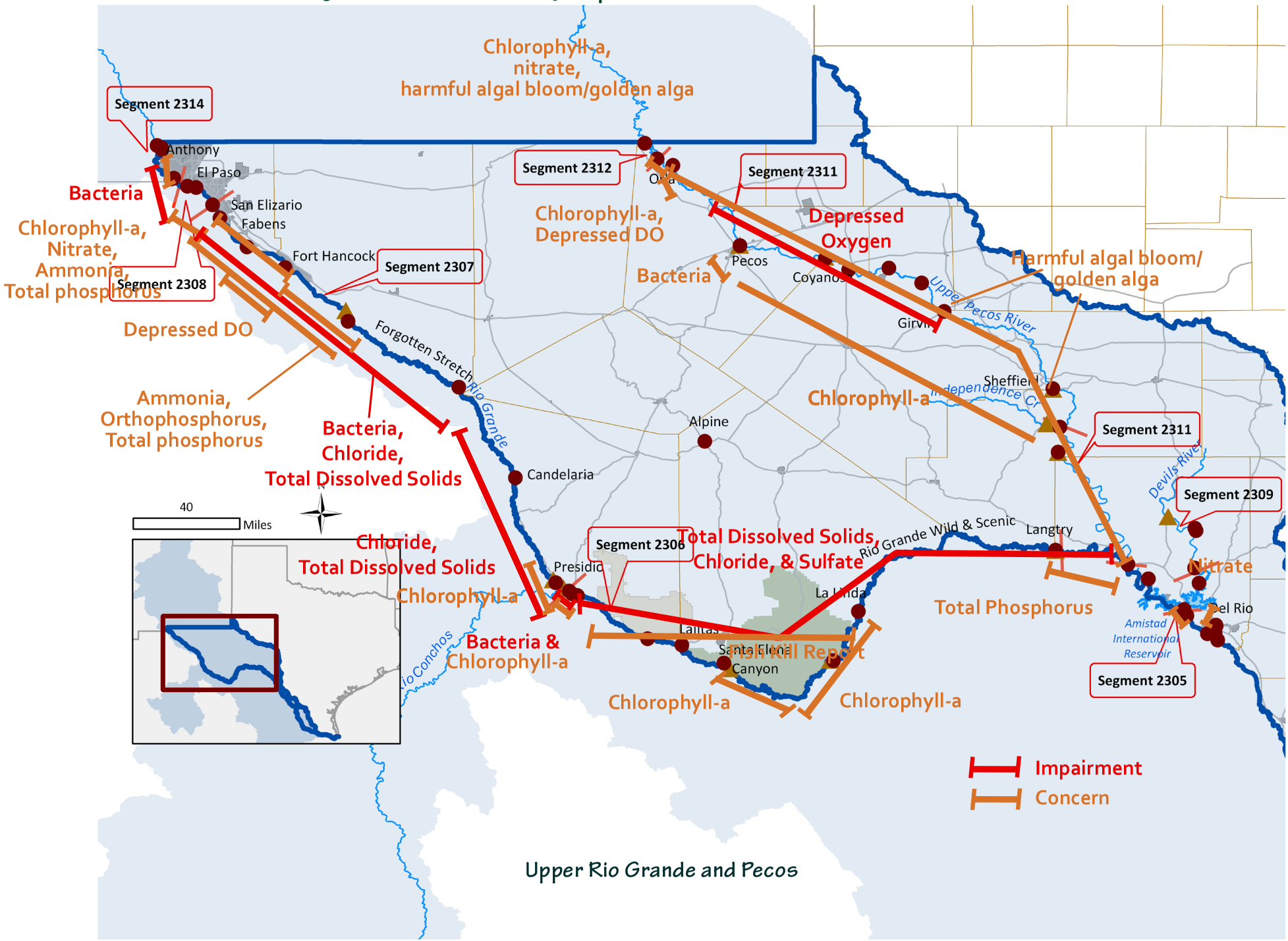
Table 5. Water Quality Impairments and Concerns in the Rio Grande Basin

Water Quality Impairments and Concerns in the Rio Grande Basin - 303(d) List*					
Segment	Segment Name	Parameter (s) Impaired	Year First Listed	Parameter(s) of Concern	Type of Concern
2301	Rio Grande Tidal	No Impairment		Bacteria Chlorophyll-a Nitrate	CN CS CS
2302	RG Below Falcon Reservoir	Bacteria	1996	Ammonia Chlorophyll-a Depressed Dissolved Oxygen	CS CS CS
2302A	Los Olmos Arroyo	Bacteria	2004	Chlorophyll-a	CS
2303	International Falcon Reservoir	No Impairment		Toxicity in Water Total Phosphorus Ammonia Nitrate	CN CS CS CS
2304	RG Below Amistad International Reservoir	Bacteria	1996	Toxicity in Water Ammonia*	CN CS
2304B	Manadas Creek	No impairment		Bacteria Chlorophyll-a Ammonia*	CN CS CS
2305	International Amistad Reservoir	Chloride* Total Dissolved Solids*	2014 2014	Nitrate	CS
2306	RG Above Amistad International Reservoir	Sulfate Total Dissolved Solids Chloride	2010 2010 2010	Chlorophyll-a Total Phosphorus Fish Kill Report	CS CS CN
2307	RG Below Riverside Diversion Dam	Bacteria Chloride Total Dissolved Solids	2002 1996 1996	Nitrate Total Phosphorus Ammonia Chlorophyll-a	CS CS CS CS
2308	RG Below International Dam	Bacteria*	2014	Chlorophyll-a Total Phosphorus Ammonia	CS CS CS
2309	Devils Rivers	No Impairment		No Concern	
2310	Lower Pecos River	No Impairment		Harmful algal bloom/golden alga	CN
2311	Upper Pecos River	Depressed DO	2006	Harmful algal bloom/golden alga Bacteria Chlorophyll-a Depressed DO	CN CN CS CS
2312	Red Bluff Reservoir	No Impairment		Harmful algal bloom/golden alga Chlorophyll-a Depressed DO	CN CS CS
2313	San Felipe Creek	Bacteria*	2014	No Concern	
2314	RG Above International Dam	Bacteria	2002	Chlorophyll-a	CS
2315	RG Below Rio Conchos**	Not evaluated		Not evaluated	

CN - Concern for near-nonattainment of the Water Quality Standards
CS - Concern for water quality based on screening levels
*** - Proposed 2014 Integrated Report**
****Proposed new segment in 2014 WQS Revision. This segment was previously a part of Segment 2306.**

Note: Each Segment is further subdivided into Assessment Units (AU). The entire segment may not be impaired. The complete list of impairments and AUs can be found at the TCEQ 303(d) website.

Figure 7. Water Quality Impairments and Concerns in the Rio Grande Basin



Figures 8 and 9. Water Quality Impairments and Concernsin the Rio Grande Basin

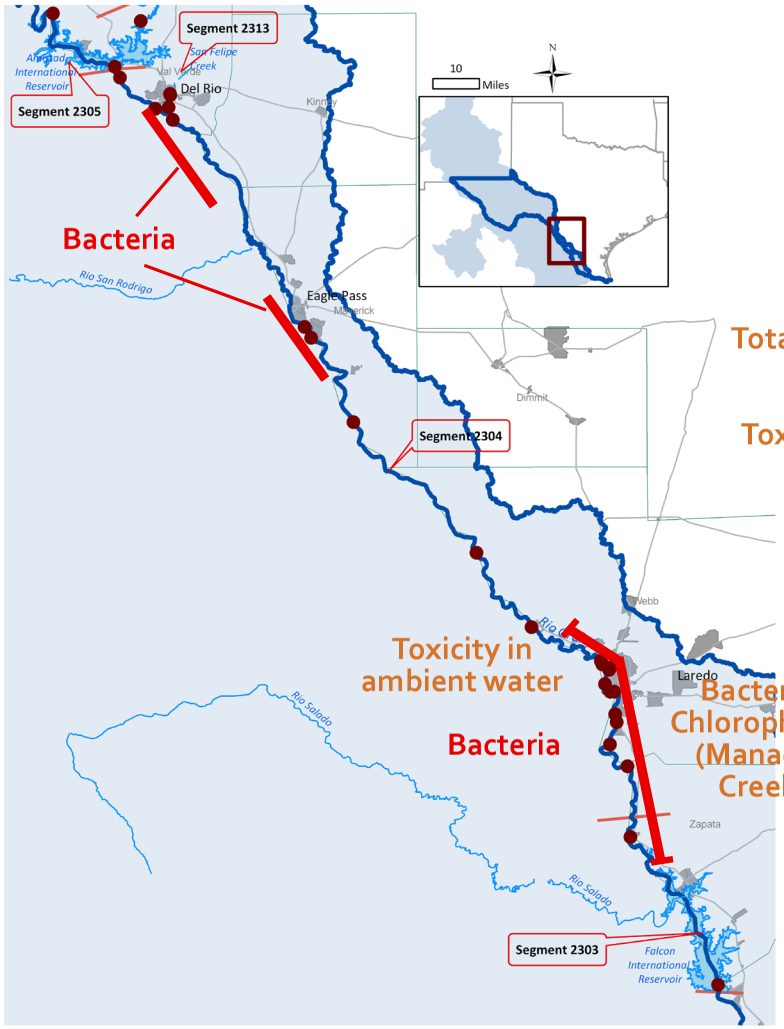


Figure 8. Middle Rio Grande

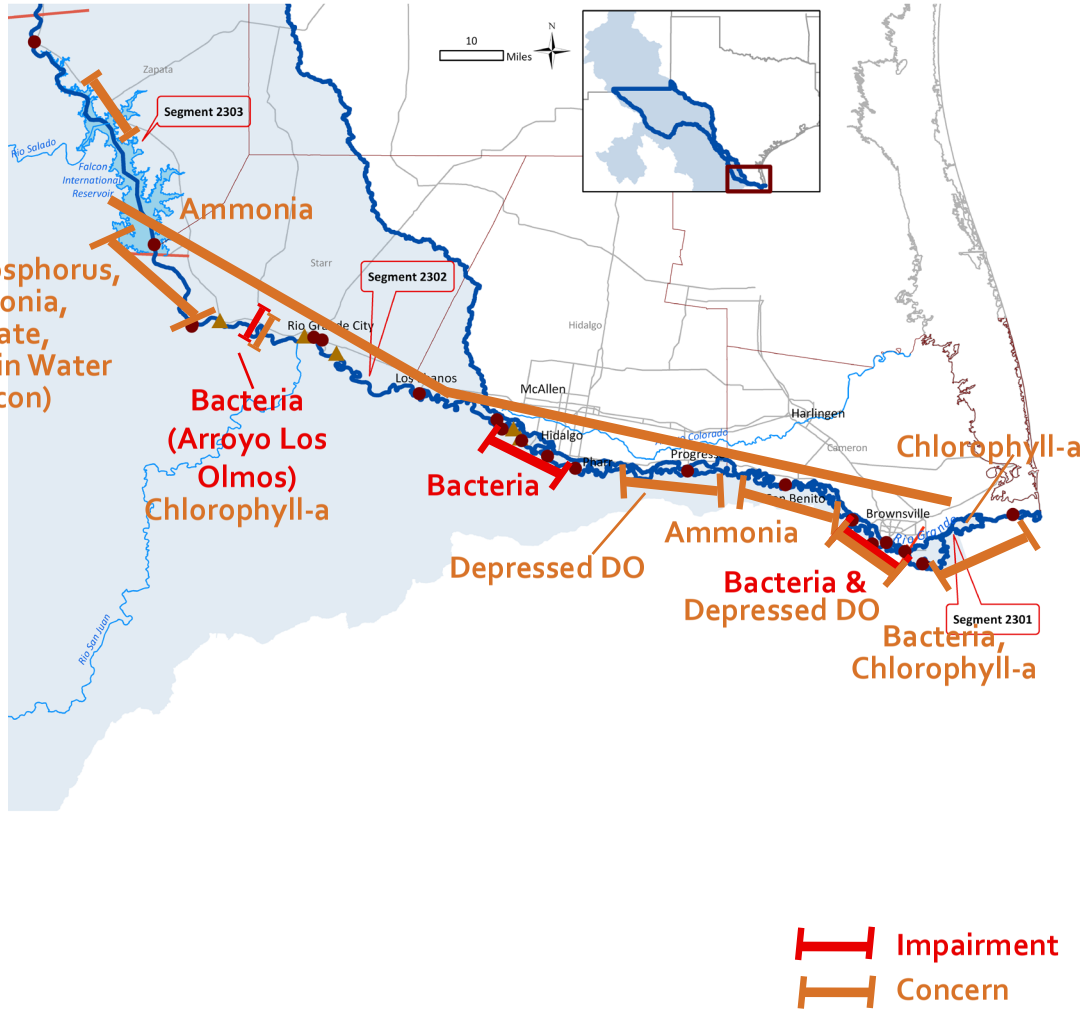


Figure 9 . Lower Rio Grande

RIO GRANDE WATER QUALITY UPDATE BY SUB-BASIN

As previously stated, because of the Rio Grande Basin's size, the program has found a need to split it into four sub-basins. A table is provided for each sub-basin that characterizes which segments are associated with each, what stations are in those segments, and other general information. For questions on these tables, please contact USIBWC CRP staff.

Table 5: Water Quality Review of the Upper Rio Grande Sub-Basin

Table 6: Water Quality Review of the Upper Rio Grande Sub-Basin					
Segment Name	Uses	Stations	Length	Segment Characteristics	Water Quality Summary
2314 - RG Above International Dam	PCR, H, PS, FC, GU	13276, 17040, 13272, 13275, 13274, 15089	21 mi	Segment runs from New Mexico boundary through El Paso County. The river runs into and out of New Mexico near Sunland Park. Treaty allotments of water for the U.S. are then diverted at American Dam, and carried through El Paso in the Rio Grande American Canal Extension (RGACE) and Franklin Canal for use as a drinking water source and for irrigation by U.S. farmers. Mexico's water is diverted at International Dam and used for irrigation in the Juarez Valley.	Contact recreation impairment due to **high bacteria**. Primary impacts are concentrated animal feeding operations (CAFOs), irrigated agriculture, some industry, and municipal wastewater treatment plant effluent. Concerns for high c**hlorophyll-a** values, caused by non-point sources.
2308 - RG Below International Dam	NCR, L, PS,	14465, 15528, 15529	15 mi	The upper portion is concrete lined to prevent meandering of the international boundary. Since U.S. and Mexican treaty water are diverted upstream, this segment contains very little to no water, resulting in designated uses for limited aquatic life and noncontact recreation.	Primary standards, which are less stringent than other segments. Concerns for **nutrients** (phosphorous, nitrate, and chlorophyll-a), probably from urban runoff. This segment is listed in the Draft 2014 TSWQS as impaired for **bacteria.**
2307 - RG Below Riverside Diversion Dam	PCR, H, PS, FC, GU	15704, 15795, 13232, 13230, 20648	222 mi	The upper portion of this segment receives flow from irrigated agriculture and wastewater treatment plant effluent from both countries as well as poorly treated sewage. Very little impacts the lower portion of this segment as the river meanders through rough terrain and sparse ranch land, the "Forgotten Stretch."	Impairments of **high bacteria, chloride, and TDS**. Bacteria issues can be attributed to urban runoff and other nonpoint sources as well as municipal discharges. Salinity issues are due to flow alterations from upstream diversions, irrigated crop production, nonpoint sources, and natural causes. Concerns for **nutrients** probably from irrigated crop production.
2306 - RG Above Amistad International Reservoir	PCR, H, PS, FC, GU	17001, 17000, 13229, 16862, 18441, 13228, 16730, 13225, 13223	313 mi	Flows from Rio Conchos confluence in Presidio County to the confluence with Ramsey Canyon in Val Verde County. Flows through Big Bend Ranch State Park and Big Bend National Park, then joins the headwaters of Amistad Reservoir.	**Bacteria** levels are high downstream of Presidio/Ojinaga; Big Bend reach has elevated algal growth; high nutrient levels below Big Bend; **high TDS, sulfate and chloride** in the upper portion of segment. Entire segment added to 2010 Impairment list for salinity. Salinity causes are similar to Segment 2307.
2305 - International Amistad Reservoir	PCR, H, PS, FC, GU	13835, 15892, 15893	75 mi	From Amistad Dam in Val Verde County (Val Verde) to a point 1.8 km (1.1 miles) downstream of the confluence of Ramsey Canyon on the Rio Grande Arm in Val Verde and to a point 0.7 km (0.4 miles) downstream of the confluence of Painted Canyon on the Pecos Arm in Val Verde.	Reservoir has high aquatic life use and contact recreation uses; **nitrate** concern but exact sources are not known. High salinity input from the Pecos is potentially a concern. This segment is listed in the Draft 2014 TSWQS as impaired for **chloride** and **TDS.**

Table 7. Water Quality Review of the Pecos River Sub-Basin

Water Quality Review of the Pecos Sub-Basin					
Segment	**Uses**	**Sta-tions**	**Length**	**Segment Characteristics**	**Water Quality Summary**
2312 - Red Bluff Reservoir	H, GU, FC, PCR	13269, 13267	11 mi	From the TX/NM state line to end of dam. High salinity prevents use as a public water supply and restricts agriculture to salt-tolerant crops.	Segment has concern for **golden alga blooms**, as well as nitrate and chlorophyll-a. **Fish kill reports** are also listed as a concern for 2312, with exact causes unknown. Concern for 1,2-Dibromoethane, a chemical probably produced by algae. Salinity values are typically over 6,000 mg/L.
2311 - Upper Pecos River	H, GU, FC, PCR	13265, 13264, 13260, 13257, 15114	349 mi	From Red Bluff Reservoir to Independence Creek.	Water is not drinkable due to high salinity. **Salinity** increases in this segment, climbing to an average of 21,000 mg/L at Girvin, although overall TDS is within the standard (15,000 mg/L). Segment has concern for **golden alga blooms**. Aquatic life is negatively affected by **depressed dissolved oxygen** and has led to a DO impairment. 2311 also has concerns for **fish kills** and **chlorophyll-a** (exact causes unknown).
2310 - Lower Pecos River	H, PS, GU, FC, PCR	13109, 13246, 13240, 16379, 18801, 14163, 13248	49 mi	From confluence of Independence Creek to the confluence with the Rio Grande.	Waters from Independence Creek in the past have brought salinity values down to treatable drinking water levels, but recent data shows abnormally high values of chloride, sulfate, and TDS. Segment has concern for **golden alga blooms** and **fish kills**.

Table 8. Water Quality Review for the Middle Rio Grande Sub-Basin

Water Quality Review for the Middle Rio Grande Sub-Basin					
Segment	**Uses**	**Stations**	**Length**	**Segment Characteristics**	**Water Quality Summary**
2304 - Rio Grande Below Amistad Reservoir	H, PS, GU, FC, PCR	15340, 13208, 13560, 18795, 18792, 20999, 20997, 15274, 17596, 15839, 17410, 15813, 13202, 15814, 13201, 15815, 13196, 15816, 15817	226 mi	From Amistad Dam to the confluence of Mexico's Rio Salado.	Impaired for contact recreation due to **high bacteria** below Del Rio; concern for nitrate and low DO from below the dam to the confluence with San Felipe Creek; near Laredo, concern for toxicity in ambient water and impaired for **bacteria**. High bacteria likely due to municipal effluent, urban runoff, and discharges outside of U.S. jurisdiction.
2304B - Manadas Creek	H	13116	1 mi	(Unclassified water body) Small, perennial stream in northwest Laredo.	Concerns for **bacteria** and **chlorophyll-a** likely due to urban runoff. Although not officially listed, 2304B has high metals due to previous industrial activity.
2303 - International Falcon Reservoir	H, PS, FC, PCR	15818, 13189	68 mi	Falcon Reservoir is used for recreation, water supply, and hydroelectric power generation. Less water is impounded in Falcon than in Amistad.	No impairments; however there is a concern for t**oxicity in water** near Zapata, likely from municipal effluent. Previous concerns for nitrate and ammonia in the lake have been removed.
2313 - San Felipe Creek	H, PS, GU, FC, PCR	15820, 15821, 13270	9 mi	Originates in the Del Rio area, where two springs make up the San Felipe Creek, providing the city with a high-quality water supply for drinking, fishing, and swimming.	The 2014 Draft TWQS list this segment as impaired for **bacteria.** San Felipe Creek has a positive effect on the Rio Grande, since the water quality is high and reduces some of the loading in the Rio Grande.

Table 9. Water Quality Review for the Lower Rio Grande Sub-Basin

Water Quality Review for the Lower Rio Grande Sub-Basin					
Segment	Uses	Stations	Length	Segment Characteristics	Water Quality Summary
2302 - Rio Grande Below Falcon Reservoir	H, PS, GU, FC, PCR	13186, 13185, 13184, 20698, 20696, 13664, 13181, 15808, 13180, 17247, 10249, 13179, 13178, 20449, 13177	231 mi	Classified as a freshwater stream. Extends from Falcon Dam to below Brownsville and includes Anzalduas Dam and most of the LRGV.	The majority of this segment has no impairments, but there are consistently **high bacteria** counts around urban areas such as Brownsville, Rio Grande City, and McAllen/Hidalgo, impairing the segment for contact recreation. Increased sulfate levels, indicating potential wastewater influences that can adversely affect the public water supply. The entire segment has a concern for fish consumption due to elevated **mercury** in fish. Colonias without wastewater infrastructure as well as urban runoff may cause the bacteria and DO issues.
2302A - Arroyo Los Olmos	L	13103	25 mi	Unclassified water body. Intermittent stream with pools, and limited aquatic life.	Impaired for **bacteria**, with exact source unknown but might be due to urban runoff and other nonpoint source pollution during rain events.
2301 - Rio Grande Tidal	E, GU, FC, PCR	16288, 13176	49 mi	Classified as a tidal stream. Extends from the confluence of the Rio Grande with the Gulf of Mexico to a point 6.7 miles downstream of the International Bridge in Brownsville, Cameron County.	Classified as a tidal stream. There are no impairments but closer to the Gulf there are high **chlorophyll-a** levels. The 2010 assessment used Enterococcus as a bacteria indicator, showing a concern for **bacteria**.

Where does the data come from?

The USIBWC Clean Rivers Program is proud to be partnered with 20 volunteer partners: 4 laboratories, five USIBWC field offices, three universities, three municipalities, non-profit organizations, and other state and federal agencies. These partners have volunteered to collect water quality data in addition to their own projects and work goals, and the collaboration helps monitor this large watershed. The large collaboration works by making sure that USIBWC CRP staff keeps in constant contact with all the partners via phone calls, emails, and meetings.

All USIBWC CRP partners are trained by USIBWC CRP staff, and all partners use the sampling methods outlined in TCEQ's Surface Water Quality Monitoring Procedures Manual, Volume 1. The stations monitored are agreed upon at annual meetings. Field sheets and chain of custody records are kept by both the partner and the USIBWC CRP staff, so that the integrity of the data can be traced if needed. The water samples are sent to a Texas-accredited laboratory, in Houston, and the laboratory analyzes the samples. The reports are then sent to USIBWC CRP staff.

The USIBWC CRP coordinates all the data received from the partners, in the form of field data, and the laboratories, in the form of lab reports. The staff checks the data against rigorous quality assurance criteria, consolidates all the data into usable reports, and sends the data to the TCEQ to be reviewed. Once the TCEQ reviews these reports, the data is uploaded into the state's database, called SWQMIS (Surface Water Quality Monitoring Information System). All data collected by the CRP partners is available to the public on the USIBWC CRP website.

Coordinated Monitoring Schedule

All entities that monitor the Rio Grande in Texas gather annually to discuss and coordinate monitoring activities. You can see who is collecting water quality data, where, and how often within the Rio Grande watershed on the Coordinated Monitoring Schedule.

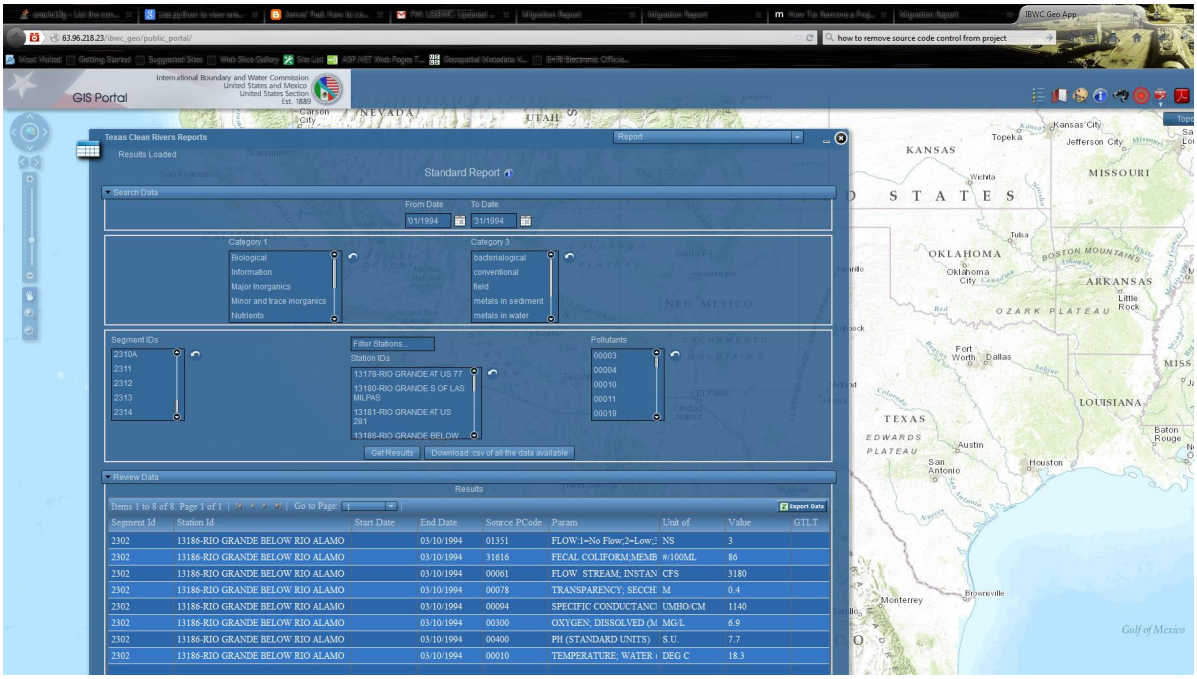
http://cms.lcra.org/

This Year's Highlights

Cool things that have been happening in the Rio Grande Basin....

USIBWC Data Management System

The USIBWC has completed the implementation of a new data management system which will improve agency-wide data management and distribution. Two different databases will complement each other to house data from multiple divisions within the agency, including water quality and quantity data and spatial data for levees, gages and other USIBWC infrastructure. CRP data will be included, and the system will make data submissions to the State of Texas more efficient. The USIBWC have all flow and water accounting data electronically, allowing it to meet treaty obligations more efficiently. The two databases will also allow data to be available for public viewing, query and download on the USIBWC website. The portal will go live and public later this year. Here is a quick look at what the public portal will look like:



Rio Salado Fish Kill

In April 2014, reports were received of a large fish kill on the Rio Salado in Mexico, about 90 km upstream of Falcon Reservoir. A massive operation between the TCEQ and USIBWC CRP ensued, which resulted in three separate sampling events over the course of a week. The teams analyzed field parameters such as pH, DO, temperature and salinity. Water samples were analyzed for bacteria, nutrients, and chemicals/pesticides. The lab results were inconclusive as to what may have caused the kill. A public meeting was held in Mercedes, TX, in May, and the results from both the Mexican and U.S. agencies were presented to the public. Despite reports that said otherwise, a source was never confirmed, and no other fish kills were reported further downstream. It was ultimately determined to be an isolated incident.

More Projects on the Rio Grande...

Building resilience in the Rio grande tributaries through reforestation

Authors: Jeff Bennett, Joe Sirotnak, Fred Phillips

Historical accounts of the Big Bend region of west Texas indicate that many intermittent and perennial streams, including Terlingua Creek, were lined continuously or nearly-continuously with stands of cottonwood and willow. In the late 19th and early 20th centuries, mining and agricultural interests harvested the riparian forests for fuel and structural material. As late as 1933, Terlingua Creek was described as a "bold running stream, studded with cottonwood timber as was alive with beaver". Yet, aside from a small area above Terlingua Abajo, the riparian forest has not returned despite 70 years of protection. We hypothesize that the old riparian forest provided the nursery conditions necessary for cottonwood and willow recruitment by reducing hydrologic forces during high flows. Once the forest was gone, normal annual flows were sufficient to scour young plants and prevent re-colonization. We also hypothesize that the removal of vegetation encouraged downstream excavation of gravel and reduced the extent of the riparian aquifer and the ability of that aquifer to capture and store water. To address these athropogenic effects, we are implementing a restoration project on a seven-acre site at Terlingua Abajo in Big Bend National Park. Coyote willow (Salix exigua) poles will be planted in bundles of three and arranged to mimic the natural distribution of poles on riparian floodplains. To assess physical and ecological response to the project, we measured baseline geomorphic and vegetation conditions using standardized repeatable methods. We propose that reforestation will both increase riparian habitat for species such as the yellow-billed cuckoo and the gray hawk, and also increase resilience to climate change by altering hydrologic conditions such that the channel aggrades, increasing the depth and extent of the riparian aquifer.

Record of Decision, River Management Alternatives for the Rio Grande Canalization Project

In June 2009, after ten years of discussions with the public and stakeholders, the USIBWC signed the Record of Decision (ROD) on River Management Alternatives for the Rio Grande Canalization Project, a USIBWC flood-control project which extends from Percha Dam in Sierra County, New Mexico downstream to American Dam in El Paso County, Texas. The ROD committed the USIBWC to continuing the agency's mission of water delivery, flood control and maintaining flood capacity while changing management practices of the Rio Grande corridor. New management practices would now include implementation of a variety of environmental improvements through the year 2019, including the implementation of up to 30 riparian habitat restoration sites and the development of an environmental water transaction program to deliver water to the sites. USIBWC has eleven habitat restoration sites underway, many targeting habitat for the endangered southwestern willow flycatcher. As of 2014, the USIBWC and its partners have cleared or treated about 350 acres of invasive saltcedar and planted about 5,000 trees, with tens of thousands more in the works. A network of 55 shallow groundwater wells have been installed to measure groundwater levels at the restoration sites. In June 2014, the USIBWC held a ceremony at one restoration site in Las Cruces to commemorate the grand achievement of the first irrigation of a riparian habitat site in New Mexico, which was accomplished through many years of collaborative work with federal agencies, non-profit organizations, and the local irrigation district.

Lower Rio Grande Water Quality Initiative

The Lower Rio Grande, from Falcon International Reservoir to the reach where the river enters the Gulf of Mexico (here-after termed Lower Rio Grande/Rio Bravo) has experienced persistently high bacteria and salinity levels. The goal of the Lower Rio Grande Water Quality Initiative is to identify feasible options for the prevention and control of pollution. These measures will result in the restoration, conservation, and improvement of water quality in the Lower Rio Grande/Rio Bravo River through a bi-national facilitated process that includes Federal, State, and local agencies on both sides of the border.

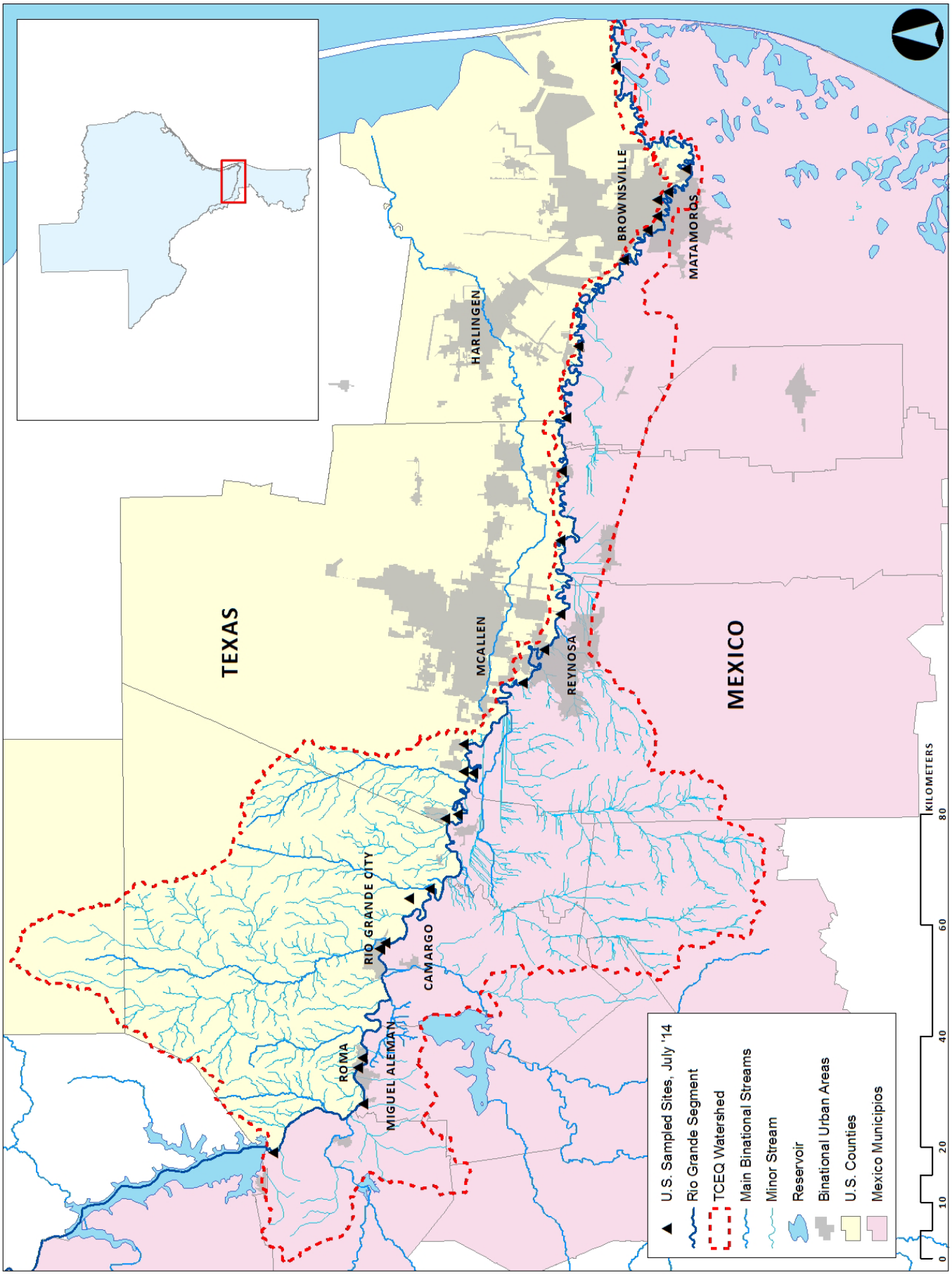
This group held several bi-national meetings to discuss the scope and focus of this project. The study included a detailed reconnaissance survey of four areas of the river to identify all potential discharges in December 2013. Planning continued throughout the beginning of 2014, which included outlining the potential study sites, choosing parameters to analyze, discussing logistics of the areas around the sites, and other issues such as security of the sampling teams while on the river.

In July 2014, teams from the University of Texas at Brownsville, Texas A&M Kingsville, and University of Texas Pan American went out onto the Rio Grande and collected water samples for analysis over the course of one week. They also recorded field data at all the sites and limited 24-hr measurements. The data was sent for review to the USIBWC Clean Rivers Program, and the quality assured data was then provided to the TCEQ. The information gathered during this phase of the project will be used to populate a hydrologic model of the Lower Rio Grande/Rio Bravo, which will be coordinated on both sides of the border through multiple agencies and participants. This model can then be used to optimize pollution prevention solutions so the most efficient course of action can be taken, and may even be used to do similar projects in other parts of the basin. The ultimate goal of this project is to establish a model and strategy that can be applied throughout the rest of the basin.

Routine monitoring at the sites will continue in order to provide baseline data and also to evaluate the effectiveness of the solutions implemented. In the end this will lead to a bi-national watershed protection plan that both countries built. Planning has continued into 2015, including additional sampling events and other binational efforts. For more information on this project, please contact Clean Rivers Program staff at the IBWC. A map of the project sites is provided on the next page.

Partcipants of the LRGWQI at a binational meeting and training in Edinburg, TX in June 2014

Lower Rio Grande Water Quality Initiative Sampling Sites



Map provided by Roger Miranda, TCEQ TMDL Program

Grant Proposal by the University of Texas at El Paso

Dr Elizabeth Walsh, a professor in the Biology department at the University of Texas at El Paso (UTEP) and a USIBWC CRP partner, has submitted a grant training proposal to the EPA under the Ecological Society of America's SEEDS (Strategies for Ecology Education, Diversity and Sustainability) program. This project is entitled: The Great Water Challenge – Multiple Scales of Water Stewardship.

The basic goals of the proposal are to have national SEEDS chapters (at UTEP it is the Environmental Advocates) conduct water quality research around a local river that receives wastewater effluent, to organize a campus water festival, and engage with other community water stakeholders. UTEP has chosen sites on the Rio Grande in El Paso, TX near American Dam, which receives wastewater effluent from more than one treatment plant. They will be collecting samples above, at and below the effluent. The USIBWC and CRP will be providing support in the form of training for her students on proper sampling techniques, transportation for field and water sampling, and lab analyses at their selected sites. The CRP looks forward to this collaboration with her students. The Environmental Advocates will also be hosting the first-ever BioBlitz in El Paso, TX in 2015, and the USIBWC CRP will be participating with them in this event as well.

The Effect of the Independence Creek Confluence on the Pecos River

Midland College is a fairly new CRP partner, having come on board as a partner in 2014. Professor Greg Larson has incorporated his sampling into his classes, and he works with his students to collect water samples at two sites on the Pecos River. Below is a small summary of a project that he and his students have been working on, and the pictures are of his students while out collecting water samples. Summary provided by Greg Larson.

Water quality data were obtained from two Pecos River sites located on the Chandler Ranch upstream and downstream of the Independence Creek confluence in Terrell County, Texas. The data included sites visits between October 17, 2014 and February 15, 2015 (3 visits) for field data, including one visit to collect samples for lab analyses. Additionally, historical water quality data were obtained at these Chandler Ranch sites, as well as established Pecos River monitoring sites at Sheffield (upstream) and Brotherton Ranch (downstream), as well as Independence Creek itself, to assess regional trends in water quality.

During the October 2014 visit, the region was still experiencing exceptionally high stream flows, estimated at around 500 cfs (normal historical flows in this region are around 30-50 cfs), therefore, the dilution effect of Independence Creek, flowing just 20-25 cfs, was minimal (conductivity values were 9790 umhos/cm upstream; 8630 umhos/cm downstream). Even during the December 2014 sampling event, the stream flows were still very high (121 cfs upstream and 145 cfs downstream) which resulted in minimal dilution by Independence Creek (conductivity values were 8830 umhos/cm upstream; 8780 umhos/cm downstream). The February 2015 visit reflected normal flow conditions (30 cfs upstream and 50 cfs downstream) which resulted in a more dramatic dilution effect by Independence Creek (conductivity values were 10,590 umhos/cm upstream; 7530 umhos/cm downstream).

A review of historical data at the two Pecos River Chandler Ranch sites, from April 1994-July 1995 (quarterly), and May 2014-February 2015 (quarterly) revealed a parallel of the regional trend established from the 2008-2011 (quarterly) data review at the upstream Sheffield site and downstream Brotherton Ranch site. The Pecos River enters the Sheffield area very saline after traversing though very salty Permian formations from Pecos to Sheffield. After Sheffield, freshwater inflow from spring systems of the Edwards-Stockton Plateau, most notably Independence Creek, dilute the Pecos River, enhancing its water quality.

The Disappearing Rio Grande

San Juan Mountains, Colorado. Photo by Erich Schlegel

A severe drought that has lasted for more than 5 years. Irrigation use and return flows. Water rights disputes. A border fence. International treaties. In 2014, Texas Tribune journalist Colin McDonald decided that the best way to learn about the many issues plagiung the once- mighty Rio Grande would be to travel its entire length (all 1,900 miles of it) by foot and small boat. And he did just that.

In a journey that began on June 21, 2014 in the San Juan Mountains in Southern Colorado, Colin and three Texas Tribune photojournalists (Erich Schlehel, Jessica Lutz, and Mike Kane) traveled down the Rio Grande through Colorado, New Mexico and Texas, documenting their travels with colorful pictures and interviews. They interviewed anyone and everyone who had an opinion on the river, and invited anyone who was interested to join them on their journey. He spoke to people about their views on the river, and how it's changed over the years.

Colin kept track of his location by GPS and marking his location on a map. At every location, he would also take basic water quality measurements (air and water temerature, pH, DO, conductivity, secchi disc, water depth, and E.coli) and log those as well. You can follow his journey by day very easily, and each day shows you the location on a map, the measurements for that particular location, his notes and interviews with anyone he spoke to while there. After seven months of walking, canoes, kayaks, and boats, in the blistering heat and the biting cold, Colin and his team reached the mouth of the Rio Grande with the Gulf of Mexio on January 25, 2015. If you'd like to follow his journey, go to http://riogrande.texastribune.org/

The paddlers reach the mouth of the Rio Grande at the Gulf of Mexico. Photo by Bethany McDonald

Erich paddling near Cochiti Dam. Photo by Colin McDonald

Paddlers who joined Colin for the last 12 miles of the Rio Grande. Photo by Colin McDonald

All Eyes on Laredo!

St. Augustine High School, Laredo, TX

Rio Research Roundup

The 2014 Rio Research Roundup, the annual binational basin-wide student water testing project, had a fantastic turnout of nearly 80 student teams - in the U.S. and Mexico - confirming their participation for the Rio Grande-Rio Bravo basin. On the same day in October, students conducted water testing on the river or one of its tributaries. They also completed a series of assignments that encompassed their day out on the field: essays, 5-minutes of free writing, a piece of literary or visual art, and a 1.5 minute video. Winners of the 2014 Rio Research Roundup will be announced soon.

Dia Del Rio

October 2014 marked the 20th consecutive year that RGISC celebrates Dia del Rio, an annual series of events held to bring awareness to the only source of drinking water for Laredoans and so many other communities along the Rio Grande-Rio Bravo. The month kicked off with "Reclaiming the Rio Grande", an art contest where artists expressed how they viewed our Rio Grande-Rio Bravo ecosystem. RGISC would like to thank Laredo Center for the Arts, all participating artists, and teachers for a great contest! In addition, RGISC also offered kayaking excursions to the public, led by Board President Dr. Tom Vaughan. They also partnered with the Lamar Bruni Vergara Environmental Science Center, Keep Laredo Beautiful and City of Laredo for the annual trail work day at the Paso del Indio Nature Trail. More than 300 volunteers spent a Saturday mulching, beautifying and restoring Laredo's oldest nature trail.

Volunteers and river enthusiasts canoeing the river during Dia del Rio

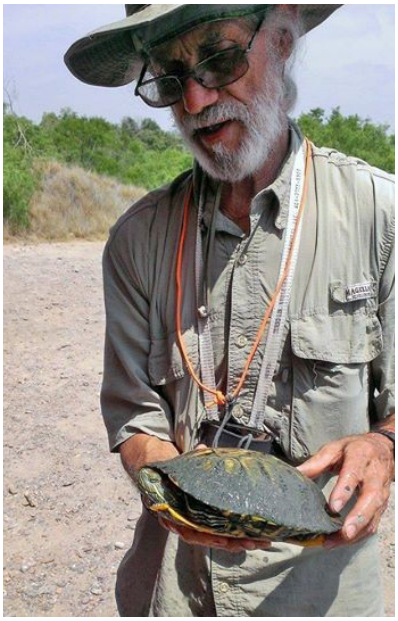
"Reclaiming the Rio Grande" art contest submission, Dia del Rio 2014

Martin High School Volunteers during Dia del Rio

First-ever BioBlitz held in Laredo

In April 2014, RGISC held the first ever BioBlitz, in which scientists and science hobbyists observed and counted species of flora and fauna in a 24-hour time period. The BioBlitz was held in Laredo, TX at the bend of the river known as Lost Lakes, which is located downstream of Laredo Community College before hitting the downtown bridges. This area was home to former gravel pits, which have since become lovely lakes whose water table coincides with that of the nearby river. They hosted visitors from Central and South Texas who studied the local fish population, as well as insects, birds, plants, trees, mammals and other animal species. Take a look at some pictures below!

Dr. Tom Vaughan holding a carp, next to volunteer Joey Lopez, Jr.



Dr. Tom Vaughan holding a Red-eared Slider turtle.

2014 Laredo Birding Festival

For the 2rd year in a row, RGISC organized the Laredo Birding Festival in partnership with the Monte Mucho Audubon Society and Convention & Visitors Bureau! They broke the record for number of birders - 114 - of which 86 percent came from other parts of the United States and Canada. Also, 164 species of birds were spotted during the Festival. Birders came to view Laredo's prized bird, the White-collared Seedeater, and bird local hotspots along the river, creeks and trails -- as well as thousands of acres of scenic ranchland. Happy Birding!

Plastic Bag Ordinance

On June 2, 2014, Laredo celebrated a tremendous victory when the City Council ended a long, hard-fought 10-year campaign to pass a plastic bag ordinance for Laredo. The ordinance passed with a 6-1 vote and takes effect April 30, 2015. It is aimed at reducing the 120 million plastic bags used in Laredo each year, of which many wind up polluting the Rio Grande. This change will benefit the river, environment, wildlife, and city taxpayers.

RGISC is working to help get Laredoans ready for this major transition, and the CRP looks forward to a Laredo area that is becoming more environmentally-friendly.. No Plastic is Fantastic!

USIBWC CRP Website

More about us and our program....

The USIBWC CRP maintains a website with a wealth of information for the public:

- **About CRP:** An introduction to the Rio Grande Basin
- **Contact Information:** Contacts for the USIBWC CRP and program information
- **Study Area:** Contains maps of the Rio Grande Basin and of the monitoring locations
- **Monitoring Station Data:** USIBWC CRP and TCEQ water quality data in Excel files by station; information about quality assurance, parameters, and standards.
- **Other Information:** A calendar provides information on upcoming meetings and activities. There are links to studies and publications about the Rio Grande Watershed and the USIBWC Adopt-a-River program. Partner links provide resources for monitoring partners, links to other planning agencies, and links to environmental groups and resources for the Rio Grande.
- **Media Gallery:** Photo albums and videos about monitoring, research, geography, wildlife, and outreach. Our video gallery now includes a number of videos, the most recent being about water quality in the Rio Grande.

Additional Resources and Links:

TSWQS: https://www.tceq.texas.gov/waterquality/standards/2014standards.html
SWQM: http://www.tceq.texas.gov/waterquality/monitoring
Integrated Report: https://www.tceq.texas.gov/waterquality/assessment/public_comment
Coordinated Monitoring Schedule: http://cms.lcra.org/
EPA Recreational WQ Criteria: http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/
The Disappearing Rio Grande http://riogrande.texastribune.org/
TPWD Kills and Spills team: https://tpwd.texas.gov/landwater/water/environconcerns/kills_and_spills/
Water Resources: http://www.twdb.texas.gov/waterplanning
RGISC: http://rgisc.org/
USIBWC website: http://www.ibwc.gov/home.html

USIBWC CRP Website
http://www.ibwc.gov/CRP/index.htm

Photos taken by Colin McDonald

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