

Basin Highlights Report

For the Rio Grande Basin in Texas

An Update on Water Quality and Basin Activities

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



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The Rio Grande below Eagle Pass

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). The CRP for the Rio Grande Basin was originally administered by the Border Environment Assessment team of the Texas Commission on Environmental Quality (TCEQ), which at that time was called the Texas Natural Resources Conservation Commission (TNRCC). 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 TCEQ and participating entities.

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.

Visit our website at :

<http://www.ibwc.gov/CRP/Index.htm>

Cover photo: Site 13276, Rio Grande at Anthony Drain, in December 2011

Aspects of the Texas 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 and watershed education activities, maintain an updated website, and print our annual reports).
- Maintain an efficient use of public funds.
- Adapt the program to emerging water quality issues.

About the covers:

In the past two years, the Rio Grande has seen two extreme conditions: flooding in 2010 and severe drought in 2011. The following pictures are the same sites depicted on the front and back covers of this report, but during normal flow conditions. CRP would like to show the drastic changes the river can undergo from one season to the next.



Below Left: Site 13276, Rio Grande at Anthony Drain, August 2011. The cover picture is of this site, taken in December 2011, just four months after this picture.



Below Right: Rio Grande facing SE toward Hotel Rio, May 2011. The back cover picture was taken of this site, facing in a different direction, in July 2010, less that a year prior to this picture.

The Rio Grande Basin

The Rio Grande/Rio Bravo watershed covers approximately 924,300 square kilometers (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 (Figure 1).

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/Cuidad Juarez area) to the Gulf of Mexico (Brownsville/Matamoras area).

For the purpose of coordination and planning, the USIBWC CRP has divided the Rio Grande into four sub-basins:

The Upper Sub- Basin, extending from the New Mexico/Texas state line downstream to International Amistad Reservoir;

The Pecos Sub-Basin, extending from the New Mexico/Texas state line to its confluence with the Rio Grande upstream of Amistad Reservoir;

The Middle Sub-Basin, extending from International Amistad Reservoir downstream to International Falcon Reservoir and including the Devil's River; and

The Lower Sub-Basin, extending from International Falcon Reservoir downstream to the Gulf of Mexico.

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

CRP holds several types of meetings, including an important series of annual meetings. The purpose of these meetings is to plan and coordinate water quality monitoring efforts among different entities and partners. These meetings, called Coordinated Monitoring Meetings, bring together stakeholders, allow for more efficient use of agency resources, and take into consideration concerns from the public. USIBWC CRP also hosts trainings for sampling partners in conjunction with these meetings. These meetings allow CRP to hear about local interests and problems, and allows attendees to bring up any questions or concerns they may have about their area to CRP staff. TCEQ's Watershed Action Planning process is also being integrated into these meetings.

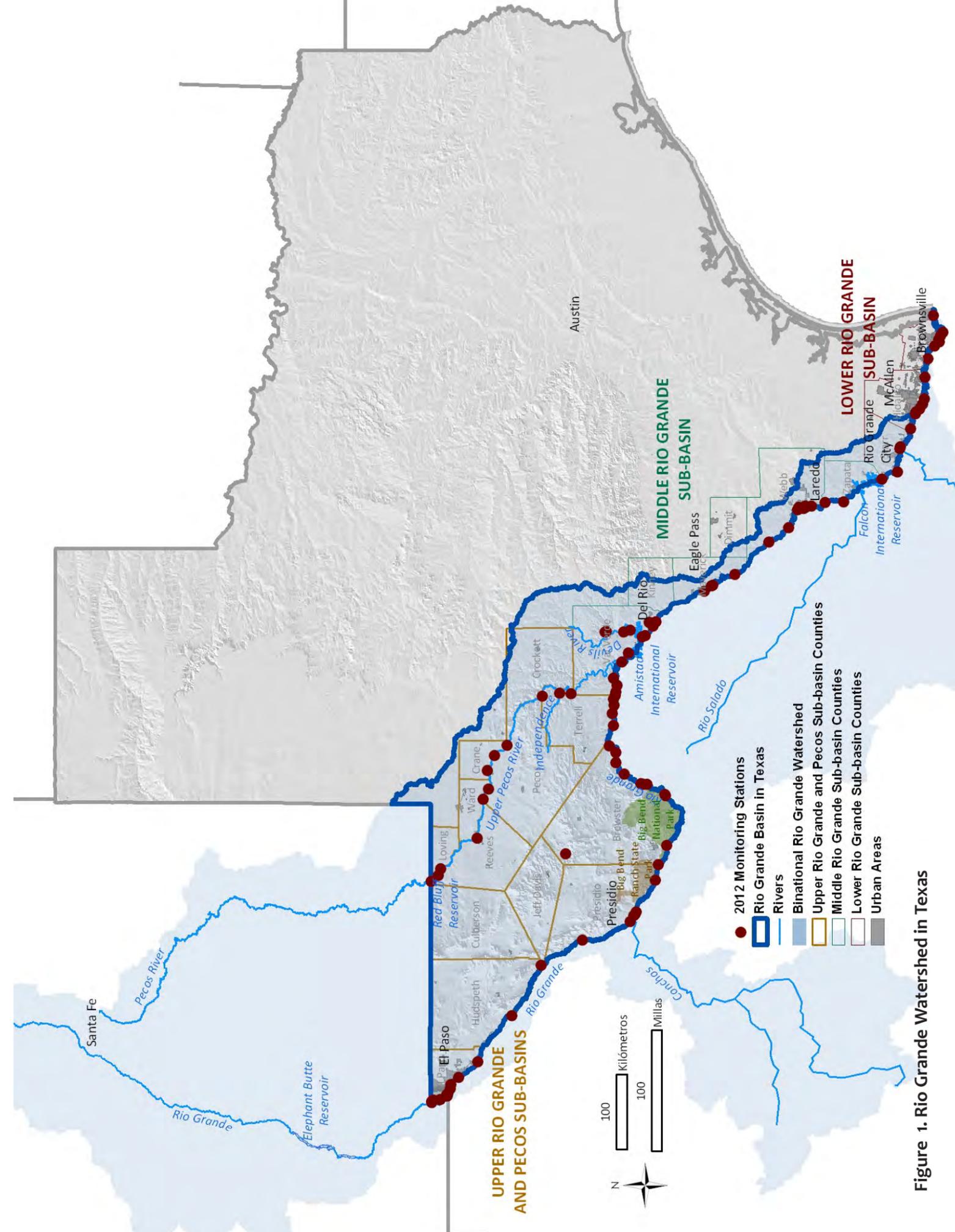
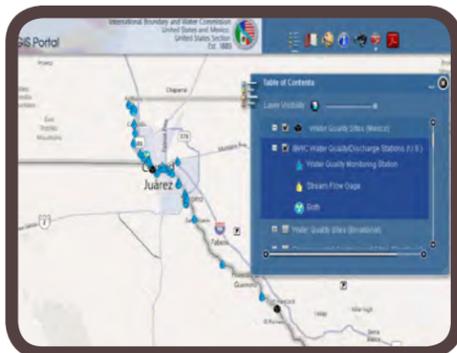


Figure 1. Rio Grande Watershed in Texas

This Year's Highlights

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



A screenshot of the new database GIS portal and CRP Toolbox

USIBWC Data Management System

The USIBWC is implementing 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 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 will be able to 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 made available to the public for viewing, query and download on the USIBWC website.



The IBWC, U.S. and Mexico Commissioners and staff at the Summit

Binational Border Sanitation and Water Quality Summit

The IBWC, United States and Mexico convened more than 230 experts from both countries in San Antonio, Texas on March 16-18, 2011 during the Binational Border Sanitation and Water Quality Summit. The theme was "Today's challenges, tomorrow's opportunities." Participants attended a series of sessions in the areas of Sanitation, Technology, Water Quality and Financing where they worked to identify activities and funding to improve wastewater collection and treatment as well as consider a framework for binational efforts to improve sanitation and water quality in border communities.



Franklin High School students performing water quality experiments

2011 Rio Research Roundup in El Paso, TX

The Rio Grande International Study Center (RGISC) continued with its Dia del Rio activities in 2011. During the month of October, 2011 schools from across the Rio Grande Basin watershed in Colorado, New Mexico, Texas, and Mexico participated in the Rio Research Roundup and collected water samples, which they then used to perform water quality experiments. In El Paso, TX, Franklin High School students in Mrs. Debbie Gilbert's class went out to the Rio Grande and collected water samples for their experiments. The classes were required to put together videos about their activities that day and what they learned and submit it to the Rio Research Roundup competition. Franklin High School won Honorable Mention for their video.



USIBWC presentation at the Upper Rio Grande Citizens' Forum in 2011

Citizens' Forum Meetings

The USIBWC held public outreach meetings about Rio Grande issues through its Rio Grande Citizens' Forum in the greater El Paso, TX-Las Cruces, NM area and the Lower Rio Grande Valley in South Texas. The USIBWC holds four public meetings per year for each of the Citizens' Forum groups. The meetings covered a broad range of topics and presentations, including water quality data from the Texas Clean Rivers Program for the Rio Grande, updates on rehabilitation of Rio Grande flood control levees by the USIBWC with funding from the American Recovery and Reinvestment Act of 2009 (the economic stimulus bill), vegetation management to reduce flood risk, and the status of Mexican sanitation projects. The purpose of the Citizens' Forum is to promote the exchange of information between the USIBWC and the public about Commission activities and related issues.



Contest participants in rafts and boats on their way to the finish line

2011 Great River Raft Race in El Paso, TX

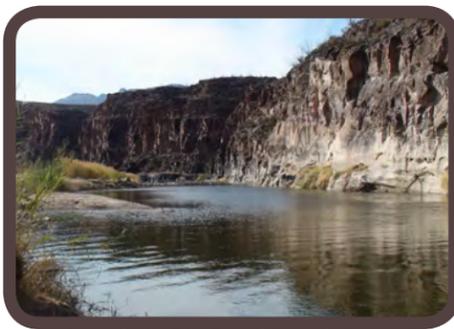
A local radio station in El Paso, TX came up with an interesting way to promote the Rio Grande and get citizens interested in their river. The KLAQ radio station planned the Great River Raft Race in 2011 to get citizens from El Paso motivated and into the water on Father's Day in June 2011. People who wanted to participate in the race were invited to build their own rafts and boats and race them in the river. A small section of the river between two bridges was sectioned off for the race, and participants, in small teams, had to paddle their way from one bridge to the other. Winners in various categories received prizes from the radio station.



Volunteers from the Big Bend River Cleanup

2011 Big Bend River Cleanup

Once a year, volunteers spearhead cleanup efforts along reaches of the Rio Grande/Rio Bravo in Big Bend National Park and Big Bend Ranch State Park in the Annual Big Bend River Cleanup. This year, 18 volunteers from Sul Ross University's Range and Wildlife studies program, the Hancock Hill student club, citizens of Terlingua and Alpine, employees of Forever Resorts, Angell Expeditions, TX Parks and Wildlife and National Park Service staff collected trash, tires, auto parts, and other unidentifiable items from Santa Elena Canyon, Colorado Canyon, a section of the river from Santa Elena Takeout to Blue Creek and popular roadsides winding through the parks. Along with several bags of trash and tires, volunteers removed a very large tractor tire from Santa Elena Canyon and a large pipe that was posing a hazard for boaters in Colorado Canyon, both of which had been deposited in the river during the 2008 floods. This is a great way to show that a small group of concerned citizens can make a huge difference in protecting our waterways for future generations to enjoy.



Rio Grande in Big Bend Ranch State Park

Cooperative Action for Conservation in the Big Bend/Rio Bravo Region

In October 2011, Secretary of the Interior Ken Salazar and Mexican Environment and Natural Resources Secretary Juan Rafael Elvira Quesada announced a working plan that identifies the steps for a continued coordination effort between the U.S. and Mexico to protect and preserve the Big Bend/Rio Bravo region. The Big Bend/Rio Bravo region is the largest and most diverse desert ecosystem in North America. The Cooperative Action for Conservation in the Big Bend/Rio Bravo Region work plan was developed

with collaboration from the National Park Service, the U.S. Fish & Wildlife Service (USFWS), the U.S. Geological Survey (USGS), Mexico's National Commission of the Natural Protected Areas (CONANP) and other agencies. Park managers, natural resource managers and scientists from both countries will begin implementing this action plan that will focus on restoring the natural ecosystem, control invasive species, preserve wildlife, adapting to climate changes, and managing wildfires in the area.

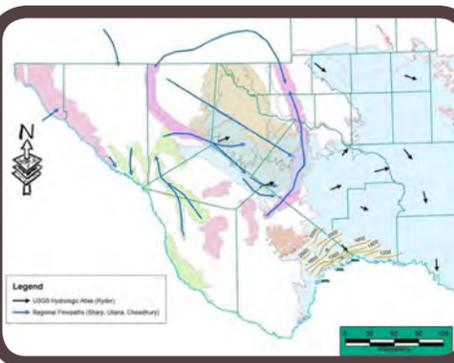


Rio Grande below Anzalduas Dam

Lower Rio Grande Watershed Initiative

The Lower Rio Grande Watershed Initiative (LRGWI) is a binational effort to address water quality problems and concerns in the Lower Rio Grande below Falcon Reservoir (Segment 2302). The initial goal of the project is to develop a binational watershed-based plan for reducing bacteria levels in the southernmost stretch of the Rio Grande. As binational consensus builds, the geographic scope of the project may be expanded to include the tidally-influenced portion of the Rio Grande (Segment 2301) and additional water quality concerns may also be addressed as part

of the initiative (e.g. salinity, and dissolved oxygen). The LRGWI is a pilot project designed to serve as a model for addressing additional trans-boundary water quality issues in other portions of the Rio Grande. Project partners include the U.S. and Mexican sections of the IBWC and the U.S. and Mexican federal, state, local, and regional agencies. Binational consensus-building on a framework for the project began in 2011 and a final binational framework document for the project is expected in the spring of 2012.



Senate Bill 3 (SB3)

SB3, passed in 2007, requires that the TCEQ adopt environmental flow standards for the river basin and bay systems in the State of Texas. The Environmental Flows Advisory Group was charged with implementing the environmental flows program. The Environmental Flows Science Advisory Committee assists the Advisory Group by serving as objective scientific advisors and making recommendations on issues pertaining to environmental flows. TCEQ aims to take recommendations made by these groups, as well as the public, and use them to adopt rules that establish

environmental flow standards for the areas. Since the Rio Grande is so long, the river was split into two groups that are addressing the environmental flows- the Upper and Lower Rio Grande BBEST (Bay and Basin Expert Science Team). For more information on environmental flows, visit the TCEQ website.

Border 2012 Program

The U.S.-Mexico Environmental Program, better known as Border 2012 and Border 2020, is a collaborative effort between federal, state, and local agencies from the United States and Mexico to improve conditions along the border.

The mission of the program is to protect the environment and the health of people who live in the U.S.-Mexico border region. The program is unique in that all issues are first identified at the local level, and stakeholder involvement is greatly encouraged. There were six goals in Border 2012, which included reducing water, land and air contamination and improving environmental health. The program spanned ten years and will be concluding in 2012. A final report will be published in 2012.

A new program, called Border 2020, is currently being planned and builds on what Border 2012 has accomplished. It will span the next eight years (2013-2020). The draft of the program was made available for public comment in October 2011 and closed in November 2011. Border 2020 focuses more on areas where environmental improvements are needed the most. The program has established five new goals, which include climate change, underserved communities, and environmental education. The Border 2020 pro-



Rio Grande separating Laredo, TX (left) from Nuevo Laredo, Tamaulipas (right)

gram will put more emphasis on reducing the risks that pose the highest threat to the public and preserving the environment of the border region.

For more information on Border 2012, please visit their website at www.epa.gov/border2012/. For more information on the new Border 2020 program or to view the draft framework available to the public, please visit www.epa.gov/border2012/docs/2020/border2020-draft-framework.pdf.



Rio Grande Environmental Program

The U.S. Army Corps of Engineers (Corps) and the USGS hosted a Rio Grande Basin Water Resources Workshop in Austin in October 2011 in conjunction with the Corp's Rio Grande Environmental Management Program. The workshop included sessions on water quality and supply, international issues, current research, and collaborating between various agencies in the entire Rio Grande Watershed. The meeting resulted in the creation of action teams that will look at issues such as water quality, water quantity, funding, outreach, and other issues. Additional meetings will be held in 2012.

Research and Publications

Study on Arsenic in Groundwater and Soil

A group of researchers at the University of Texas at El Paso published a paper that focuses on arsenic in northern Mexico and the Southwestern states in the U.S. The paper is titled *Occurrence and treatment of arsenic in groundwater and soil in northern Mexico and southwestern USA*. The review focuses on the occurrence and treatment of arsenic in northern Mexico, specifically Chihuahua and Coahuila, and the bordering southwestern states in the US, which include New Mexico, Arizona, and Texas, all of which are known historically for having high concentrations of arsenic. For more information on this paper, please contact the primary author, Lucy Mar Camacho, at lcamacho@utep.edu.



UTB students taking samples during the Brownsville Bacteria Special Study

Brownsville Bacteria Special Study

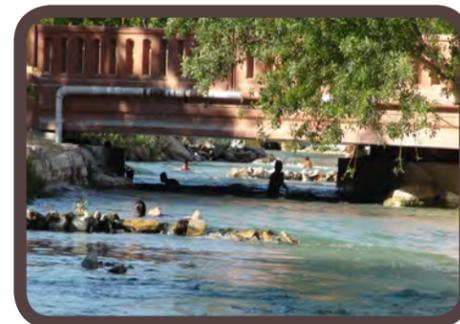
In 2010, CRP collaborated with the University of Texas at Brownsville (UTB) to conduct a special study to investigate the possible sources of bacterial contamination that might be causing the impairment in a 20-mile stretch of the river in Brownsville. A draft report was published in Fall 2010. Results showed low bacteria counts during the sampling days. Analysis showed bacteria levels had dropped significantly between September and October 2008 when compared to historical data from the previous 10 years. This is thought to be due to the first wastewater treatment plant in Matamoros that began operations in 2008. The final report was published in June 2011 and is available on the CRP website.

Watershed Action Plan (WAP)

The Watershed Action Planning process is a management tool that TCEQ's Water Quality Planning Division will be using to coordinate the planning, facilitation, and tracking of any actions taken to address water quality issues within a basin. The WAP will reduce redundancy, combine resources and increase the efficiency of documenting water quality benefits, which has been a historically difficult task. The process will allow for local watershed discussions through the coordinated monitoring meetings currently held within the CRP program. By discussing watershed issues associated with impairments, concerns, and any other topics of special interest at these meetings with partners and stakeholders, sources contributing to these problems may be identified. TCEQ will be receiving local feedback and could then incorporate these changes to the management strategy.

2012 EPA Recreational Water Quality Criteria Document

In December 2011, the EPA released the 2012 draft document for Recreational Water Quality Criteria, which contains the EPA's recommendations for protecting human health in ambient waters designated for primary contact recreation. The EPA accepted comments until February 21, 2012. The document can be viewed on their website at <http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/index.cfm>.



San Felipe Creek in Del Rio, Texas

SECURE Water Act and the WaterSMART Program

In 2009, the SECURE Water Act was passed into law by Congress. This statute established that Congress understood that adequate and safe water supplies are fundamental for the health, economy, ecology, and security of the U.S., and recognized that variables, such as climate change, pose a risk to those resources.

In response to the statute, the Department of the Interior (DOI) established the WaterSMART (Sustain and Manage America's Resources for Tomorrow) program in 2010, which focuses on the efficient use of our water resources and sustaining those we currently have. More recently, the DOI has begun collaborating with the USFWS, adding the Landscape Conservation Cooperatives (LCC), which combines land use and landscape stressors to the WaterSMART Program.

The program provides grant opportunities for various types of projects. There are currently four projects in the Rio Grande Basin that were funded through the LCC WaterSMART aspect of the program:

- **Texas Tech University, Resource Management in a Changing Climate: Understanding the Relationship between Water Quality and Golden Alga Distribution in the Pecos River, New Mexico and Texas** Texas Tech will conduct sampling at a wide variety of sites in the Middle and Lower Pecos for golden alga and environmental variables. Researchers will establish specific water quality standards that can be used by management agencies to prevent the further spread of golden alga and to mitigate its impacts on those locations that are already being impacted by toxic algal blooms.
- **University of Texas at Austin, Fish Data Compilation and Climate Change Assessment for Desert LCC Fishes** The University of Texas at Austin will normalize and try to improve existing data to provide a high quality spatial database and decision support tools for the conservation, restoration, and management of U.S. priority freshwater fishes in the Rio Grande Basin. The project will focus on the Rio Grande drainage and model the current distribution of selected fish species based on environmental variables known to be of ecological relevance.
- **World Wildlife Fund, Remote Acquisition of High Quality Topography and Multispectral Imagery Data for the Rio Grande through Big Bend National Park** The World Wildlife Fund, in collaboration with the Big Bend Conservation Cooperative, Basin and Bay Expert Science Team, three federal agencies, two universities, the Texas State Climatologist and the Environmental Defense Fund, will use aerial-based Light Detecting and Ranging and multispectral imagery to generate baseline topographic, near-channel vegetation data (maps) and extremely accurate terrain models for the 100-mile reach of the Rio Grande that flows through Big Bend National Park. The project will provide information to natural resource managers by predicting geomorphic change for different water demand scenarios, assessing flood risks, evaluating habitat for key species, and evaluating near channel exotic plant eradication efforts to promote positive channel change.
- **Lower Rio Grande Basin Study Receives Funding** A Lower Rio Grande Basin study received funding from the U.S. Bureau of Reclamation through the Basin Study Program for Section 9503 of the Secure Water Act. The goal of the study is to reduce the amount of raw water going into the Rio Grande and to improve operational efficiencies of current structures in place. This includes canal linings, pump stations, pump replacements, and gate replacements. This project is also part of the WaterSMART program.
- For more information go to www.usbr.gov/WaterSMART/grants.html

Research and Publications

Algae Report Update

Texas State University has completed a report on their research on benthic algal communities and phytoplankton in the Upper Rio Grande. Sampling was initiated in the Rio Grande near Presidio, Texas, below the confluence of the Rio Grande with the Rio Conchos in Mexico. The study area continued 450 km downstream to Langtry, Texas. Algae samples were collected in March of 2009 and April 2011. Preliminary data had shown that dominant algal species were different upstream and downstream of Big Bend National Park. Algal samples from the upper section of the study area were dominated by brackish-water species, while samples from the middle segment were dominated by planktonic green, blue-green, and diatom taxa. The lower section of the study area was dominated by filamentous red algae, benthic diatoms, and nitrogen-fixing algae. The study shows that the components of benthic algal communities found in the Rio Grande in the Lower Canyons indicate an improvement in water quality. The final report, titled *Influence of Ground and Surface Water Relations on Algal Communities in the Rio Grande Wild and Scenic River*, was published in October 2011, and the final report is available at <http://www.eardc.txstate.edu/about/reports.html>.



Collecting algae samples in the Lower Canyons



Washboard, Southern Mapleleaf, and Tampico Pearly Mussels, Laredo, TX

Report Shows More Mussels in Laredo

The Texas Parks and Wildlife Department (TPWD), in collaboration with the U.S. Fish & Wildlife Service (USFWS) and New Mexico Department of Game and Fish (NMDGF), completed a joint report on the mussel population in Texas titled *Survey of Texas Hornshell Populations in Texas*. The report was done to assess the current distribution of the Texas Hornshell in Texas, locate and evaluate any existing populations, and look at habitat requirements. Freshwater mussels are some of the most endangered animals in North America, and the mussels endemic to the Rio Grande area are unique from those found in the rest of Texas. The Texas Hornshell is regionally endemic to the Rio Grande drainage in Texas, the Black River in New Mexico, and several Mexican tributaries of the

Rio Grande. Mussels are great indicators of water quality, so TPWD was worried when between 1998-2001, no live specimens were recovered from the Rio Grande. In March of 2011, TPWD and NMDGF, along with other collaborators, surveyed 25 sites in the Laredo and five sites in the Devil's River. The study found the largest known population of Texas Hornshell, as well as one other endangered freshwater mussel, in the Laredo area. This indicates not only that water quality in the area has improved, but that the fish and mussel population (as fish are hosts for mussels) are healthy and are reproducing. The final report was published in September 2011. In April 2012, TPWD, USFWS, and the NMDGF will again be conducting a survey of freshwater mussels, specifically for the Texas Hornshell, at selected sites along the Rio Grande. The sites are located in Webb County, Terrell County, and Maverick County, as well as the Devils River in Val Verde County. For more information on this study, please contact one of the lead researchers, Tom Miller, at tmiller@laredo.edu.



Texas Hornshell

Highlight of the Paso del Norte Watershed Council's Water Resources Database and RiverWare Model

In 2011 Texas AgriLife Research and New Mexico State University researchers began developing the RiverWare model of the Rio Grande. The model is for Water Resources Management in the Paso del Norte Watershed under the Gulf Coast Cooperative Ecosystem Studies Unit Cooperative Agreement between the U.S. Army Corps of Engineers (Corps) and Texas AgriLife research on behalf of Paso del Norte Watershed Council. The objectives of this project are to collect and compile necessary data and analyses (including the physical layout of the river and surface and groundwater interaction) to expand the RiverWare model for water operations in the Mesilla Basin, as well as to simulate flows and water operations planning for the El Paso Lower Valley under a new operational agreement. The project will continue to enhance the RiverWare model and expand the database in 2012. This project is part of the Upper Rio Grande Water Operations Model (URGWOM) program, established by the Corps in collaboration with the New Mexico Interstate Stream Commission (NMISC), the U.S. Bureau of Reclamation (USBR), the U.S. Geological Survey (USGS), and the U.S. Bureau of Indian Affairs (BIA), with cooperation from numerous other federal, state, local, and other agencies. More information on this project and associated activities can be found at <http://www.pdnwc.org> or you can contact Dr. Zhuping Sheng of Texas AgriLife Research at zsheng@ag.tamu.edu or Dr. Phillip King of New Mexico State University at jkping@nmsu.edu.

Studying the Rio Grande Watershed

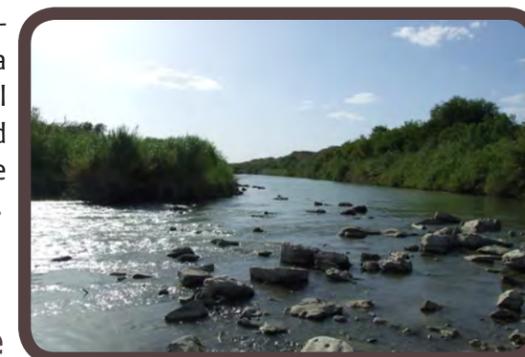
There are several PhD research projects currently underway in the Rio Grande, two of which are at New Mexico State University. Randa Hatamleh is working on a model that will simulate flow and water quality from runoff events. Luzma Fabiola Nava's research will look at the challenges and perceptions of managing the entire Rio Grande watershed.

Outreach Events in the Lower Rio Grande

Several organizations in the Brownsville/Matamoros area have organized various types of outreach events in an effort to clean up the Bahia Grande and the coast. The organizations have organized a parade and a cleanup, as well as a campaign against the use of helium balloon releases in Texas, as helium balloons are detrimental to marine life. This is a great example of binational teamwork, as both sides of the border have organizations that have been participating.

2012 State Water Plan

The Texas Water Development Board's (TWDB) completed the 2012 State Water Plan, which outlines strategies to meet future water needs and addresses changes needed for water infrastructures in response to population growth. The plan also recommended strategies for the drought. Public meetings were held throughout the state during October 2011 where TWDB representatives were available to answer questions and address comments that the public had. The TWDB discussed adopting the plan in November 2011. A draft was available for public comment in Fall 2011. The final plan was delivered to the Governor and the state legislature, and published on the TPWD website, on January 5, 2012. Contact information and the final document can be accessed at the following link: <http://www.twdb.state.tx.us/wrpi/swp/swp.asp>.



Station 15817 at the Webb/Zapata county line, downstream of Laredo, TX

How is the Water Quality?

How is the water quality?

The biggest water quality issues in the Upper Rio Grande are **bacteria**, **salinity**, and **low dissolved oxygen**. The quality of water changes based on location.

Upper Rio Grande: Segment 2314 (upstream of International Dam) has high bacteria. In El Paso, the river is lined (Segment 2308 Below International Dam) and water quality standards are less stringent, although this segment has concerns for nutrients. Below the cemented channel (Segment 2307 Below Riverside Diversion Dam, which includes El Paso's lower valley down to Presidio, TX) there are high values of bacteria, chloride, and total dissolved solids, with concerns for nutrients, chlorophyll-a and depressed dissolved oxygen. Segment 2306, which stretches from the Rio Conchos in Presidio/ Ojinaga through Big Bend and ends at Amistad International Reservoir, is impaired for salinity as well as bacteria near the Presidio area, with concerns for nutrients and chlorophyll-a. Amistad Reservoir (Segment 2305) only has a concern for nitrate. The Devils River (Segment 2309) has nearly pristine waters that meet all water quality standards and provides excellent water to Amistad Reservoir.

Pecos River: Red Bluff Reservoir (Segment 2312) has some concerns with chlorophyll-a, algae, and nutrients. The Upper Pecos (Segment 2311) has issues with low dissolved oxygen, algal blooms, and naturally high salinity. The Lower Pecos improves (Segment 2310) in water quality but still has algal blooms.

Middle Rio Grande: Below Amistad Dam (Segment 2304), there are bacteria issues in the urban areas of Del Rio, Eagle Pass and Laredo. Falcon Reservoir (Segment 2303) has some concerns for nutrients.

Lower Rio Grande: Below Falcon Dam (Segment 2302) there are also bacteria issues in some urban areas near Rio Grande City, Hidalgo, and Brownsville. Arroyo Los Olmos in Rio Grande City (Segment 2302A) has bacteria and chlorophyll-a issues. The tidal section of the river (Segment 2301) has issues with bacteria and chlorophyll-a.

How can we tell the quality of water?

The following are some of the water quality information collected in the Rio Grande Basin in Texas:

Bacteria - a measure of health risk for recreational activities

pH - measure of acidity of water

Conductivity - an field measurement of salt in the water.

Dissolved Oxygen - oxygen in the water available for aquatic life

Solids (total dissolved solids, chlorides, sulfates, etc) - indicate level of salt

Nutrients - nitrogen compounds, ammonia, and phosphorus, usually from fertilizers and treatment plants

Chlorophyll-a - indicator of excessive algae and high nutrients

Metals - aluminum, arsenic, copper, lead mercury, etc

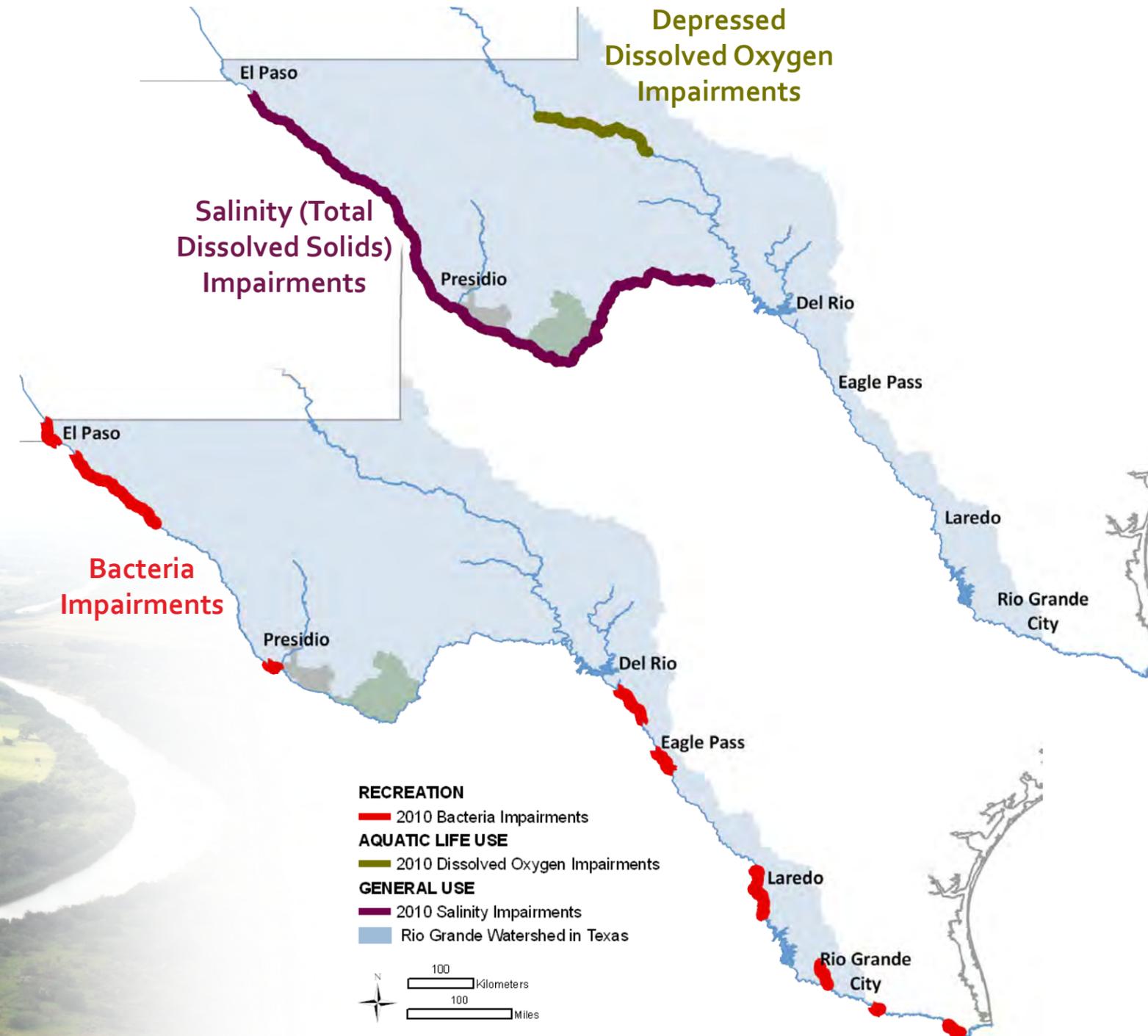
Organics - herbicides, pesticides, and industrial compounds

Benthics - freshwater macroinvertebrates that live in the water under rocks and in the bottom sediments that indicate water quality

All of the above water quality parameters collected in the Rio Grande Basin can be found at the USIBWC CRP website:

<http://www.ibwc.gov/CRP/monstats.htm>

2010 Impairments



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 determine whether stream segments are meeting the standards. A waterbody is listed as "impaired" on the Texas Integrated Report's 303(d) List if the data show the standards are not being met. EPA must approve the Integrated Report. The TSWQS for the Rio Grande Basin and the 2010 Integrated Report can be found at the following links:

TSWQS http://www.ibwc.gov/CRP/documents/TSWQS_B23_revised2010.pdf

Integrated Report <http://www.tceq.texas.gov/waterquality/assessment/10twqi/10twqi>

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 and where within the Rio Grande watershed on the Coordinated Monitoring Schedule.

<http://cms.lcra.org/>

How are the Lakes?

Lakes and Reservoirs of the Rio Grande Basin in Texas

There are three major lakes of the Rio Grande Basin in Texas, and all three of them are considered “reservoirs” because they are impounded by dams. The reservoirs are used for storing and delivering water between states and countries, as well as for flood control, hydroelectric power generation, and recreation.

Amistad International Reservoir - Segment 2305

AMISTAD DAM: Amistad Dam is the largest of the storage dams and reservoirs built on the international reach of the Rio Grande River. The dam was dedicated in 1969 by U.S. President Richard M. Nixon and Mexico President Diaz Ordaz. Amistad Dam was constructed primarily for flood control and water conservation storage for the benefit of the United States and Mexico.

SEGMENT DESCRIPTION: Segment 2305, Amistad International Reservoir, starts from Amistad Dam in Val Verde County (Val Verde) and includes 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.

WATER QUALITY SAMPLING: Amistad has three routine stations collected quarterly (13835, 15892, and 15893) by TCEQ Regional Office 16 in Laredo, TX. TCEQ also collects samples twice a year from the Pecos arm (16379). Big Bend National park staff collect data once a year at three new stations on the Rio Grande arm (20624, 20627, and 20630).

WATER QUALITY IMPAIRMENTS: Amistad has no impairments and meets all water quality standards set for the reservoir in Texas.

WATER QUALITY CONCERNS: In the 2010 assessment, there were concerns for nitrates in both the Rio Grande and Devils River arms of Amistad.



Red Bluff Reservoir - Segment 2312

RED BLUFF DAM: Red Bluff Dam was constructed in 1936 for irrigation and hydroelectric power. The dam is operated by Red Bluff Water Control District.

SEGMENT DESCRIPTION: Segment 2303, Red Bluff Reservoir, starts from From the TX/NM state line to end of dam. High salinity prevents its use as a public water supply and restricts agriculture to salt-tolerant crops.

WATER QUALITY SAMPLING: Red Bluff has two routine stations collected twice a year (13267 and 13269). Samples are collected by TCEQ Regional Office 7 in Midland.

WATER QUALITY IMPAIRMENTS: Red Bluff has no impairments and meets all water quality standards set for the reservoir.

WATER QUALITY CONCERNS: In the 2010 assessment, Red Bluff had a concern for golden alga blooms, as well as nitrate and chlorophyll-a. Fish kill reports are also listed as a concern. Red Bluff also has a concern for 1,2-Dibromoethane, a chemical probably produced by algae. In addition, salinity values are typically over 6,000 mg/L.



Falcon International Reservoir - Segment 2303

FALCON DAM: Falcon Dam is the lowermost major multipurpose international dam and reservoir on the Rio Grande, and its construction was completed in April of 1954. Falcon Dam, which is operated by the IBWC, controls and regulates the flow of international waters of Mexico and the United States, in compliance with various existing treaties. In conjunction with irrigation, domestic and flood releases, the project generates electricity through the hydroelectric generating plant.

SEGMENT DESCRIPTION: Segment 2303, Falcon International Reservoir, starts from Falcon Reservoir is used for recreation, water supply, and hydroelectric power generation. Less water is impounded in Falcon than in Amistad.

WATER QUALITY SAMPLING: Falcon has two routine stations. Station 13189 is collected quarterly by USIBWC Falcon Dam Office staff. 15818 is collected twice a year by CRP partner RGISC in Laredo.

WATER QUALITY IMPAIRMENTS: Falcon has no impairments and meets all water quality standards set for the reservoir in Texas.

WATER QUALITY CONCERNS: In the 2010 assessment, there was a concern for toxicity in ambient water as well as nutrients near Zapata, possibly from municipal effluent.



Drought Conditions in Texas

The drought in Texas in 2011 has been described as one of the worst droughts in recent history. Livestock and crops throughout the state have been desiccated and water sources have been severely depleted. The Southwestern states of New Mexico and Texas have been particularly affected. According to the US Drought Monitor, much of the Rio Grande Basin in 2011 was either in extreme or exceptional drought, with record-breaking temperatures in most parts of the state.

The water that is allocated to the State of Texas is received from the Elephant Butte Reservoir, located in New Mexico. In winter of 2011, Elephant Butte was at a conservation capacity of about 16%, but only 8% of that is available for water deliveries. Without heavy precipitation, usually in the form of snow, in the Rio Grande Basin in Colorado, Texas may receive a smaller water delivery in 2012. The Rio Grande is completely dry in some parts of Texas, including in northern El Paso where the background picture on this page was taken. Currently, the forecast is that La Niña's cycle may last longer than usual, which would mean that there is still more drought to come for the Southwest.



Elephant Butte Reservoir, June 2011

Red Tide Outbreak in the Gulf 2011

It is thought that this past year's high temperatures and lack of rain may have contributed to frequent algal blooms in the Gulf of Mexico. Several fish kills in the Gulf had first responders on edge this past year, as each brought fear of a red tide. In October 2011, Brownsville, Texas, had a particularly large fish kill stretching 7 miles along the coast line that was cause for concern. Fish kills are often the first indicator of a red tide, which are caused by a high concentration (also called a "bloom") of microscopic algae called *Karenia brevis*. This type of algae produces a toxin that can affect the nervous system of animals, including birds, fish and mammals. If the concentration gets high enough, it also causes water discoloration, which can make the water appear brown, red, or green. Many people are sensitive to the aerosols that these algae release into the air, which can be a problem for people with respiratory issues. Aside from the large fish kill in Brownsville, there have been fish kills and small concentrations of algae found in the South Padre Island area as well as recently as December. As of December 2011, the active red tide around the coast had killed an estimated 4.5 million fish.

TCEQ Issues Interim Drought Guidance

In response to the severe drought that is currently plaguing Texas, the TCEQ has revised their Surface Water Quality monitoring Procedures manual Vol. 1 to include guidance for monitoring during a drought. The document, titled *Interim Guidance for Routine Surface Water Quality Monitoring During Extended Drought*, gives additional information on collecting routine samples during drought conditions. The information includes the addition of drought parameters to the Quality Assurance Project Plans, and guidance on sampling pools. The TCEQ Surface Water Quality Monitoring team drafted the document and is taking suggestions and comments on the text. The primary TCEQ contact for the guidance is Bill Harrison, at Bill.Harrison@tceq.texas.gov.



Left to right: Site 13276, Rio Grande above Anthony Drain, in December 2010 (normal winter conditions), July 2011 (normal summer conditions), and December 2012 (winter drought conditions).

What's going on in the Pecos?

Pecos Compact Commission Welcomes New Commissioner

The Pecos Compact Commission has a new Texas Commissioner. The Honorable Frederick "Rick" Rylander was appointed as the new Texas Representative to the Pecos River Commission (PRC) in May 2011 by Governor Rick Perry. Commissioner Rylander is originally from Iraan, Texas.

Pecos River Watershed Protection Plan

The Pecos River Watershed protection Plan (WPP) Implementation Plan has ended its second year with progress made on accomplishing the goals in the WPP. There are currently two programs underway to implement portions of the WPP that are being funded by the Texas State Soil and Water Conservation Board and U.S. EPA through the Clean Water Act, Section 319(h) grant funds. The two projects are *Implementing the Pecos River Watershed Protection Plan through Invasive Species Control (Saltcedar)* and by *Providing Technical and Financial Assistance to Reduce Agricultural Nonpoint Source Pollution and Implementing the Pecos River Watershed Protection Plan through Continuous Water Quality Monitoring and Dissolved Oxygen Modeling*. The program has also sprayed over 2,600 acres of saltcedar in the watershed, established three saltcedar beetle sites, and installed two Continuous Water Quality Monitoring (CWQM) stations. The CWQM stations are located above Red Bluff Reservoir and near Girvin. For additional information on projects and meetings in the Pecos River watershed, please visit <http://pecosbasin.tamu.edu/>.



Pecos River near Sheffield, TX

Pecos River Water Quality Coalition

State Senator Carlos Uresti and State Representative Pete Gallego, interested in improving water quality in the Pecos River, established the Pecos River Water Quality Coalition. The Coalition's goal is to reduce salinity concentrations and impacts in order to increase usable water supplies for agricultural, urban, and environmental purposes. This Coalition is working in both the TX and NM portions of the watershed, and the Pecos River WPP is also participating. Senator Uresti and Representative Gallego authored the resolution SCR 2, which was passed by the State



Pecos River near Sheffield, TX

Legislature in May 2011. This resolution recognizes the work done to develop the Pecos River WPP and urges Congress to reauthorize Section 5056 of the Water Resources Development Act of 2007 and to appropriate funds to the U.S. Army Corps of Engineers to solve the salinity problems in the Rio Grande Basin, which includes the Pecos River watershed. The Coalition also hosted a Summit in October 2011 in Austin.

Initial Watershed Assessment of the Pecos River Watershed

The USGS, in cooperation with the U.S. Army Corps of Engineers (Corps), is conducting an Initial Watershed Assessment (IWA) of the Pecos River watershed in New Mexico and Texas. An IWA is the initial phase in the development of the Corps Watershed Assessment (WA) which will be used to achieve integrated water resources management in the basin and address watershed issues such as elevated salinity. The purpose of an IWA is to determine if there is Corps interest in pursuing a WA of the basin, and more detailed studies of watershed problems.

Pecos River Aquatic Life Monitoring

The TCEQ is conducting additional aquatic life monitoring in the Pecos River, specifically in the Sheffield area. The title of the project is *Pecos River Aquatic Life Monitoring- Segments 2310 and 2311*. The Sheffield area is targeted in this project because it is a transition zone between saline formations upstream of the area (from Orla to Girvin) and the freshwater/spring-fed attributes downstream of Sheffield to the river's convergence with the Rio Grande. The study will attempt to document the transitions of water quality and the biological response in the Sheffield area of the Pecos River. This data will then be provided to the Water Quality Standards group at the TCEQ



Aquatic Life Monitoring, Pecos River near Sheffield, TX

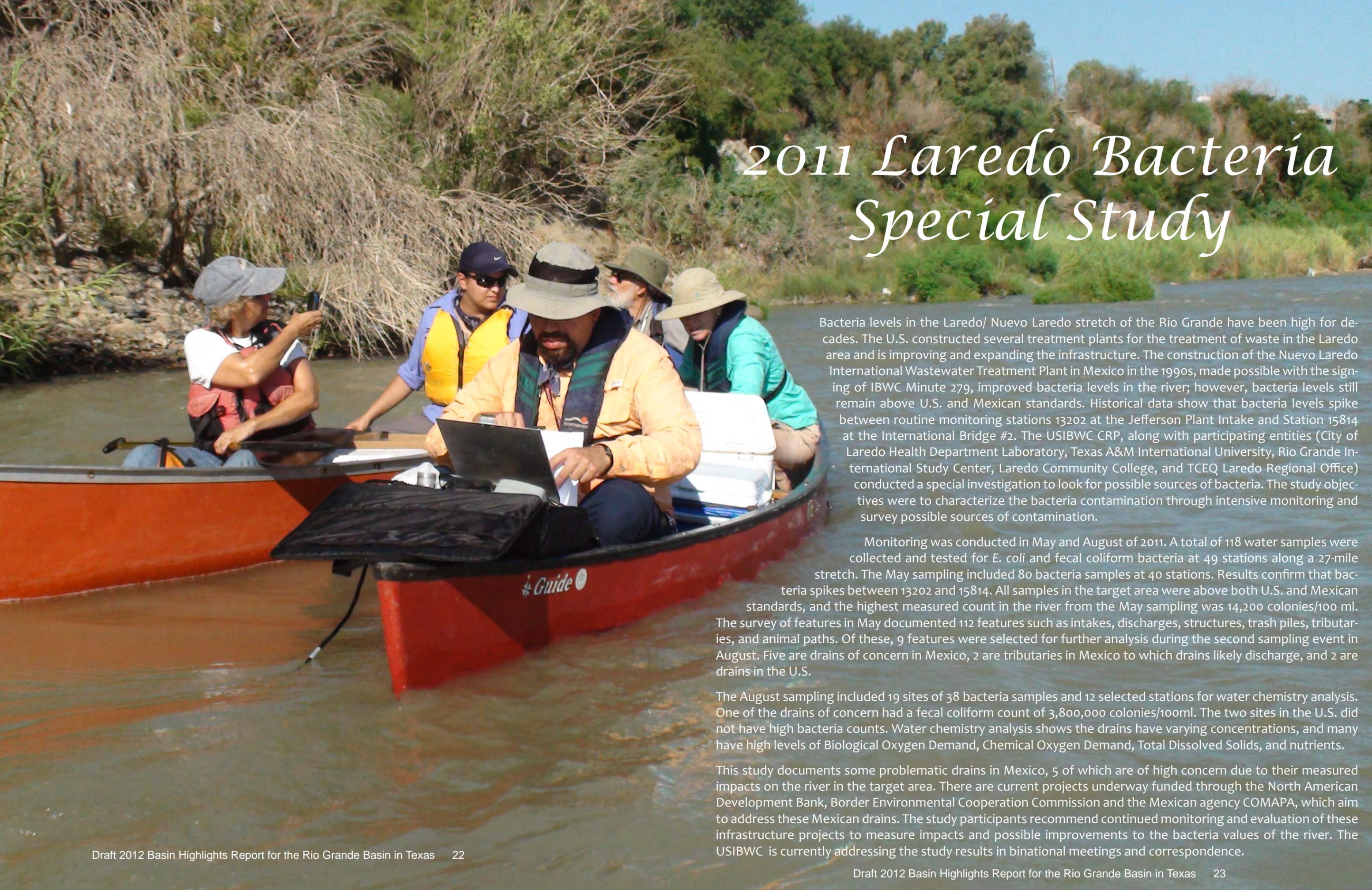
Dia del Rio in Iraan, TX

Iraan High School found a way to incorporate water quality and ecology into their curriculum when two teachers, Ms. Crowder and Ms. Slover, started an Ecology class. The teachers take their students out to the Pecos River to collect samples and investigate salinity and pH. They also participated in the 2011 Dia del Rio Rio Research Roundup. The students collected samples from their site, performed water quality experiments, and incorporated their results and learning experiences into a video.



Iraan High School students performing water quality experiments at the Pecos River

to supplement existing data for use in the Use Attainability Analysis (UAA) to determine if the existing use and criteria are appropriate for this segment. The data collection will occur in the fiscal years 2012 and 2013, with a report to be published in the fiscal year 2014. For more information on this project, please contact the TCEQ Project manager, Greg Larson, at greg.larson@tceq.texas.gov. This research will complement previous aquatic life monitoring on the Pecos, the results of which are posted at www.ibwc.gov/CRP/studies.htm.

A group of five researchers are in a red canoe on a river. One man in the center is using a laptop. They are wearing life jackets and hats. The background shows a riverbank with trees and brush.

2011 Laredo Bacteria Special Study

Bacteria levels in the Laredo/ Nuevo Laredo stretch of the Rio Grande have been high for decades. The U.S. constructed several treatment plants for the treatment of waste in the Laredo area and is improving and expanding the infrastructure. The construction of the Nuevo Laredo International Wastewater Treatment Plant in Mexico in the 1990s, made possible with the signing of IBWC Minute 279, improved bacteria levels in the river; however, bacteria levels still remain above U.S. and Mexican standards. Historical data show that bacteria levels spike between routine monitoring stations 13202 at the Jefferson Plant Intake and Station 15814 at the International Bridge #2. The USBWC CRP, along with participating entities (City of Laredo Health Department Laboratory, Texas A&M International University, Rio Grande International Study Center, Laredo Community College, and TCEQ Laredo Regional Office) conducted a special investigation to look for possible sources of bacteria. The study objectives were to characterize the bacteria contamination through intensive monitoring and survey possible sources of contamination.

Monitoring was conducted in May and August of 2011. A total of 118 water samples were collected and tested for *E. coli* and fecal coliform bacteria at 49 stations along a 27-mile stretch. The May sampling included 80 bacteria samples at 40 stations. Results confirm that bacteria spikes between 13202 and 15814. All samples in the target area were above both U.S. and Mexican standards, and the highest measured count in the river from the May sampling was 14,200 colonies/100 ml. The survey of features in May documented 112 features such as intakes, discharges, structures, trash piles, tributaries, and animal paths. Of these, 9 features were selected for further analysis during the second sampling event in August. Five are drains of concern in Mexico, 2 are tributaries in Mexico to which drains likely discharge, and 2 are drains in the U.S.

The August sampling included 19 sites of 38 bacteria samples and 12 selected stations for water chemistry analysis. One of the drains of concern had a fecal coliform count of 3,800,000 colonies/100ml. The two sites in the U.S. did not have high bacteria counts. Water chemistry analysis shows the drains have varying concentrations, and many have high levels of Biological Oxygen Demand, Chemical Oxygen Demand, Total Dissolved Solids, and nutrients.

This study documents some problematic drains in Mexico, 5 of which are of high concern due to their measured impacts on the river in the target area. There are current projects underway funded through the North American Development Bank, Border Environmental Cooperation Commission and the Mexican agency COMAPA, which aim to address these Mexican drains. The study participants recommend continued monitoring and evaluation of these infrastructure projects to measure impacts and possible improvements to the bacteria values of the river. The USBWC is currently addressing the study results in binational meetings and correspondence.

USIBWC CRP Outreach

Public Outreach and Public Participation



Upper Rio Grande Basin Advisory Meeting

Basin Advisory Meetings

The Basin Advisory meetings gather private citizens, government agency representatives, citizen groups, and academia who provide input and information for the CRP program to ensure issues and concerns in the community are addressed. Input from the public meetings assists the CRP in determining changes to the monitoring schedule, new monitoring sites, special studies, and dissemination of information. People who are interested in providing input on environmental issues and who would like to participate in the Rio Grande BAC can contact anyone in the CRP (see the back cover of this report for contacts). Although they are called Committees, the USIBWC BAC meetings are much more informal and are open to all the public for participation.

BAC meetings are held once a year in various locations throughout the basin in conjunction with the USIBWC Rio Grande Citizens Forum or a similar gathering of stakeholders. The meetings provide the USIBWC CRP with an opportunity to update the public on recent activities and future plans, as well as act as forums for research exchange and input about the program.

Water Festival

USIBWC CRP supports the annual El Paso Water Utilities (EPWU) Water Festival by hosting a booth to educate children about water quality. In October 2011, USIBWC CRP conducted water quality experiments with 3rd, 4th, and 5th graders from El Paso County. The children learned about dissolved oxygen, pH, and turbidity and how they can affect water quality and aquatic organisms. The pH experiment also allows the children to learn about simple acids and bases.



CRP staff performing water quality experiments for elementary students at the 2011 Water Festival

Other Outreach Activities

USIBWC CRP staff have participated in numerous additional outreach activities to disseminate information about the Rio Grande, the CRP, and water quality. In April 2011, USIBWC CRP held an educational booth at the El Paso Earth Day Fair, and in May staff conducted water quality experiments with middle school children at the Drinking Water Summit. In addition, staff also participated in and facilitated sessions at the Healthy Water, Healthy People and Project WET workshops, and had a presentation and field trip with a local high school. USIBWC CRP staff also attended numerous trainings and conferences for watershed outreach and monitoring.



EPCC Adopt-a-River Cleanup, September 2011

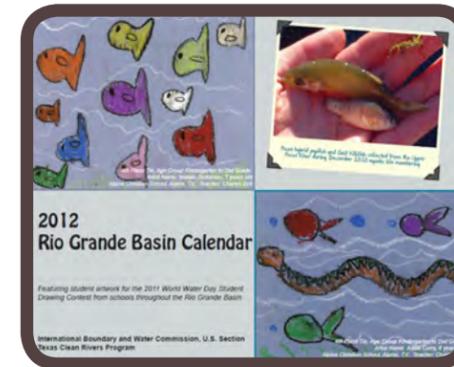
Adopt-a-River Cleanups

In 2011, USIBWC continued to coordinate river cleanups with local groups, such as the Texas Master Naturalists, the Boy and Girl Scouts, and El Paso Community College (EPCC). Through the program, ten river cleanups were held throughout the year, and CRP was able to participate in a handful of them, including providing water quality monitoring and demonstrations for EPCC student volunteers.



2011 World Water Day Student Art Contest

The USIBWC CRP held a drawing contest in honor of the 2011 World Water Day. A flyer was sent to school districts in the Rio Grande Basin specifying contest rules: the drawings needed to be about the Rio Grande, about how water was important to them, or how they enjoy the river. Students from K-12 could submit a drawing, and winning entries would be published in the 2012 CRP calendar. We received over 365 entries! The winning drawings can be viewed on the CRP website's media gallery.



2012 Rio Grande CRP Calendar

USIBWC CRP compiled another outreach calendar to promote awareness of the Rio Grande. This year, the calendar featured the winners from the student art contest. We distributed almost 2,000 calendars to the public throughout the Texas border region. They were so popular that CRP ran out of copies! You can still download your own copy on the CRP website.

Outreach with EPCC

USIBWC CRP had the opportunity to participate in an event with the EPCC Early College Program, in which high school students are able to take college-level courses. CRP staff presented on their duties and job opportunities, and took the students to a river site for a demonstration. The students learned about the program, but also gained exposure to careers in the environmental science field.



CRP staff doing a demonstration at a Rio Grande river site

USIBWC CRP Website

More about us and our program....

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

Study Area

Maps of the Rio Grande Basin and monitoring locations.

Monitoring Station Data

USIBWC CRP and TCEQ water quality data in Excel files by station; information about quality assurance, parameters, and standards.

Monitoring Station Water Quality Data

Below is a list by segment of monitoring stations in the Rio Grande basin. Click on the station ID number to download an Excel format file that contains the water quality data for that station from 1995 to present, for conventional parameters and bacteria. For NOTES regarding data, click here.

- The standards for an impairment in a water body are based on the use of the water body. A table of the USES BY SEGMENT and the ASSESSMENT CRITERIA can be found by clicking here for an Excel table. For the Texas Surface Water Quality Standards for the Rio Grande Basin, click here. Draft 2010 Revised Standards for the Rio Grande Basin, click here.
- For a PDF file describing the MONITORING PARAMETERS, click here.
- For the complete 2010-2011 QUALITY ASSURANCE PROJECT PLAN (QAPP) for the USIBWC Clean Rivers Program, click here.
- For the FY2011 MONITORING SCHEDULE for any basin in Texas, click here and then select your basin of choice from the map. The Rio Grande Basin is Basin 23. Information about STATIONS can be found on our Studies - GIS data page.
- For METALS data, click here for a single Excel file containing all of the data that we have for the entire basin by station ID, for total and dissolved metals as well as metals in sediment.
- For ORGANICS IN SEDIMENT data from 2007-2010, click here. For a summary of the project and the organics parameters, click here. For a brief presentation on organics in sediment collection, click here.

Segment 2301 - Rio Grande Tidal

Station ID	Station Description
13176	Rio Grande Tidal at State Highway 2 near Boca Chica
16268	Rio Grande at Sabal Palm Sanctuary

Segment 2302 - Rio Grande below Falcon Reservoir

Station ID	Station Description
13177	Rio Grande below El Jardin at Brownsville

About the Rio Grande

Introduction to the Rio Grande Basin.

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

About CRP

Contacts for the USIBWC CRP and program information.

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 analyzing bacteria samples in the Rio Grande.

The USIBWC Clean Rivers Program MEDIA GALLERY

Welcome to the Clean Rivers Program Photo and Video Gallery! This page has pictures and videos from past CRP events and water monitoring.

[PHOTO GALLERY](#) | [VIDEO GALLERY](#)

PHOTO GALLERY

Click on the album below to see additional pictures or to view the video.

Additional Resources and links:

- TSWQS: http://www.ibwc.gov/CRP/documents/TSWQS_B23_revised2010.pdf
- SWQM: <http://www.tceq.texas.gov/waterquality/monitoring>
- Integrated Report: <http://www.tceq.texas.gov/waterquality/assessment/10wqi/10wqi>
- Coordinated Monitoring Schedule: <http://cms.lcra.org/>
- TPWD Red Tide Status: <http://www.tpwd.state.tx.us/landwater/water/enviroconcerns/hab/redtide/status.phtml>
- Pecos WPP: <http://pecosbasin.tamu.edu/>
- EPA Recreational WQ Criteria: <http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/index>
- USBR WaterSMART: www.usbr.gov/WaterSMART/grants.html
- TCEQ Env. Flows: http://www.tceq.texas.gov/permitting/water_rights/eflows
- EPA Border 2012: www.epa.gov/border2012/
- EPA Border 2020: www.epa.gov/border2012/docs/2020/border2020-draft-framework.pdf
- PDNWC: www.pdnwc.org
- TWDB Water Resources: <http://www.twdb.state.tx.us/wrpi/swp/swp.asp>
- RGISC: <http://rgisc.org/>
- Edwards Aquifer Research and Data Center: <http://www.eardc.txstate.edu/about/reports.html>
- Drought Monitor <http://droughtmonitor.unl.edu>

Errata from the 2011 Rio Grande Basin Highlights Report: on page 13, Table 3, the table of the TSWQS that discussed human health criteria was from the 2000 TSWQS. In the revised standards, Table 2 was changed to Table 3 and a new Mercury criteria was adopted. The back cover, Julie McEntire's phone number is 512-239-6693.

Back Cover: Picture is of the Rio Grande in Laredo, TX, facing Northwest towards the Railroad Bridge and Hotel Rio. Submitted by Elsa Hull, TCEQ Region 16. Ms. Hull also provided the picture on page 9 under the Border 2012 section. All photos were taken by USIBWC unless otherwise noted.

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