



Successful Continuous Water Quality Monitoring in Remote Arid West Texas

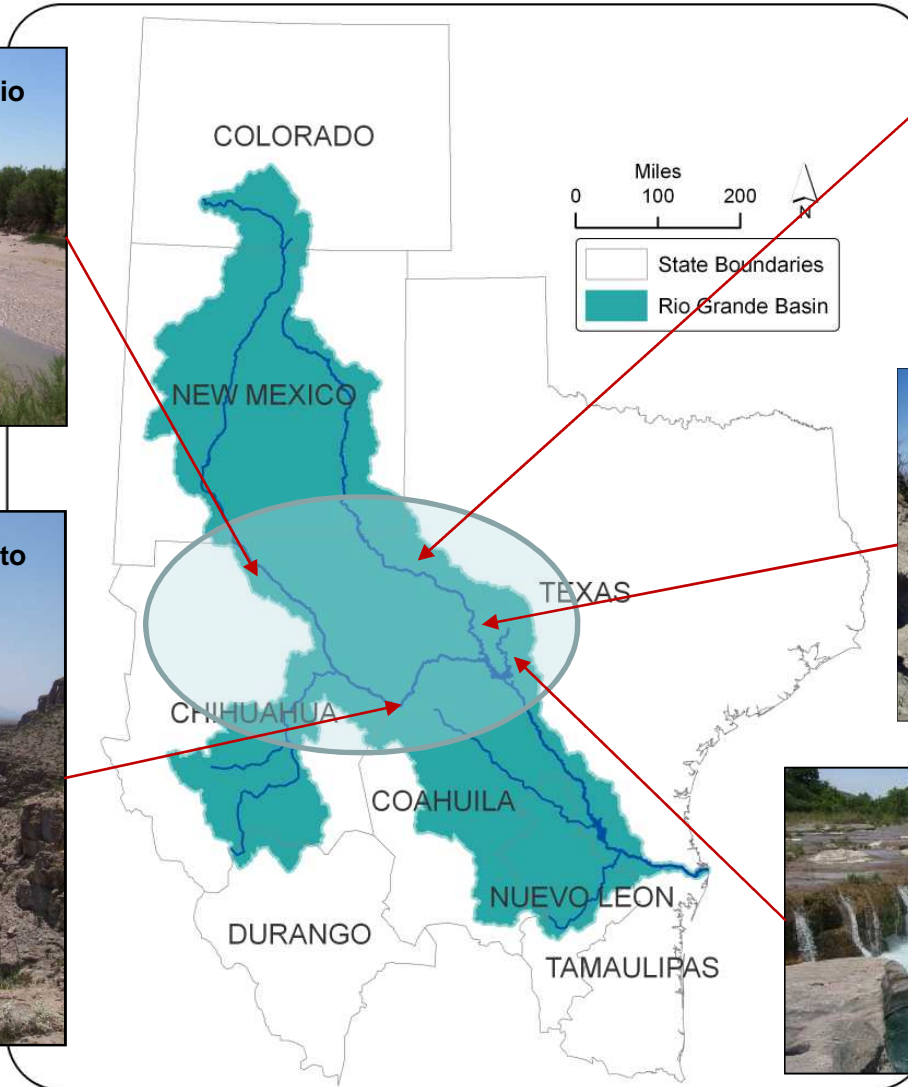
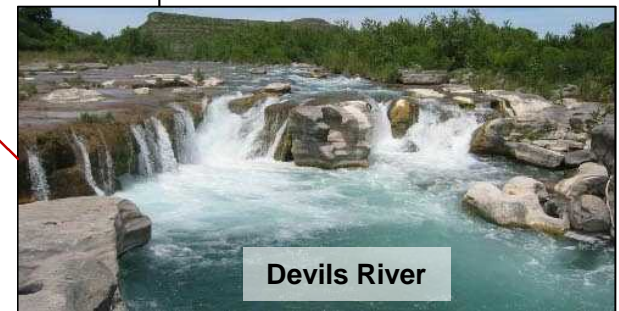
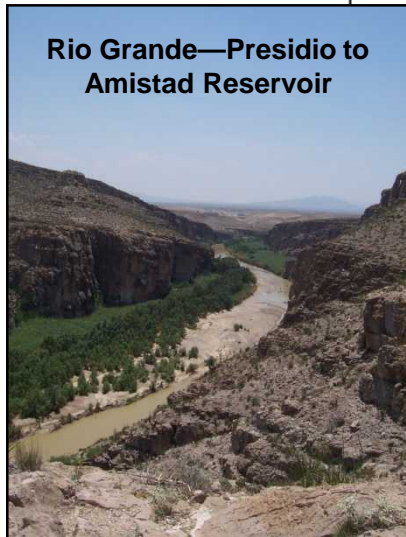
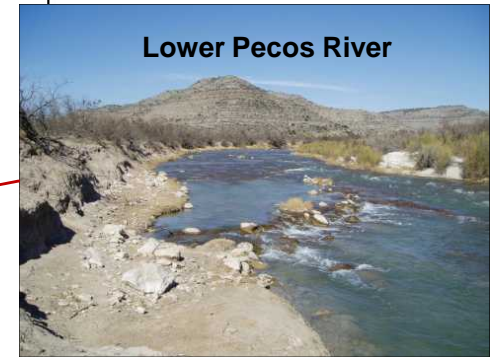
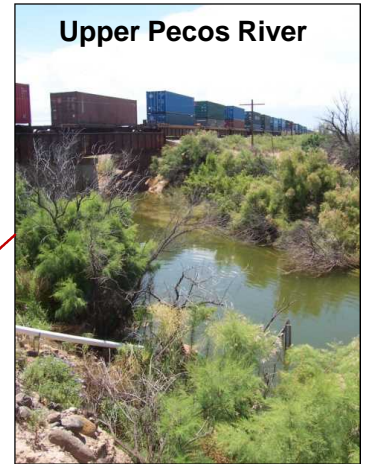
Christine Kolbe and Chuck Dvorsky
Surface Water Quality Monitoring Team
Texas Commission on Environmental Quality



The Rio Grande and Pecos Rivers

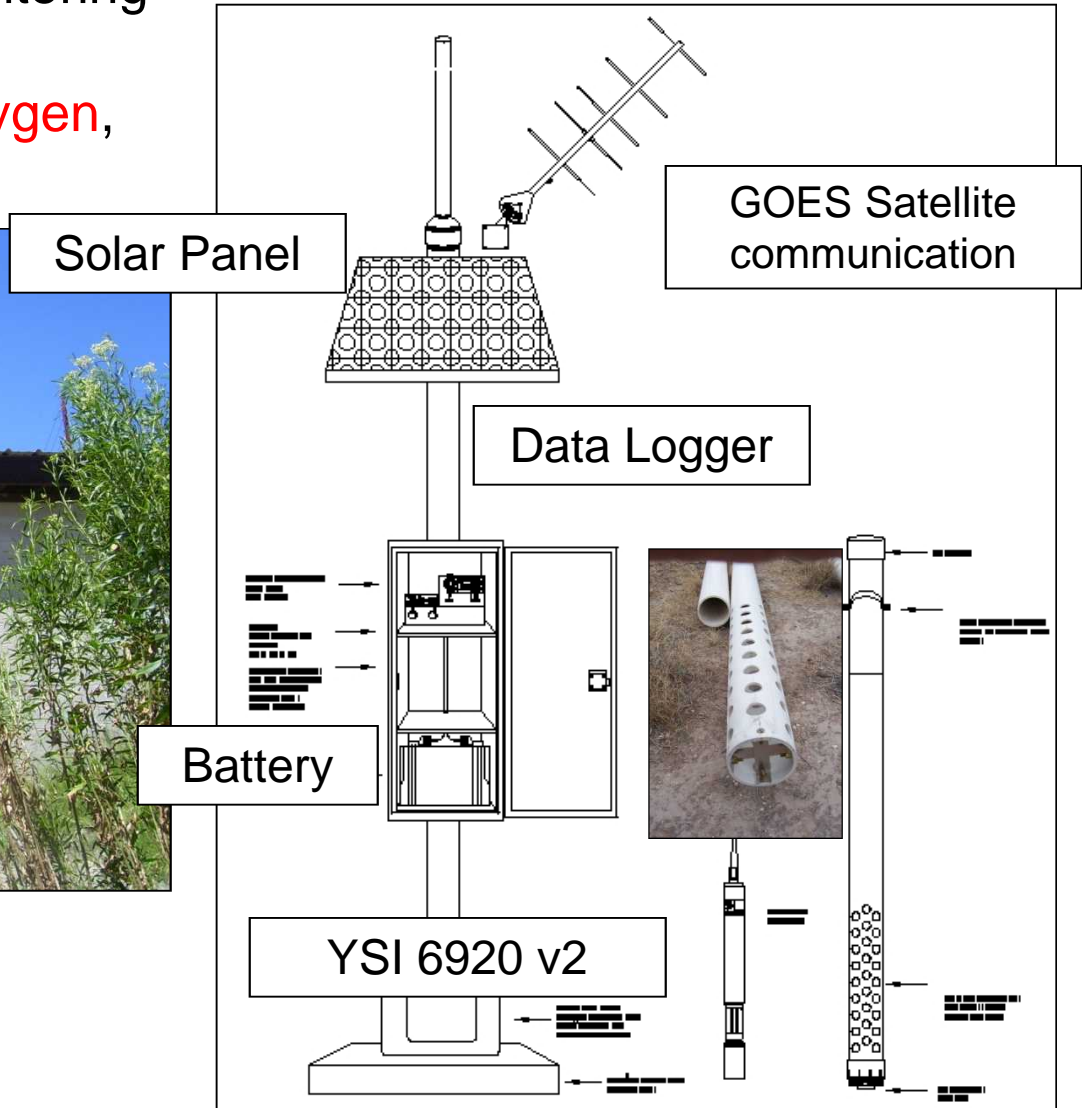


The Rio Grande and Pecos River Continuous Monitoring Project Areas



Basic Continuous Water Quality Station

Continuous **Water Quality Monitoring** Stations commonly monitor **temperature, pH, dissolved oxygen, specific conductance.**



Site Operation and Maintenance



Data Uses—Upper Pecos River

To monitor the effects of salt cedar eradication—

- ❑ Increasing Flow
- ❑ Decreasing Salinity

To support a watershed protection plan—

- ❑ Model salt loading and low dissolved oxygen.



Data Uses—Lower Pecos River

To monitor changing water quality

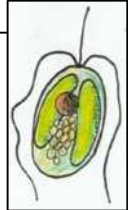
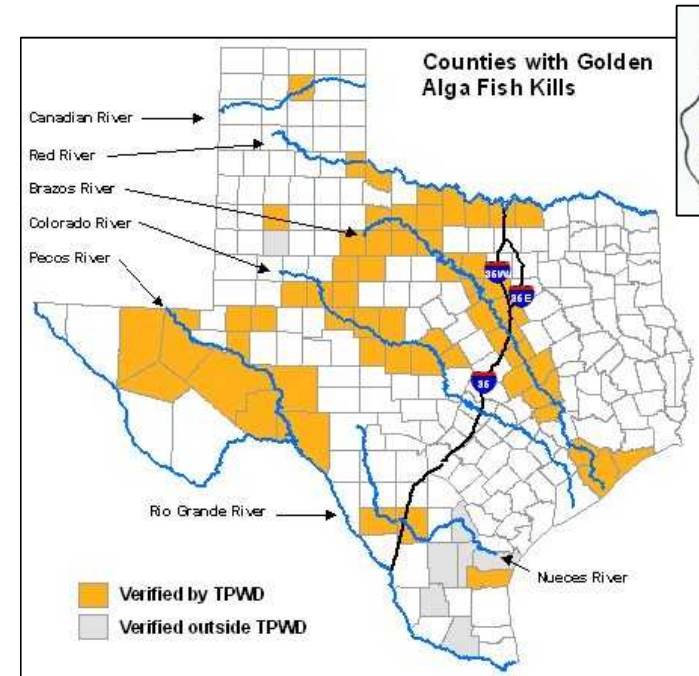
- ❑ Increasing oil & gas activity
- ❑ Presence of golden algae
- ❑ To support a watershed protection plan



3 sites



Installation of a new site on the lower Pecos River April 2012 by USGS staff.





Segment 2307 - Riverside Diversion Dam in El Paso to the Rio Conchos Confluence;
TDS criterion = 1,500 mg/L.

Data Uses—Upper Rio Grande

Segment 2306 – Downstream Rio Conchos Confluence to Ramsey Canyon;
TDS criterion = 1,550 mg/L



Rio Conchos

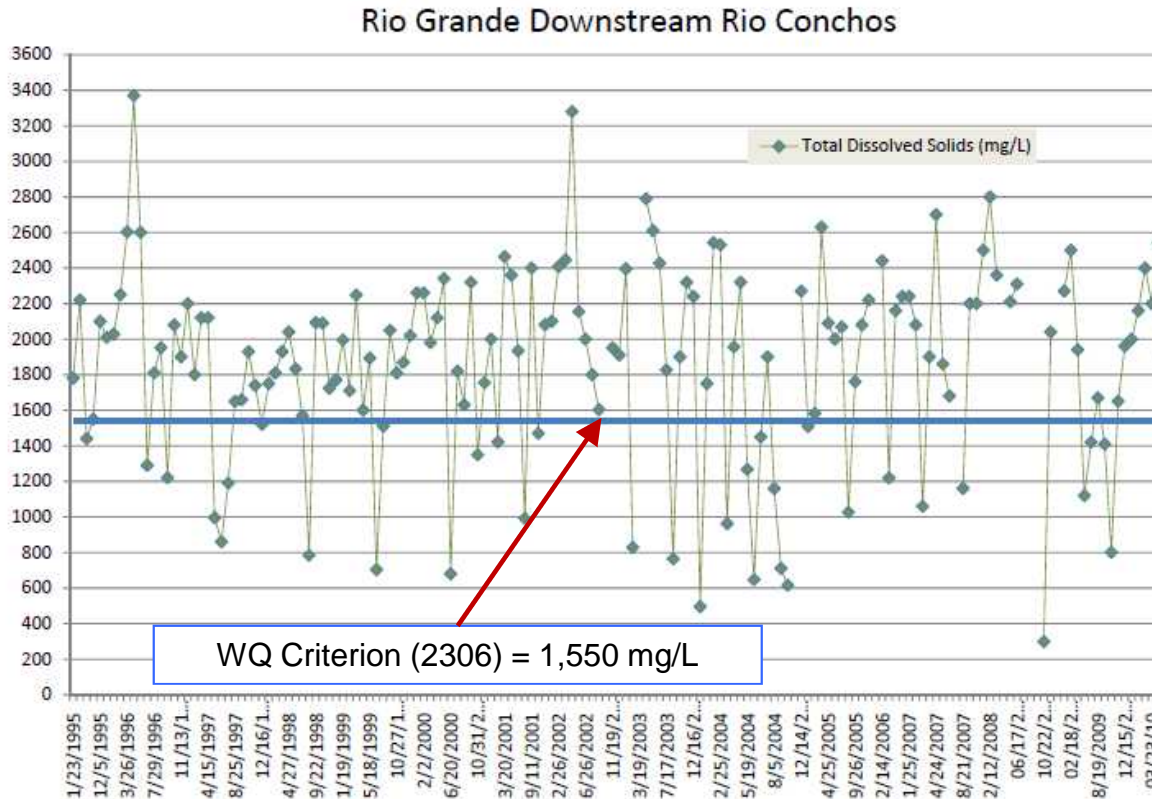
Provides ~75% of flow downstream of Presidio

5 sites

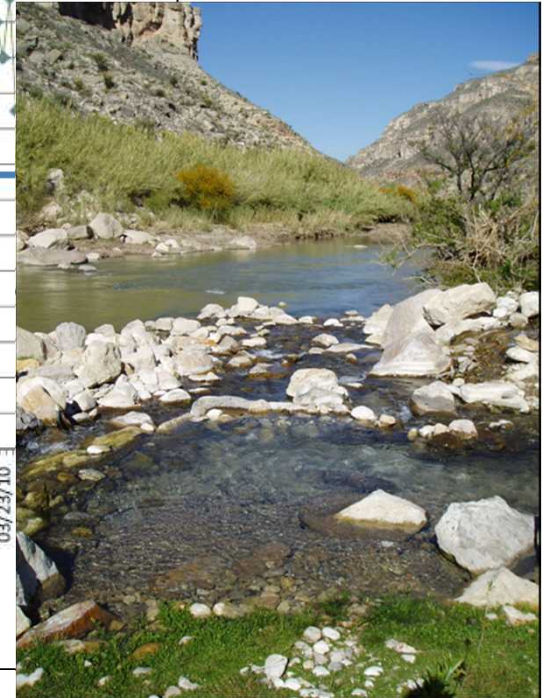
Segments 2306 and 2307 currently listed as impaired for TDS and chloride.

Data Use—Water Quality Standards Revisions

Routine monitoring lab TDS data 1995-2010



Continuous specific conductance data is used to estimate TDS which supports revisions to the Texas Water Quality Standards.



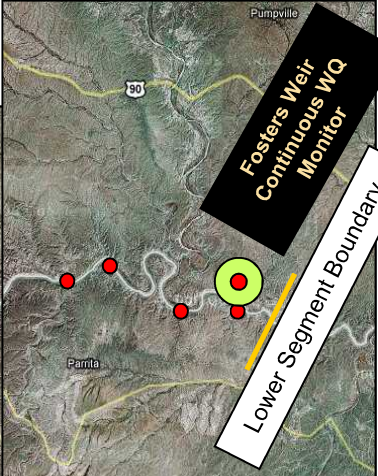
Most of Segment 2306 runs through protected areas in the US (Big Bend Ranch State Park, BBNP, Wild and Scenic River) and Mexican states of Chihuahua and Coahuila.

Data Use—TCEQ Biological Stations in the Lower Canyons Below Big Bend NP

Using specific conductance and benthic macroinvertebrates to assess need to refine river segment boundaries in Texas water quality standards.

San Francisco Canyon

Sanderson Canyon



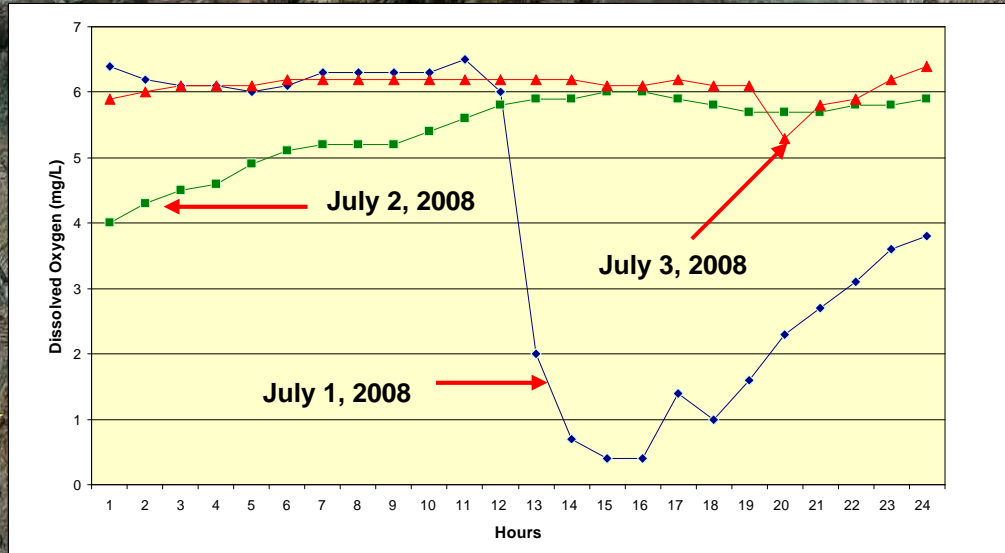
23 Stations

Black Gap Wildlife Management Area



41 samples collected 2005-2010

Data Use—Identifying Unknown WQ Issues



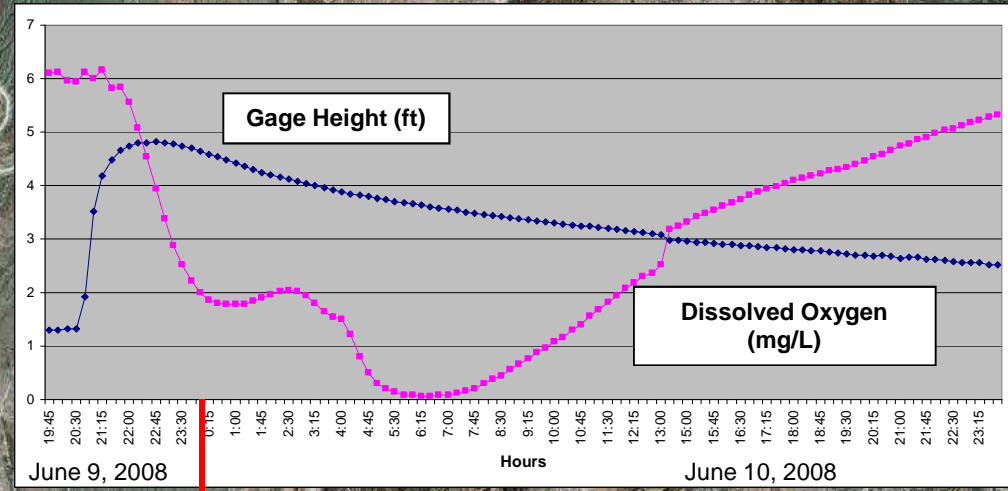
Castolon



Rio Grande Village



Rise in flow + decrease in DO = fish kills documented at BBNP



Santa Rosa

El Melón

El Olan

Data Use—Devils River



Continuous monitoring is done to track the status of WQ due to increased oil and gas production in the watershed.



Devils River is one of the most pristine water bodies in Texas.

The Devils River site is operated by TCEQ staff from Laredo field office.

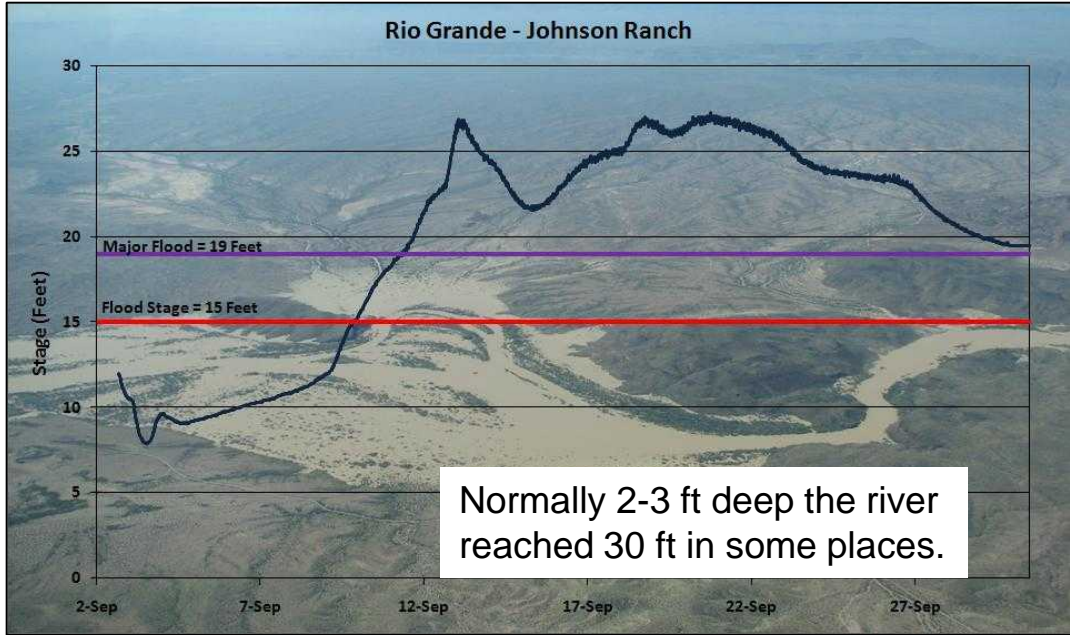
The Unexpected—Too Much



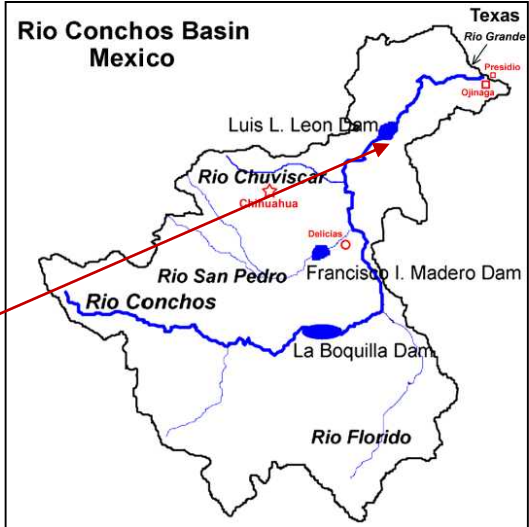
The dam at Luis Leon Reservoir, Chihuahua Mexico

September 2008

Abnormal rainfall in Mexico resulted in the emergency release of water from reservoirs on the Rio Conchos.

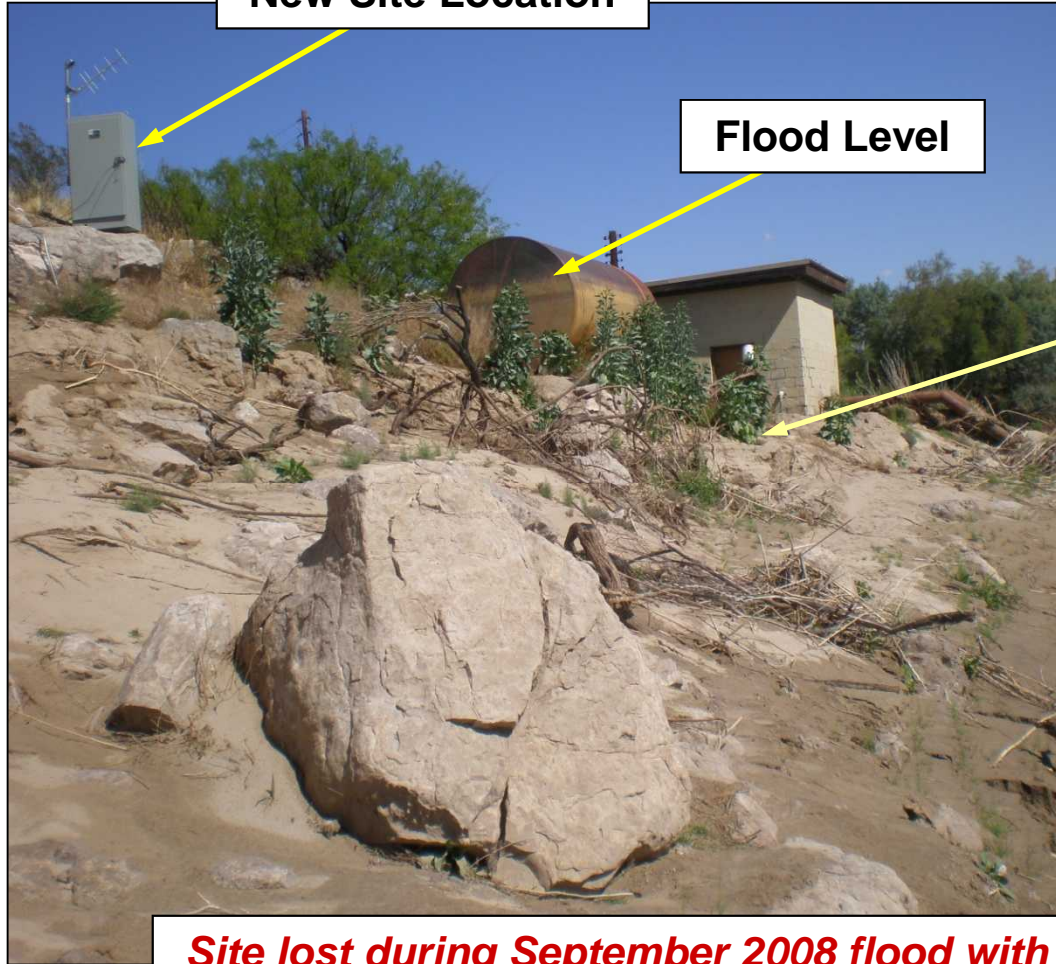


Normally 2-3 ft deep the river reached 30 ft in some places.



The Risk of CWQM Sites—Upper Rio Grande

New Site Location



Flood Level

Rio Grande Village

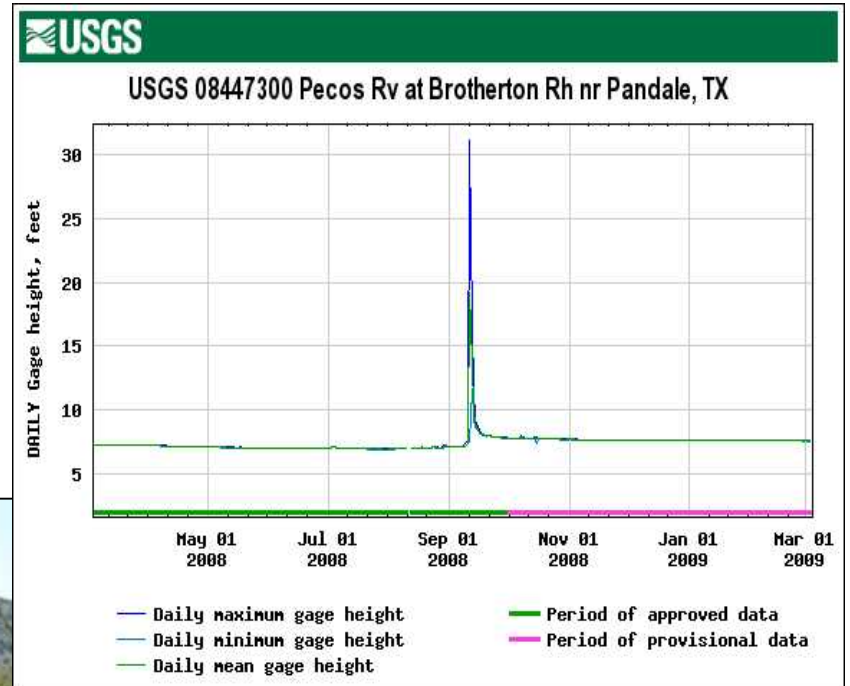


Original Location

Site lost during September 2008 flood with flows $\geq 55,000$ cfs—emergency release to prevent dam failure



The Risk of CWQM Sites—Lower Pecos River



Site lost during September 2008 flood with flows $\geq 18,000$ cfs—heavy rain in upper watershed

The Unexpected—Not Enough



Rio Grande at Big Bend

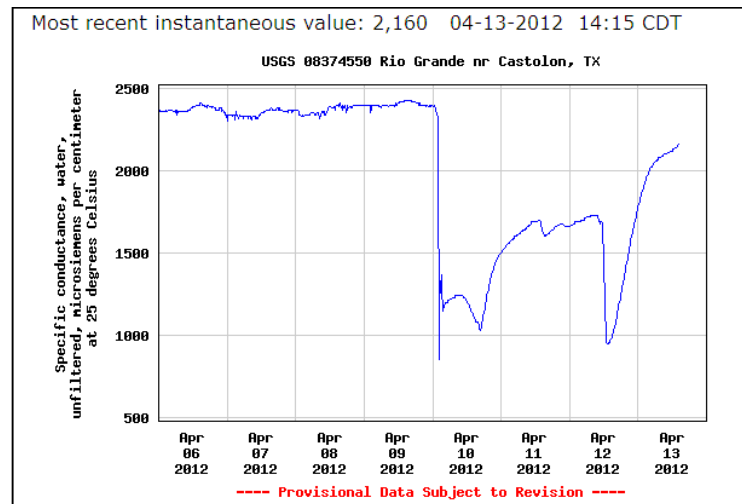


Upper Pecos River



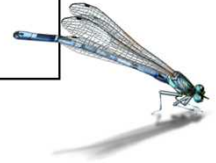
Accessing Data on the Web

Station Number	Station name	Date/Time	Temperature, water, deg C	Specific conductance, wat unf, uS/cm @ 25 degC	Dis-solved oxygen, mg/L	pH, water, unfltrd, std units	Sam- pling depth, feet	Stream velocity, ft/s
● Rio Grande Basin								
08371500	Rio Grande abv Rio Conchos nr Presidio, TX	04/13 15:00 CDT		29.8	3,010	9.28	8.03	--
08374200	Rio Grande bl Rio Conchos nr Presidio, TX	04/13 15:00 CDT		26.9	1,820	7.32	7.99	--
08374550	Rio Grande nr Castolon, TX	04/13 14:15 CDT		25.4	2,160	7.20	8.05	--
08375300	Rio Grande at Rio Grande Village, Big Bnd NP, TX	04/13 14:00 CDT		24.8	604	0.38	7.58	--
08377200	Rio Grande at Foster Rh nr Langtry, TX	04/13 15:00 CDT		24.4	423	7.11	8.16	1.21
08420500	Pecos Rv at Pecos, TX	04/13 14:45 CDT		Dry	Dry	Dry	Dry	--
08437710	Pecos Rv at RR 1776 nr Grandfalls, TX	04/13 14:45 CDT		27.7	23,000	13.85	8.19	--
08446500	Pecos Rv nr Girvin, TX	04/13 14:45 CDT		29.3	23,700	20.29	8.07	--
08447000	Pecos Rv nr Sheffield, TX	04/13 14:45 CDT		23.2	10,200	7.19	7.80	--
08447018	Caroline Springs at Oasis Ranch, TX	04/13 14:45 CDT		22.0	881	7.71	7.27	--
08447300	Pecos Rv at Brotherton Rh nr Pandale, TX	04/13 14:45 CDT		23.5	6,090	9.71	7.95	--
08447410	Pecos Rv nr Langtry, TX	04/13 15:00 CDT		24.2	3,230	8.59	8.26	--



<http://tx.usgs.gov/>

Accessing Data on the Web




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Rio Grande at Castolon C720 Data by Site by Date (all parameters)

- Dissolved Oxygen**
- pH**
- Specific Conductance**
- Water Temperature**

CAMS 720 Rio Grande at Castolon C720
Month: **Day:** **Year:** **Time Format:**
 January 1 2012 12 Hour (AM/PM)

Parameter Measured	Morning											Afternoon												
	Mid	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	Noon	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00
Surface Water Temperature	9.2	8.9	8.8	8.6	8.5	8.4	8.2	8.1	8.1	8.2	9.0	9.9	10.7	11.4	11.9	12.2	11.9	11.5	11.1	10.8	10.2	9.9	9.6	9.4
Surface Specific Conductance	3170	3170	3170	3170	3170	3170	3170	3170	3170	3170	3170	3165	3160	3160	3160	3160	3160	3160	3158	3150	3152	3150	3150	3150
Surface Dissolved Oxygen	10.8	10.8	10.8	10.9	10.8	10.8	10.8	10.7	10.7	10.8	10.8	10.9	10.8	10.8	10.9	10.9	10.9	10.9	10.8	10.8	10.8	10.8	10.8	10.8
Surface Water pH	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
Parameter Measured	Mid	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	Noon	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00
	Morning											Afternoon												

<http://www.texaswaterdata.org> ; select Continuous Water Quality Monitoring Network



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