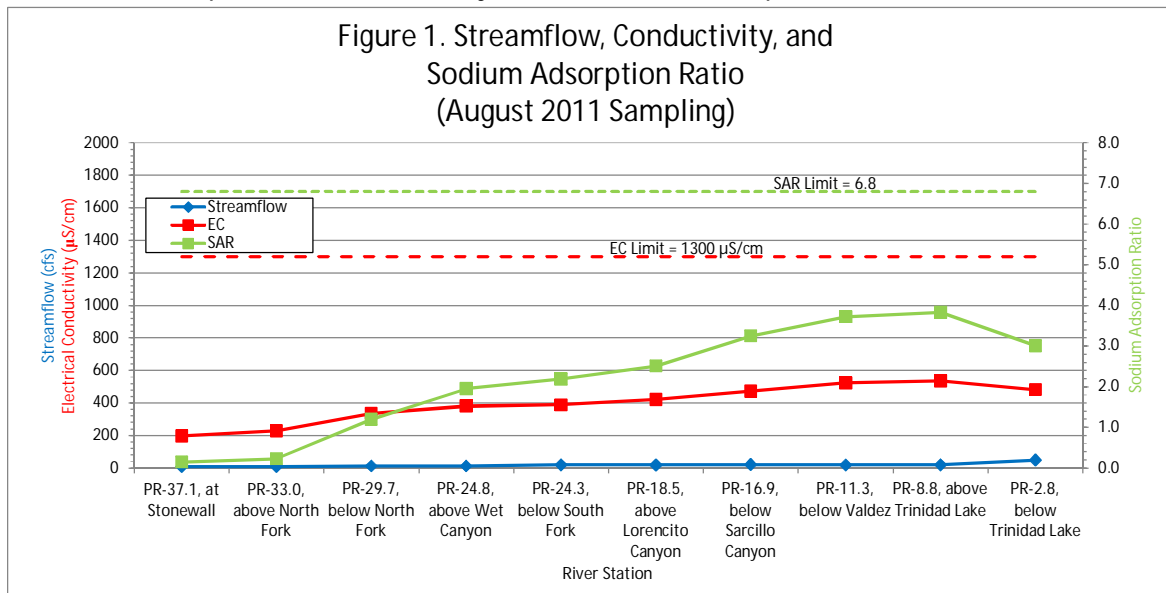
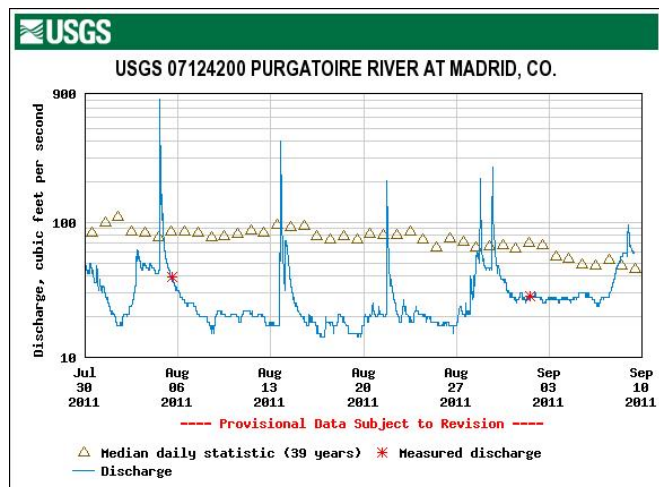


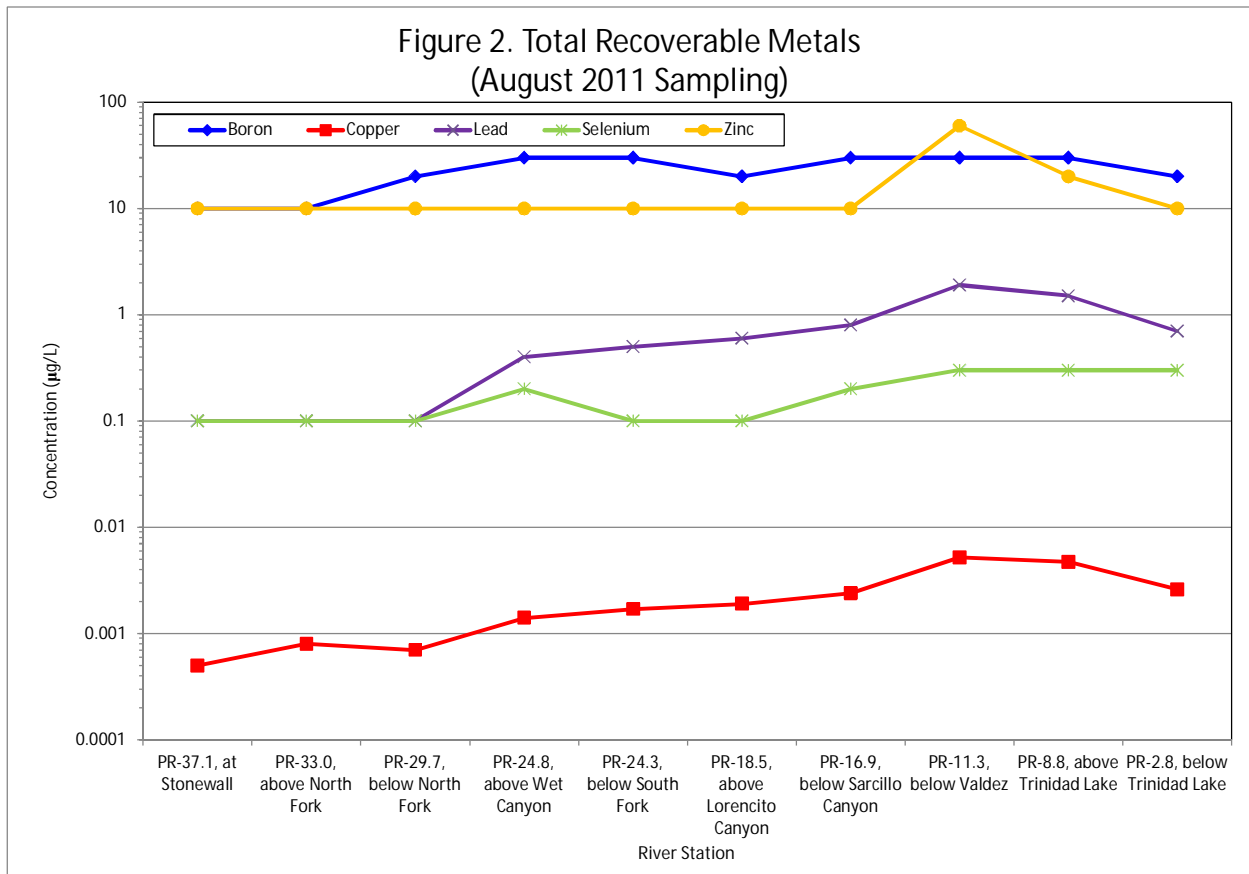
## August 2011

Tetra Tech sampled the Purgatoire River and tributaries on August 17 and 18, 2011. The following information provides a “snapshot” of water quality information from these two days of water quality monitoring. Figure 1 depicts streamflow, electrical conductivity (EC), and calculated Sodium Adsorption Ratio (SAR) at various points along the Purgatoire River from upstream (PR37.1 at Stonewall) to downstream (PR 2.8 below Trinidad Lake). The Purgatoire River picks up streamflow from the tributaries and its watershed as it flows downstream towards Trinidad Lake. 2011 streamflow has been extremely low and it appears this year is one of the driest in recent record. August streamflow (Figure 1, blue line on graph) in the Purgatoire River decreased significantly compared to July with around 19 cfs flowing downstream of the South Fork (PR 24.3) to PR 8.8, above Trinidad Lake. Sampling was conducted for each of the Purgatoire River stations. The EC that is protective of alfalfa crops in the Purgatoire valley is 1,300  $\mu\text{S}/\text{cm}$ . EC increased from a high of approximately 400  $\mu\text{S}/\text{cm}$  in July to a maximum value of 535  $\mu\text{S}/\text{cm}$  in August. EC values remain well below the alfalfa protection threshold. The SAR measurements were also well below the threshold value protective of soil infiltration rates of 6.8, and increased in comparison to values in July to a maximum of 4.0 upstream of Trinidad Reservoir.



As depicted on the USGS hydrograph of the Purgatoire River at Madrid, CO (located upstream of Trinidad Lake), the flows in the Purgatoire River are extremely low and fluctuated around 19 cfs during the August sampling event.





Since sampling commenced in April 2010 the monthly water quality monitoring has shown the metal concentrations of boron, copper, lead, selenium and zinc remain below the water quality standards established by the Water Quality Control Commission for these segments in the Purgatoire. The August 2011 metals data are shown in Figure 2; the yellow line of zinc concentrations indicates that all data, except stations PR-11.3 and PR-8.8, were below method detection limits (MDLs).

Except for boron (agricultural-irrigation water quality standard of 750 µg/L), all of the metal concentrations depicted in Figure 2 are hardness based standards. Table 1 below provides more information on the specific water quality standards on the Purgatoire River along the various monitoring locations. Again, all August metal concentrations were below the standard values listed on Table 1. Our FAQ page on the website summarizes other information about the MDLs of the laboratory analytical methods.

Water Quality Standards for Purgatoire River Mainstem, Segment 5a  
August Sampling 2011

STREAM WATER QUALITY STANDARDS

LABID	CALCULATED HARDNESS (mg/L as CaCO <sub>3</sub> )	STREAM SEGMENT	ACUTE COPPER DISSOLVED ug/L	CHRONIC COPPER DISSOLVED ug/L	CHRONIC IRON DISSOLVED ug/L	CHRONIC IRON TOTAL RECOVERABLE ug/L	ACUTE LEAD DISSOLVED ug/L	CHRONIC LEAD DISSOLVED ug/L	ACUTE SELENIUM DISSOLVED ug/L	CHRONIC SELENIUM DISSOLVED ug/L	TEMPORARY MODIFIED SELENIUM, DISSOLVED ug/L	ACUTE ZINC DISSOLVED ug/L	CHRONIC ZINC DISSOLVED ug/L
PR2.8-081711	108.5a		14.5	9.6	0.3	1000	70.2	2.7	18.4	4.6	11.2	153.1	132.7
PR8.8-081711	105.5a		14.1	9.3	0.3	1000	68.1	2.7	18.4	4.6	11.2	149.4	129.6
PR11.3-081711	108.5a		14.5	9.6	0.3	1000	70.2	2.7	18.4	4.6	11.2	153.1	132.7
PR16.9-081711	105.5a		14.1	9.3	0.3	1000	68.1	2.7	18.4	4.6	11.2	149.4	129.6
PR18.5-081711	101.5a		13.6	9.0	0.3	1000	65.3	2.5	18.4	4.6	11.2	144.6	125.4
PR24.3-081711	103.5a		13.8	9.2	0.3	1000	66.7	2.6	18.4	4.6	11.2	147.0	127.5
PR24.3-081711D	101.5a		13.6	9.0	0.3	1000	65.3	2.5	18.4	4.6	11.2	144.6	125.4
PR24.8-081711	107.5a		14.3	9.5	0.3	1000	69.5	2.7	18.4	4.6	11.2	151.9	131.7
PR29.7-081711	123.5a		16.3	10.7	0.3	1000	80.8	3.2	18.4	4.6	11.2	171.0	148.3
PR33.0-081711	109.5a		14.6	9.6	0.3	1000	70.9	2.8	18.4	4.6	11.2	154.3	133.8
PR37.1-081711	99.5a		13.3	8.9	0.3	1000	63.9	2.5	18.4	4.6	11.2	142.1	123.2

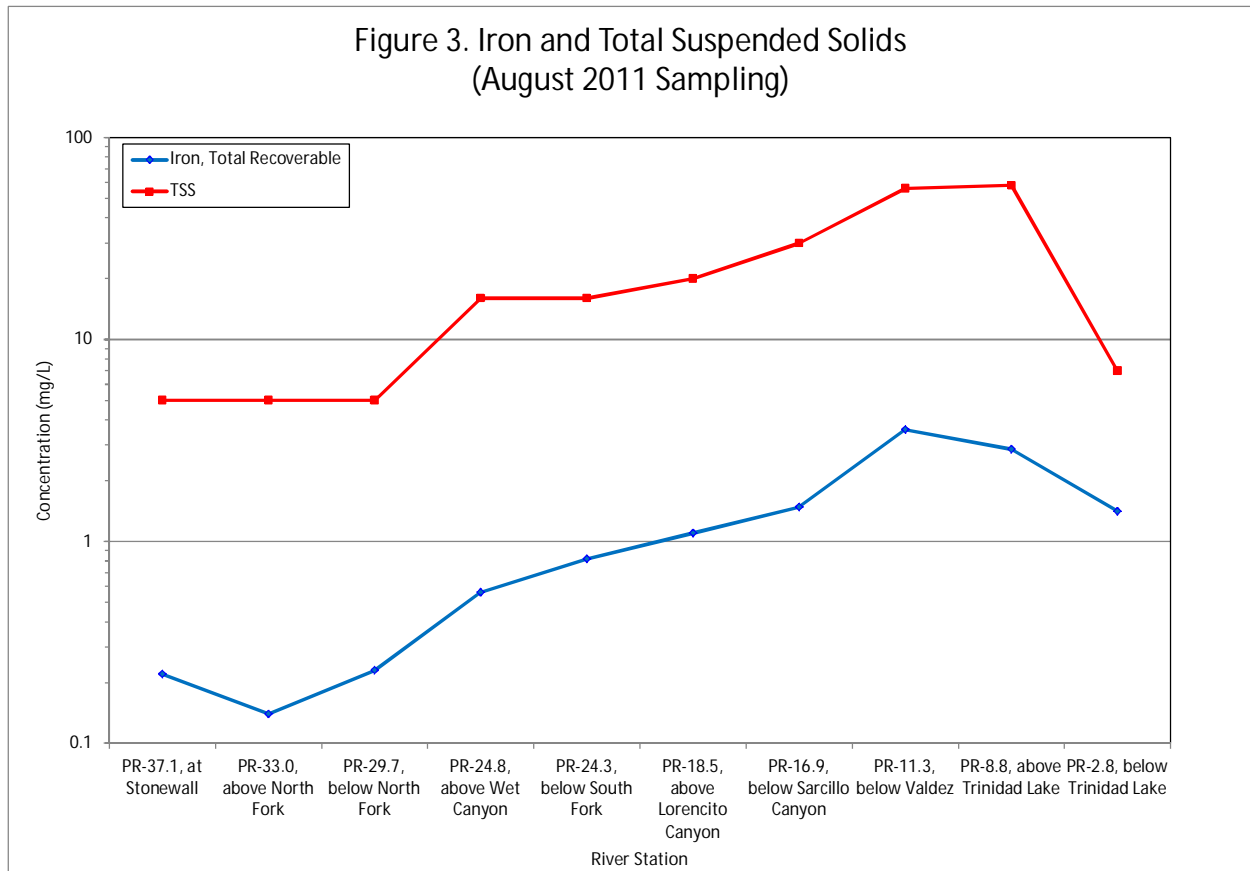
STREAM WATER QUALITY STANDARDS

LABID	CALCULATED HARDNESS (mg/L as CaCO <sub>3</sub> )	STREAM SEGMENT	BORON DISSOLVED mg/L	CHLORIDE mg/L	SULFATE mg/L	pH-Low S.U.	pH-High S.U.
PR2.8-081711	108.5a		0.75	250	250	6.5	9
PR8.8-081711	105.5a		0.75	250	250	6.5	9
PR11.3-081711	108.5a		0.75	250	250	6.5	9
PR16.9-081711	105.5a		0.75	250	250	6.5	9
PR18.5-081711	101.5a		0.75	250	250	6.5	9
PR24.3-081711	103.5a		0.75	250	250	6.5	9
PR24.3-081711D	101.5a		0.75	250	250	6.5	9
PR24.8-081711	107.5a		0.75	250	250	6.5	9
PR29.7-081711	123.5a		0.75	250	250	6.5	9
PR33.0-081711	109.5a		0.75	250	250	6.5	9
PR37.1-081711	99.5a		0.75	250	250	6.5	9

SAMPLING LOCATION DESCRIPTIONS

STATION ID	STATION DESCRIPTION
PR-02.8	Purgatoire River below Trinidad Lake
PR-08.8	Purgatoire River above Trinidad Lake
PR-11.3	Purgatoire River below Valdez
PR-16.9	Purgatoire River below Sarcillo Canyon
PR-18.5	Purgatoire River above Lorencito Canyon
PR-24.3	Purgatoire River below South Fork
PR-24.8	Purgatoire River above Wet Canyon
PR-29.7	Purgatoire River below North Fork
PR-33.0	Purgatoire River above North Fork
PR-37.1	Purgatoire River at Stonewall

Total recoverable iron (Fe) and sediment (TSS) concentrations continue to demonstrate high correlation, as depicted in Figure 3. For the month of August the iron concentrations for five stations were under the water quality standard of 1 mg/L in the lower Purgatoire River, while stations downstream of Lorencito Canyon exceed the 1 mg/L standard.



The box and whiskers plots on Figure 4 illustrate historic USGS metals concentration data measured at the Purgatoire River at Madrid station, 1978 – 1981. As shown, metals concentrations Tetra Tech has measured since April 2010 (depicted in the colored dots) are below the historic range measured by USGS with the exception of boron. Recent boron concentrations are similar to those observed by the USGS, but are well below the stream standard of 750 µg/L.

