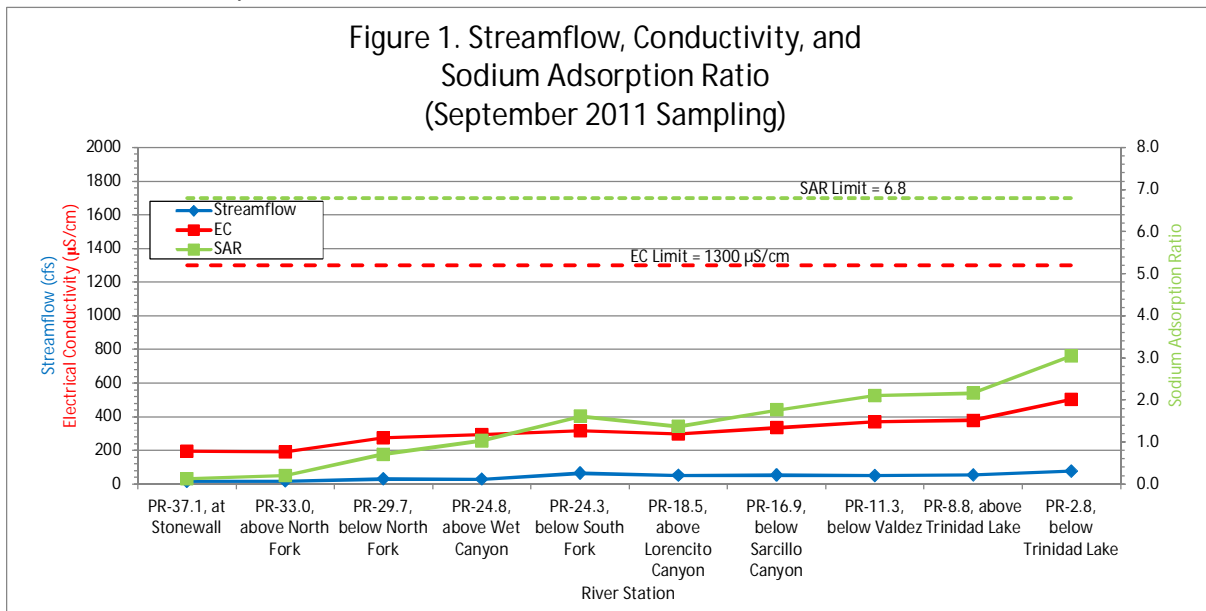
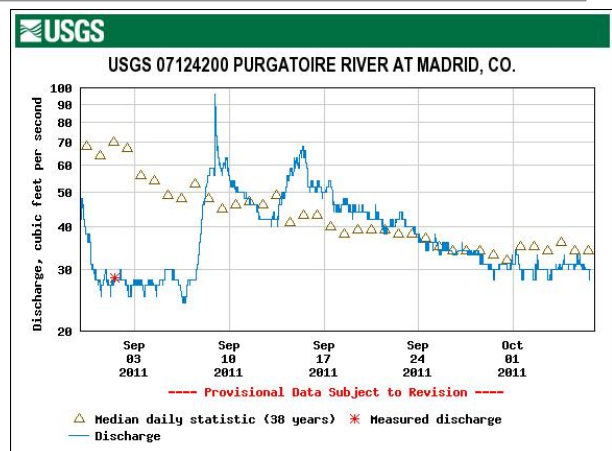
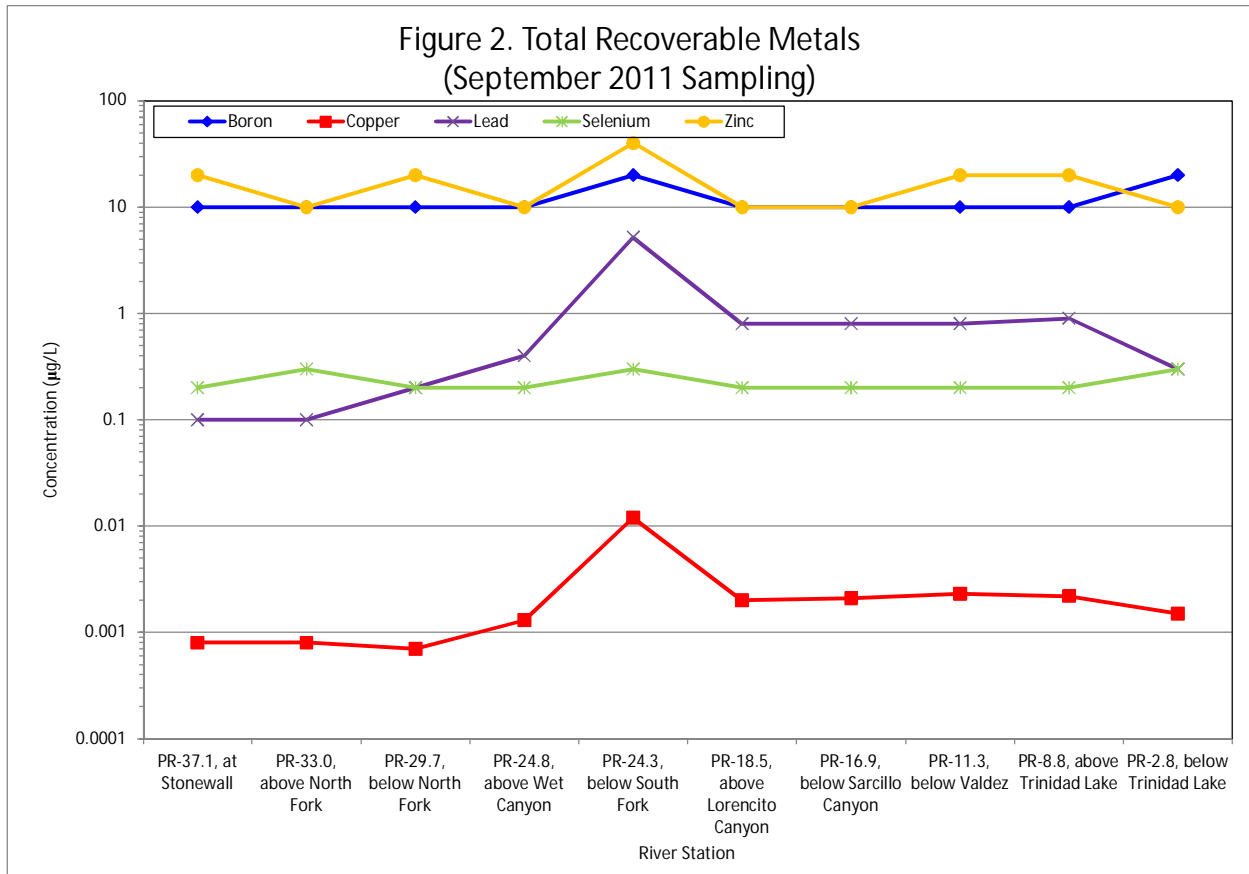


Tetra Tech sampled the Purgatoire River and tributaries on September 14 and 15, 2011. The following information provides a “snapshot” of water quality information from these two days of water quality monitoring. Figure 1 depicts streamflow, electrical conductivity (EC), and calculated Sodium Adsorption 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. September streamflow (Figure 1, blue line on graph) in the Purgatoire River increased significantly compared to August with around 54 cfs flowing downstream of the South Fork (PR 24.3) to PR 8.8, above Trinidad Lake compared to only 19 cfs in August. 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 decreased from a high of approximately 535 $\mu\text{S}/\text{cm}$ in August to a maximum value of 504 $\mu\text{S}/\text{cm}$ in September. 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 decreased in comparison to values in August with a maximum of 2.16 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 54 cfs during the September 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 September 2011 metals data are shown in Figure 2; the blue line of boron concentrations indicates that all data, except stations PR-24.3 and PR-2.8, 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 September 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.

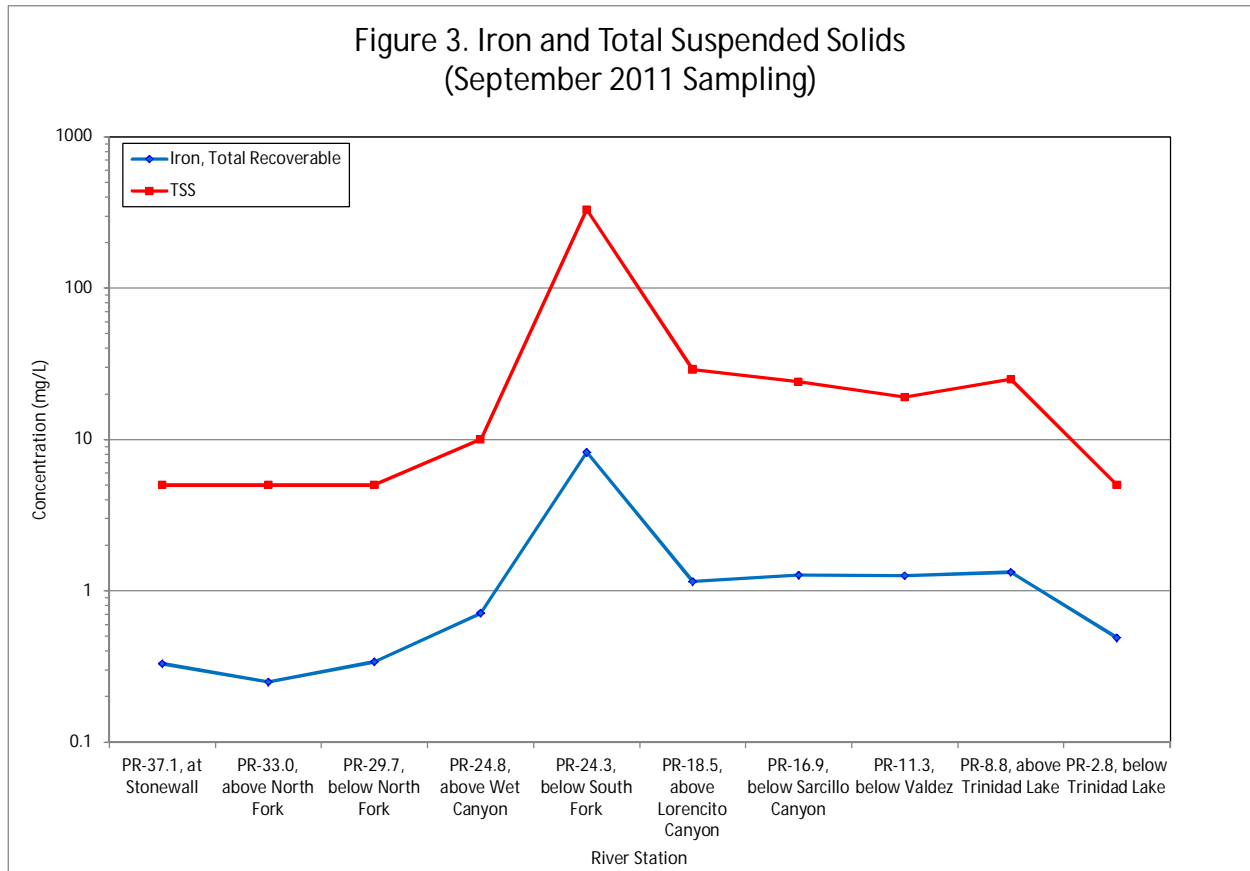
Water Quality Standards for Purgatoire River Mainstem, Segment 5a
September Sampling 2011

STREAM WATER QUALITY STANDARDS													
LABID	CALCULATED HARDNESS (mg/L as CaCO ₃)	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
PR2.8-091411	111.5a		14.8	9.8	0.3	1000	72.3	2.8	18.4	4.6	11.2	156.7	135.9
PR8.8-091411	94.5a		12.7	8.5	0.3	1000	60.4	2.4	18.4	4.6	11.2	136.0	117.9
PR11.3-091411	95.5a		12.8	8.6	0.3	1000	61.1	2.4	18.4	4.6	11.2	137.2	119.0
PR16.9-091411	91.5a		12.3	8.3	0.3	1000	58.3	2.3	18.4	4.6	11.2	132.3	114.7
PR18.5-091411	89.5a		12.0	8.1	0.3	1000	56.9	2.2	18.4	4.6	11.2	129.8	112.5
PR24.3-091411	94.5a		12.7	8.5	0.3	1000	60.4	2.4	18.4	4.6	11.2	136.0	117.9
PR24.8-091411	105.5a		14.1	9.3	0.3	1000	68.1	2.7	18.4	4.6	11.2	149.4	129.6
PR24.8-091411D	104.5a		13.9	9.3	0.3	1000	67.4	2.6	18.4	4.6	11.2	148.2	128.5
PR29.7-091411	109.5a		14.6	9.6	0.3	1000	70.9	2.8	18.4	4.6	11.2	154.3	133.8
PR33.0-091411	89.5a		12.0	8.1	0.3	1000	56.9	2.2	18.4	4.6	11.2	129.8	112.5
PR37.1-091411	82.5a		11.1	7.6	0.3	1000	52.0	2.0	18.4	4.6	11.2	121.0	105.0

STREAM WATER QUALITY STANDARDS							
LABID	CALCULATED HARDNESS (mg/L as CaCO ₃)	STREAM SEGMENT	BORON DISSOLVED mg/L	CHLORIDE mg/L	SULFATE mg/L	pH Low S.U.	pH High S.U.
PR2.8-091411	111.5a		0.75	250	250	6.5	9
PR8.8-091411	94.5a		0.75	250	250	6.5	9
PR11.3-091411	95.5a		0.75	250	250	6.5	9
PR16.9-091411	91.5a		0.75	250	250	6.5	9
PR18.5-091411	89.5a		0.75	250	250	6.5	9
PR24.3-091411	94.5a		0.75	250	250	6.5	9
PR24.8-091411	105.5a		0.75	250	250	6.5	9
PR24.8-091411D	104.5a		0.75	250	250	6.5	9
PR29.7-091411	109.5a		0.75	250	250	6.5	9
PR33.0-091411	89.5a		0.75	250	250	6.5	9
PR37.1-091411	82.5a		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 Lorenzito 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 September 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 Wet 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.

