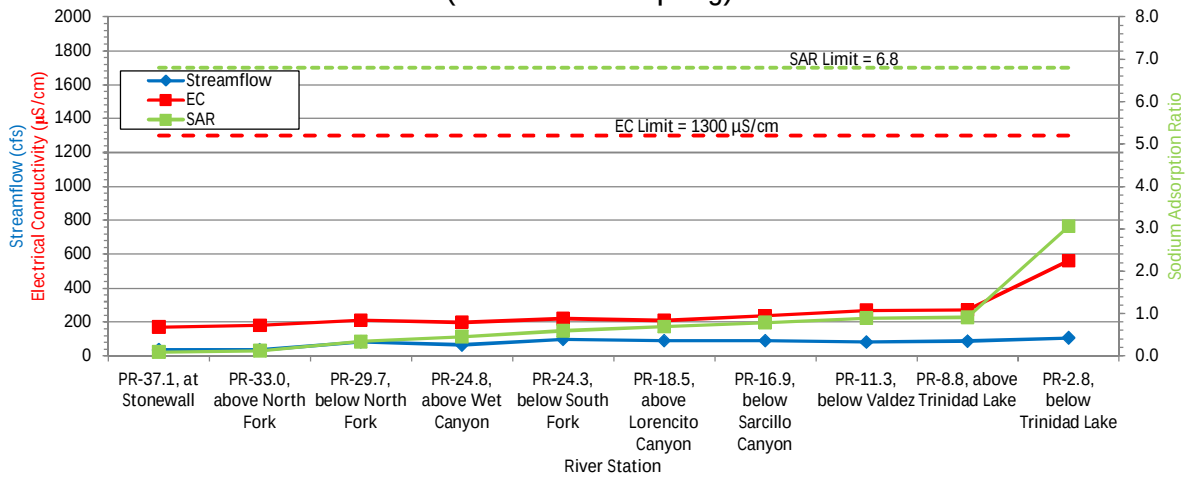
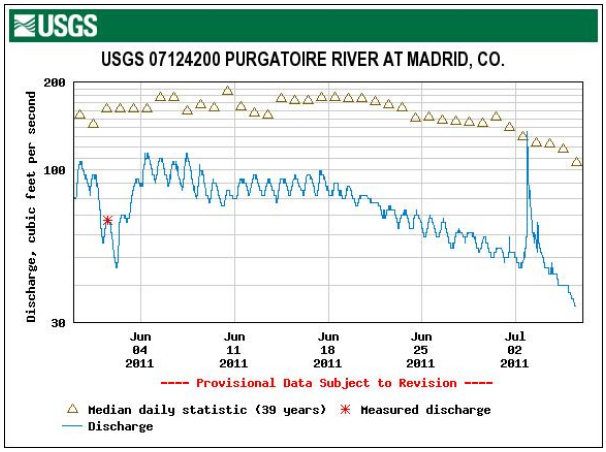
June 2011

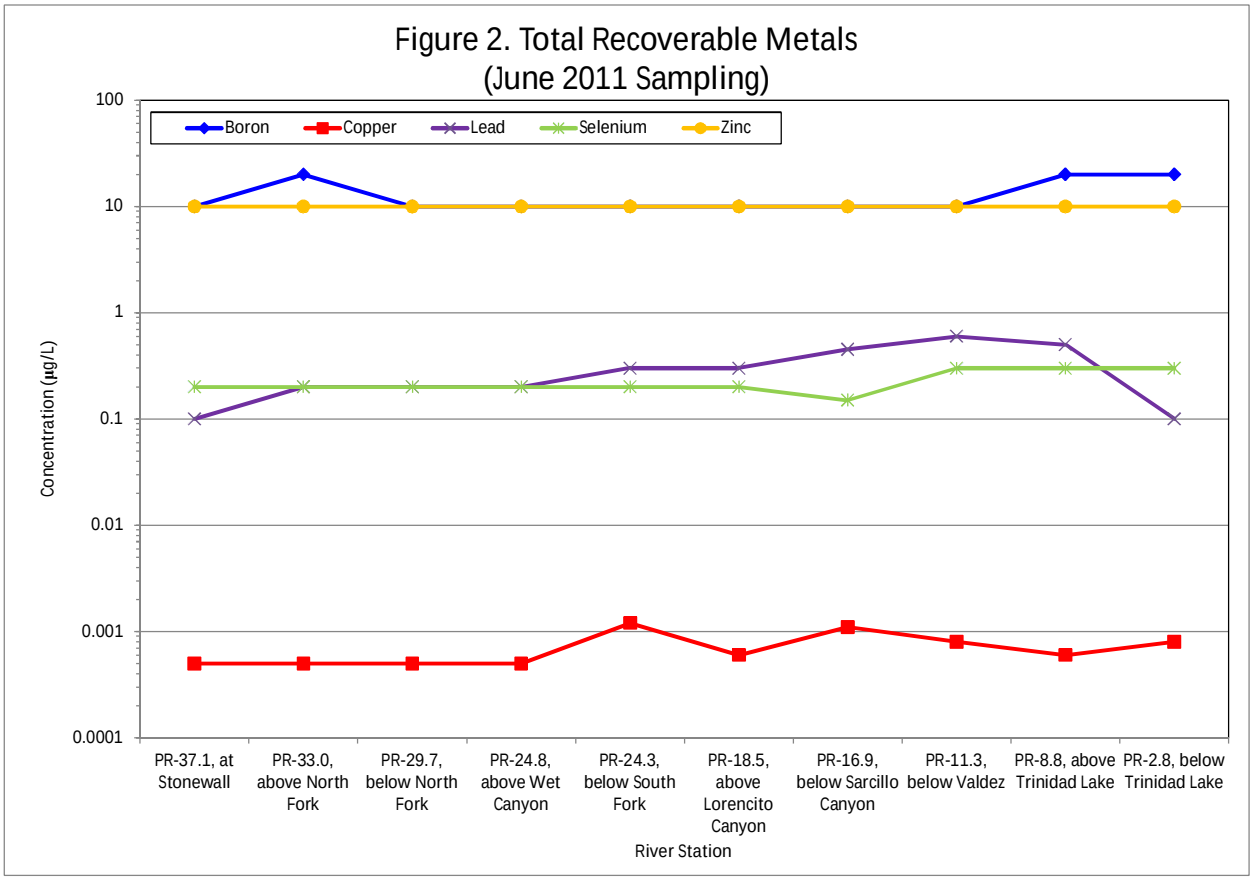
Tetra Tech sampled the Purgatoire River and tributaries on June 15 and 16, 2011. The following information provides a "snapshot" of water quality information from these two days of water quality monitoring. Figure 1 depicts streamflow, electrical conductivity (EC), and calculated Sodium Adsorption Ratio (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. June streamflow (Figure 1, blue line on graph) in the Purgatoire River increased significantly compared to May with around 87 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 µS/cm. EC decreased from a high of approximately 591 µS/cm in May to a maximum value of 561 µS/cm in June. EC values remain well below the alfalfa protection threshold. The SAR measurements were also well below the alfalfa threshold value of 6.8, and slightly increased in comparison to values in May.

Figure 1. Streamflow, Conductivity, and Sodium Adsorption Ratio (June 2011 Sampling)



As depicted on the USGS hydrograph of the Purgatoire River at Madrid, CO (located upstream of Trinidad Lake), the flows in the Purgatoire River fluctuated around 87 cfs during the June 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 June 2011 metals data are shown in Figure 2; the yellow line of zinc concentrations indicates that all data 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 June 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
June Sampling 2011

STREAM WATER QUALITY STANDARDS

LABID	CALCULATED HARDNESS (mg/L as CaCO3)	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
PR11.3-061611	98	5a	13.2	8.8	0.3	1000	63.2	2.5	18.4	4.6	11.2	140.9	122.2
PR16.9-061511	87	5a	11.8	8.0	0.3	1000	55.5	2.2	18.4	4.6	11.2	127.3	110.4
PR16.9-061611	96	5a	12.9	8.6	0.3	1000	61.8	2.4	18.4	4.6	11.2	138.5	120.0
PR18.5-061511	89	5a	12.0	8.1	0.3	1000	56.9	2.2	18.4	4.6	11.2	129.8	112.5
PR2.8-061511	125	5a	16.6	10.8	0.3	1000	82.3	3.2	18.4	4.6	11.2	173.4	150.3
PR24.3-061511	86	5a	11.7	7.9	0.3	1000	54.8	2.1	18.4	4.6	11.2	126.1	109.3
PR24.8-061511	93	5a	12.6	8.4	0.3	1000	59.7	2.3	18.4	4.6	11.2	134.8	116.8
PR24.8-061511D	93	5a	12.6	8.4	0.3	1000	59.7	2.3	18.4	4.6	11.2	134.8	116.8
PR29.7-061511	92	5a	12.4	8.3	0.3	1000	59.0	2.3	18.4	4.6	11.2	133.5	115.8
PR33.0-061511	77	5a	10.5	7.2	0.3	1000	48.5	1.9	18.4	4.6	11.2	114.7	99.5
PR37.1-061511	73	5a	10.0	6.8	0.3	1000	45.8	1.8	18.4	4.6	11.2	109.6	95.1
PR8.8-061611	99	5a	13.3	8.9	0.3	1000	63.9	2.5	18.4	4.6	11.2	142.1	123.2

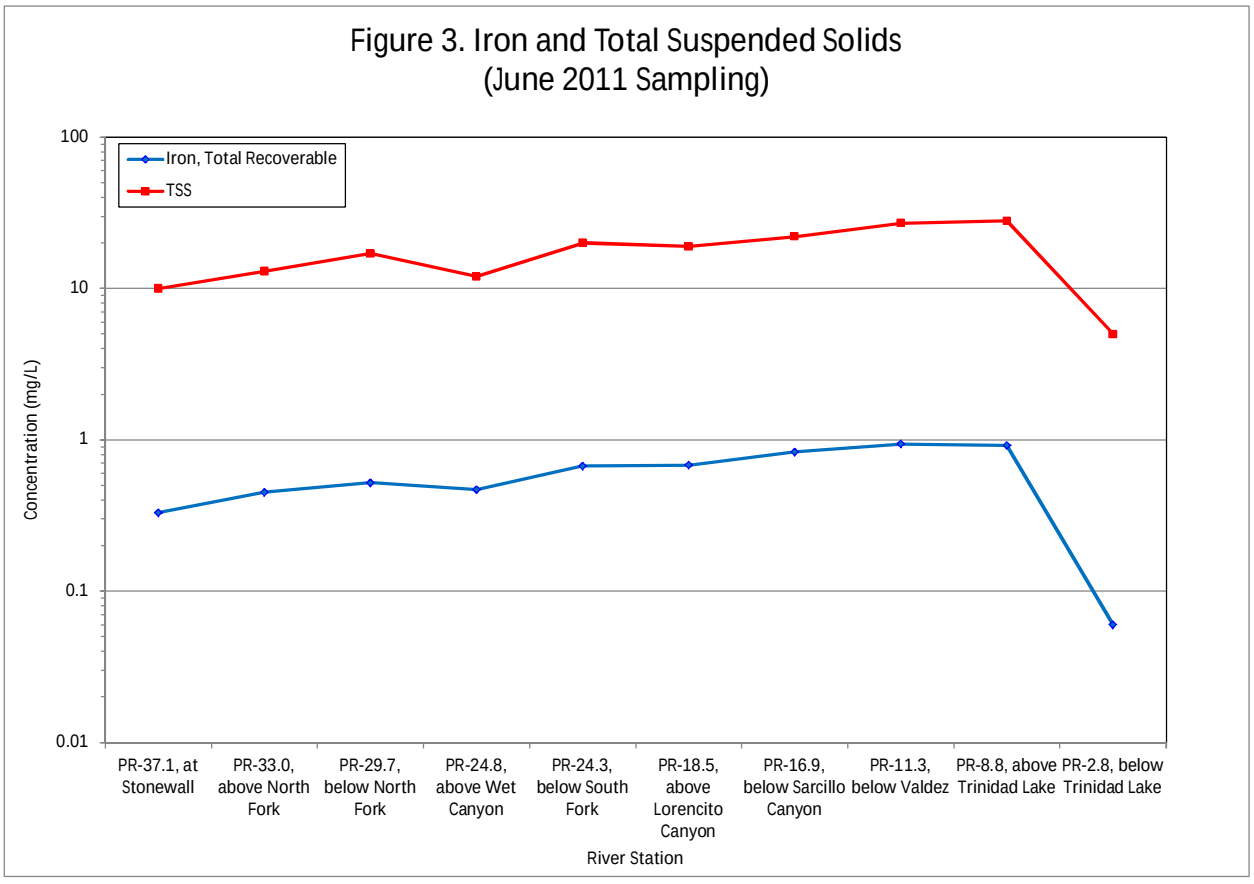
STREAM WATER QUALITY STANDARDS

LABID	CALCULATED HARDNESS (mg/L as CaCO3)	STREAM SEGMENT	BORON DISSOLVED mg\L	CHLORIDE mg\L	SULFATE mg\L	pH-Low S.U.	pH-High S.U.
PR11.3-061611	98	5a	0.75	250	250	6.5	9
PR16.9-061511	87	5a	0.75	250	250	6.5	9
PR16.9-061611	96	5a	0.75	250	250	6.5	9
PR18.5-061511	89	5a	0.75	250	250	6.5	9
PR2.8-061511	125	5a	0.75	250	250	6.5	9
PR24.3-061511	86	5a	0.75	250	250	6.5	9
PR24.8-061511	93	5a	0.75	250	250	6.5	9
PR24.8-061511D	93	5a	0.75	250	250	6.5	9
PR29.7-061511	92	5a	0.75	250	250	6.5	9
PR33.0-061511	77	5a	0.75	250	250	6.5	9
PR37.1-061511	73	5a	0.75	250	250	6.5	9
PR8.8-061611	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, depicted in Figure 3, were greater than those measured in the May sampling event. The red line of TSS concentrations at the various river stations shows that nine of the ten stations were above 10 mg/L. For the month of June the iron concentrations for all stations were under the water quality standard of 1 mg/L in the lower Purgatoire River.



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.