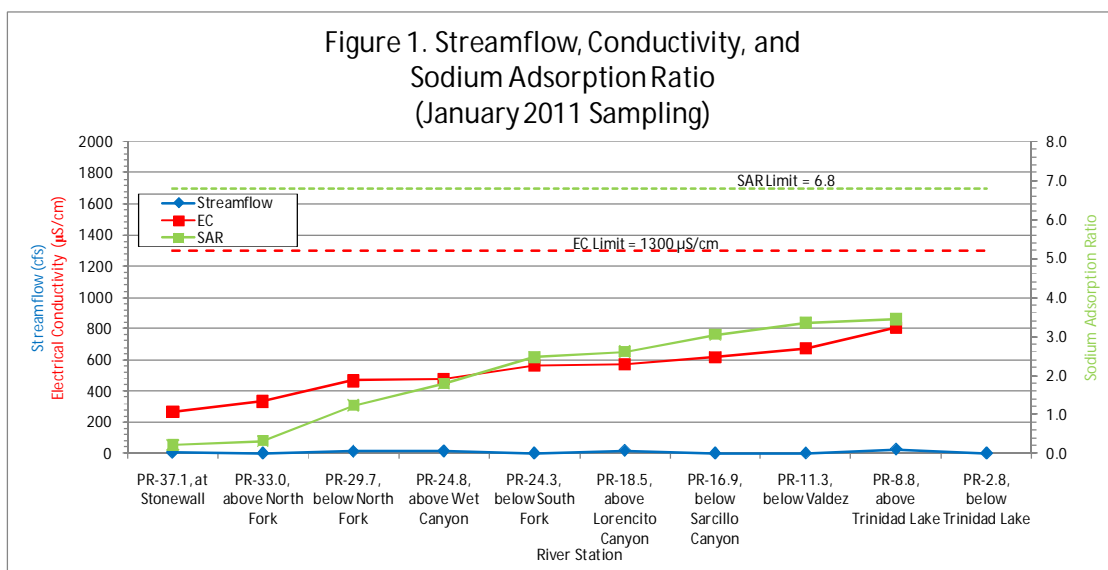
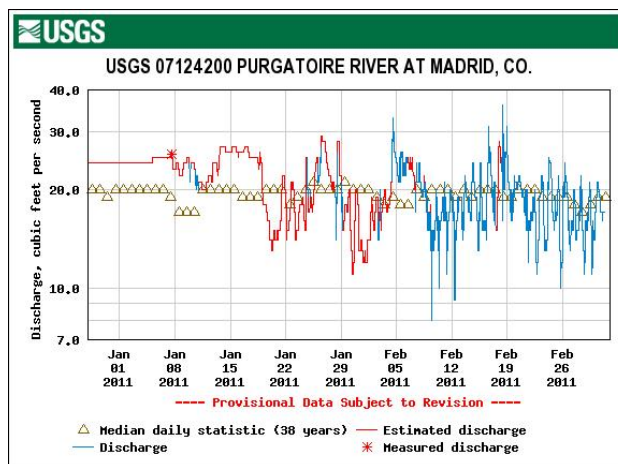
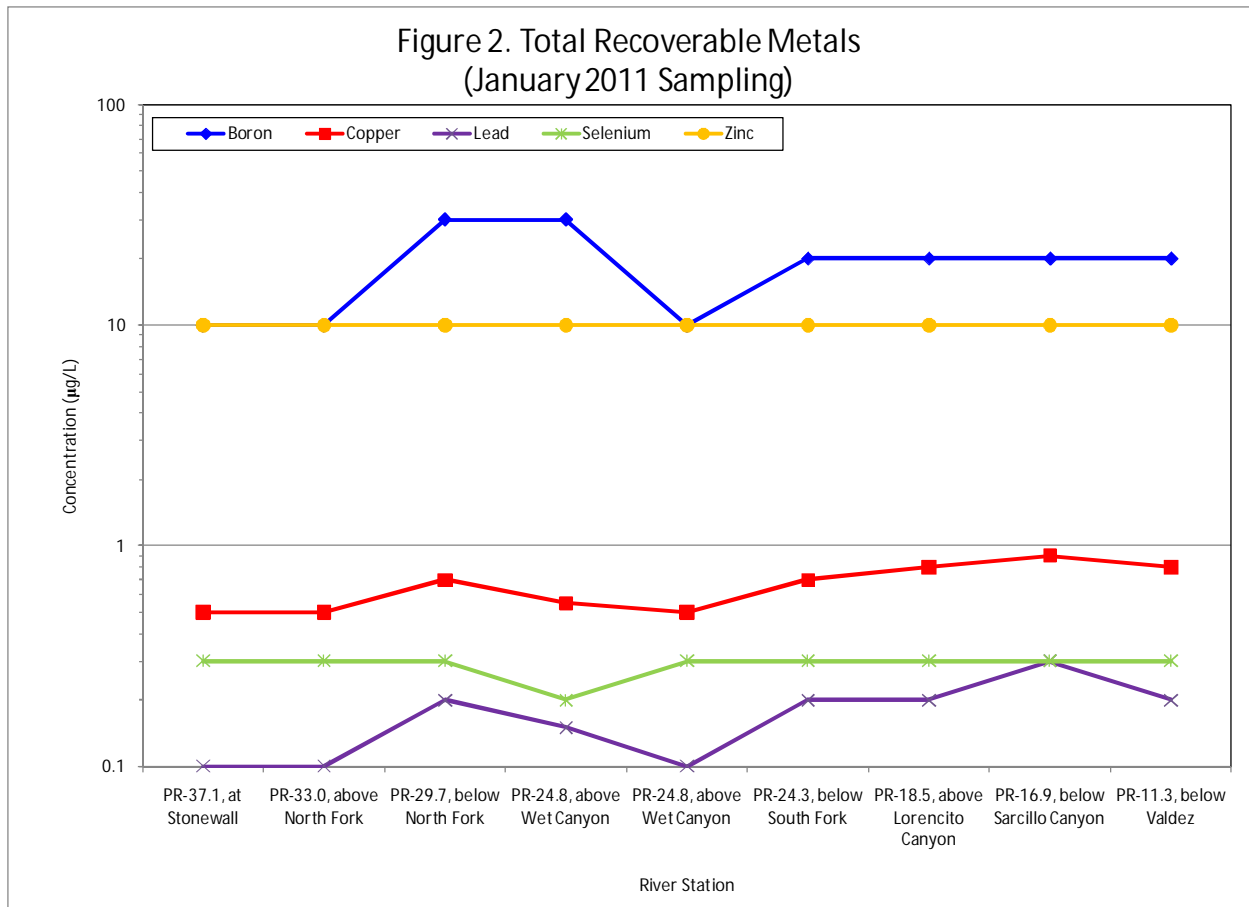


Tetra Tech sampled the Purgatoire River and tributaries on January 12 and 13, 2011. The following information provides a “snapshot” of water quality information from these two days of water quality monitoring. Figure 1 depicts streamflow, electrical conductivity (EC), and calculated Sodium Adsorption Ratio (SAR) at various points along the Purgatoire River from upstream (PR37.1 at Stonewall) to downstream (PR 8.8 above Trinidad Lake). The Purgatoire River picks up additional streamflow from the tributaries and its watershed as it flows downstream towards Trinidad Lake. January streamflow (Figure 1, blue line on graph) in the Purgatoire River has decreased to around 18 cfs downstream of the South Fork (PR 24.3) to PR 8.8, above Trinidad Lake. Several stations were covered with a layer of ice and therefore flow measurements were not completed for those river stations. Sampling was conducted for each of the stations except for PR 2.8 because the lake’s gates were closed. The agricultural limit for EC is 1,300 $\mu\text{S}/\text{cm}$. As shown in Figure 1, EC continues to increase from previous months with a high around 804 $\mu\text{S}/\text{cm}$ but still remains below the agricultural limit. The SAR measurements were well below the agricultural limit of 6.8, but slightly increased in a downstream direction in comparison to values in November and December, as streamflow in the Purgatoire continues to decrease.



As depicted on the USGS hydrograph of the Purgatoire River at Madrid, CO (upstream of Trinidad Lake) the flows in the Purgatoire have fluctuated around 18 cfs.





Since sampling commenced in April 2010 the monthly water quality monitoring has shown the metal concentrations (Figure 2) of boron, copper, lead, selenium and zinc still remain below the water quality standards established by the Water Quality Control Commission for these segments in the Purgatoire. The yellow line of data for zinc concentrations from station PR 37.1 to PR 18.5 indicates that all data were consistently below method detection limits (MDLs).

Except for boron (agricultural-irrigation water quality standard of 750 ug/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. 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
January 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
PR8.8-011311	181	5a	23.45	14.84	0.3	1000	122.1062	4.7583	18.4	4.6	11.2	237.2462	205.7054
PR11.3-011311	180	5a	23.36	14.79	0.3	1000	121.587	4.7381	18.4	4.6	11.2	236.4394	205.0069
PR16.9-011311	175	5a	22.76	14.44	0.3	1000	118.0121	4.5988	18.4	4.6	11.2	230.8688	200.1759
PR18.5-011311	175	5a	22.73	14.42	0.3	1000	117.8608	4.5929	18.4	4.6	11.2	230.6325	199.9709
PR24.3-011311	170	5a	22.10	14.06	0.3	1000	114.1665	4.4489	18.4	4.6	11.2	224.8453	194.9532
PR24.8-011211	170	5a	22.10	14.06	0.3	1000	114.1521	4.4483	18.4	4.6	11.2	224.8227	194.9336
PR24.8-011311	170	5a	22.14	14.08	0.3	1000	114.3825	4.4573	18.4	4.6	11.2	225.1844	195.2472
PR29.7-011211	165	5a	21.54	13.74	0.3	1000	110.8711	4.3205	18.4	4.6	11.2	219.6568	190.4544
PR29.7-011211D	165	5a	21.57	13.75	0.3	1000	111.051	4.3275	18.4	4.6	11.2	219.9405	190.7005
PR33.0-011211	167	5a	21.81	13.89	0.3	1000	112.4609	4.3824	18.4	4.6	11.2	222.163	192.6275
PR37.1-011211	140	5a	18.46	11.94	0.3	1000	92.9836	3.6234	18.4	4.6	11.2	191.0101	165.6162

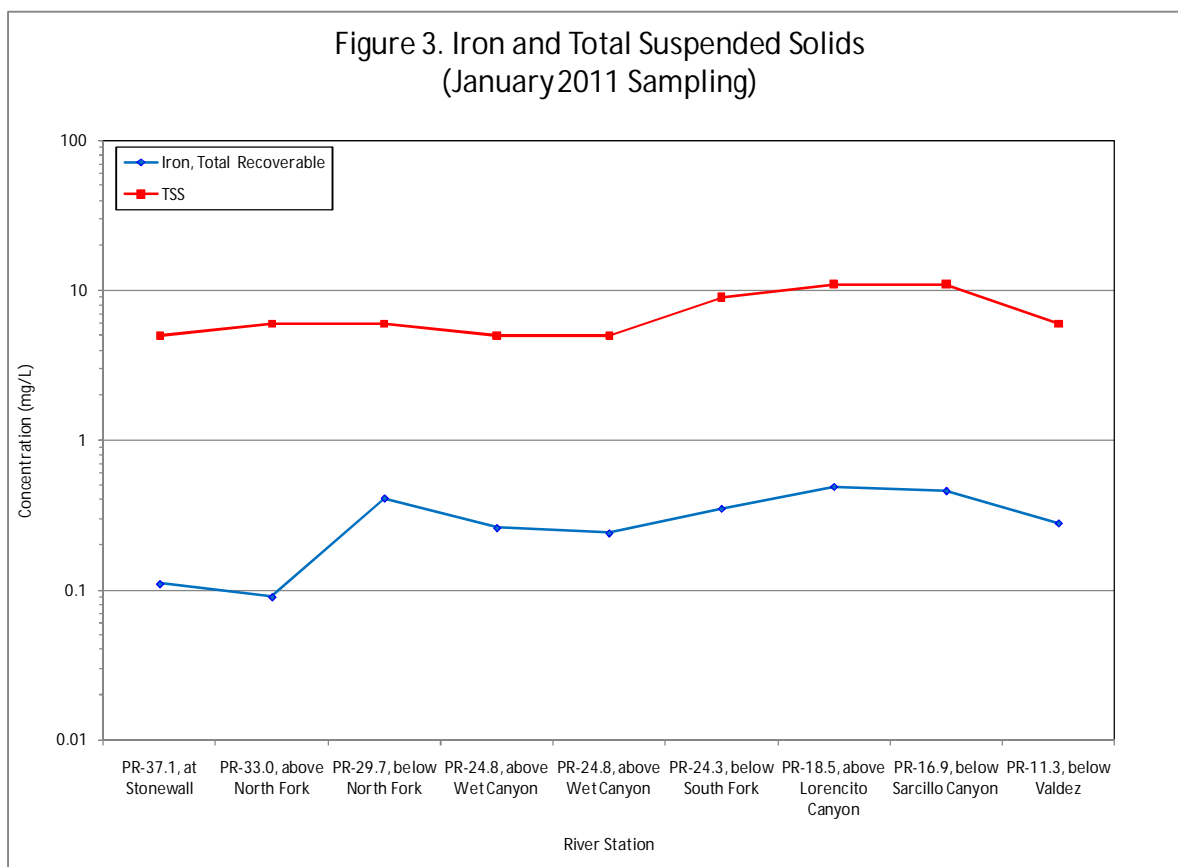
STREAM WATER QUALITY STANDARDS

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.
PR8.8-011311	181	5a	0.75	250	250	6.5	9
PR11.3-011311	180	5a	0.75	250	250	6.5	9
PR16.9-011311	175	5a	0.75	250	250	6.5	9
PR18.5-011311	175	5a	0.75	250	250	6.5	9
PR24.3-011311	170	5a	0.75	250	250	6.5	9
PR24.8-011211	170	5a	0.75	250	250	6.5	9
PR24.8-011311	170	5a	0.75	250	250	6.5	9
PR29.7-011211	165	5a	0.75	250	250	6.5	9
PR29.7-011211D	165	5a	0.75	250	250	6.5	9
PR33.0-011211	167	5a	0.75	250	250	6.5	9
PR37.1-011211	140	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, increased slightly compared to December sampling events. The red line of data for TSS concentrations at the various river stations indicates that all data were just above the method detection limit (MDL) of 5 mg/L. For the month of January the iron concentrations were all under the water quality standard of 1 mg/L in the 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 generally below the historic range measured by USGS.

