



Water Quality Monitoring in Craters of the Moon National Monument and Preserve (CRMO)

Importance

Freshwater habitats are diverse and productive ecosystems, providing habitat for aquatic plant, invertebrate, and vertebrate species including many fishes and birds. Rivers and streams are intimately connected to riparian zones, providing habitat for many specialist species. Additionally, most upland animals rely on aquatic habitats to one degree or another.

Water resources in the semi-arid west have been strongly affected by human activity, and many Upper Columbia Basin Network (UCBN) streams and rivers are listed by states as impaired for one or more parameters. Most UCBN waterbodies and many aquatic resources, such as migratory fish, are strongly influenced by activities in the larger watersheds outside park boundaries. Understanding the current status of freshwater ecosystems will help guide management and restoration efforts and provide insight into ecosystem change in a landscape with shifting climate and dynamic human influences.

Little Cottonwood Creek is of special importance to CRMO because its headwater springs served as the source of water for park headquarters until 2004. Since then, the park water supply has come from shallow wells along the downstream end of the creek (see picture below). As a result, water quality in Little Cottonwood Creek has a direct impact on water use within the park.



Little Cottonwood Creek near water quality monitoring station, June 2013.

Status of Little Cottonwood Creek in CRMO

In June 2013, the Inventory and Monitoring Program measured 5 core water chemistry parameters in Little Cottonwood Creek including: dissolved oxygen, pH, specific conductance, temperature, and turbidity. Each parameter was evaluated every 30 minutes for 24 hours using a continuous water quality monitor. In addition, aquatic macroinvertebrates were collected according to United States Forest Service (USFS) - PACFISH/INFISH Biological Opinion Effectiveness Monitoring (PIBO-EM) Program protocol. For more on macroinvertebrates please see the integrated water quality annual report for CRMO on the UCBN website listed below.

Results indicate that all core parameters were within acceptable ranges relative to Idaho cold water aquatic life criteria. The following table is a basic summary of findings from monitoring in 2013, 2010, and 1998. Note that Little Cottonwood Creek is an “undesignated surface water” and therefore should meet the state thresholds for cold water aquatic life shown in the table below. UCBN water quality monitoring is conducted on a 3 year rotating panel. Little Cottonwood Creek will be sampled for water chemistry and macroinvertebrates again in 2016.

Little Cottonwood Water Chemistry Summary for 24 hour period 21-22 June 2013

Measure	Current Condition (21-22 June, 2013)	Condition (22-23 June 2010)	NPS Baseline Data 1998 (Site CRMO0021)	State DEQ Thresholds ^a	% Exceedance ^b
Temperature (*MDMT, **MDAT)	*MDMT=9.07 °C **MDAT =8.29 °C	*MDMT=10.45 °C **MDAT = 8.29 °C	mean = 9.13 °C max = 15.00 °C	*MDMT <22 °C **MDAT <19 °C	0% 0%
Specific Conductance (mean)	250.89 µS/cm	223.97 µS/cm	mean = 160.86 µS/cm max = 228.00 µS/cm	N/A	N/A
Dissolved Oxygen (mean daily min)	8.94 mg/l	8.80 mg/L	mean = 7.92 mg/L min = 5.40 mg/L	> 6.0 mg/L	0%
pH (mean daily max)	8.32 pH Units	8.80 pH Units	max = 8.00 pH Units	9.0 pH Units, Max	0%
pH (mean daily min)	8.28 pH Units	8.56 pH Units	min = 6.02 pH Units	6.5 pH Units, Min	0%
Turbidity (mean daily max)	8.0 NTU	<0.2 NTU	max = 3.40 NTU	< 50 NTU over background (instantaneous) < 25 for 10 consecutive days	Insufficient data

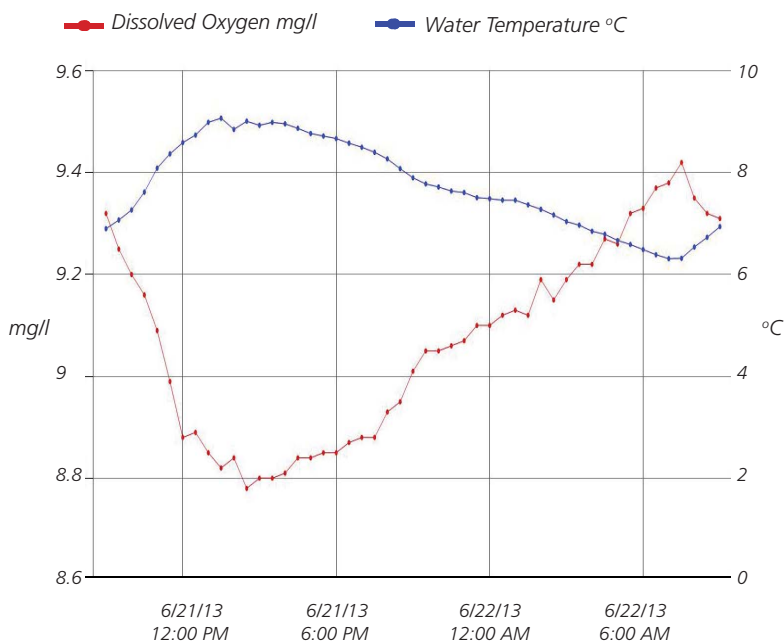
*MDMT – Maximum Daily Maximum Temperature, **MDAT – Maximum Daily Average Temperature, ^a Criteria for cold water aquatic life designation,

^b Proportion of samples above water quality standard (Note that the % exceedance indicated is based on 24 hours of data)



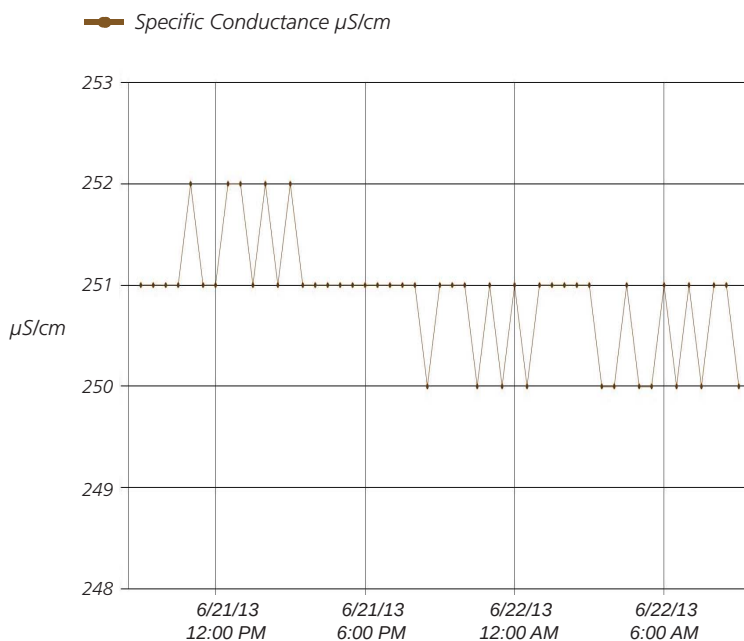
Monitoring Data for Little Cottonwood Creek (CRMO), June 21st-22nd, 2013

**Corrected Dissolved Oxygen and Water Temperature,
Little Cottonwood Creek, June 21-22, 2013**



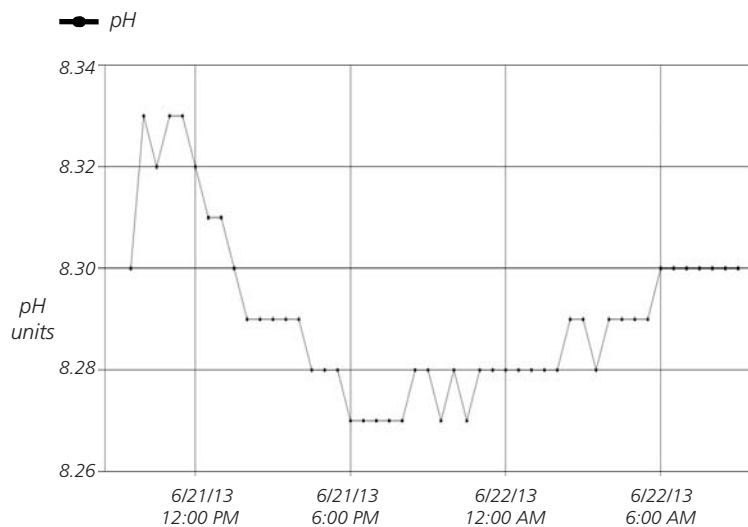
Note that temperature never exceeded the regulatory threshold daily maximum of 22 °C. In addition, daily minimum dissolved oxygen was never below the recommended threshold (6.0 mg/L).

**Corrected Specific Conductance,
Little Cottonwood Creek, June 21-22, 2013**



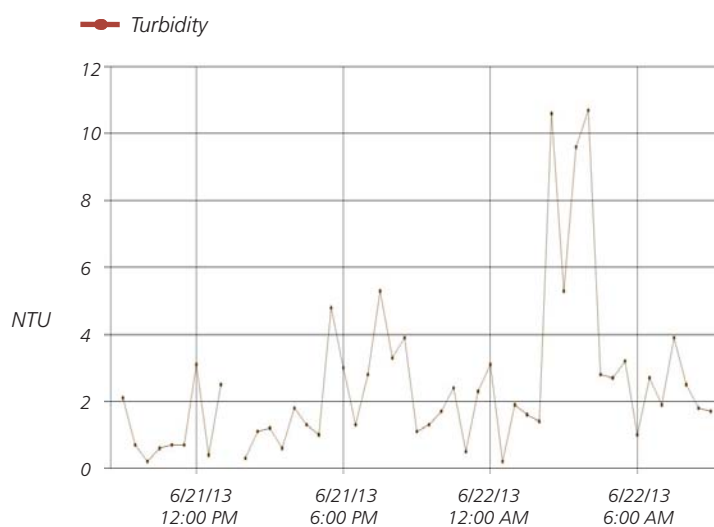
The mean specific conductance was 250.89 µS/cm. There is no established threshold for specific conductance.

**Corrected pH,
Little Cottonwood Creek,
June 21-22, 2013**



The minimum and maximum pH were never outside the acceptable regulatory thresholds of 6.5-9.0 pH units.

**Corrected Turbidity,
Little Cottonwood Creek,
June 21-22, 2013**



Mean daily maximum turbidity was 8.0 NTU.

Important Note: Where necessary, data has been corrected for fouling and drift error according to guidelines established by the USGS.