



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. UCBN waterbodies and 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 (CRMO),
continuous water quality monitor

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.

Status of Little Cottonwood Creek (CRMO)

In 2010, 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 using the EPA's Environmental Monitoring and Assessment Program (EMAP) protocol. For more information on macroinvertebrates, please see the 2010 integrated water quality annual report for CRMO on the UCBN website listed below.

Results indicate that all core parameters are well within acceptable ranges. The following table is a basic summary of findings from 2010 monitoring. Note that regulatory thresholds (TMDLs***) have not been established for Little Cottonwood Creek. Results from 2010 should be considered baseline data as there has been relatively limited sampling of Little Cottonwood Creek in the past. Most existing water chemistry data comes from the NPS Baseline Water Quality Data Inventory and Analysis for CRMO (1998). Results from this report for 5 core parameters (Site CRMO0021 Upper Little Cottonwood) are shown in the table below.

Little Cottonwood Creek (CRMO) Water Chemistry Summary for 24 Hour Period 22-23 June, 2010

Measure	Current Condition (June 22-23, 2010)	NPS Baseline Data 1998
Temperature	10.45 °C = MDMT*, 10.45 °C = MDAT**	9.13 °C = mean, 15.0 °C = max
Specific conductance	223.97 µS/cm = mean	160.86 µS/cm = mean, 228 µS/cm = max
Dissolved oxygen	8.8 mg/L = mean daily min	7.92 mg/L = mean, 5.4 mg/L = min
pH	8.8 pH Units = mean daily max	8.0 pH Units = max
pH	8.56 pH Units = mean daily min	6.2 pH Units = min
Turbidity	< 0.2 NTU = mean daily max	3.4 NTU = max

*MDMT – Maximum Daily Maximum Temperature, **MDAT – Maximum Daily Average Temperature, ***TMDL = Total Maximum Daily Load



Little Cottonwood Creek drainage looking south. Note that the end of riparian vegetation in the background is the approximate location where all surface flow ceases.

Discussion

In summary, water chemistry results indicate that, despite historic mining in the watershed, Little Cottonwood Creek is a relatively un-impacted stream. Given this stream is entirely within park boundaries and is not connected by surface flow to any other stream, potential impacts on water quality are limited. UCBN water quality monitoring is conducted on a 3 year rotating panel; therefore, Little Cottonwood Creek will be re-sampled in 2013. Data collected in 2010 will serve as a baseline to which future conditions will be compared.

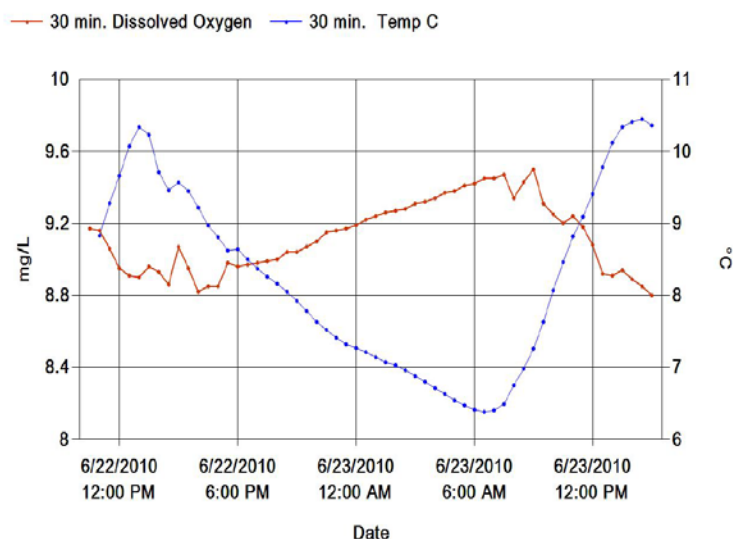
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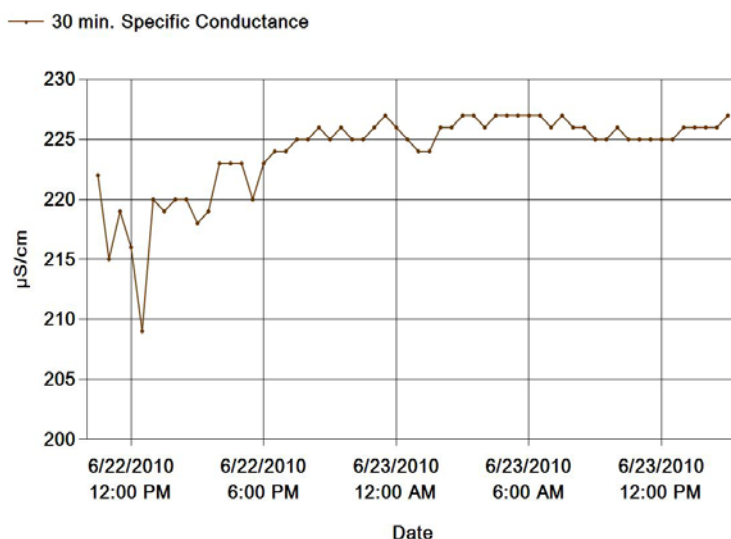
Monitoring Data for Little Cottonwood Creek (CRMO), June 22-23, 2010

Dissolved Oxygen and Water Temperature, Little Cottonwood Creek, 22-23rd June 2010



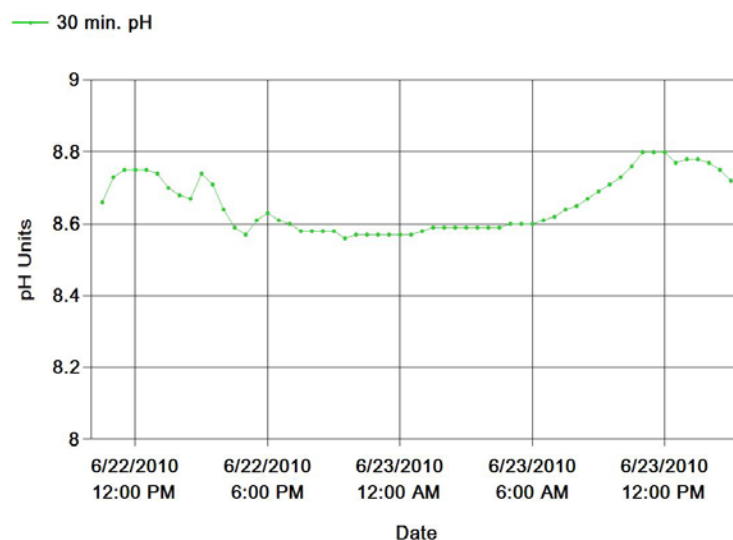
Maximum daily water temperature was 10.45 °C and minimum dissolved oxygen was 8.8 mg/L. The NPS Baseline Water Quality Data Inventory and Analysis for CRMO (1998) indicates that between May 1992 and August 1997, the maximum observed temperature was 15 °C and the minimum dissolved oxygen was 5.4 mg/L (n = 22).

Specific Conductance, Little Cottonwood Creek, 22-23rd June 2010



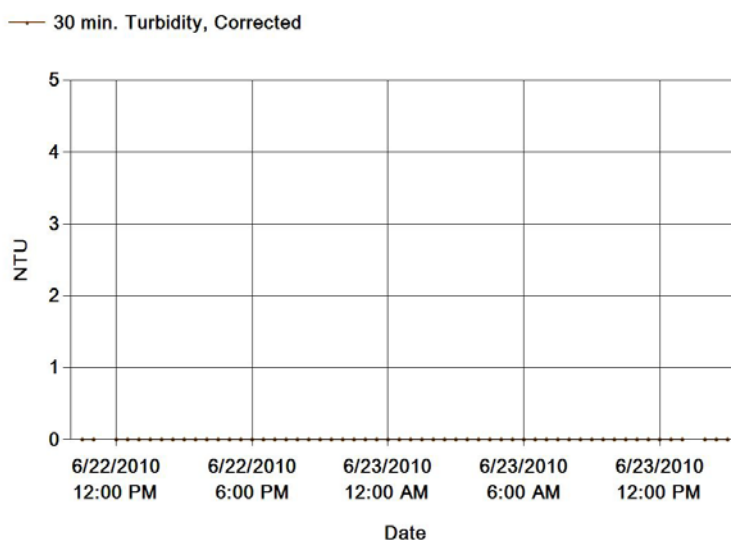
The mean specific conductance was 223.97 µS/cm. The NPS Baseline Water Quality Data Inventory and Analysis for CRMO (1998) indicates that between May 1992 and August 1997, the mean specific conductance was 160.86 µS/cm and the maximum was 228 µS/cm (n = 22).

pH, Little Cottonwood Creek, 22-23rd June 2010



During the period of observation, pH ranged from 8.56 to 8.8 pH units. The NPS Baseline Water Quality Data Inventory and Analysis for CRMO (1998) indicates that between May 1992 and August 1997, pH ranged from 6.2 to 8.0 pH units (n = 22).

Turbidity, Little Cottonwood Creek, 22-23rd June 2010



Mean turbidity during the period of observation was < 0.2 NTU. The NPS Baseline Water Quality Data Inventory and Analysis for CRMO (1998) indicates that between May 1992 and August 1997, turbidity ranged from 0.8 to 3.4 NTU with a mean of 1.38 NTU (n = 11).

Important Notes:

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