



Water Quality Monitoring in City of Rocks National Reserve (CIRO)

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 all 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.



South Fork Circle Creek

Status at City of Rocks National Reserve (CIRO)

Threats to water resources in CIRO have been listed as: ranching and grazing activities; residential development; gas, oil and mining operations; and recreational use (Garrett et al. 2007). In 2009, the Inventory and Monitoring Program measured 5 core water chemistry parameters in the North Fork, South Fork, and Main Stem of Circle Creek including: dissolved oxygen, pH, specific conductance, temperature, and turbidity. Each parameter was evaluated hourly for 24 hours using a continuous water quality monitor. In addition, aquatic macroinvertebrates were collected from all three creeks using the EPA's Environmental Monitoring and Assessment Program (EMAP) protocol. For more information on macroinvertebrates, please see the 2009 integrated water quality annual report for CIRO on the UCBN website listed below.

Results indicate that all core parameters with the exception of turbidity and dissolved oxygen were within the general state regulatory thresholds. The following table is a basic summary of findings from 2009 monitoring along with state regulatory thresholds for the main stem of Circle Creek. It should be noted that data for all streams at CIRO were collected during an exceedingly wet June in southern Idaho. The rainfall total from June 1st to June 15th 2009 in Burley ID was 2.36 in. The average monthly rainfall for the entire month of June is 0.87 in.

Main Stem Circle Creek Water Chemistry Summary 2009

Measure	Current Condition (June 11-12 th , 2009)	State DEQ Thresholds
Temperature (*MDMT, **MDAT)	* MDMT= 15.62 °C ** MDAT= 15.62 °C	*MDMT < 22 °C **MDAT < 19 °C
Specific Conductance (mean)	305 µS/cm	N/A
Dissolved oxygen (mean daily min)	5.66 mg/L	> 6.0 mg/L
pH (mean daily max)	7.87 pH Units	9.5 pH Units, Max
pH (mean daily min)	7.75 pH Units	6.0 pH Units, Min
Turbidity (mean daily max)	252 NTU	< 50 NTU (instantaneous) < 25 for 10 consecutive days

*MDMT – Maximum Daily Maximum Temperature , **MDAT – Maximum Daily Average Temperature



North Fork Circle Creek

Discussion

Elevated turbidity in the Circle Creek drainage is primarily due to bank erosion. The predominate cause of bank erosion along the North Fork and main stem of Circle Creek is the extensive use of the riparian area and stream channel by livestock. This use has removed much of the vegetation needed for soil stability. Exclusion of livestock in sensitive riparian areas is necessary for improved bank stability and reduced turbidity. Dissolved oxygen was below the regulatory threshold for one hour and is not considered a threat to water quality at this time. UCBN water quality monitoring is conducted on a 3 year rotating panel. Each branch of Circle Creek will be sampled for water chemistry and macroinvertebrates again in 2012.

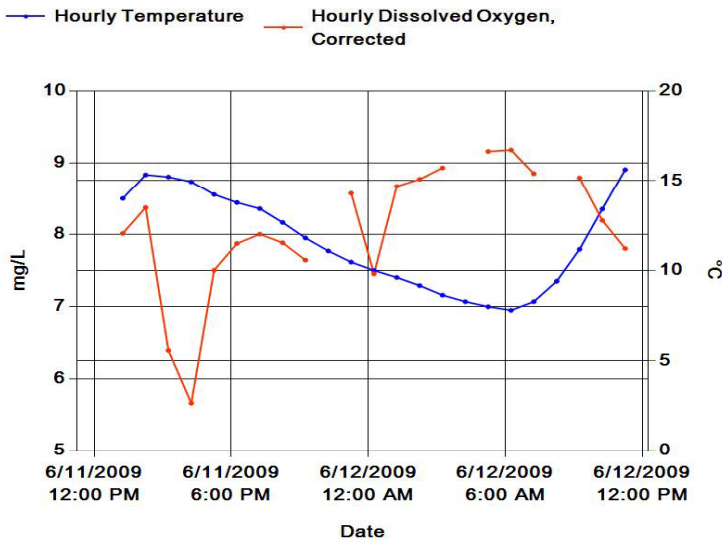
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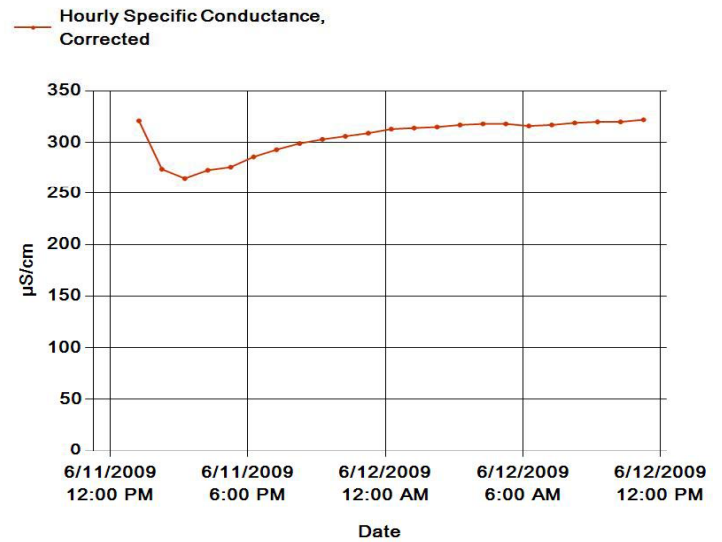


Monitoring Data for Main Stem Circle Creek (CIRO), June 11-12th, 2009

Hourly Dissolved Oxygen and Water Temperature



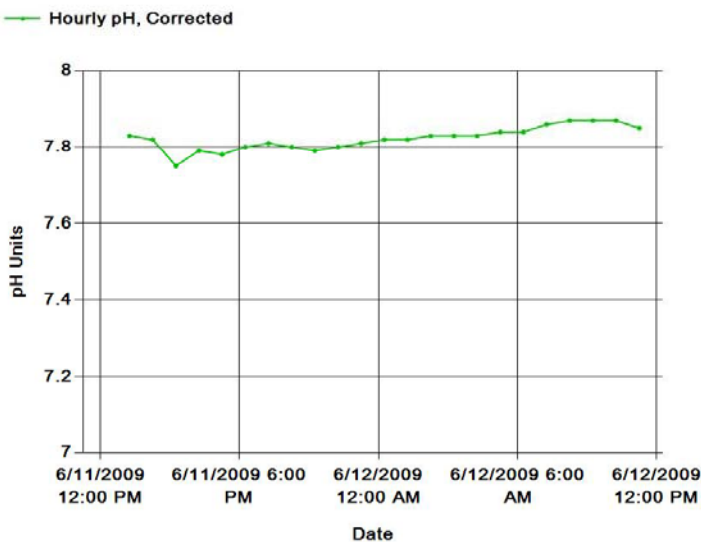
Hourly Specific Conductance



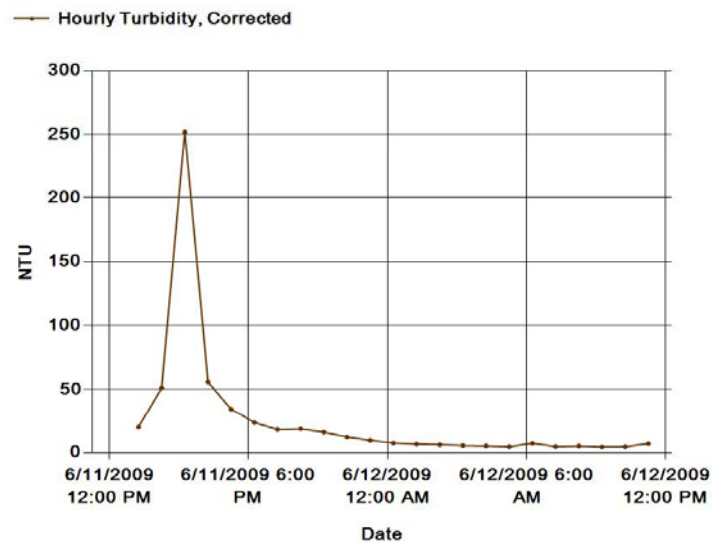
Note that temperature never exceeded the regulatory threshold daily maximum of 22 °C. Daily minimum dissolved oxygen dipped below the recommended threshold (6.0 mg/L) at 4:15 PM on June 11th, but given the short duration at such a low level it is not considered a threat to water quality

The mean specific conductance was 305 µS/cm. There is no established threshold for specific conductance.

Hourly pH



Hourly Turbidity



The minimum and maximum pH were never outside the acceptable regulatory thresholds of 6.0-9.5 pH units.

Turbidity ranged from 4.3 NTU to 252 NTU and exceeded the general regulatory threshold of 50 NTU (instantaneous) for three hours on June 11th. This spike in turbidity correspond to rain events. The primary cause of turbidity in the main stem of Circle Creek is erosion of deeply incised banks. Bank stability would likely improve with recovery of riparian vegetation.

Important Notes:

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