



## Water Quality Monitoring at Whitman Mission National Historical Site (WHMI)

### 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 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 changing climate and dynamic human influences.



WHMI resource manager calibrating the continuous water quality monitor.

### Status at Whitman Mission National Historical Site (WHMI)

Threats to water resources in WHMI have been identified as: agricultural chemical use, over allocation of irrigation water, and a private airfield 3 miles upstream. In 2002 and 2004 Doan Creek exceeded the state Department of Environmental Quality (DEQ) criteria for temperature. As a result Washington DEQ designates Doan Creek as a category 5 waterbody and lists the creek as impaired on the EPA 303(d) list. In 2004 Mill Creek was listed as 303(d) impaired for dissolved oxygen, pH, temperature, and fecal coliform. Consequently Mill Creek is also listed as a Category 5 (303d) stream by Washington DEQ.

In 2008 the UCBN monitored 5 core water chemistry parameters in Mill Creek including: dissolved oxygen, pH, specific conductance, temperature, and turbidity. Each parameter was evaluated hourly between the months of June and November using a continuous water quality monitor. In addition, aquatic macroinvertebrates were collected from Mill Creek using the EPA's EMAP protocol. For more information on macroinvertebrates in Mill Creek please see the integrated water quality annual report for WHMI on the UCBN website listed below. Monitoring of Doan Creek was limited in 2008 due to restoration efforts and low water conditions.

#### Mill Creek Water Chemistry Summary 2008

Measure	Current Condition (June-October, 2008)	State DEQ Thresholds
Temperature (MDMT, MDAT)	MDMT= 25.47 °C MDAT= 22.92°C °C	7-DADMax <13 °C
Specific Conductance (mean)	287.70 µS/cm	N/A
Dissolved oxygen (min. daily min.)	3.73 mg/L	>5.0 mg/L Minimum Daily Minimum
pH (mean daily max)	8.89 pH Units	8.5 pH Units, Max
pH (mean daily min)	7.65 pH Units	6.0 pH Units, Min
Turbidity (mean daily max)	5.97 NTU	< 5 NTU increase above background when background NTU < 50, < 10% increase when background NTU > 50

7-DADMax – 7 Day Average Daily Maximum Temperature

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

### Discussion

Sub-optimal temperatures, dissolved oxygen, and pH indicate impaired conditions in Mill Creek. Also of concern is the dewatering of Mill and Doan Creeks due to irrigation. Improving water quality within WHMI will depend on riparian and water use improvements basin wide. For this reason cooperation with other agencies and stakeholders will be critical. Future monitoring efforts will include more intensive efforts on Doan Creek to help evaluate restoration efforts. UCBN water quality monitoring is conducted on a 3 year rotating panel. Mill and Doan Creeks will be sampled for water chemistry and macroinvertebrates again in 2011.

### Contact Information

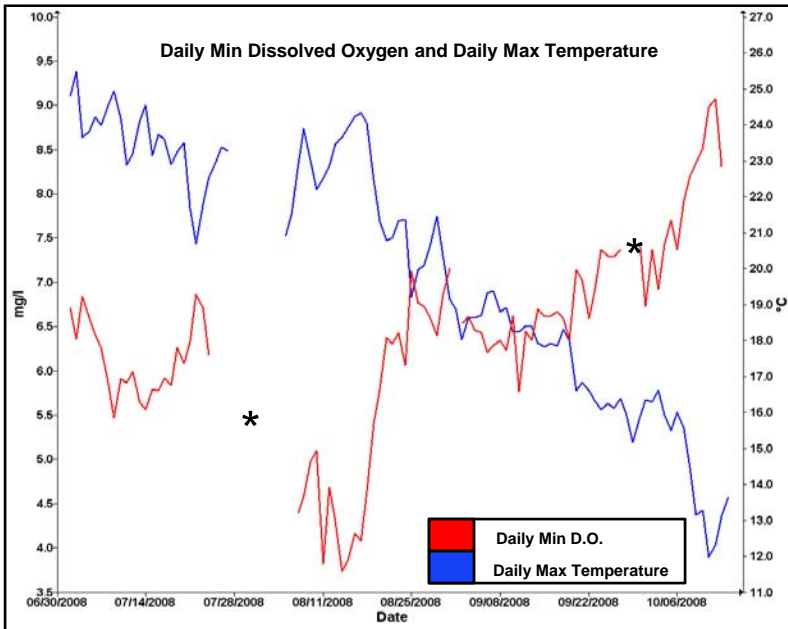
Eric Starkey, [estarkey@uidaho.edu](mailto:estarkey@uidaho.edu)



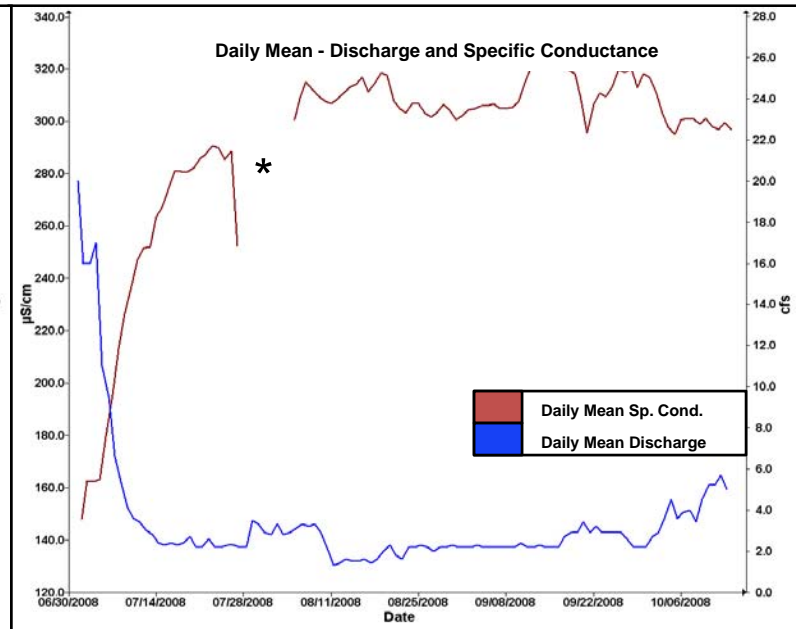
Mill Creek, WHMI, WA



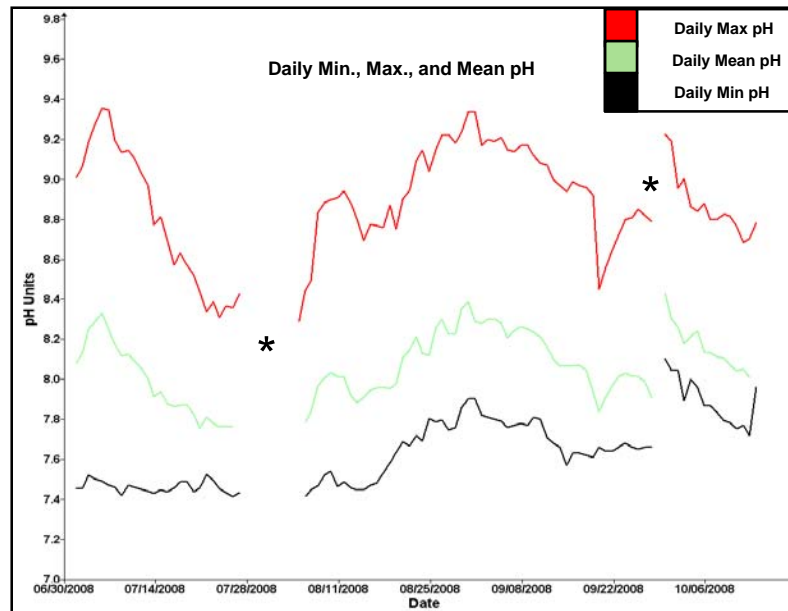
### Monitoring Data for Whitman Mission National Historical Site (WHMI), 2008



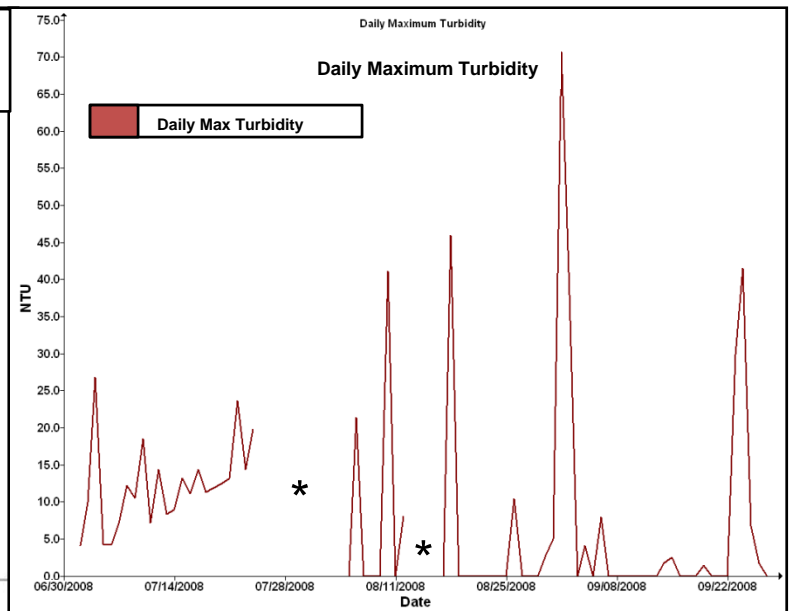
Note that temperature exceeded the regulatory threshold daily maximum of 20 °C a total of 51 days. Daily minimum dissolved oxygen was below the recommended threshold (5.0 mg/L) on 12 days.



The mean specific conductance was 287.70 µS/cm. There is no established threshold for specific conductance. The inverse relationship between discharge and specific conductance is typical for streams. Note that discharge in Mill Creek is highly regulated for irrigation.



The regulatory threshold for Mill Creek is between 6.0 and 8.5 pH units. pH was never below 6.0 while pH exceeded 8.5 a total of 84 days. Mean pH was 8.08.



Daily maximum turbidity ranged from near 0 NTU to 71 NTU. Spikes in turbidity should be viewed with some caution as fouling likely contributed to these spikes. Instantaneous turbidity values occasionally exceeded threshold criteria but were likely caused by fouling or low battery power and are not of concern. Note missing data from 9/22 until the end of season due to sensor malfunction.

#### Important Notes:

\*Indicates a break in data due to service dates and/or a loss of battery power.

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