



Water Quality Monitoring in Whitman Mission National Historical Site

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.



Mill Creek looking upstream from monitoring station, July 2014.

Status of Mill Creek in WHMI

Threats to water resources in WHMI have been identified as: agricultural chemical use, and over allocation of irrigation water. In 2012 Mill Creek was listed as a category 4A water for temperature, pH, fecal coliform, and dissolved oxygen meaning that it has a pollution problem, but has total maximum daily loads (TMDL) being actively implemented. According to the Washington Department of Ecology (WADOE) “a TMDL identifies how much pollution needs to be reduced or eliminated to achieve clean water.” After a TMDL has been established, the WADOE works with local stakeholders to reduce pollution and improve water quality. In 2014 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.

Prior to discussion on the findings for this stream, it is important to note that this segment of Mill Creek has an aquatic life use designation of “salmonid rearing and migration only” and must meet water quality criteria associated with this use. In addition, this segment of Mill Creek has a special dissolved oxygen designation (described below). Parameters that exceeded water quality standards between June and November are:

- Temperature, exceeded the standard designated for “salmonid rearing and migration only” (7-DADMax <17.5°C) during 70% of observations. These data suggest the need for an increase in stream shading via riparian vegetation within the watershed. In addition, given that streamflow during the summer is maintained by ground/surface water, upstream withdrawals and diversions are likely impacting stream temperatures by reducing streamflow.
- Minimum dissolved oxygen levels were below the “special condition” standard (> 5.0mg/l minimum daily minimum) during 5% of observations.
- pH levels exceeded the desired pH range (6.5 to 8.5 pH Units), with 10% of observations falling above 8.5 pH units and 0% of observations below 6.5 pH units.

UCBN water quality monitoring is conducted on a 3 year rotating panel. Mill Creek will be sampled for water chemistry and macroinvertebrates again in 2017. The following table is a summary of findings from 2014 monitoring along with state regulatory thresholds for Mill Creek.

Mill Creek Water Chemistry Summary 2014

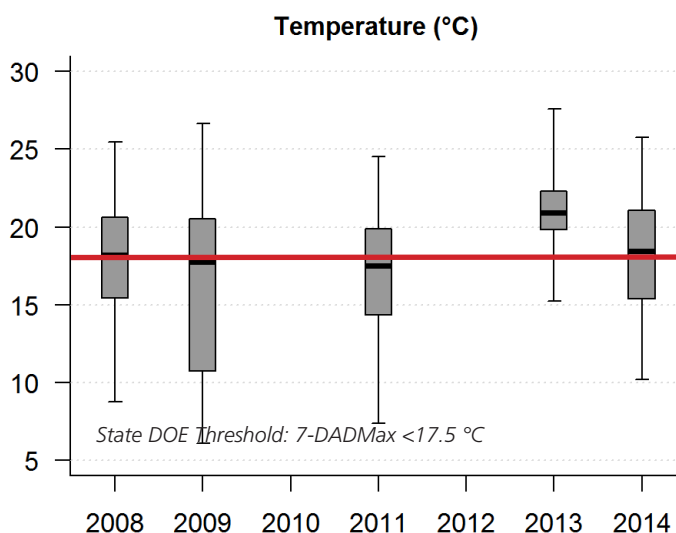
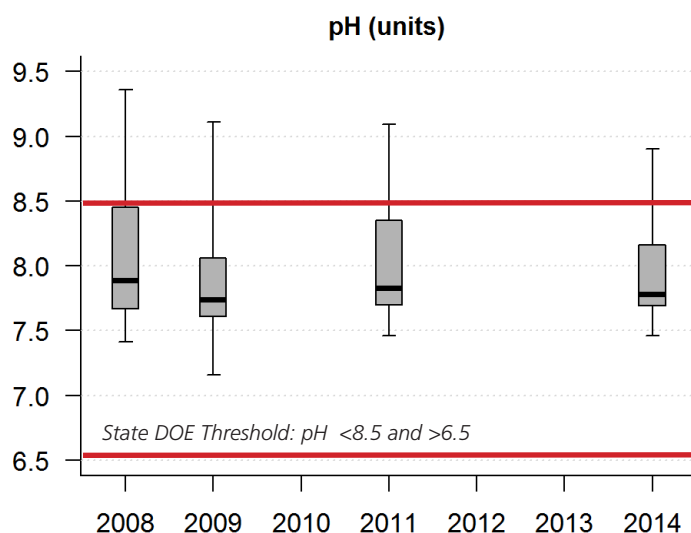
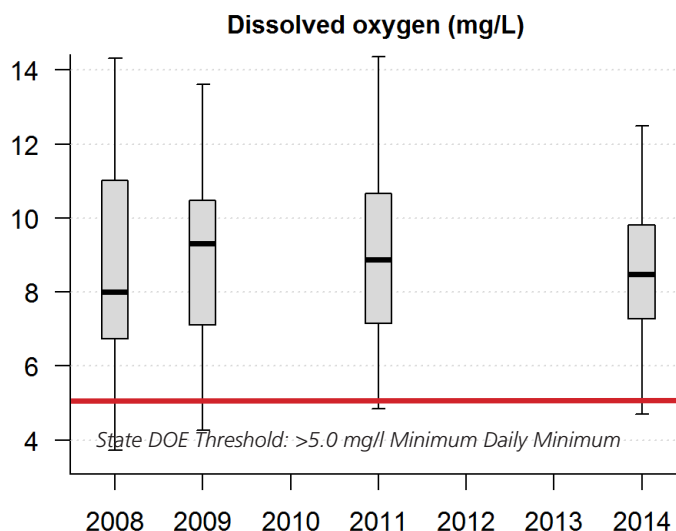
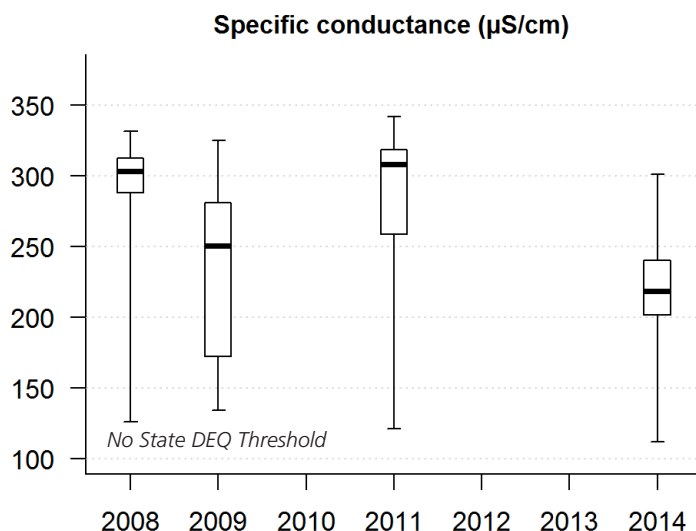
Measure	Current Condition (June-November, 2014)	State DEQ Thresholds ^a	% Exceedance ^c
Temperature (*MDMT, **MDAT)	*MDMT=25.78 °C **MDAT=23.58 °C	*** 7-DAD Max <17.5 °C	70%
Specific Conductance (mean)	217.8 µS/cm	N/A	N/A
Dissolved Oxygen (mean daily min)	6.7 mg/L	>5.0 mg/l Minimum Daily Minimum ^b	5%
pH (mean daily max)	8.5 pH Units	8.5 pH Units, Max (0.5 units human caused variation)	10%
pH (mean daily min)	7.6 pH Units	6.5 pH Units, Min (0.5 units human caused variation)	0%
Turbidity (mean daily max)	6.8 NTU	<5 NTU increase above background (instantaneous) background NTU <50, <10% increase when background NTU >50	Insufficient data

*MDMT – Maximum Daily Maximum Temperature, **MDAT – Maximum Daily Average Temperature, ***7-DAD Max - 7-Day Average Daily Maximum Temperature ^a Criteria established for Salmonid Rearing and Migration Only, ^b Special designation for Mill Creek mouth to 13th St. Bridge, ^c Proportion of samples above water quality standard.



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Mill Creek, Water Quality Monitoring Results 2008-2014



Note that box-plot tail ends represent the minimum and maximum values



Mill Creek looking upstream from monitoring location, July 2014



Mill Creek looking upstream from monitoring location, October 2014