



Water Quality Monitoring in Whitman Mission National Historic Site (WHMI) - Doan Creek

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.



Doan Creek's water quality monitoring station.

Status of Doan Creek in Whitman Mission National Historic 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 2008 Doan Creek was listed as a "category 4A" water for temperature meaning that it has a pollution problem, but has a total maximum daily load (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 2010 WHMI monitored 5 core water chemistry parameters in Doan Creek including: dissolved oxygen, pH, specific conductance, temperature, and turbidity. Each parameter was evaluated hourly between the months of April and November using a continuous water quality monitor.

Prior to discussion on the findings for this stream, it is important to note that the segment of Doan Creek, immediately upstream of the park is considered a "class A" waterbody and has less stringent water quality standards than exist for the stream as it flows through the park (designated "class AA"). Parameters that exceeded water quality standards between April and November are:

- Temperature, which routinely exceeded (46%) the standard designated for "class AA core summer salmonid habitat" (7-DADMax < 16 °C), but only exceeded the "class A salmonid, spawning, rearing and migration" standard (7-DADMax < 17.5°C) during 19% of observations. When compared to either "class AA" or "A" standards, 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 water, upstream withdrawals may be impacting stream temperatures by reducing streamflow.
- Dissolved oxygen levels consistently failed to meet (96%) the standards for "class AA" streams (> 9.5 mg/l), but only exceeded "class A" standards (8.0mg/l) during 31% of observations. The lack of dissolved oxygen attainment is likely linked to elevated water temperatures.

UCBN water quality monitoring is conducted on a 3 year rotating panel. Doan Creek will be sampled for water chemistry in 2013 and sampled for macroinvertebrates again in 2014. The following table is a summary of findings from 2010 monitoring along with state regulatory thresholds for Doan Creek.

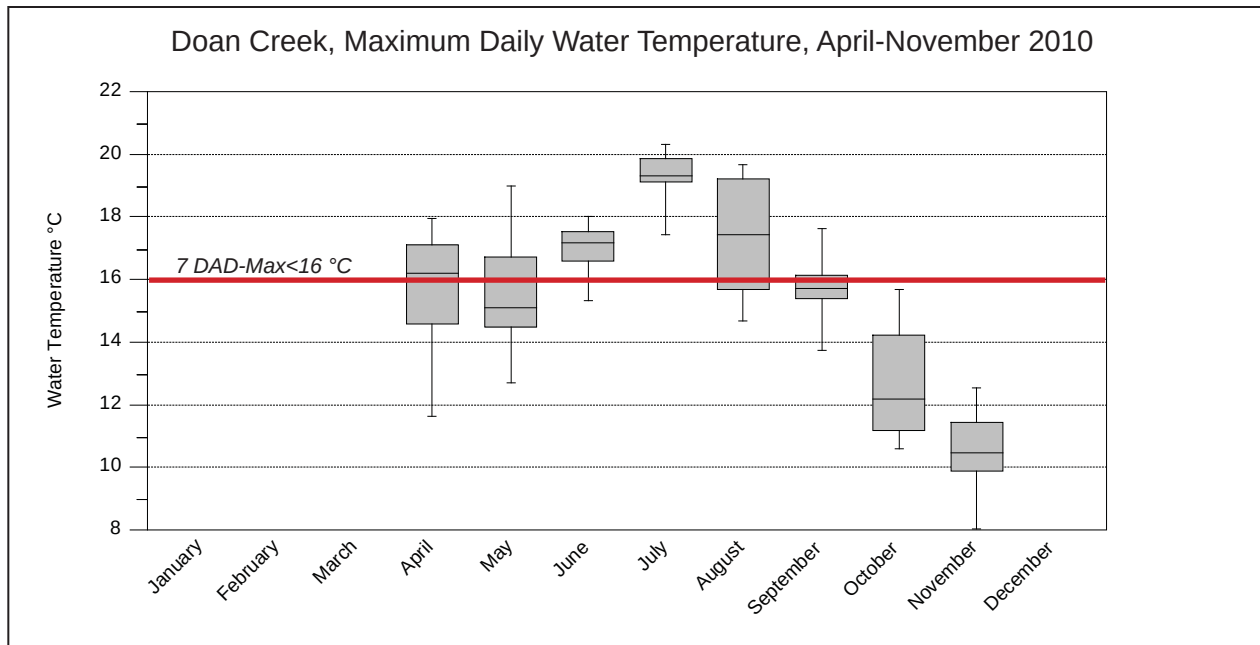
Doan Creek Water Chemistry Summary 2010

Measure	Current Condition (April-November, 2010)	State DEQ Thresholds ^a	% Exceedance ^c
Temperature (*MDMT, **MDAT)	*MDMT=20.3 °C **MDAT=17.8 °C	***7-DADMax <16 °C	46%
Specific Conductance (mean)	501.0 µS/cm	N/A	N/A
Dissolved Oxygen (mean daily min)	8.3 mg/L	>9.5 mg/L Minimum Daily Minimum	96%
pH (mean daily max)	8.0 pH Units	8.5 pH Units, Max (0.5 units human caused variation)	0%
pH (mean daily min)	7.9 pH Units	6.5 pH Units, Min (0.5 units human caused variation)	0%
Turbidity (mean daily max)	36.1 NTU	< 5 NTU increase above background when background NTU < 50, < 10% increase when background NTU > 50	Insufficient data
<i>E. coli</i>	110 cfu/100 ml	Geometric mean of samples < 200 cfu/100 ml, < 10% of the samples can exceed 400 cfu/100 ml ^b	0%

*MDMT – Maximum Daily Maximum Temperature, **MDAT – Maximum Daily Average Temperature, ***7-DADMax – 7 Day Average Daily Maximum Temperature, ^a Criteria established for Class AA, ^b Secondary contact recreational use criteria, ^c Proportion of samples above water quality standard.



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Restored Doan Creek channel looking downstream towards confluence with Mill Creek.



A beaver (*Castor canadensis*) seen near the monitoring station.

