



# Water Quality Monitoring in John Day Fossil Beds National Monument (JODA)- Sheep Rock Unit

## 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 shifting climate and dynamic human influences.



Deployment of water chemistry monitoring instrument in the John Day River, June 2010

## Status of John Day River in JODA – Sheep Rock Unit

Threats to water resources in JODA have been listed as: irrigation withdrawals, confined animal feeding upstream, and untreated sewage effluent upstream. In addition, the John Day River is listed as impaired on the EPA 303(d) due to dissolved oxygen, temperature and fecal coliform (Garrett et al. 2007). In 2010 the UCBN monitored 5 core water chemistry parameters in the John Day River 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 according to United States Forest Service (USFS) - PACFISH/INFISH Biological Opinion Effectiveness Monitoring (PIBO-EM) Program protocol. For more on macroinvertebrates please see the integrated water quality annual report for JODA on the UCBN website listed below.

Results indicate that temperature levels frequently exceed state thresholds, and dissolved oxygen occasionally violates established thresholds. The following table is a summary of findings from 2010 monitoring along with state regulatory thresholds for the John Day River.

**John Day River Water Chemistry Summary 2010**

Measure	Current Condition (June-November, 2010)	State DEQ Thresholds	% Exceedance <sup>a</sup>
Temperature (*MDMT, **MDAT)	* MDMT= 26.44 °C ** MDAT= 23.0 °C	7 day average < 18 °C (salmon/trout rearing/migration)	50 %
Total dissolved solids /TDS (mean)	210 mg/L	TDS < 500 mg/L	0 %
Dissolved oxygen (mean daily min)	7.77 mg/L	> 6.5 mg/L instantaneous (cool water, non-spawning)	< 1 %
pH (mean daily max)	8.58 pH Units	9.0 pH Units	0 %
pH (mean daily min)	8.14 pH Units	6.5 pH Units	0 %
Turbidity (mean daily max)	73.16 NTU	< 10% cumulative increase in natural stream turbidities may be allowed, as measured relative to a control point immediately upstream of the turbidity causing activity	Insufficient data
<i>E. coli</i>	9 MPN/100 ml	< 406 <i>E. coli</i> /100 ml	0 %

\*MDMT – Maximum Daily Maximum Temperature, \*\*MDAT – Maximum Daily Average Temperature, <sup>a</sup> Proportion of samples above water quality standard



The John Day River in the Sheep Rock Unit of John Day Fossil Beds National Monument

## Discussion

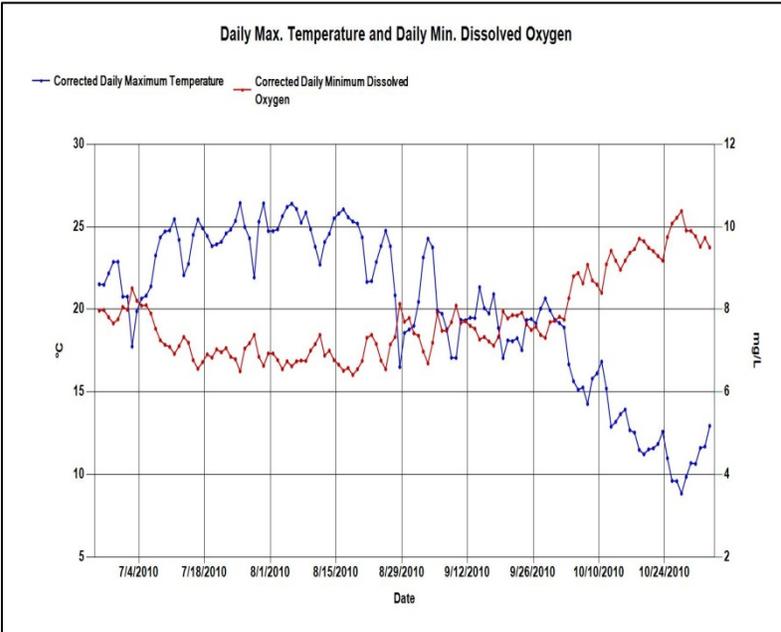
Temperature frequently exceeded the state standard designated for salmon and trout rearing/migration streams (18 °C). Temperature data suggests the need for an increase in stream shading via riparian vegetation basin wide. Given that streamflow during the summer is maintained by ground water, upstream withdrawals are likely impacting stream temperatures by reducing streamflow. UCBN water quality monitoring is conducted on a 3 year rotating panel. The John Day River will be sampled for water chemistry and macroinvertebrates again in 2013.

## Contact Information

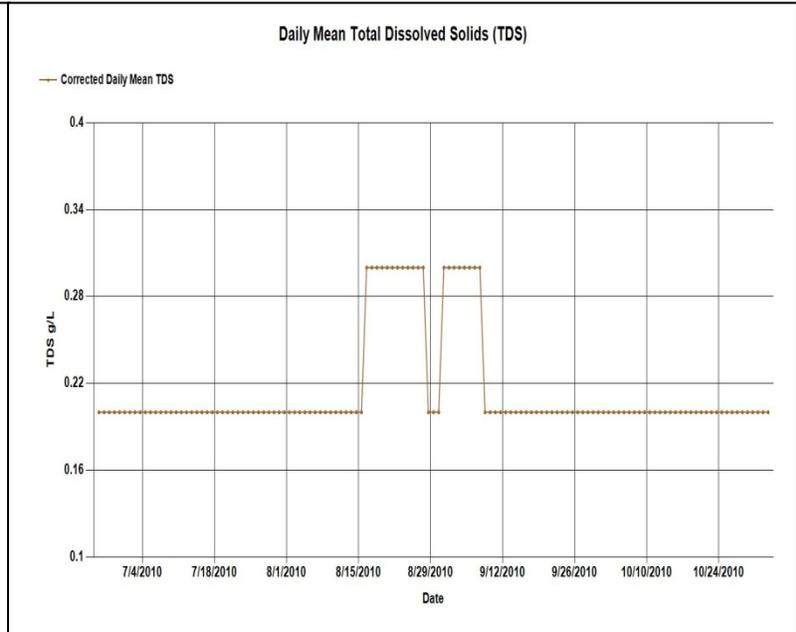
Eric Starkey, Eric\_Starkey@nps.gov



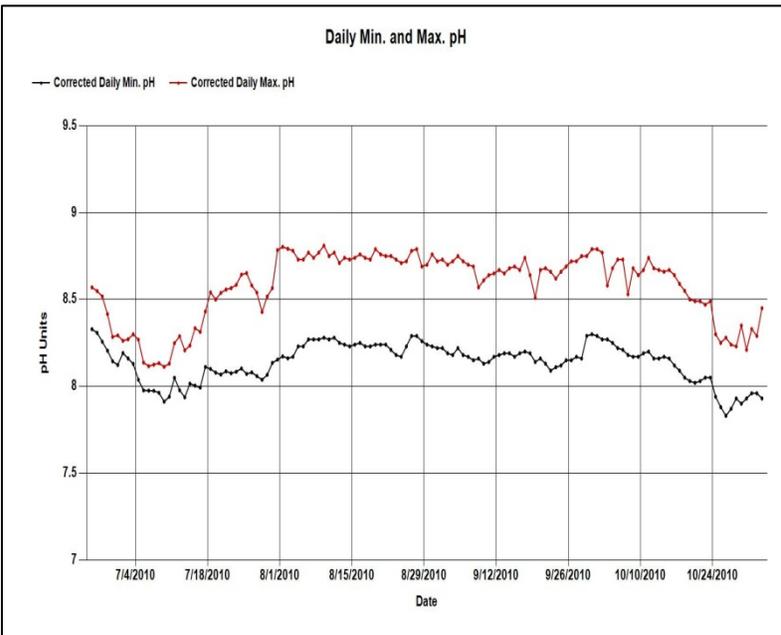
### Monitoring Data for John Day River (JODA), June-November, 2010



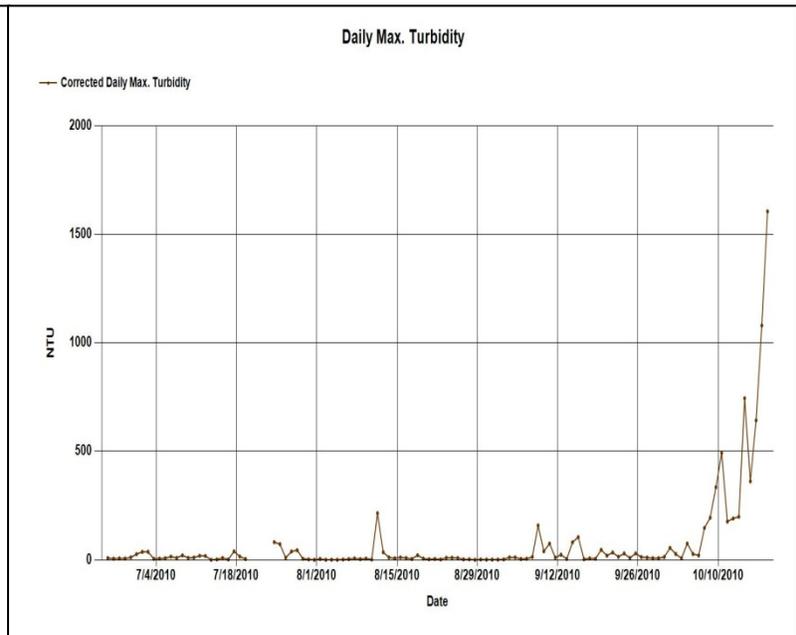
Maximum daily water temperature was 26.44 °C and minimum dissolved oxygen was 6.4 mg/L. The 7 day average temperature exceeded the 18 °C standard set by Oregon DEQ for salmon/trout rearing/migration streams in 50% of observations. Data quality ranges from “Good” to “Excellent” for temperature and “Fair” to “Excellent” for dissolved oxygen. Quality ratings are based on the degree of sensor fouling and drift.



The mean total dissolved solids (TDS) was 0.21 g/L and was well under the state threshold of 0.5 g/L (500 mg/L). Note that the graph is in g/L while the state standard is generally reported in mg/L. Data quality ranges from “Fair” to “Excellent.” Quality ratings are based on the degree of sensor fouling and drift.



During the period of observation, pH ranged from 7.83 to 8.81 pH units and never exceeded the state standard (6.5-9.0 pH Units). Data quality ranges from “Good” to “Excellent.” Quality ratings are based on the degree of sensor fouling and drift.



The mean daily max. turbidity was 73.16 NTU, with the maximum (1606.00 NTU) occurring on the 18<sup>th</sup> of October. Note that turbidity data should be viewed with caution, as the data quality has been rated as “Poor.” Quality ratings are based on the degree of sensor fouling and drift.

#### Important Notes:

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