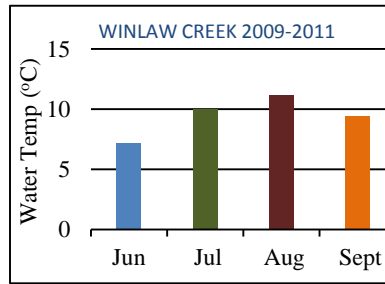
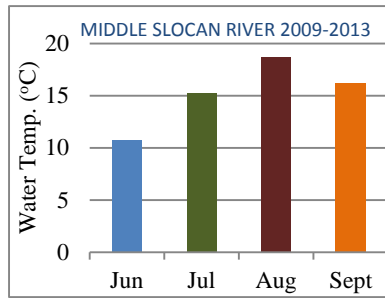


Water Temperature

Water temperature is important for all aquatic life and has been monitored at the three Slokan River sites and at Winlaw Creek. Results indicate:

- A variety of temperature patterns.
- The Slokan River (see graph to right) has summer temperatures on the upper end of the suitable range for rearing bull trout (14 °C), kokanee (16 °C), and rainbow trout (18 °C).
- Winlaw Creek had lower summer temperatures that were more suitable for native fish species.

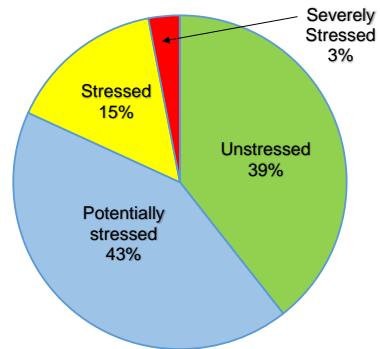
Long-term temperature monitoring is important to understanding changes in aquatic environments, and what those changes mean for native fish.



Mean stream temperature (°C)

How Are We Doing Overall?

The Slokan River watershed is generally healthy, with 82% of sites since 2005 being unstressed or potentially stressed (see chart below). Conditions were consistently healthy in the tributaries. The Slokan River mainstem had evidence of aquatic community impacts, with some stressed and severely stressed years.



Water and sediment quality results outside of guidelines may have been human caused or may indicate natural levels in the watershed. There were no clear linkages between the elevated water quality findings and stressed aquatic community conditions.

This baseline dataset is valuable for future comparison. A longer term data set will be valuable to confirm trends.

Watershed condition, 2005 to 2013

Working for Healthy Watersheds: Conservation, Management, Sustainability



Who We Are

The **Columbia Basin Water Quality Monitoring Project (WQMP)** is a water stewardship project funded by the **Columbia Basin Trust (CBT)**.

Members of the WQMP are also members of the **Columbia Basin Watershed Network (CBWN)**, which supports non-government groups working to conserve, protect, and monitor water resources throughout the Canadian-Columbia River basin (www.cbwn.ca).

The **Slokan River Streamkeepers** is a non-profit society founded in 2003. The Society's mission is to protect and restore streams, streambeds and riparian zones on the Slokan River and surrounding streams. The society also provides community education in schools and at local events.

Lotic Environmental Ltd. is a consulting company based out of Cranbrook, BC, specializing in aquatic science. Lotic Environmental has provided analysis and reporting support to this project since 2012.

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Slokan River Watershed Water Quality Monitoring 2005-2013

A Columbia Basin Water Quality Monitoring Project

In partnership:



CBWQMP



Why Monitor?

Citizen scientists play a key role in identifying the threats and impacts to water quality and quantity and preserving watershed function for sustainable communities and ecosystems.

Understanding current and future water quality and quantity condition is important, as environmental changes can pose risks to ecosystem and societal health. Land use and climate related changes are specific threats to water resources in the Columbia River basin, since they can lead to introduction of pollutants, alteration of stream temperature and/or reductions in streamflow.

In the Slokan River watershed, examples of pressures include:

- o Logging and road building along Bonanza and Wilson creeks
- o Residential development along Goose Creek and the Slokan River
- o Potential independent power production in Koch Creek
- o Mining in the Carpenter Creek watershed
- o Agricultural activity along the Slokan River mainstem

What Are We Doing?

Eight community stewardship groups in the Canadian-Columbia River Basin are conducting water quality monitoring as a part of the Water Quality Monitoring Project (WQMP).

The goals of the WQMP are to:

1. *Develop a science-based model for community-based water quality monitoring*
2. *Provide online accessibility to water quality data*
3. *Increase community awareness of watershed health*

The Slokan River Streamkeepers have completed water quality and quantity monitoring in the Slokan River watershed since 2005.

Data collection and analyses:



The benthic invertebrate community was monitored using the Canadian aquatic biomonitoring network (CABIN) methods. A kicknet was used to collect the invertebrate samples. Samples were analyzed by a taxonomist. Stream health was then rated using CABIN analytical tools, which identify community composition and compare test site results to reference streams with similar environmental characteristics.

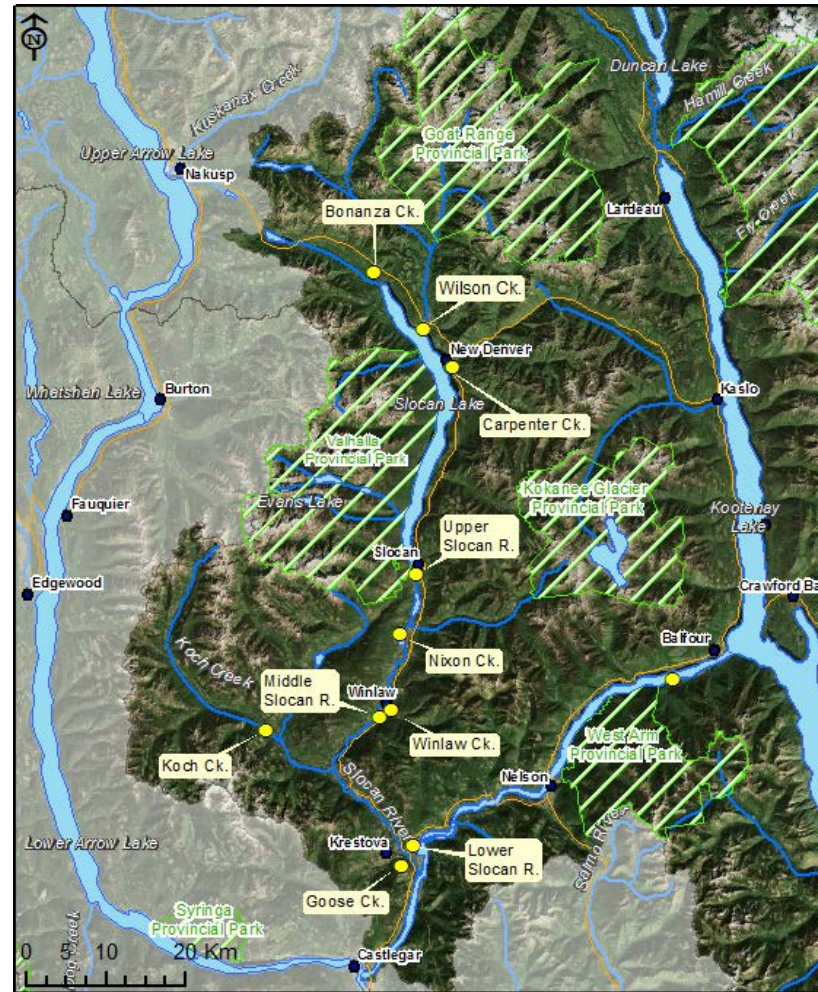


Water and sediment quality data were collected using field measurements and lab analysis. Results were compared to the British Columbia and Canadian guidelines for the protection of aquatic life and drinking water.



Hourly stream temperature was measured using HOBO temperature loggers. Downloaded data were analyzed using statistics.

What have we found?



Slokan River and Area Water Quality Monitoring Sites



Benthic Invertebrates

Tributary Sites

Benthic invertebrate results indicated healthy tributaries, with Bonanza, Carpenter, Goose, Koch, Nixon, Wilson, and Winlaw creeks rated unstressed or potentially stressed for all years sampled.

Stress level ratings describe how the invertebrate community compares to unimpacted reference areas. Ratings range from unstressed to severely stressed.

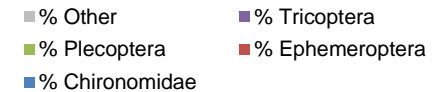
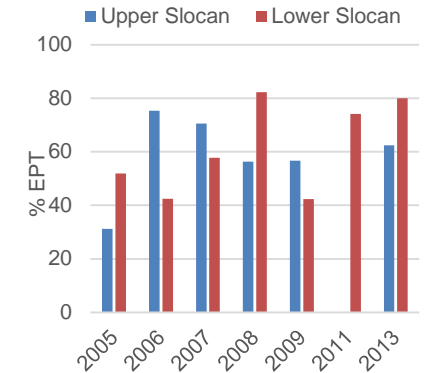
Slokan River Mainstem

The Slokan River mainstem has shown signs of stress. The upstream most site was potentially stressed in 2005–2008, severely stressed in 2009, and stressed in 2013. The severely stressed year had the fewest numbers of EPT taxa (5 families of ephemeroptera, plecoptera and trichoptera), the highest total abundance (1862 individuals), and the highest percentage of two dominant taxa (77%). There were improvements in 2013.

EPT taxa are sensitive to habitat disturbance.

In 2005, the Middle Slokan River site was potentially stressed.

The downstream site alternated between potentially stressed (2006, 2008, 2011) and stressed (2005, 2007, 2009, 2013). Recent years (2011 and 2013) saw higher %EPT (>70%) indicating healthy conditions (see graph to right). However, elevated total abundance in 2011 and 2013 (829 and 2950 individuals) could be a sign of nutrient enrichment. Ongoing monitoring will be important to identify trends.



Organisms sampled in the Lower Slokan R



Water and Sediment Quality

Some parameters have two guidelines
 - Values below the **low effect guideline**, are expected to rarely (<25%) result in adverse biological effects.
 - Above the **high effect guidelines**, adverse effects are expected to occur frequently (>50%).

The following BC approved, BC working and/or Canadian guidelines for the protection of aquatic life were exceeded. :

- **Bonanza Creek:** In 2012, the low effect sediment quality guidelines were exceeded for cadmium, iron, manganese, nickel, and zinc.
- **Carpenter Creek:** annual water samples in 2011 and 2012 had low pH. In 2013, the low effect sediment quality guidelines were exceeded for arsenic, iron, lead, manganese, nickel and zinc; and cadmium exceeded the high effect sediment guideline.
- **Goose (2011, 2012) and Wilson creeks (2010)** had low pH levels during annual sampling for the years indicated.
- **Upper Slokan River:** In 2013, the low effect sediment guideline was exceeded for cadmium.
- **Middle Slokan River:** In 2007, the zinc water quality guideline was exceeded.
- **Lower Slokan River:** Water column had low pH for many monthly samples collected since 2011, and high zinc in 2008. 2010 sediment sampling found cadmium and zinc to be above the low effect guidelines.

