Alexander Creek Site Locations

Despite the pressures on Alexander Creek, i.e. highway 3, cattle grazing and logging upstream, water quality is relatively good. Flagged parameters (total suspended solids and phosphorous) may be from natural sources. However, continued monitoring will be beneficial to ensure values do not increase over time. Elevated values can impact fish and benthic invertebrates. ERA has successfully completed a bank restoration project on Alexander Creek to mitigate some erosion and associated turbidity issues. Winter low temperatures are likely not a concern to fish as they would spawn in areas with groundwater inputs.

These results provide a good baseline to monitor changes with time.

Why We Monitor

Community-based water monitoring (CBWM) helps fill knowledge gaps in existing data sets and ensures water quality information is available to all stakeholders, including Elk Valley citizens.

Vision: Using long-term monitoring, detect trends in stream health, identify priority areas for further study and address potential issues.

Goals of the CBWM program:
- Use scientific, repeatable approaches
- Involve community to increase water literacy
- Collect and add baseline data for Elk River tributaries
- Collaborate with stakeholders, share information, and make data available to community and decision-makers

Alexander Creek was selected due to human pressures including: Hwy. 3, logging, road-building, cattle grazing, coal mining in adjacent valleys and proposed coal mining in the watershed. Alexander Creek provides important habitat for Bull Trout and Westslope Cutthroat Trout, two blue-listed fish species, also valuable to the local fishery.

How We Monitor

Since 2012, the Elk River Alliance (ERA) has monitored 4 sites on Alexander Creek (see map). The CBWM program uses protocols from Pacific Streamkeepers Federation (Streamkeepers), Canadian Aquatic Biomonitoring Network (CABIN), and Sensitive Habitat Inventory Mapping (SHIM).

Benthic macro-invertebrates
- Collect samples during low flow using CABIN protocols, which are analyzed by a professional taxonomist
- Assess stream habitat conditions
- Upload data to CABIN database produce site report

Water quality
- Use Streamkeepers and CABIN protocols during high and low flow (monthly from 2015-2017) to monitor: temperature, pH, dissolved oxygen, turbidity, metals, nutrients, and conductivity
- Compare results to applicable Canadian and BC aquatic life and water quality guidelines

Stream temperature
- Continual water temperature was measured at ALX03 from March 2015 – September 2017
Alexander Creek CABIN Results

CABIN is a nationally recognized water monitoring standard, which compares invertebrate community and stream habitat information to similar ‘reference streams’ (i.e., healthy streams).

- Alexander CABIN results determined that the benthic invertebrate community was potentially stressed in 2012, 2013 and 2017, and unstressed in 2014 – 2016 and 2018.
- Potentially stressed conditions indicate mild divergence from the reference group. This may be from: small annual changes in habitat conditions, sampling variability, and/or natural community variability.
- Overall, benthic macro-invertebrate community, habitat, and water quality data support the CABIN model rating of a healthy aquatic environment.

Water Temperature

- Long-term temperature monitoring helps to understand changes in aquatic environments, and potential impacts on native fish.
- At ALX03, minimum Bull Trout (BT) incubation water temperature of 2 °C was not met in winter. Spawning likely occurs elsewhere, where groundwater-surface water interactions provide consistent year-round water temperatures.

Continual stream temperatures at ALX03 and BC aquatic life guidelines to protect Bull Trout (BT).

Benthic Invertebrates

Invertebrate populations are a useful tool to assess stream health, because certain species are more/less resistant to water quality.

Table 1 shows CABIN metrics. The colour of the year indicates the CABIN rating. Circled values were near (dashed) or exceeding (solid) reference levels and may contribute to lower ratings.

- Invertebrate abundance (total number) may increase with nutrient enrichment or decrease with pollutants
- EPT are Ephemeroptera (mayfly), Plecoptera (stonefly), and Trichoptera (caddisfly). EPT are sensitive to pollution, thus important water quality indicators.
- Chironomidae (midges) are generally pollution tolerant.
- % of most dominant taxa is a biodiversity indicator and increases with disturbance.
- Total # of taxa typically declines with disturbance.
- Substrate type (cobble, pebble, silt/clay) and embeddedness provide important information for benthic habitats.

<table>
<thead>
<tr>
<th>Table 1. Select macro-invertebrate community &amp; physical habitat metrics</th>
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<tbody>
<tr>
<td>Metric</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Abundance</td>
</tr>
<tr>
<td>% EPT taxa</td>
</tr>
<tr>
<td>% Chironomidae</td>
</tr>
<tr>
<td>% 2 dom. taxa</td>
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<tr>
<td>Total # of taxa</td>
</tr>
<tr>
<td>% cobble</td>
</tr>
<tr>
<td>% pebble</td>
</tr>
<tr>
<td>% silt and clay</td>
</tr>
</tbody>
</table>

Condition: unstressed, potentially stressed, stressed, severely stressed.

Water Quality

- Two guidelines for the protection of aquatic life were flagged.

TOSSED SUSPENDED SOLIDS (TSS)
- The TSS BC guideline is dependent on background levels.
- Alexander Creek TSS was high in May 2015 and April 2016, at 52 and 33mg/L (respectively).
- TSS will increase naturally during spring freshet, but can be influenced by human activities (i.e., loss of vegetation).

TOTAL PHOSPHOROUS
- Exceedances occurred in April 2015 and May 2017.
- Sources could be natural or from human related activities such as cattle grazing.

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ERA received support from the Columbia Basin Water Quality Project (CBWQ), a citizen scientist project made up of non-profit partner groups who monitor their local watersheds. Since its inception in 2007, CBWQ has been administered and coordinated by Jim and Laura Duncan of Mainstreams Environmental Society in Kimberley.

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 CBWQ projects since 2012.

Contact Us

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A heartfelt thank-you to our dedicated volunteers who have spent hundreds of in-stream hours monitoring water quality with us!