



First Nations Fish Habitat Program Birdtail Creek



CIER

CENTRE FOR INDIGENOUS ENVIRONMENTAL RESOURCES

What is Water Quality Monitoring?

Monitoring water quality involves trying to tell a story of what is going on in a particular river or lake. There are many ways to get information to fill in the story. Chemical monitoring to understand the amount of oxygen in the water or the pH levels (measure of acidity or alkalinity) will tell you one type of information about what is going on in your waterbody. These water quality numbers can be compared to nationally accepted levels and guidelines to gauge whether your water is considered healthy.

What are Macroinvertebrates?

Large and easy to see aquatic animals that have no backbone. Ex. waterbugs bugs, leeches, and crayfish.



Photo by B. Maclean

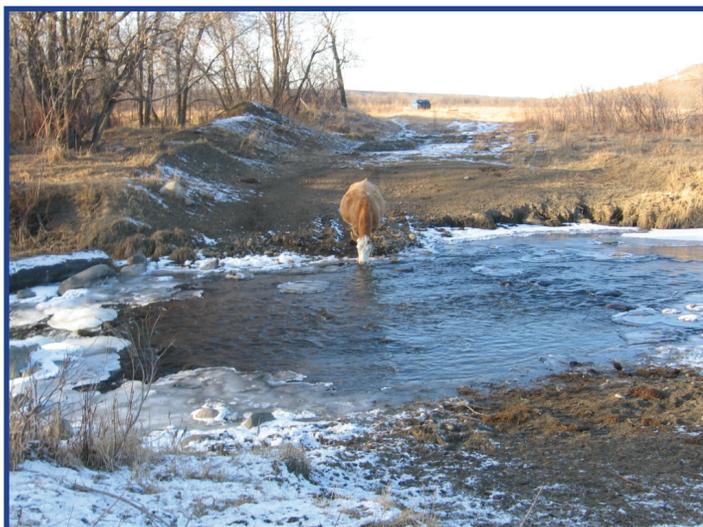


Photo by B. Maclean

Why Sample the Birdtail Creek?

The Birdtail Creek is used as a watering area and as a crossing point for around 500 cattle. The cattle, in accessing the water destroy the banks and pollute the river with sediment, nutrients, and fecal matter. The Birdtail Sioux First Nation and the Centre for Indigenous Environmental Resources (CIER) sampled macroinvertebrate in the Birdtail Creek to determine the impacts these cattle were having on fish habitat. This pamphlet reports on the results of that study.

What are Other Ways to Monitor Water Quality?

Another way to monitor water quality is by looking at the macroinvertebrates in the water. This takes the monitoring story to a greater level of complexity and usefulness, by answering questions like “what does a pH of 6 look like in the biological community?”. I.e. What impact do these numbers (water chemistry parameters) have on aquatic life? Capturing macroinvertebrates and determining which different kinds are in the water can give indications of how healthy a system is. Ex. Some macroinvertebrates die with even small amount of pollution. If none are found in your water system then it might mean something is wrong.

Results of Metric 1 – Species Richness



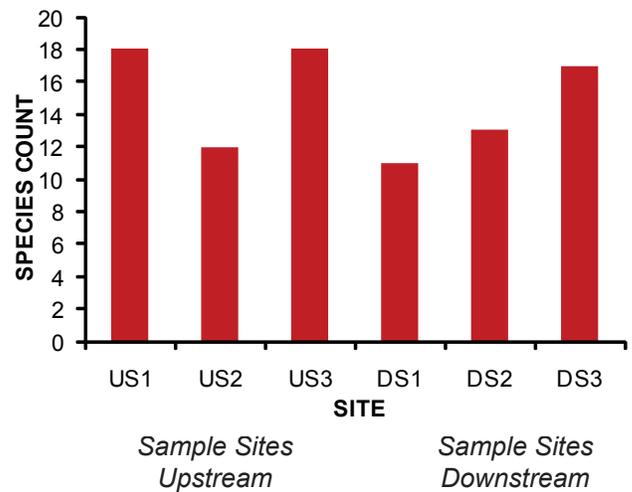
Sample Sites Upstream of Cattle Disturbance
(Above; Photo by B. Maclean)

Sampling with a Kick net
(Left; Photo by B. Maclean)

How was Sampling Done?

Macroinvertebrates were caught using a kick net at three sites upstream of the cattle crossing area and at three sites downstream to observe if cattle had negative impacts on the Birdtail Creek. All macroinvertebrates were preserved and examined later in a laboratory.

Species Richness



What is a Metric?

A comparison of groups of macroinvertebrates. Some metrics involve looking at the amount of different kinds of species in the water and others look at comparing specific groups of bugs sensitive to pollution versus pollution tolerant ones.



Sample Sites Downstream of Cattle Disturbance
(Map courtesy of Google Earth)

What is Species Richness?

The total number of different kinds of macroinvertebrates found in a sampling study. A river with many different types of macroinvertebrates is generally understood to be more healthy than one with fewer numbers of macroinvertebrates.

What Did the Study Show?

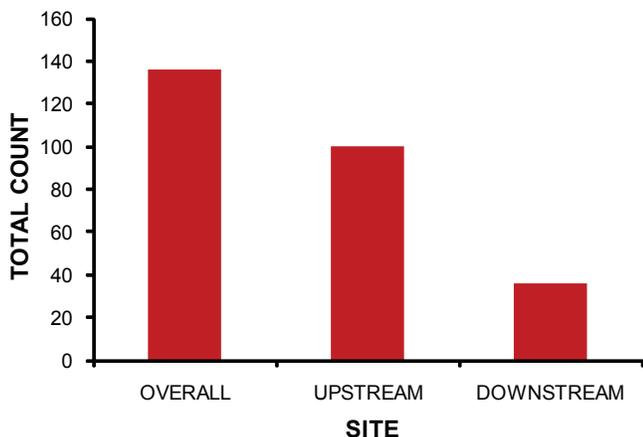
In the Birdtail Creek there are more species upstream of the cattle crossing than downstream. This shows that the cattle have a negative effect on water quality.

HOWEVER, the overall diversity in the Birdtail Creek is relatively high which shows that it is still a moderately healthy creek.



Results of Metrics 2 and 3 – Total EPT and EPT vs. Chironimidae

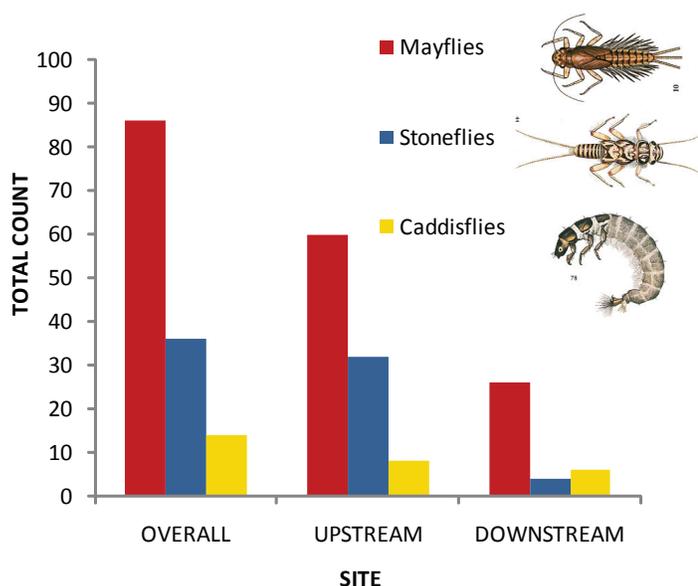
Metric 2 - EPT Total



What is Total EPT?

It is the total number of three different species of macroinvertebrates (mayflies, stoneflies and caddisflies) found in the samples. The letters EPT are from the scientific name of these macroinvertebrates. Mayflies, stoneflies and caddisflies are the most sensitive to habitat disturbance. An even distribution and high numbers of EPTs will indicate good water quality. Special attention should be paid to the absence of any one of the three EPT groups at a site.

Metric 2 - INDIVIDUAL EPT SPECIES COUNT



What Did the Study Show?

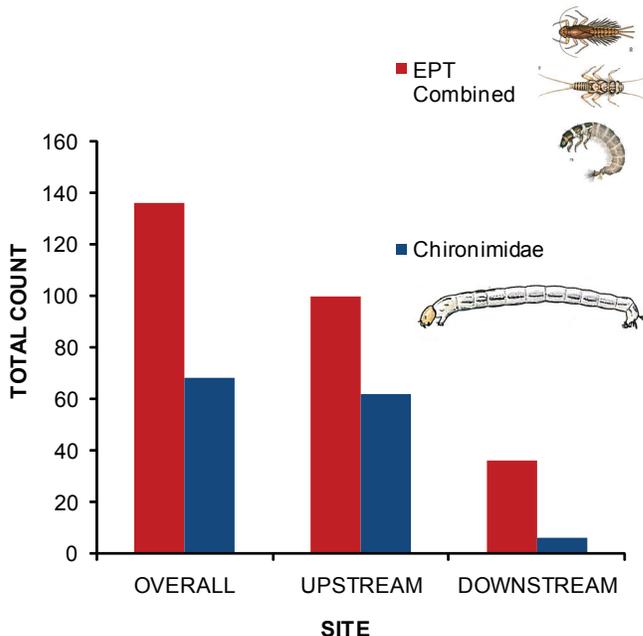
In the Birdtail Creek we see more EPT (mayflies, stoneflies and caddisflies) in the upstream sites than the downstream ones. This implies that cattle are negatively affecting water quality downstream of the crossing.

The ratio of EPT to Chironimidae (midges) is somewhat balanced and indicates fair water quality at both sites. The number of midges is still somewhat high and might indicate low oxygen levels.

What is EPT vs. Chironimidae?

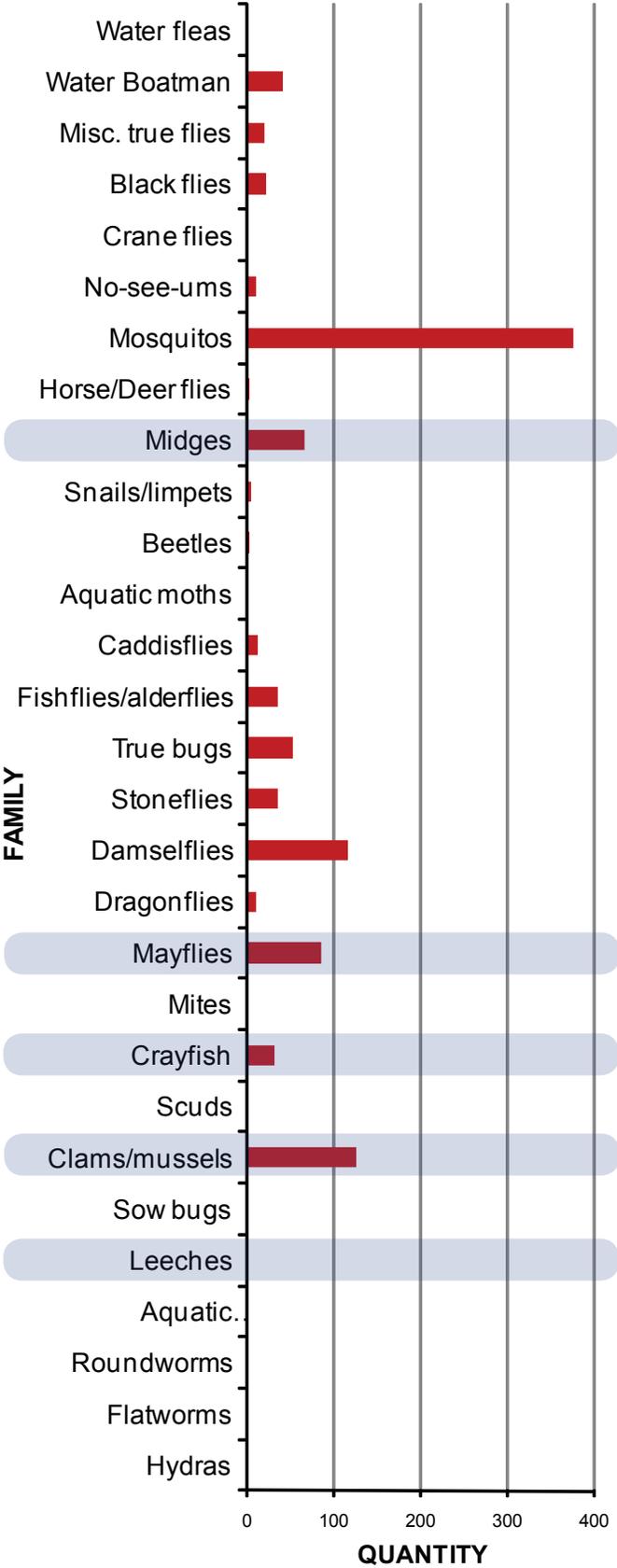
This compares the sensitive three species (EPT) from metric 1 to midges, which are able to survive in quite polluted waters with low oxygen levels. In a disturbed creek there will be an imbalance between the EPT (sensitive and pollution intolerant) and the midges (non-sensitive pollution tolerant), with more midges than the EPT combined. As water quality improves the ratio becomes more balanced.

Metric 3 - EPT Combined VS. Chironimidae





Species Richness



Is the Water Quality in the Birdtail Creek Good?

Overall, this study shows that the quality of water in the Birdtail Creek is fair to marginal, however with room to improve. Moderate numbers of midges, (which can tolerate low oxygen levels) indicates marginal water quality, as does the presence of many clams and mussels. The presence of moderate amounts of mayflies is a great sign, because they are very intolerant to pollution, (their presence means the creek is not severely damaged). Also crayfish are a good sign of creek health.

Special thanks go to Joe and Murray Bunn for bringing the concerns in the Birdtail Creek to the attention of the First Nations Fish Habitat Program. Thanks to Unilever for funding the study.

More on Leeches

Joe Bunn specifically mentioned the change in water quality and the disappearance of leeches from the creek. This macroinvertebrate study confirmed the absence of leeches. Leeches are generally understood to be indicators of poor water quality but, only if they form a large proportion of the macroinvertebrates collected. For example, catching a few wouldn't necessarily mean the system is severely degraded.

The leeches might have disappeared because the riverbed was disturbed and fine sediment was suspended. In environments with fine sediment, leeches cannot attach their suckers to the substrate. The constant action of cattle on the banks could cause this to happen.

For Further Information Please Contact:

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