



## why biomonitor BENTHIC INVERTEBRATES ?

Biological monitoring (biomonitoring) is the use of living organisms as indicators of environmental conditions. Biomonitoring may include counting the numbers and types of species within a community, or testing the effects of toxins on particular organisms.

Benthic invertebrates are the bugs that live on the bottom of streams and lakes and include the larval stages of insects such as mayflies, stoneflies, caddisflies as well as worms and other animals such as freshwater shrimp. They are commonly used for biomonitoring as they present a number of advantages for researchers:

- they are the most widely used aquatic organisms for assessment of ecosystem health
- they stay in one place and can therefore reflect localized conditions or site-specific impacts
- they have highly diverse sensitivities to physical and chemical stresses
- they have life cycles of 1-3 years that reflect time-integrated effects of pollution and stressors
- they are an important food source to fish and wildlife
- they are easy to collect

*Enabling Experiential Learning*

*Embracing Local Communities*

*Promoting College Leadership*

*Ensuring Sustainable Futures*

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*implementing the*

**CANADIAN  
AQUATIC  
BIOMONITORING  
NETWORK**

*in the  
Muskrat River  
Watershed*



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# monitoring the MUSKRAT RIVER WATERSHED

Students and faculty of Algonquin College in the Ottawa Valley (ACOV) are taking the lead on implementing a new multi-year ecosystem monitoring program in the Muskrat River Watershed. Using aquatic benthic invertebrates or “bugs” as indicators of ecosystem health and following the scientifically defensible CABIN protocol, college participants are learning how to properly collect, identify, quantify, manage and analyse aquatic invertebrates. This initiative embraces experiential learning and relies on the combined expertise that can be leveraged only through a multi-disciplinary approach. It involves students from the forestry, outdoor adventure naturalist, business, health, and technology based programs; each serving a unique role in the project. This cross-cutting expertise, combined with ongoing support from local landowners, government agencies and stewardship groups, will allow Algonquin College to move the community forward on a path to enhanced ecosystem awareness and improved environmental decision-making.

By knowing the individual preferences of species we can look at their abundance as well as their absence in a sample and be able to predict the type of impact that may be occurring.

## what is CABIN?

Canadian Aquatic Biomonitoring Network is a program developed by Environment Canada that promotes the national standard for biomonitoring in Canada.

CABIN's web-based resources include standardized sampling methods, a reference database of biological and landscape data, a data management system, and analytical software and reporting tools.

CABIN standard sampling method training is offered in a series of online modules coupled with field training workshops. CABIN trainees learn to apply these standard biomonitoring methods and are then able to make scientifically defensible assessments.

## how does CABIN WORK?

Aquatic benthic invertebrate or “bug” sampling, using the CABIN protocol, allows for the establishment of reference conditions within a watershed. Reference sites are chosen because they are deemed to be minimally exposed to human influences such as urban activities, effluent discharges, or land use changes which often degrade aquatic ecosystems. By collecting samples at a variety of reference locations, we gain an understanding of the natural variability of invertebrate communities.

Once enough reference sites have been collected to capture this natural variability in minimally impacted streams, models are then constructed and can be used repeatedly to assess the aquatic ecosystem health of test streams. The numbers and types of bugs found at a test site are compared to the reference condition. This process allows the researcher to determine if a test site is disturbed and may also indicate the severity of the impact. Such an analysis may then lead to identifying the cause of the change in the local bug community and eventual remediation of the impaired site.



photo: Nancy Bell

**CHOOSE REFERENCE SITES**  
LOOK AT BUGS IN  
UNIMPACTED / PRISTINE SITES

**BUILD REFERENCE MODEL**  
RELATIONSHIP BETWEEN  
HABITATS ↔ INVERTS

**CHOOSE TEST SITES**  
IDENTIFY INVERTS AND HABITAT

**COMPARE**  
HOW DIFFERENT ARE TEST  
SITES FROM REFERENCE SITES  
OF SIMILAR HABITAT?

