# Stream Superheroes

Audubon Center of the North Woods

**Purpose:** Sometimes the tiniest, most unexpected creatures can teach us BIG, important lessons. The unique abilities and features that Macroinvertebrates possess seem to give them superhero strengths (just on a smaller scale). In this class students will collect and identify macroinvertebrates, and then observe how their adaptations help them to survive in their aquatic environment. Students will also discover why scientists study these creatures to assess the quality water.

**Concepts:**

- Macroinvertebrates are organisms that can be seen with the naked eye and that have no backbone.
- Water quality is important as it pertains to the survival of life on earth.
- Adaptations are characteristics that an organism possesses that assists in its survival.
- Tolerance to water quality conditions varies among aquatic invertebrate organisms.
- Population diversity provides insight into the health of an ecosystem.

**Learning Outcomes:** ***Students will be able to***

- Recognize the physical adaptations of macroinvertebrates, and how they assist in its survival
- Define the terms *macroinvertebrate* and *water quality*
- Predict what types of environmental stressors affect water quality and aquatic invertebrate populations
- Interpret dichotomous keys in order to identify and determine the tolerance of the species collected
- Record and present information about their favorite macroinvertebrate and make an assessment on the quality of water at the sampling sites based on the species that were sampled

**Minnesota Academic Standards:**

Science:

5.4.2.1.2 Explain what would happen to a system such as a wetland, prairie or garden if one of its parts were changed.

7.4.2.1.3 Explain how the number of populations an ecosystem can support depends on the biotic resources available as well as abiotic factors such as amount of light and water, temperature range and soil composition

7.4.3.1.3 Distinguish between characteristics of organisms that are inherited and those acquired through environmental influences.

8.3.4.1.2 Recognize that land and water use practices can affect natural processes and that natural processes interfere and interact with human systems.

**AUTHOR:** Jaime Souza, Spring 2008

**CLASS LENGTH:** 3 HR

**AGES:** GRADES 4-8

**SEASON:** F, SP, S

**GROUP SIZE:** 10-15 students

**SAFETY:** Students should work in small teams, so they can monitor each other around the various aquatic sampling spots. Students should handle invertebrates, carefully. Students should not wonder off while sampling at each site.

**MATERIALS:** Laptop, Projector, Laminated Macro pictures, Microscopes, TV Projector, Water trays and utensils (4 sets), Laminated aquatic invertebrate keys, Pond Books, Collecting Nets, Collecting Buckets (4), rubber boots, Water Quality Equipment (when requested), scrap paper, *Interview with an Invertebrate sheet*, *Data sheet*, Pencils or Pens, reflective readings

**PRE-CLASS PREP (30 min):** Tables need to be set up for aquatic stations. Determine which sampling sites you will visit. Set up at least four exploration stations to spread the students out. Each station should include one field microscope, plastic trays, plastic spoons, Petri dishes, field guides, data sheet, pencils, and aquatic invertebrate keys. Set up stereoscopes on the perimeter of the science room or lounge. Also, nets, buckets and water quality equipment (if requested) will be used for field collection. The TV and connecting microscope should also be set up. Two separating stations should be set up on the counters; one for the pond, and one for the stream.

**CLASS OUTLINE:**

I. **Ten Minutes to Teaching**
II. **Introductions**
   - A. Lesson Preview
   - B. Grabber – Macro lunch or stonefly push-ups

III. **Class Experiences**
   - A. Meet the Mighty Macroinvertebrates (5 min)
   - B. Anatomical Adaptations(15 min)
   - C. Stream Simon Says(10 min)
   - D. Metamorphosis (20 min)
     1. Activity: Transformations
     2. Activity: Macroinvertebrate Match

IV. **Field Collection (30-45 min)**
V. **Dig and discover (30 min)**
   - A. Identifying aquatic invertebrates
   - B. Pollution Tolerance Classification
   - C. How Sensitive Are You?

VI. Authentic Assessment(20 min)
   - A. Separation Stations
   - B. Graph the Results
   - C. Assign Points
   - D. PTI (Pollution Tolerance Index)
   - E. Discuss the Results

VII. **Clean-up (5 min)**
VIII. **Reflection- Create a Critter (20 min)**
IX. **The Sending – Little Life Lessons (5 min)**