Macroinvertebrates

Helpful Facts and Information

- Macroinvertebrates are animals that lack a backbone ("invertebrate") and are big enough to be seen with the unaided eye ("macro").
- The macroinvertebrates we focus on are aquatic which means they either spend their whole life in water or a significant portion of it in water. These water bodies can be rivers, streams, lakes, ponds, etc.
    - They live in the rocks, along the banks, tucked into grass and moss, and mud.
    - Sometimes we can see them clearly and sometimes we don't even know they are there until we dig around a bit with our net or hands.
- Life stages: Similar to salmon, macroinvertebrates have a complicated life cycle. Most remain underwater in the immature stage and only emerge out of the water as adults. Their life cycle can be broken into incomplete (egg-nymph-adult) or complete (egg-larva-pupa-adult)
    - Egg: Eggs are deposited in the water
    - Larva: This stage can last years and looks very different from the adult stage. Think of a caterpillar before it becomes a butterfly
    - Pupa: This is where they undergo the morphological (physical) changes and develop the structure to become an adult
    - Nymph: Immature form that closely resembles the adult form. During this stage they can be found crawling around rocks
    - Adult: In this stage, the insect is usually winged and lives out of the water. The adult cycle is brief and similar to salmon, it ends after the macroinvertebrate mates and lays eggs. (on land)
- Feeding Types
    - Shredders: Chew on plant material. Take little bits of plant material and shred.
    - Scrapers/grazers: Scrape off and consume thin layer of algae growing on substrate and woody debris
    - Collectors: Consumer very small pieces of dead organic material (detritus)
    - Predators: Feed on other bugs
- The importance of macros
    - Bioindicators: A bio-indicator is an organism that gives us clues as to how healthy or desirable an ecosystem is. Aquatic macroinvertebrates are affected by physical, chemical, and biological conditions of the stream. Some are sensitive to pollution and others tolerate pollution. Because macros can be grouped based on how they handle pollution, they tell us a lot about the health of a stream. If we see a lot of pollution tolerant species, we can assume that the water quality in that area needs improvement and may not be able to support fish.

- Provide a food source for maturing fish. Small fry and juvenile salmon depend on macros as a food source.
- Because of their different feeding styles, macros support a healthy stream system by feeding on and breaking down the organic material that can impact water quality. What if we didn't have macros feeding on algae covered rocks? That algae would spread and soon the water temps would heat up and the dissolved oxygen would go down.

Station Outline: Station length varies depending on the class. Most stations are between 30 and 45 minutes.

Station Preparation

1. Arrive at the field trip location early (30 min) to collect macros at various locations in the stream
2. Dump macros into small bins. Be sure to not have too much mud and leaf litter in the bin
3. Prepare ice trays, turkey basters, and handout

Student Participation

1. Welcome the students to the station
2. Let them know that there will be a chance to look at and play with what is in the bins after we talk a little bit more about it
3. Talk to students about macros: What is a macroinvertebrate? Why do macroinvertebrates matter? What types of macroinvertebrates live in streams?
4. Introduce the macros that have been collected on site and the guides available to identify different species. Set clear and direct expectations on how to handle macros. Explain to students that these are living creatures that we will return to their natural habitat after the trip.
    a. Look for movement in the bins
    b. Use a spoon to collect larger macroinvertebrates
    c. For smaller macroinvertebrates, use the turkey baster. Be sure to push the air out BEFORE stick the baster tip in the water to suck up the macro. Keep the baster at an angle so the macro does not get sucked up in the bulb but stays in the baster before squeezed into the ice cube tray.

Discussion/Wrap Up

- Use the macros the group sorted to decide how healthy the stream habitat is
    - What macros did we find?
    - What do they tell us about the health of this stream?
    - If they have already been through the water quality station, how does this information compare?
- Ask students if they have a favorite macro and why
- Based on what the macros look like, can we guess what type of habitat they live in?
    - Fast water vs slow water, silt/sand vs rock/cobble, rock/cobble vs leaf litter

- What can we do to protect macros in streams
- **HS Discussion:**
    - How do you think Macros fit into the food chain? Who eats Macros? What do macros eat? What do you think would happen to this river/stream if there were no macros present?
    - Where do we see examples of macros ability and role as a resource outside of the stream?
        - Example: fishing lures, scientists are studying webs of caddis flies to mimic the material for use in open heart surgery because it holds great strength in a wet environment, art work,etc
    - If you were a macroinvertebrate, what species would you be and where would you live in the stream?
    - How can we use the information from macros and this station to influence how we interact with streams and aquatic environments outside of Salmon Watch?
        - Would you go swimming in water that has lots of pollution tolerant species? How can you use life cycle patterns to catch fish? Will macros tell us what other kinds of animals and fish we might see in an area?