Lake Roosevelt Water Festival 2008

September 23 & 24 • 9:30am to 2pm • Lake Roosevelt Day Use Area

Kids in the Creek

Curriculum Objective

To teach students about the plants, animals and insects that live in and near Sherman Creek. To provide an opportunity for the students to explore the stream habitat and collect stream insects. To teach students how to identify the insects they collected and how to determine the health of the stream by using the macroinvertebrate water quality testing method. To provide students with the knowledge that plants, animals and insects need a healthy home in order to survive and that the interconnection of these species and their habitat is vital to the circle of life: they provide for us and we, in turn, must make every effort to protect them.

Washington State Essential Academic Learning Requirements (EALRs)

Science: 1.1 (basis of biological diversity BM 1,2&3)
Science: 1.2 (biological systems BM 2&3, structure and organization of living systems BM 2 &3)
Science: 1.3 (life processes and the flow of matter and energy BM 2&3, biological evolution BM 2, interdependence of life BM 1,2&3, environmental and resource issues BM 1&2)
Science: 2.1 (designing and conducting investigations BM 1,2&3, explanation BM 1&2, modeling BM 1&2, communication BM 1, identifying problems BM 1&2)
Science: 3.1 (dealing with inconsistencies BM 1&2, evaluating methods of investigation BM 1&2)
Communication: 3.1 (work cooperatively as a member of a group BM 1,2&3)
Communication: 3.3 (seek agreement and solutions throug discussion BM 1,2 &3)
Mathematics: 1.1 (computation BM 1,2&3, estimation BM 1,2&3)
Mathematics: 2.1 (investigate situations BM 1,2&3)
Mathematics: 2.2 (formulate questions and define the problem BM 1,2&3)
Mathematics: 3.1 (analyze information BM 1,2&3)
Mathematics: 3.3 (draw conclusions and verify results BM 1,2)
Mathematics: 4.1 (gather information BM 1,2&3)
Mathematics: 4.2 (organize and interpret information BM 1,2)
Mathematics: 5.3 (relate mathematical concepts and procedures to real-life situations BM 1,2)

Links: macroinvertebrate identification | scientific observations and methods | macroinvertebrate anatomy | benthic sampling | macroinvertebrate on-line key | macroinvertebrate identification key

Course Description

This activity provides students with a simple method of assessing the long-term health of a stream by viewing and identifying the aquatic insects and observing the world they inhabit. It explains the importance of a healthy watershed and the effect of a vibrant forest canopy and riparian area of the stream and its water quality. It also connects the conditions of the stream being explored to the immediate food chain as well as the entire ecosystem.

Stream Investigation

Each student will be provided with a pair of rubber boots. In the stream, they will locate a riffle that has not been disturbed or pose unsafe conditions. A leader will be selected to carry a white bucket with stream water for collected specimens.

The class will approach the sample area to find rocks which they will hold to the sunlight until they can see movement. Then, they will carefully wash off the "bugs" and place them in the white plastic bucket.

Once enough of a variety of bugs has been collected, the students will take them back to the stream bank and select similar species for placement into a cubical in an ice tray.

The students will identify

Prework

Help prepare students for this field trip by taking a few minutes in the classroom to go over some of the vocabulary words and their meanings as well as the objective of this outside classroom activity.

Take your students on a virtual stream tour!

Vocabulary Words

Forest Canopy: Trees and foliage. Overhead cover. It provides leaves, woody debris, and insects to the stream; it prevents your stream from evaporation, as well as providing shade necessary to keep water temperatures cool.

Macroinvertebrate: These are creatures without backbones. They are a primary link in the stream food chain. They eat smaller organisms like bacteria, fungi, leaves and woody debris and in turn they are eaten by fish, birds, amphibians and reptiles.

Habitat: A place that provides food, water and shelter for living things.

Watershed: An area that surrounds and drains into a body of water. The water collects into little streams that join into bigger ones forming a drainage system. Your stream is part of the drainage system. With this runoff comes a lot of substances in the form of sediment, dissolved minerals, chemicals and pollutants.

Riparian: The area of vegetation adjacent to the stream. Composed of foliage, shrubs and trees. All around the waters edge it is very green with vegetation. This is important because it

insects according to the pictures on a macroinvertebrate pocket chart provided by the instructor, recording each type of organism on an aquatic insect record (see below). Once the students have identified several types of organisms, they will compare what they have found to the "tolerant-intolerant" species grouping on the chart and make some conclusions about the health of the stream. Their conclusions will be based upon: 1) the types of organisms identified; 2) observations of streambed conditions; and, 3) observations of the riparian area and forest canopy.

Aquatic Insect Record

Keep a record of each type of organism you find in your search.

Observe and record the descriptive features of the insect you are looking at.

Look at the two identification sheets included in your packet. ONce you have found an insect that looks like the one you have just described, find its common name.

Identify to which group the insect belongs (tolerant or intolerant of water pollution.

Descriptive Features	Common Name	Tolerant/ Intolerant

helps prevent erosion and provides shelter and food to the inhabitants of the area.

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Riffle & Pool Description

Background Information

Gazing into the cold water of a small stream in winter reveals little animal activity. The stream, like the woods around it, seems lifeless. But, take a closer look. Skeletons of leaves with only the main ribs remaining provide evidence of animal activity.

The leaves are eaten by aquatic invertebrates, especially insects that spend most of their lives in water. They change their forms, grow wings and emerge from water only during spring or summer when they mate.

During late fall and winter, small streams in wooded areas are menageries of aquatic insects. This is because most of the leaves and wood (containing energy for the insects) fall into the stream during this time. At other seasons of the year, you would probably find a different assemblage of animals.

If you were to collect a handful of leaf litter or a rock from the stream or kick up some bottom material from under rocks and let the current carry the material into a fine mesh net, you would be able to collect a winde range of insects you probably had not known were present. These insects can be placed into groups according to how they feed (functional feeding groups):

Shredders: Feed on leaves or wood that falls into streams and eat the softer plant material, leaving the leaf skeleton.

Collectors: Feed on fine material in streams. Some filter the water for their food (filtering collectors), while others burrow in the stream bottom, feeding as they go (gathering collectors).

Scrapers: Feed by scraping the surface of rocks and logs, removing algae.

Predators: Feed on insects and other invertebrate animals

The following aquatic insect guide will help students discover what kinds of insects live in the stream. This is just a general guide but it will help identify most insects to a particular group:

Aquatic Insect Guide	
Builds a portable "house" or case to live in	Caddisfly
• If case is made of material that was once living (wood, leaves, etc.,)	Shredder
• If case is made of mineral material (rocks, sand grains)	Scraper
Has two tails, without abdominal gills	Stonefly
• If dark and uniformly colored	Shredder
• If large and brightly colored and/or mottled	Predator
Has three tails (sometimes two), with abdominal gills	Mayfly
• If flat, sometimes egg-shaped	Scraper
• If cigar-shaped	Gatherer Collector
Worm-like, without true legs	Flies
• If <1cm long, 1 pair stubby "legs," head well developed	Gathering Collector (Midge)
• If>1.5 cm long, head reduced, often found in leaf litter	Shredder (Cranefly)
• Antennae modified as tiny fans	Filtering Collector (Blackfly)
Free-living, 3 pairs of legs	Odonates/Beetles
• If large, with gills at end of abdomen	Predator (Damselfly, Dragonfly)
• If no gills, usually tough outer covering, jaws often easy to see	Beetles
• Dark brown; tough outer covering	Gathering Collector (Riffle Beetle)
• Color varied; abdomen soft-bodied	Predator (Beetle

Classroom Activity

Pint jars make excellent aquariums for pond life if fish and other large animals are left out. Every pupil should have one of his or her own to watch and enjoy, even if the windowsills and bookshelves are filled for a time!

Such aquariums encourage pupils to make observations on their own and to share their discoveries with classmates. This is so much better than merely feeding goldfish in a classroom aquarium that has become just part of the furniture!

To make a fish-less aquarium, a pupil should place a centimeter or two of pond-bottom sediment in a jar, stick in a small water plant or two, and add pond water. Then put in a snail or two and a few water insects. The water will become clear after a while, allowing many tiny animals to be seen, perhaps for the first time! A magnifying glass will help.

Ideally, a class should set up jar aquariums at a nearby pond. Borrowing in a sense, small parts of the pond for a little while. Early fall is a good time to do this. Then the experience may be repeated in the spring to see what seasonal changes have occurred.

Well in advance of the trip to a pond, notes should be sent home to advise about clothing, especially rubbers or boots. Also, one or two parents may be invited along to participate as well as to provide additional supervision. Possibly a primary grade teacher and an upper-grade teacher can take their classes at the same time, having each older pupil be responsible for a younger one. It surprising how well they shoulder this responsibility!

If the whole class cannot be taken to the pond, perhaps you and a few pupils can bring the material to school. For a class of 30 pupils, you should fill four gallon jugs with pond water and get a small pail of sand or silt from the pond bottom. Also borrow some plants and animals from the pond - not too many!

Gather a few handfuls of small plants, and use a large kitchen strainer to collect some water insects, snails, and other small animals. Put them in a gallon jar of water.

If each sample is first dumped into water in a white pan, the creatures will be more easily seen. Then they can be spooned out. At school, they may be transferred to shallow pans for pupils to select the ones they want. To make the experience a really pleasant one, be sure that pupils:

Put only a few animals and plants in a jar, too few rather then to many. Crowding may cause them to die.

Keep the jars in a cool place, away from radiators. As a rule they should not be left in direct sunlight.

Move or shake the jars a little as possible. The creatures that live in them should be observed, not disturbed.

Add no food. The green plants make their own food, and the animals eat plants, or animals whose food came from plants.

Use pond water to replace any water that evaporates. Tap water containing chlorine is harmful to some creatures.
Over several days, pupils may investigate questions such as these:

How do the animals get around by legs, or by other means? Do any stay in one place, attached to objects?

What do the animals eat and how do they eat? How do they keep from being eaten?

Which animals carry bubbles of air with them, or get air through little tubes? Do any get air by moving gills through the water?

Do some animals avoid light? If you leave a paper bag over a jar and later remove it, can you see things you did not see before?

Where do the plants show signs of most growth in leaves, stems, or roots? Do they all have these parts?
Among the many other things that pupils may discover are these:

Hydra, named after a monster of mythology, snaring other small animals with their “arms”.

Tiny water “fleas”, such as Daphnia and Cyclops, darting through the water.

Small shrimp like animals with curved backs and many legs, called scuds, swimming along.

Diving beetles carrying their own air supply with them.

Caddis larvae pulling their cases along.

Mosquito eggs later changing into “wigglers” hanging from the water surface and later hatching as adults.

Ananchairs (once called Eldea) plants giving off tiny streams of bubbles in sunlight.

After a week or so, before interest wanes, have pupils return the plants and animals to the community from which they were borrowed. Take another trip to the pond - make it just as important as the first one, for the express

purpose of putting the creatures back.

Doing this instead of flushing them down the drain or throwing them out helps to instill respect for living things. A basic environmental ethic!

Source: "Teaching Science with Everyday Things"

Safety in the Creek

Crossing a tranquil stream can be a pleasant experience, however unsafe stream crossings by hikers or "investigators" can result in injuries or deaths. Often people in unfamiliar areas do not adequately size up the situation before attempting a crossing or they ignore dangerous changes which have taken place at crossings with which they are familiar. The purpose of this article is to remind everyone of some all-too-often forgotten elements in hopes of sharpening your judgement skills.

- Do not attempt to cross a stream over 2 feet deep and/or with very fast (3.4 MPH) water.
- Pick a good crossing, on a straight stretch of water, free from soft mud, snags and large, slippery rocks.
- Prevention is always the best cure. When navigating unfamiliar streams make sure the group is in agreement that they will size up every significant crossing before anyone starts across. Mishaps don't happen that often, but they can have devastating consequences.
- It is sometimes difficult to know exactly what a water crossing has in store until you are out in it. Water is heavy and the impact that it has on humans is dependant upon depth, velocity (speed), and direction (which includes turbulence).
- Since fast moving water causes most stream bed erosion, channels are generally deepest where water is flowing the fastest.
- Avoid crossing at bends.
- Smooth water is generally the safest, and most desirably should appear with the least visible changes in velocity as one looks across the stream.
- Wide, shallow crossings are generally desirable as water velocity is consistently lower.
- Gravel stream beds are generally the safest, particularly when water is clear enough to see the bottom and avoid the more obvious submerged hazards.
- Roots, snags and other entanglements should be avoided for obvious reasons. Avoid banks crowded with water loving trees, dead branches and such.
- Finally, when walking out in rocky stream beds, there is always the possibility that you could get a foot stuck in a hole or crack. If this occurs, it may be necessary for someone to help you keep your balance while you attempt to extract your foot. To attempt to do so prematurely can result in your falling over and not being able to get back up!

Pictures

Materials

Boots for students
White Bucket
Ice Cube Trays
Pocket Macroinvertebrate Guides
Aquatic Insect Records