Science Unit: ***Discovering Life in Local Habitats***

Lesson 2: ***Urban Life: What lives in our local park?***

School Year:	2009/2010
Developed for:	Weir Elementary School, Vancouver School District
Developed by:	Ingrid Sulston (scientist); Diane Merchant and Julie Kawaguchi (teachers)
Grade level:	Presented to grades 1 and 2; appropriate for grades K – 7 with age appropriate modifications
Duration of lesson:	Two lessons within a field trip, the first 1.5 hours long, the second 30 mins long

Objectives

1. Discover the enormous wealth of life once we step into our local park.
2. Practice careful observation and use of tools to find life barely visible to the naked eye
3. Learn to use colour assays to measure life processes.

Background Information

Central Park is a short walk from Weir Elementary and is rich with wildlife. The walk to the park from the school highlights to students how easy it is to access local wildlife. Once in the park, two ponds with a stream between them provide several sites for two classes of students to do science activities, along with the adjacent woods and their nurse logs.

Vocabulary

Cyclops, freshwater shrimp, worm, Daphnia	names of animals that we find in the pond
oxygen:	a gas that is part of air. we need it to stay alive. pond and stream organisms also need it.
pH:	a measure of how acidic something is. stream water is about pH7.
nurse log:	a dead log or stump that has started to decay and provides a habitat and food for other living things
decomposition:	breaking down; rotting

Materials

- lunches, raincoats, backpacks
- science notebook and pencil each
- plastic sheets for materials, sitting
- nets
- box magnifiers
- 10x loupe to see pond life more closely
- image of Daphnia showing eggs, gut, eye
- tubes for dissolved oxygen measurement
- dissolved oxygen tablets and colour chart
- tubes for pH measurement

- pond sample rich with life
- toothpicks to point out small pond animals and to remove debris from box magnifiers
- pH indicator solution and colour chart
- bingo cards with native plant images

In the Park

The students are split into three groups and rotate around three activities, each lasting 30 minutes. If additional scientists or teachers are available to help, these lessons benefit from additional adults stationed at each of these activities.

- Pond dipping: collection and identification of microscopic pond invertebrates.
- Stream chemistry: measurement of pH and dissolved oxygen levels in a stream.
- Nurse Log Life: identification of the living things on a nurse log.

The final activity is done in one large group:

- Native Plant Bingo: bingo game with native plants.

Students will focus on these processes of science: observation, exploration, recording results, concluding.

Safety guidelines: stay within areas designated by scientist and teachers. Do not ingest the chemicals used in the stream chemistry activity.

Science Activities

(1) Activity Title: Pond dipping

Purpose of Activity: To observe the animal life in a pond not visible to the naked eye.

Methods and Instructions:
Set-up prior to experiment: none
Students work individually.

1. Introduce the activity next to the pond: there is even more life in this park than we can see with our eyes. Lets see what we can scoop up with our nets. We'll use magnifiers to look at any tiny animals we find.
2. Students collect a small amount of pond water in the base of their box magnifier. Then, using a net, they scoop from the pond or stream near to plants then invert the net into the box magnifier. Using a pond identification key (ref 1), students are assisted in identifying the pond invertebrates they have caught. In this lesson, we identified Cyclops, freshwater shrimp, worms and Daphnia. Water plants and seeds also caught may be identified (refs 2 and 3).
3. Students can also look at pond water taken from a pond rich with invertebrate life in their magnifiers - I used pond water containing a concentration of Daphnia (water fleas). Students scoop a sample into their box magnifiers and look for the body parts of Daphnia by comparing with a labelled diagram (ref 1).
4. All students take notes in their science notebooks on how they caught pond organisms, what they find in the water, and the body parts of Daphnia.

(2) Activity Title: Stream Chemistry

Purpose of Activity: To measure pH and dissolved oxygen levels in a stream, and learn why this chemistry is important to living things.

Methods and Instructions:
Set-up prior to experiment: None.
Students work individually.

1. Introduction: the chemistry of the stream water determines how much life can grow in it. First we will measure how much oxygen is in the water (ref 4). Like us, the living things in the stream need oxygen. We breathe oxygen in from the air. Animals that live in the water use oxygen that is dissolved in the water (ref 5). Second, we will measure the pH of the water (or how acidic it is). If the water is too acidic (or too much in the other direction, too alkaline) living things will die (ref 6).
2. Within a designated area, students explore the stream to find landmarks (e.g. waterfall, bridge), then choose a part of the stream that they would like to sample. First they collect water in a tube for dissolved oxygen testing, and then collect the tablets from an adult (ref 4). While these tablets are dissolving, they can collect a second tube of water from the same place for pH testing, and then get a drop of pH indicator solution.
3. Students record their pH and their dissolved oxygen level for the area of the stream that they tested. Students can draw a map of the stream, with landmarks, and mark where they sampled from. They can also mark the location and readings obtained by a friend.
4. When all the students have made their measurements, the group hears all the readings and then discusses how healthy the stream is for living things. (In this class: dissolved oxygen was 4ppm - sufficient for some, but not all, life; pH varied from 6.5 to 7.5 - able to support a variety of living things). See refs 5 and 6 for the range of life at various dissolved oxygen and pH levels).

(3) Activity Title: Nurse Log Life

Purpose of Activity: To record the living things on a nurse log and the food web between them.

Methods and Instructions:
Set-up prior to experiment: None.
Students work individually.

1. Introduction: nurse logs were formed when a tree fell over, or was cut by early loggers. As the log starts to decompose it provides food and a habitat for many animals and plants. Although the soil in these forests is poor, many rotting logs provide the nutrients needed for new life to grow. There are two nurse logs close by each other in our park that the students can divide between.
2. Students draw the nurse log, and the large trees growing out of it. They should shade in the nurse log (to highlight how much is consumed by the new trees). Then draw where three or more living things (or evidence of living things) are on the nurse log (e.g. large trees (hemlock and Douglas fir), huckleberry, sword fern, lichen, spider webs, bird poop, bushes (huckleberry), lichen, fungus, insects, holes made by insects, birds).
3. Group discussion of what everyone found.
4. Smell the log to find one more living thing: the fungus growing through the log.
5. Students write out the names of the living things found on the nurse log, to show who eats who, with the nurse log at the bottom of the food chain. (e.g. nurse log eaten by insects, plants, fungi and lichen; insects eaten by spiders and birds; spiders eaten by birds).
6. Read “A Log’s Life” (ref 7). Students can add other animals to their food web that we did not see, but are living in there.

After a break for lunch, all students do two activities together:

(4) Activity Title: Native Plant Bingo

Purpose of Activity: To identify native plants growing in the park, and learn how they were used by First Nations People.

Methods and Instructions:
Set-up prior to experiment: None.
Students work individually.

1. Discussion: native plants have grown in this region for many years, long before Vancouver was here. Many of these plants were used by the local First Nations cultures for food, clothes and medicine.
2. Each student is given a bingo card, and instructed to search for the plants on it within a designated area. (Each card has six of these 10 plants: cedar tree, fir tree, moss, cattail, Oregon grape, red flowering currant, salal, salmonberry, fern, skunk cabbage). Students call Bingo! when they have found all 6 plants.
3. Discuss what First Nations people used each of these native plants for:
   - fern: young leaves for food (called fiddleheads - look for them in your food market)
   - red flowering currant: berries for food
   - salmonberry berries: for food
   - salal: berries for food, leaves for a cooking flavour
   - skunk cabbage: leaves for lining berry baskets
   - cattail: leaves woven into mats and seeds for pillows and wound dressings
   - moss: for bedding and pillows
   - iris: leaves braided into snares for catching large animal prey
   - fir tree: wood for fuel, and for making spear handles and spoons and other tools
   - cedar tree: wood for canoes, houses, totem poles, arrow shafts as well as fuel; cedar bark for baskets, rope, mats and woven with wool for clothes; roots for baskets and ropes.

4. Hand out Doulas fir cones to look at and retell First Nations story about Douglas Fir cones:
   - Long, long ago there lived a mouse in the forest. The mouse was fearful all day and all night, for the sly fox always tried to catch him and eat up him. The mouse was very clever and was able to hide from the fox for a long, long time. But one day, he let his attention wander, and before he knew it, the fox was right there! The mouse was very scared and ran off as fast as he could. But he knew the fox was faster, so frantically he searched for a place to hide. He spied a cone that he thought was big enough to hide him, so he scurried inside. Well, he was hidden well enough that the fox couldn't find him, but really the cone was too small. And to this day, you can see the hind legs and the tail of the mouse sticking out from the Douglas-fir cone, where he is STILL hiding from the fox!
   - Students can find their own Douglas fir cones until time to go back to school.

References

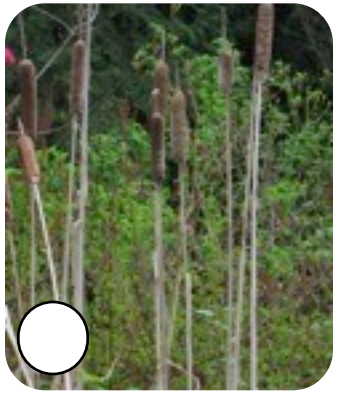
1. <http://www.microscopy-uk.org.uk/> Pond Life Identification Kit on “Micascapes”. Last accessed March 29th 2010.
2. Kavanagh, James and Leung, Raymond. 2005. British Columbia Trees and Wildflowers. A Pocket Naturalist Guide. Waterford Press.
3. Pojar, Jim and MacKinnon, Andy. 2004. Plants of Coastal British Columbia. Lone Pine Publishing.

4. <http://www.lamotte.com/pages/common/pdf/instruct/5963.pdf> Instructions for dissolved oxygen testing, with additional experiments.
5. <http://tellus.ssec.wisc.edu/outreach/teach/ideas/kotoski/Minifact_Sheets/Minifact4_Dissolved_Oxygen.pdf> Fact sheet on dissolved oxygen in water. Spring Harbor Environmental Magnet Middle School by James E. Kotoski,. Last accessed April 3rd 2010.
6. <http://tellus.ssec.wisc.edu/outreach/teach/ideas/kotoski/Minifact_Sheets/Minifact7_pH.pdf> Fact sheet on pH of water. Spring Harbor Environmental Magnet Middle School by James E. Kotoski,. Last accessed April 3rd 2010.
7. Pfeffer, Wendy. 1997. A Log's Life. Simon and Schuster Publishing.

Extension of Lesson Plan

Extension of experiments on dissolved oxygen - use the tablets to measure the dissolved oxygen in a sample of pond water, and track the reduction in dissolved oxygen as it is used by the living things in the pond water (experiment suggestions in ref 4).

Native Plant Bingo

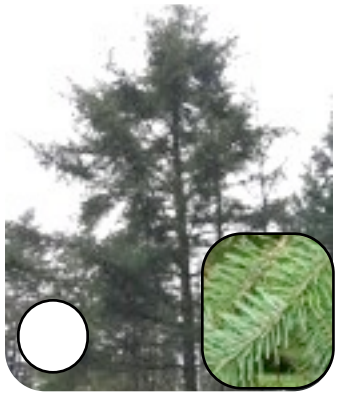


Cattail

Salal

Red Currant

Skunk cabbage

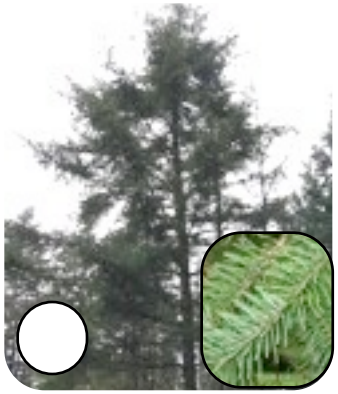


Fir tree

Cedar tree

Native Plant Bingo

Cedar tree



Fir tree

Moss

Salmonberry

Fern

Iris