Science Unit: ***Ecologists Grow a Garden***

Lesson 2: ***The Northwestern Crow – Think Like a Scientist***

School Year:	2012/2013
Developed for:	David Lloyd George Elementary School, Vancouver School District
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Grade level:	Presented to grade 4 and 5; appropriate for grades 2 – 7 with age appropriate modifications
Duration of lesson:	1 hour and 20 minutes
Notes:	Waterproof paper is recommended throughout this science unit. Waterproof paper is special field paper that field scientists regularly use. With a pencil you really can write on it in the rain, it won't disintegrate if you drop it in the wet grass and it can be photocopied! One source is: http://www.riteintherain.com/ This lesson could be adapted for another crow species or a highly visible resident bird living in your community.

Objectives

- Experience the process of scientific inquiry.
- Be inquisitive. Give students time to wonder about the Northwestern Crow.
- Conduct an observation experiment. What is the most common behavior of the Northwestern Crow on school property?

Background Information

In this lesson, students observe the behaviour of the Northwestern Crow (*Corvus caurinus*), a common school yard bird. Students experience what it means to explore questions scientifically.

The Northwestern Crow is part of the *Corvus* genus, which includes other crows, ravens, jackdaws and rooks. The Northwestern Crow is the only crow species found in Vancouver, B.C. It is located west of the Coast Mountains, from Alaska to the Pacific Northwest. In Washington it may interbreed with the American Crow. The Northwestern Crow is similar to the American Crow, but it is smaller with a more nasal call. The Northwestern Crow lives in semi-open habitats such as suburbs, cities and coastal shorelines.

Northwestern Crows are omnivores. They eat a large variety of food including, marine and terrestrial invertebrates; small reptiles, amphibians, birds and mammals; bird eggs, fruit, seeds, carrion and garbage.

Northwestern Crows are very intelligent. They harvest mollusks off the beach, then fly up holding the shells in their beak and then drop the mollusks to crack open the shells. When foraging in intertidal areas, they gather food at low tide, stash it above the tideline and eat it later when the tide is high. They also look for and take advantage of new food sources.

Northwestern Crows are very social. Adults are monogamous and form long-term bonds. Each year 3-6 eggs are laid in a nest of large sticks, usually in a tree, but sometimes in a shrub or on the ground. Both parents raise the young. Young crows are fed in the nest and for a few weeks after they leave the nest. Family members, such as other offspring, aunts and uncles, often help parents raise their young. When they are not breeding they roost and forage in large flocks.

Northwestern Crows year-round presence in cities, their large size, their ease near humans, and their interesting behaviour make them a great bird to observe.

Vocabulary

Scientific Inquiry:	A process where we first observe and wonder by asking questions, then select a question to investigate through observation or experiment, collect information, review information, make conclusions and ask more questions.
Observe:	To look closely at something. This is a very important skill for a scientist.
Hypothesis:	A testable statement of what we expect to occur during our observation experiment.

Materials

- Waterproof paper
- Waterproof cushion
- Clipboards & pencils

In the Classroom

Introductory Discussion

1. Use the story of a Japanese engineer finding design inspiration from a Kingfisher as the hook to demonstrate one reason why it is important to study birds:
    - The Japanese Shinkasen Bullet train is the fastest train in the world. It travels 300 km/h. The original train was designed with a blunt front. In a tunnel, this design pushed the air in front of it and when the train exited the tunnel it caused a sonic boom. The boom bothered residents and exceeded Japan's sound regulations. An engineer was asked to redesign the train to be quieter. Luckily this engineer also loved to watch birds. He noticed when a kingfisher dives for fish; when it moves from air (less dense) to water (more dense) it doesn't make a splash This is due to the Kingfisher's very streamlined beak. He wondered, if he redesigned the bullet train's front end to mimic the shape of the kingfisher's beak, with a long and narrow front, would it be quieter? It worked. The train was quieter, it used less energy to run the train and it travelled even faster.
2. Science experiment/activity:
    - In class, begin to think about the Northwestern Crow and explore the scientific inquiry process.
    - Outside, students will do two activities: wonder about crows and observe crow behaviour.
3. Safety guidelines:
    - Stay with your group
    - Stay on school property
    - Respectful observation

Science Activity/Experiment

Activity 1: Explore scientific inquiry

Purpose of Activity: To explore the scientific inquiry process using the Northwestern Crow.

Methods and Instructions: Set-up prior to experiment: Print the worksheet at the end of this lesson plan (Northwestern Crow KWL [Know, Wonder, Learn]) on waterproof paper.

1. Have students write what they know about the Northwestern Crow. Discuss as a class.
2. Introduce students to process of scientific inquiry: observe and wonder, select a question to investigate through observation or experimentation, make a prediction/hypothesis, collect information, review information, make conclusions and ask more questions (draw as a cycle in context of crow observation experiment).

Activity 2: Think about the Northwestern Crow

Purpose of Activity: To be curious and wonder about a B.C. animal, the Northwestern Crow.

Methods and Instructions:

1. Instruct students to a find a spot to wonder on the school ground.
2. Students fill out the wonder section of their Northwestern Crow KWL worksheet. Further guidance for students: write wondering questions, think about the resources crows need and their physical and behavioural adaptations.

Activity 3: Observe Northwestern Crow Behaviour

Purpose of Activity: To experience scientific inquiry by studying Northwestern Crow behaviour in the school yard

Experimental Observations: Tally the observed behaviour of the Northwestern Crow

Prediction or Hypothesis: In small groups, students write a hypothesis based on the question "Which Northwestern Crow behaviour do you predict you'll see most often today?" Use your prior knowledge of seeing crows in your neighbourhood and parks to predict what you think will happen when we observe crows in the school yard.

Methods and Instructions: Set-up prior to experiment: Print the Northwestern Crow Behaviour Tally worksheet on waterproof paper (the worksheet is at the end of the lesson plan).

1. Brainstorm possible crow behaviour with students. Have students record the list of crow behaviours on their waterproof worksheet.
2. In small groups on the school ground, students record hypotheses, field conditions and tally behaviour. Each student should each record a hypothesis, field conditions and their own crow behaviour observations.
3. Walk quietly and slowly through the school yard tallying observed crow behaviour.
4. Instruct students to only record what they see.

Closure Discussion

1. What do you wonder about the Northwestern Crow? What do you think its resource needs are? What do you think its adaptations are? Discuss and record ideas as a class.
2. What was the most common Northwestern Crow behaviour you recorded? Tally and record results. Did it match your hypothesis?
3. Students can record what they learned on their Northwestern Crow KWL.

References

The Cornell Lab of Ornithology. All About Birds. Northwestern Crow. http://www.allaboutbirds.org/guide/Northwestern_Crow/lifehistory Accessed June 14, 2013.

Marzluff, John and Tony Angell. 2005. In the Company of Crows and Ravens. New Haven - Yale University Press.

Fleming, Susan (Director and Producer). 2009. A Murder of Crows. Canada/France. http://www.cbc.ca/documentaries/natureofthings/2009/murderofcrows/ Accessed Nov 8, 2012.

Savage, Candace. 2005. Crows: Encounters with the Wise Guys. Greystone Books.

Seattle Audubon Society. http://www.birdweb.org/birdweb/bird/northwestern_crow Accessed June 14, 2013.

Biomimicry: Copying our way to conservation. http://vimeo.com/27640060 Accessed January 31, 2013.

Shinkansen Train: High speed train silently slices through air. 2012. http://www.asknature.org/product/6273d963ef015b98f641fc2b67992a5e Accessed January 22, 2013.

Extension of Lesson Plan

1. Before this lesson: watch A Murder of Crows. A documentary produced and directed by Susan Fleming. Available on-line at CBC documentaries http://www.cbc.ca/documentaries/natureofthings/2009/murderofcrows/ Accessed Nov 8, 2012.
2. In the winter or early spring, before deciduous trees leaf out, map crow nests on or close to school property.

SCIENTIST IN RESIDENCE PROGRAM

Name:_____
Date:_____

Northwestern Crow KWL

I Know	I Wonder	I Learned

SCIENTIST IN RESIDENCE PROGRAM

Northwestern Crow Behaviour Tally

Hypothesis:_____

_____

Crow Behaviours	Tally each time a behaviour occurs
Notes:	

Day: _____ Weather:_____

Time Started: _____ Time Finished:_____

Location: _____ Name: _____