

USING BIRDS TO STUDY OUR LOCAL ENVIRONMENT

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Using Birds to Study our Local Environment

GRADE LEVEL(S): 5/6

INQUIRY FOCUS:

Biodiversity, sustainability, interrelationships, vertebrate, ecosystem, biome, habitat, species, environmental footprint, population

TIMELINE:

A minimum of 12 weeks is suggested for this inquiry. Time required will depend on students' prior knowledge, skill set, level of interest and additional time to complete work.

Big Ideas:

Community: a group of living and non-living things sharing a common purpose or space. Human actions affect communities and therefore humans affect biodiversity.

Place: natural and human communities together make up one's place.

Systems: parts that are connected through larger patterns. Our local actions can have far reaching impacts elsewhere on the planet.

Health and Well Being: birds are a harbinger for the health of systems and humans.

Materials and Equipment:

SAFETY:

Expectations and safety considerations should be reviewed prior to each outdoor and indoor activity.

OUTDOOR SAFETY: In general, the teacher should:

- Walk around the area where you would like to bring your class or group to look for safety issues, both natural and human-made, (e.g. poisonous plants poison ivy, stinging nettles, animal feces, broken glass, needles, etc.
- Remind students to dress appropriately for the terrain and weather, e.g., proper hiking shoes, sunscreen, hats, etc.
- Have students bring water if you are planning to be outside longer than 30 minutes.
- Have a predetermined area to do work so the students are visible in a clearly marked area within hearing distance of your whistle or bell.

INDOOR SAFETY:

- No food should be eaten in class
- Hands should be washed before and after all activities
- Safety glasses should be worn if tools are being used
- Allergies to latex should be known or use only non-latex gloves, when needed

Lesson 1: Mapping the Place Where We Live

This introductory map making activity is to get students to think about where they live and the places that are important to them. It is intended to foster their sense of place and connection to place as an initial step to developing a stewardship mindset. The first lessons focus on mapping and learning what students understand about map making. Anecdotal notes will inform you (the teacher) about students' background knowledge and learning gaps. Lesson 1 could also be used as a Visual Art activity.

Time Needed/Location/Groupings: 60-80 min; In class; Independent

Minds On: PROMPTS: •Close your eyes and remember the places you visited this summer, you favorite playing place outside, where your friends live, places around your home that are special to you. •List 6-10 of those favorite places in your journal •Share as a class

Activity: •Students will draw a map to showcase places of significance in their lives.

Consolidation: •Share maps with class- Gallery Walk •*What was the best part of making your special map?* •*What was the trickiest part?*

Assessment Strategies: Anecdotal; focus, attention to details, connections, creativity, what do they know about making maps, developmental level, mindset

Materials/ Equipment: 8 ½ x 11 copy paper, colouring pencils, crayons, glue sticks, construction paper/ Bristol board cut into 13 x 6 pieces (To be used as covers for maps, which are folded)

Lesson 2: School Yard Mapping: Distances and Relative Position

Students will begin to experience the challenges of drawing an accurate map. •Students will review perimeter, area and computation skills. •Students learn to estimate distances in school yard. •Students will learn how to devise a scale for their maps •Students will begin to consider different views of objects (aerial or bird's eye)

Time Needed/Location/Groupings: Math blocks spread over 2-3 days; Outside; Work in pairs

Minds On: Inside: •*Taking the perspective of a bird flying overhead, draw the shape of our school from the sky.* •*If I wanted to draw that desk on a piece of paper and I wanted the desk to be the right shape and size, how might I go about drawing it?* •*What does scale mean?* •*How can we learn to draw maps that have the right amount of space between objects?*

Activity: Outside: •Using tools and strategies of their own invention, students will measure the perimeter of the school and draw it to scale and measure the distances between various natural & human-made structures.

Consolidation: •Students will form groups of 4 to discuss their work. •*What were some of the distances you found?* •*What were some of the challenges?* •*Share work with someone different.* •*What do you notice?* •Two Stars and a wish

Assessment Strategies: Anecdotal, Student Focus, Selection of tools, Knowledge of units, Knowledge of how to use tools •Estimation, adding & subtraction strategies, •Knowledge of perimeter, •Knowledge of what a scale is and any strategies students may have to create a scale

Materials/ Equipment: Tape measures, Meter sticks, pedometers, Clip boards, 8 ½ x 11 copy paper (1 per student), pencils

Lesson 3: Knowing Where We Live: A Nature Walk

Students will start to extend knowledge of geographical features of community. This lesson is also a review of concepts about habitat learned in Grade 4. The lesson will help to provide students lacking in knowledge about their local natural environment with some of that background knowledge. They will need to observe and carefully record their observations

Time Needed/Location/Groupings: 80-100 min, Outside, Work in pairs or in groups up to four (depending on availability of cell phones/iPads)

Minds On: •*What are the natural features of our local area?* •*What do you think makes good habitat for birds?* •*What do you think makes bad habitat for birds?* •*How do you think humans have altered the environment?* •*What are some skills we have learned so far to draw an accurate map of where we will be today?* We will do a walking tour to a local green area near the school

Activity: ROLES: photographer, note taker, spotter (finds troubles/treasurer), artist (sketches area), bird and nest spotter/counter •Students will take photos of “one trouble” and “one treasure” from a bird’s perspective or make drawings of their observations. A trouble is anything that could negatively affect a bird’s well-being (e.g. garbage, lack of shelter, etc.) while a treasure is a positive resource a bird might use (fresh water, food, etc.). •Students will draw the area •Students will count birds and their nests • Students will identify birds using field guides

Consolidation: •In class, review treasures and troubles. List these on a chart. •As a class suggest possible actions we might take to tip the balance of treasures to troubles in favour of birds. •Students will use drawing to draw a bird’s eye view of map. • Students will name the species they saw/ identified

Assessment Strategies: Conference with students; Student maps; Exit card

Materials/ Equipment: Mentor text: “*Have you seen birds?*” by Joanne Oppenheim and Barbara Reid; Devices to take photos (cell phones, iPads), Clip boards; Pencils/paper (plain or graph); Art Journals; Binoculars (optional)

Lesson 4: Placemat Activity about Birds in the Community.

Students will formalize the observations they made last day on their nature walks.

Time Needed/Location/Groupings: 30 mins, In class, Small groups/Whole class

Minds On: •*What are some things you know about birds in this community?* •*In what ways might we improve habitat in this community for birds?* •*Whose responsibility is it to make improvements?* •*Would improving bird habitat improve our habitat too?*

Activity: •Students will brain storm ideas at table groups regarding 4 questions • They will choose one thing they would like to improve, explain why they think it’s important & pose possible solutions

Consolidation: •Groups will present ideas/ placemats to class

Assessment Strategies: Exit card “*I learned that , I was surprised by* ”

Materials/ Equipment: BLACK LINE MASTERS FOR LESSON 4 placemat and exit cards, Pencils/ pens, Chart paper for success criteria

Lesson 5: Birdsongs VROC

Students will listen to birds’ sounds and vocalizations and then write a poem to be completed and shared by the next day. This lessons is intended to prepare students for a video conference about songbird research in Ontario. The video conference must be pre-organized and an account must be set up with VROC (<http://www.vroc.ca/vroc/en/experts-on-demand-sign-up/> (<http://www.vroc.ca/vroc/en/experts-on-demand-sign-up/>)), and your computer must have the program downloaded prior to video conferencing.

We have conferenced with Dr. Jennifer Foote of Algoma University about song birds and her research

Time Needed/Location/Groupings: 30 mins; Outside; Independent; 65 mins; Inside; Whole class (video conference)

Video conference to be determined with researcher base on class needs. Approximately 1 hour (?)

Minds On: Students will sit quietly outside and listen to the sounds and noises they hear, focusing on the different voices of birds. •*While you listen(ed) to birds outside, what did wonder about the sounds the birds made? Think about some questions/ wonderings you might ask about during the video conference*

Prior Knowledge: •Review etiquette and good manners while conducting a video conference with class before conference

Activity: Students will write a poem about birdsongs and complete it to present next day. They will share some of their work during video conference.

Consolidation: Using VROC (Virtual Researchers On Call) students will learn more about songbirds.

Success Criteria: Students will: •be able to listen closely to bird sounds and distinguish between some different types of calls •Use poetry to express how the bird calls sounded to them/ made them feel •Listen attentively and participate in video conference by asking questions based on what they learn/know about birds

Assessment Strategies: •anecdotal: students are able to detect differences in bird vocalizations, students can pose meaningful and relevant questions to researcher about birds and research; students can remain on task

Materials/ Equipment: OUTDOOR: Clipboards, paper, pens/pencils: INDOOR: Computer (with webcam/microphone), projector, speakers

Lesson 6: How Trees Help Regulate Temperature

This is a simulation of how a tree canopy affects the air temperature that allows us to compare the effects of the shade of a tree with the shade of a built structure.

Time Needed/Location/Groupings: 60 mins; In class; groups (3-4)

Minds On: • *How do living things survive in hot environments?* •*What happens to us when we get hot?* •*How do we avoid getting dehydrated while we are perspiring?* • *Do you feel cooler standing in the sun or under a tree? Do you feel cooler standing under a tree or under a cement roof like a parking garage? Why?*

Activity: Give each student group two identical terra cotta flower pots marked A and B upside down on a plastic tray. •Provide students with a spray bottle or small tub of water, two thermometers and a piece of cotton or paper towel. Instruct students to saturate only pot B with water, keeping the other dry. •*What do these pots represent in our test?* (I.e. A = a dry built canopy, such as a concrete or adobe roof, B = an evaporating canopy, much like a tree). •Record the air temperature on both thermometers, then wedge them carefully into the pot holes with a bit of cotton or paper. Make sure the thermometer is readable above the pot and the bulb is suspended the same distance from the table surface. Place the trays in the sun for observation and data collection. (The shady underside of the pot is protected from the sun).

•*Will the temperature differ in the shade of pot A vs. the shade of pot B? Why? Make a prediction for the temperatures at 5 min and at 10 min. and record it on the data collection worksheet.* •Observe and record the temperatures every minute for between 10-20 minutes to 1 hour (depending on time it takes to see a difference in temperature).

Consolidation: •Students will graph their group data. Make two line plots, one for pot A and one for pot B. •*How did the temperature change over time?* •*Which pot had more stable air temperatures under it? How long did the wet pot “resist” heating up in the sun? How long would it take for the two pots to reach the same temperature?* •*Was there a difference in the average temperature under the two pots?* Discuss the importance of variation in nature and in experiments.

•*Did all the groups get the same averages? Why or why not?* •*How will evaporating water affect the air temperature inside the pot?*

•**Analyze class data.** •*Based on the data analysis, what is the class conclusion? Did the results support your predictions? Why or why not?*

Success criteria: Students will be able to: • measure and compare changes in air temperature due to evaporation from a wet surface vs. a dry one. • understand that evapotranspiration cools the air around plants. • relate evapotranspiration to urban landscaping choices, particularly in an urban heat island.

Assessment Strategies: Discuss: • *What types of plants and where might students choose to plant them? What other types of built structures could improve the landscaping to reduce the effects of heat/cold?* Have students add plants to their maps of the school yard. Label the cooler places and explain what makes them cool.

Materials/ Equipment: •Thermometers •Small terra cotta flower pots with drainage holes large enough to hold thermometers (2/group) •Plastic tray (1/group) •Spray bottle or tub of water •Timer (1/group - optional)

Lesson 7: Where Are Birds Found on School Grounds?

We will count how many birds, and which species, are found in different areas of the school yard, and learn if these areas represent different microclimates. Ecologists use Point Counts as one method for surveying birds. In a Point Count, one person counts all the birds located within a circle with the radius of 20 meters for 10 minutes.

Time Needed/Location/Groupings: 20 mins-once in morning and once in afternoon; Outdoors; Small groups (3-4)/Whole class. Teachers need to decide on a consistent time of day to do bird counts. Two times/per day must be chosen. In addition two sites on the school ground need to be chosen to see the effects of microclimates (e.g. one with tree cover, one without). Ideally, quiet, low traffic areas are selected and the set up can be left for the afternoon count.

Minds On: •Are there areas in the school yard that birds might prefer? •What is different about each of these locations (e.g. vegetation, built structures, ground cover, sun/shade, irrigation? •Which sites do you predict will be hottest and coolest? Why?

Activity: Outdoors •Choose at least two different locations in schoolyard to conduct the survey. Assign a number and name to each site. Are there other factors that might affect your survey (e.g. maintenance activities, watering schedule, class schedule, high activity or traffic areas).NOTE: Students should not be allowed to work in areas where traffic is a concern. •Ask students to carefully state their questions and predictions and record them. •Have students describe their sites •Establish a random point at each location and mark out a circle with a 20-meter radius from the points. Make sure there are no large obstructions within the circle. If you just don't have enough space for a 20-meter radius circle, then note the size of the study area on the data sheet. •Complete a habitat description for each point count site • Estimate the land cover in your 20m radius study area: Take two pieces of string and divide the plot into 4 equal sections, so the strings cross in the middle. •Make a diagram for each point count site showing where the vegetation is less than 0.15m (ground cover), between 0.15m to 1.5m tall (shrubs) and any which is taller than 1.5m (tree). The land cover type can be "building" or "cement" as well as plants. •Observe the cloud cover and measure the air temperature at each survey point (center of the circle) and record on Bird Point Count Data Collection Worksheet. •Conduct the point count. Spread students around the circle and allow some time to pass after this disturbance to the area. Select 1 Official Bird Observer and 1 Official Bird Recorder. Count all birds that enter the circle for 10 min. Count each bird only once. (Although all students can observe and record birds on their own data sheets, the official data should be collected by only one observer to avoid over counting. It may be interesting to compare data afterward and discuss differences among observers)

Success criteria: Students will be able to: • Propose a relationship for how microclimates might affect birds.

• Test whether schoolyard microclimates affect the distribution and abundance of urban bird species.

Consolidation: Compare your species lists for each site. Ask students if they can see any differences. How might they explain those differences? Sum the total numbers of each species found at each site at each time of day from all surveys. Use the table on Student Worksheet - Bird Count Data Analysis to summarize the results.

Assessment Strategies: •Students will participate in all activities • Students will make bar graphs of the compiled data to look for patterns/trends between times of day and sites. Which birds were more abundant at which sites? Why might this be? •Evaluate the effects of temperature. Create averages for each site and each time of day. Was it warmer at one site than another? • Students will use their findings to determine possible locations for school garden

Materials/ Equipment: •Meter tape or meter stick and string •Binoculars •Clipboards •Thermometers

Lesson 8: Adaptation for Eating

Birds' beaks come in many sizes and shapes. The beaks are structurally adapted to enable them to eat different foods Students will build beaks from a selection of materials and test them to see how much 'food' their beak can 'eat' in one minute

Time Needed/Location/Groupings: 45 mins; Indoors; Small groups (3-4)/Whole class

Minds On: two videos Gull drops shell to break it <https://www.youtube.com/watch?v=zUpWuTfkXyk> (https://www.youtube.com/watch?v=zUpWuTfkXyk) Ask students, "What strategy gull uses to obtain food?"

<https://www.youtube.com/watch?v=Fh7fYmTgYPo> (https://www.youtube.com/watch?v=Fh7fYmTgYPo) Ask students, "What adaptations do gannets have for catching prey? What do you notice about how gannets eat their prey?"

Activity: Students design their own beak using a variety of materials. Students then complete an “eating challenge” to see how much food they are able to eat in 1 minute. At the end of each round of eating, students may make one modification to their beaks and retest their beak. This activity mimics the evolutionary changes that occur in bird populations as they adapt to particular foods. Alternatively, students can be challenged to eat different foods and determine which food is best suited to their beak.

Success criteria: Students will be able to: • Design, and subsequently make improvements to the beak they design, and explain their original design and why they made changes and how those changes improved their “eating success”.

•Connect the role played by adaptations to evolutionary success • Explain how bird beak shapes help birds eat and give examples from life.

Consolidation: •Brain storm different adaptations to eating

Assessment Strategies: EXIT CARD: In writing, describe how beaks are specialized for certain foods and provide examples• How do adaptations in beaks help a bird to be a successful eater? •How does adaptation lead to evolution of bird beaks? • What sort of beaks do birds have in this community?

Materials/ Equipment: •Styrofoam cups, decorations (coloured papers, feathers, goggle eyes, etc.), round head fasteners, masking tape, plastic spoons, plastic forks, toothpicks, etc., •Scissors (1 per student) •Glue sticks/craft glue •Index cards or sticky notes (exit cards)

Lesson 9: Owl Pellet Dissection

The students will understand that within ecosystems, complex interactions exist between organisms and the physical environment. Animals eat plants or other animals for food and may also use plants (or even other animals) for shelter and nesting. Some source of energy is needed for all organisms to stay alive and grow. The activity may be guided, using the questions provided or it may be presented as a more open-ended inquiry lesson in which you let the students come up with questions they would like to investigate as opposed to you having the questions for them. A *Q-chart* or an *O.W.L. chart* (observations, wonderings, learned) or similar tool could really help with this strategy. It is important to get our students thinking about what they are doing and having them come up with questions before, during and after the activity to promote higher order thinking skills.

Time Needed/Location/Groupings: 60 mins; Indoors; Pairs for dissection/Individual to answer (or pose) questions/Whole class discussion

Advance preparation: Order pellets

Minds On: Think/Pair/Share •Show students an owl pellet and ask •*What do you think this is? What do you think we might learn about birds today?*

Activity: Students mass, measure and dissect owl pellet to learn what animals make up its diet.

Success criteria: Students will be able to: • dissect an owl pellet. • identify the animal skulls and other bones found in the pellet. • participate in a class discussion to learn about food chains and food webs and make inferences about the ecosystem in which the owls live. •Skills: observations, Inferring, Measuring, Recording, Classifying, Explaining.

Consolidation: Class discussion about learning

•**Assessment Strategies:** Students are on task •Listen in to conversations as they identify bones and prey •Students answer questions/ explain their thinking

Materials/ Equipment: Owl pellets; metric ruler; forceps; wooden probes; hand lens; 8 cards labeled with the following bone groups: skull, jaw, scapula, fore limb, hind limb, pelvic, rib, vertebrae; Styrofoam plates; zip lock bags; bone charts (1 per pair)

Lesson 10: The Birds Are Returning: How Can We Welcome Them Home?

This will be the final lesson in which students will utilize all their knowledge about birds to develop their ideas to design a bird friendly garden in the school grounds. They will be provided with the opportunity to pitch their ideas to the Parent Council to get financial support to begin to build the garden.

Time Needed/Location/Groupings: Three 60 min classes: In groups of four.

Minds On: What have we learned/ do we remember about the birds that live in this area? (Their names, the habitat they prefer, what foods they like) •Are there plants that local birds eat that we could plant at school (or at home)? •What areas of the school grounds would provide birds with the best types of shelter? •Are there some types of birds we would rather not encourage to be on school grounds? •What areas might be less safe for birds on the school grounds.

Activity: Students will research native plants that are edible for birds. Using the maps that they drew in Lessons 2-4, students will plan and support with reasoning the most suitable plants for the school grounds and where the plants should be located. They will prepare a presentation to pitch their ideas to the Parent Council, Principal and VP

•**Assessment Strategies:** •Self-assessment Reflection in journal •Peer assessment Two Stars and a Wish •Co-created Success criteria



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