

## Chapter 2: Preparing Students to Conduct Field Investigations

### Lesson 2: Descriptive Field Investigation: What Plants and Animals Use the Schoolyard Habitat?

#### Objectives

##### Students will:

- 1) observe an outdoor area;
- 2) represent their observations using pictures, numbers, words, labeled diagrams;
- 3) pose descriptive and comparative questions based on their observations.

#### Student Outcomes

*Lesson 2- I can carry out a descriptive field investigation in my schoolyard and record my observations using pictures, numbers, words, and labeled diagrams. I can come up with a descriptive and comparative question based on my observations.*

#### Thinking Skills

Observing, Finding Evidence

#### Learning Experience

Students will conduct a descriptive investigation by observing a particular outdoor area.

#### Materials

##### Per Class

- Field Guides

##### Per Pair of Students

- Hula Hoops
- Yard or Meter sticks
- Tape Measures
- Colored Pencils
- Paint Chips (to help name as many different forms of the “same” color, e.g. green)

##### Per Student

- Clipboards
- Ruler
- Hand Lenses

### Next Generation Science Standards (NGSS)

Dimension from the Framework	Connections to the 3 Dimensions of NGSS
<p><b>Disciplinary core idea:</b></p> <ul style="list-style-type: none"> <li>• LS4.D Biodiversity and Humans</li> </ul>	<p>Students observe living things in a specific habitat. This is a foundational activity for understanding in this Disciplinary Core Idea and can connect to multiple NGSS Performance Expectations such as:</p> <ul style="list-style-type: none"> <li>• 2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats.</li> <li>• 3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.</li> </ul>
<p><b>Crosscutting concepts:</b></p> <ul style="list-style-type: none"> <li>• Patterns</li> <li>• Systems and Systems Models</li> </ul>	<ul style="list-style-type: none"> <li>• Students look for patterns in which living things live in the schoolyard.</li> <li>• Students clarify the schoolyard ecosystem as a system by identifying the living parts of the system.</li> </ul>
<p><b>Science and engineering practice:</b></p> <ul style="list-style-type: none"> <li>• Planning and carrying out investigations</li> <li>• Analyzing and interpreting data</li> <li>• Obtaining, evaluating, and communicating information</li> </ul>	<ul style="list-style-type: none"> <li>• Students plan and conduct observations of the schoolyard.</li> <li>• Students analyze and interpret the data to answer the question, “What lives in the schoolyard?”</li> <li>• Students communicate their findings from the investigation.</li> </ul>



Common Core State Standards	Connections to Common Core State Standards (CCSS)
Common Core ELA –Anchor Standards – College and Career Readiness Anchor Standards for Writing – 2	<p><b>CCSS.ELA-LITERACY.CCRA.W.2</b>                      Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.</p>
Common Core ELA - Anchor Standards – College and Career Readiness – Anchor Standards for Writing -7	<p><b>CCSS.ELA-LITERACY.CCRA.W.7</b>                      Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.</p>

## Background

In descriptive field investigations, researchers describe parts of a natural system. This lesson helps students learn how to conduct a descriptive field investigation of a specific site. Although it is not a long-term study focused on identification of organisms, students observe a large area and a small study area. Allowing students to make observations multiple times helps them notice detail and ask investigative questions based on their own observations of a habitat. By extending this into a longer term study and collecting data over time at the same site, students can begin to see patterns and notice cause and effect relationships.

Breaking a large area into parts can help students consider different aspects of a larger ecosystem. Students need multiple observation sessions outdoors in order to pose meaningful questions. Students could spend multiple sessions observing a large study area, noting their overall observations, and then focusing on looking up, looking down, and looking in the middle. Finally, students can select a much smaller study area for their focused observation.



## Lesson 2: Descriptive Field Investigation:

### What Plants and Animals Use the Schoolyard Habitat?

#### ENGAGE

1. Ask students, “What do you think when you hear the word habitat?” Have students do a think-pair-share<sup>1</sup> and then come up with a class definition or have students define their own habitat.

Teacher note: Project WILD, a wildlife-focused conservation education program for K-12 educators and their students, has an activity that compliments this lesson titled “Oh Deer!”

2. Write the investigative question on the board: “What plants and animals use the schoolyard habitat?” Discuss strategies for observing - using four of the five senses (sight, hearing, touch, smell) and recording observations (drawing, using numbers, labeled diagrams writing). Using an object (e.g., pinecone, leaf, twig, rock) ask students to describe its physical properties and characteristics. To prompt student thinking model drawing and/or writing observations.
  - What does it look like? (e.g., size, shape, color)
  - What does it feel like? (e.g., texture, temperature)
  - What does it smell like?
  - What does it sound like?

#### Large Study Area

#### EXPLORE

1. Divide the class into pairs before going outside. Students should have multiple opportunities to create observation journals and record data, e.g., measurements. As an extension, paint chips may provide students an understanding that there are multiple shades and names of a color (e.g., green) and can expand their color vocabulary. Below are sentence starters that will help students generate questions about the system they are drawing (Fulwiler, 2007).
  - I am curious about...
  - It surprised me that...
  - I wonder how this part affects another part in the system...
  - Questions I could investigate are...

*Day 1: Overall Observations.* Students record general observations and questions.

*Day 2: Looking Up.* Students look up (above eye level) and record observations and questions. What do we see in the sky? What is in the trees? What is flying?

*Day 3: Looking Down.* Students look down (to the ground) and record observations and questions. What is in the bushes? What is in the ground/soil? What is under the rocks, bark, etc.?

*Day 4: Looking in the Middle.* Students look at eye level and record observations and questions. What is in our normal field of vision? What might we be missing?

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<sup>1</sup>Think-pair-share (TPS) is a collaborative learning strategy in which students work together to solve a problem or answer a question about an assigned reading. This technique requires students to (1) think individually about a topic or answer to a question; and (2) share ideas with classmates.



## EXPLAIN

1. After each observation session ask students to share their findings and questions. Ask: What plants did they observe? What animals and evidence of animals did they see? What other organisms were in the schoolyard? What questions did you have? Make a class list of their findings and questions.
2. Optional: Have students categorize the types of organisms they found in the schoolyard habitat and summarize their findings.
3. As a class categorize the questions students posed (descriptive, comparative, correlative, essential questions, why questions, questions we can look up).

Type of Question	Examples
Book/Internet Research	What is the name of this insect? What is the normal range of this animal? What are the habitat needs of a rabbit?
Essential-Life Pondering, Always Wonder	How do trees alter climate? Is this area healthy?
Descriptive	What kinds of birds do we see in the local park? What plants live in this area? What is the average temperature in the forest?
Comparative	Which type of tree is the most common? Do wet areas or dry areas have more moss? Do fallen logs or leaf litter have more invertebrates? Are there more birds on the lake in summer or winter?
Correlative	How is fall leaf color related to the number of sunny days in fall? How is when butterflies first appear in spring related to temperature?
Why Questions	Why is this forest a good habitat for plants and animals?



## Special Study Area

### EXPLORE

1. Divide the class into pairs and give each pair a hula hoop and a yard stick.
2. Students select a study area and place the yard stick in the middle of the hula hoop to create a transect<sup>2</sup> line and two observation quadrats<sup>3</sup>. Model this set up in the classroom before going outside; show students how to record locations of plants and animals by noting the nearest inch on the yard stick (e.g. there are three acorns, one at 4 inches, one at 15 inches and one at 22 inches).
3. Students record observations using written words/phrases, drawings, labeled diagrams, and numbers to describe the area within the hula hoop, to contrast the two observation quadrats, or to note items along the transect line.
4. Students use field guides to identify plants and animals.

### EXPLAIN

1. Students discuss the relationship they have noticed between the large study area and smaller special study area. Ask students, what similarities and differences did you notice?
2. Students formulate two descriptive questions and two comparative questions about the special study site based upon their observations.
3. Ask students to answer the investigative question by writing or discussing, “What plants and animals use the schoolyard habitat?”
4. Create a map of the school grounds, identifying organisms in each study area.

### ELABORATE

1. Have students categorize the organisms they observed and share what they observed in the special study area. Have students write an explanation/argument using Claim, Evidence, Reasoning (See Claim, Evidence, Reasoning Rubric Appendix B for description) to answer one of the following questions:
  - What types of organisms use the schoolyard?
  - Does the schoolyard provide habitat for a diversity of organisms?
  - How many organisms use the smaller study area in the schoolyard as habitat?
2. Using student maps of the school grounds, students look for patterns and come up with questions about those patterns.
3. As an extension, students could carry out an investigation of one of the questions they came up with during the lesson.

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<sup>2</sup>A transect is a straight line or narrow section through an object or natural feature or across the earth's surface, along which observations are made or measurements taken.

<sup>3</sup>A quadrat is a plot used in ecology and geography to isolate a standard unit of area for study of the distribution of an item over a large area. Quadrats can be rectangular, circular, irregular, etc.



## EVALUATE

1. Review how students' are representing their observations including numbers, words, labeled diagrams, and drawings. Descriptions might include size, shape, color texture, or smell. As you review student work you can look for:
  - a. drawings that fill the notebook page
  - b. small objects/organisms are enlarged
  - c. drawings are detailed
  - d. parts of an organism/object are labeled
  - e. color is added as appropriate
  - f. drawings have captions or titles and note the date and place recorded
2. During student observations, assess their insights and what they reflect about the quality of the observations.
3. Assess their descriptive and comparative questions to check understanding of those categories.
4. Assess the accuracy of their maps for displaying their observational data.
5. Use Claim, Evidence, Reasoning Rubric to evaluate how they communicate about their observations.  
– see Appendix B.

## Examples of Student Questions

5th grade students at Arlington Elementary School in Tacoma, Washington recorded numbers of the animals in Oak Tree Park and generated questions based on their observations:

What is the most occurring plant at Oak Tree Park?

What are the life styles of the birds at Oak Tree Park?

What is the lifecycle of each species?

What are the eatable plants?

What mammals (not birds) do we see at Oak Tree Park in the spring?

How big is Oak Tree Park?

How many different kinds of trees are there?



What the most common trees?

What part of the forest do most birds live in during the spring time?

Why is Oak Tree Park a good habitat for plants and animals?

What kind of bird is not commonly seen in Oak Tree Park?

Is there water at the park during spring?

How many different animals live in the forest?

What is the most common plant you see at Oak Tree Park?

How many different types of birds are in Oak Tree Park?

How many different types of ants are there in Oak Tree Park?

What is the least common bird you see at Oak Tree Park?

How many total square miles is Oak Tree Park?

What kind of bird do we see in Oak Tree Park?

How many different species of plants are in Oak Tree Park?

**Nature Observation Form**

Location: Oak Tree Park

Date	Animal Observed	How many	Comments
5/11/11	American Crow	1	hopping on branches
	Starling Jay	1	looking for food
	chickadee	2 ♀	hiding or looking for insects
	Squirrel	1 #3	climbing on a tree
	Anna's Hummingbird	1	flying
	Bobcat's Swallow	5	making noises and flying
	Ants	small ant hill	in anthill
	Acorn Woodpecker	2	flying. Long-tailed
	American Robin		
	Gull		

**Nature Observation Form**

Location: ~~STC~~ ~~STC~~ ~~STC~~  
Oak Tree Park

Date	Animal Observed	How many	Comments
5/11	chickadee	3	I could tell by the white.
5/11	Anna's Hummingbird	1	saw pink on its throat
5/11	Gray Squirrel	1	leaves are shiny
5/11	Ant Hill	unlabeled	
5/11	Branch of Green Alder	1	berries are brown
5/11	hazel nut	1	soft leaf
5/11	daisy	1 clump	
5/11	blue bell flower	1 large clump	
5/11	lilac bush	1	
5/11	Cedar	1	
5/11	indian plum	1	
5/11	Crow	1	black



## Educator Insights

Below are insights and comments shared by pre-service teachers who conducted the special study area investigation.

*“We measured the circumference of this tree and discovered the circumference is equal to our height. We were really surprised; it looks so different in a circle.”*

Quantitative observations were used; numbers describe the physical characteristics of a tree and demonstrate understanding of comparative measurement by comparing human height to tree circumference.

*“We’ve seen the effects of time in our space; things fly in and out of our space and the amount of shade in our space has decreased.”*

This observation demonstrated awareness that places are not static, but instead are constantly changing by citing two pieces of evidence (“things fly in and out” and amount of shade) to support a claim that time effects what is observed.

*“What is this—pollen or a seed? What is this tree that is dropping berries on us?”*

By posing questions, pre-service teachers demonstrated a desire to identify the objects they observed. By making detailed observations they could later conduct research to identify the object.

*“Look at all the different green colors on this fern. We can’t just call them all green.”*

This careful observation demonstrated attention to nuanced color differences, rather than just labeling an entire plant as green. They recognized a need for a larger color vocabulary to make accurate descriptions.





Pre-service teacher recorded descriptive and comparative questions in her lab book after observing a special study area

### Descriptive ?'s

1. how many evergreen trees do you see when facing the music building?
2. What color(s) is in the tree bark?
3. How often does the sun shine in a certain spot (time for ten minutes)?
4. how many bird chips do you hear in 30 seconds?
5. Use 3 adjectives to describe how the stump feels
6. How does this area smell?

### Comparison ?'s

1. how do the ~~radius~~ circumferences differ on two trees?
2. Is there a difference between the shape & color of the stump rings, based on location?
3. Compare the ground → some places more moist than others?
4. compare the volume of sounds, a half hour apart?

