Washington Biodiversity and Pollinators

2nd grade unit

WILD WASHINGTON

This open educational resource is brought to you by the Washington Department of Fish and Wildlife's Wild Washington Education Program.

Request this information in an alternative format or language at wdfw.wa.gov/accessibility/requests-accommodation, 833-885-1012, TTY (711), or CivilRightsTeam@dfw.wa.gov.

Licensing

Authorship

This unit plan is brought to you by the Conservation Education team at Washington Department of Fish and Wildlife. Lead author **Autumn Eckenrod**, Conservation Education Curriculum Coordinator, with support from **Lindsay Walker**, Conservation Education Coordinator. Special thanks to all the WDFW staff who helped to review and format this unit plan.

Appreciations

This lesson bundle has been designed to facilitate alignment with the Next Generation Science Standards (NGSS). It is structured to allow students to engage in sense making around a real-world fish and wildlife conservation issue as a central phenomenon. Each lesson incorporates a disciplinary core idea (DCI), a cross-cutting concept (CCC), and a science and engineering practice (SEP) to allow for three-dimensional learning. This lesson bundle is designed to engage students through interdisciplinary learning by including Common Core Math Standards.

This lesson could not have been written without the collaboration and review from partners. Special thanks to **Kimberley Astle**, Associate Director of Elementary Science and Content Integration with the Office of the Superintendent of Public Instruction (OSPI), **Carolyn Colley**, Sartori Science Instructional Facilitator with Renton School District, and **Virginia Morales**, Assistant Director for Multilingual Education with OSPI for their collaboration and review of this unit!

Part of this unit (Lesson 9) was inspired by the following: Flowers Seeking Pollinators lesson plan © 2014 **California Academy of Sciences**. Any associated text has been used with permission.

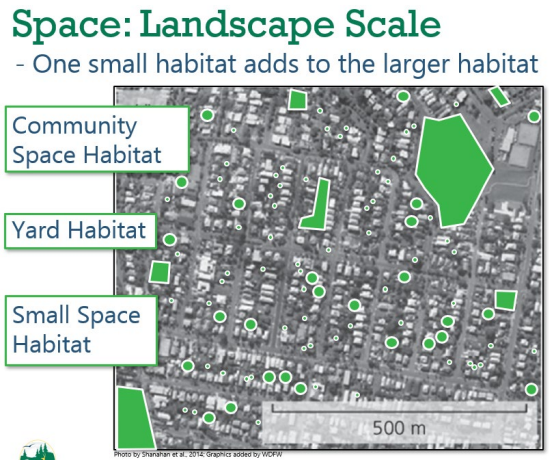
Finally, many thanks to **Sara Talley** and the students at Jefferson Elementary School in Spokane for allowing the WDFW education team to trial lessons in their classroom and ensure they were suitable for students of all learning levels.

Table of contents

Introduction

This unit is designed to support and expand the work of the Washington Department of Fish and Wildlife's **Habitat at Home** program. This program works to support people through the creation, certification, and stewardship of wildlife habitat in private and public spaces. There are multiple goals for increasing habitat throughout our state:

- Offset the acres of habitat that are lost to housing and urban development.
- Provide space for people to view, interact with, and experience wildlife.
- Provide habitat connectivity providing pathways to allow wildlife to move safely through developed areas and reach the green spaces they need for survival.



Habitats at home (community spaces, schoolyards, backyards, gardens, container gardens) improve connectivity for mobile animal species in urban and suburban environments.

This is an integrated unit, teaching key Common Core math and English Language Arts (ELA) standards through a science lens. In this unit, students will be presented with an anchoring phenomenon of two very different schoolyard habitats and will work to discover how to increase biodiversity and support healthy habitats for animals (especially pollinators!) where we live, learn, and play.

Throughout this unit students will use text, media, and data to answer the following questions:

- What is biodiversity?
- Why do schoolyards with a higher variety of plant life support a higher variety of animal life?
- How do plant-animal relationships support the needs of plants and animals?
- How do animals help plants reproduce?
- How do the structures of flowers and the structures of certain animals aid in pollination?
- How can we increase habitat and support biodiversity in our schoolyard?

To learn more about the importance of biodiversity and the unique ecoregions in Washington, check out WDFW's Biodiversity in Washington website.

Special note about raising butterflies

When teaching a unit about pollination it is natural to consider raising butterflies as a student project.

Butterflies are a powerful gateway to learning. From exploring life cycles and pollination to sparking curiosity about conservation, they offer endless opportunities for hands-on education. Many educators and community groups consider raising and releasing butterflies as part of their programs—but it's important to know the rules and best practices that apply in Washington state.

Butterflies are considered wildlife under state law, so releasing them—just like releasing fish, birds, or other animals—is generally prohibited to protect native species and ecosystems. Permits for raising and/or releasing butterflies are typically only given for the direct conservation of endangered and/or threatened species by professionals and are not given for education or classroom activities.

For more information on the rules and best practices for raising and releasing butterflies in Washington state, see the guidelines included at the end of this unit: "Raising and releasing butterflies in Washington."

Standards

Next Generation Science Standards (NGSS)

2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

Common Core Math Standards

CCSS.Math.Content.2.NBT.B.6

Add up to four two-digit numbers using strategies based on place value and properties of operations.

CCSS.Math.Content.2.MD.D.10

Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple, put-together, take-apart, and compare problems[1] using information presented in a bar graph.

Common Core English Language Arts Standards

CCSS.ELA-Literacy.RI.2.3

Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.

CCSS.ELA-Literacy.RI.2.9

Compare and contrast the most important points presented by two texts on the same topic.

CCSS.ELA-Literacy.CCRA.R.2
Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

Materials needed for unit

If you're using the print version of this lesson, please visit the online version to access the web links at: https://wdfw.wa.gov/get-involved/environmental-education-curriculum/lesson-plans/washington-biodiversity-and-pollinators-unit

- PowerPoint slide show
- Student pages (found in this document)
- Pollinator research poster template
- Equipment for showing videos with sound to class (laptop, projector, tv, etc.)
- Art materials (see Lesson 6 for more information)
- Investigation materials (see Lesson 7 for more information)

Books used in lessons:

- A Fruit is a Suitcase for Seeds by Jean Richards
  - Read aloud video
- A Seed Moves by Robin Page
  - Read aloud video
- Sip, Pick, and Pack: How Pollinators Help Plants Make Seeds by Polly W. Cheney, illustrated by Kim Overton
  - Read aloud video
- The Reason for a Flower by Ruth Heller
  - Read aloud video
- Flowers are Calling by Rita Gray, illustrated by Kenard Pak
  - Read aloud video
- Flower Talk: How Plants Use Color to Communicate by Sara Levine, illustrations by Masha D'yans
  - Read aloud video

Videos used in lessons (many of these videos are embedded in the slideshow)

- Where plants and animals live
- Habitat loss
- Urban wildlife

- Look who visits my pollinator garden
- Trillium flowers and ants
- What is pollination?
- WDFW video "Pollinators: why we love them and how you can help
- Sagebrush Country; Backbone of the West
- This Land is Part of Us
- Understanding forest ecosystems
- Biodiverse Washington: West Cascades Ecoregion
- Building pollinator habitat

Big ideas

1. Our schoolyards can be designed to provide habitats for animals and support biodiversity.
2. Plants provide animals with many of their habitat needs: food, shelter, water, space.
3. Animals help plants reproduce by distributing seeds and pollinating flowers.
4. Pollinators and flowers have structures that help pollinators move pollen.
5. Pollinators are important to the health of ecosystems in Washington state.
6. We are responsible for helping pollinators- **they live where we live!**

Essential questions

- What is biodiversity?
- Why does biodiversity matter?
- How do plant-animal relationships help living things survive where they live?
- How do animals benefit from plant-animal relationships?
- How do plants benefit from plant-animal relationships?
- How do animals help plants reproduce?
- What is pollination?
- Why should we care about pollinators?
- How do pollinators support healthy habitat?
- How can art help us make observations and record what we see?
- What are the structures of flowers?
- What are their functions?
- What are the properties of pollen that allows it to stick?
- What are the animal structures that allow animals to move pollen?
- How do flowers get pollinators to fly to them?
- How do pollinators choose which flowers to visit?
- How can we help support biodiversity and pollinators where we live, learn, and play?

Common student-generated questions

To connect with the anchoring phenomenon and engage in student-led learning, begin and end each lesson by looking at the driving questions board you created as a class. In each lesson you should help students identify the questions they asked that will be addressed in the lesson and add information they learned to their "What We Have Learned" chart. At the end of each lesson students may also add new questions.

Example questions:

1. Why do some animals only live in certain habitats?
2. Why don't the same animals live in both school yards?
3. What happens if there aren't enough plants or animals in a habitat?
4. Where do animals get water?
5. What animals come to our schoolyard at night?
6. Is it okay to have bees at school?
7. Why does the schoolyard garden have so many more animals?
8. Do animals live in the soil too?
9. Why don't we see butterflies all the time at our school?
10. How do animals know which plants to visit?
11. Do animals eat all the plants in the school yard?
12. Why do some animals only like certain kinds of plants?
13. Why do animals need to be in areas where plants grow?
14. Do animals hurt plants or help plants?
15. Without plants, would animals live there?
16. Are bugs good or bad?
17. What would happen if we planted flowers all around our school?
18. What do birds eat?
19. Where do the bugs come from?
20. Are there more animals at different times of the year?

Unit plan summary

Days	Lesson	Lesson learning objectives	What will students learn?	What will students figure out?
2-3 days	**Lesson 1: Schoolyard biodiversity anchoring phenomenon**	Students will engage with anchoring phenomena to formulate questions about why different habitats support different living things. Students will: 1. Identify the components of a habitat. 2. Make observations about two different schoolyard habitats to compare their biodiversity. 3. Graph the different kinds of plants and animals they observe in the schoolyard habitats. 4. Conduct a survey of their own schoolyard habitat. 5. Generate questions about how schoolyards can help support biodiversity and organize those questions into a driving questions board.	Review what living things need to survive What makes a good habitat New Terms: **Biodiversity** Reintroduce the term **Pattern**	Some habitats have more biodiversity than others. Habitats that have a higher diversity of plant life have more quantity and diversity of animals. Plants and animals interact to help meet their needs for survival.
1 day	**Lesson 2: Relationships in habitats: How do plants help animals?**	Students will: 1. Develop models of interconnectedness between plants and animals in a backyard habitat. 2. Use texts and media to identify how animals interact with plants in ways that help animals survive.	Plants and animals interact in ways that help animals survive.	Plants and animals interact- animals get food from plants. Animals find shelter in plants. Habitats that have a higher diversity of plant life offer more food and shelter for animals.
1-2 days	**Lesson 3: Relationships in habitats: seed dispersal!**	Students will: 1. Determine that many plant-animal interactions occur between an animal and either a seed or a flower. 2. Identify the parts of plants that animals (including humans) eat. 3. Read and compare the key points presented by two texts on how animals help plants move seeds. 4. Use observable features of seeds to design and create a "seed" for attachment dispersal.	Introduce the terms **Reproduce** and **Seed dispersal** Plants and animals interact in ways that help plants **reproduce**	Plants get help from animals to move their seeds.

Days	Lesson	Lesson learning objectives	What will students learn?	What will students figure out?
1 day	**Lesson 4: Relationships in habitats: pollination!**	Students will: 1. Determine that animals visit flowers for either nectar or pollen and carry pollen from flower to flower as they look for food. 2. Use non-fiction and fiction text and media to learn about pollination. 3. Read a passage about pollination and respond to questions about the text. 4. Collaborate to create their own definition of pollination using information from the reading passage and class discussion.	Introduce the term **Pollination** Plants make flowers. Pollen from one flower has to move to another flower to allow a plant to make seeds.	Plants get help from animals to make seeds by moving pollen from one flower to another. Flowers all have the same function: to make seeds.
1 day	**Lesson 5: Pollinators and habitats**	Students will 1. Understand that pollinators contribute to biodiversity 2. Make observations of different plants and animals that live in different habitats around Washington. 3. Evaluate the diversity of life in different habitats around Washington.	Pollinators are responsible for helping over 80% of plants create seeds.	Different kinds of animals and plants live in different habitats in Washington state. Pollinators love prairies because they are full of flowers.
2 days	**Lesson 6: Pollination and flower structures: Observations with an artist's eye**	Students will: 1. Use tools to make close observations of a cut flower and identify reproductive structures. 2. Engage with famous paintings by American artist Georgia O'Keeffe. 3. Use close observations of flowers to create their own Georgia O'Keeffe inspired flower paintings.	Flowers come in different sizes, shapes, and colors, but have similar structures with the same functions. Georgia O'Keefe's use of shades of color, scale, contrast, and composition to explore flowers.	Flowers all have the same structures: petals, pollen, anthers, stigma Flowers all have the same function: to make seeds. Artists find inspiration in nature.
2 days	**Lesson 7: Pollination and animal structures: Pollination investigation**	Students will: 1. Explore the properties of pollen and compare it to the pollen analog to be used in an investigation. 2. Compare the structures of different pollinating animals to the materials to be used in an investigation. 3. Test different materials to determine which are best able to move "pollen"	Pollinators have different structures. The structures of pollinators allow them to move pollen	The structure of pollen makes it stick to pollinators. The structures of pollinators allow them to move pollen from flower to flower.

Days	Lesson	Lesson learning objectives	What will students learn?	What will students figure out?
		from their flower paintings to a blank flower. 4. Work collaboratively in a small group to construct a claim with evidence of the type of animal pollinator that can move the most pollen.	from flower to flower.	
1 day	**Lesson 8: Picky pollinators and their perfect plant**	Students will: 1. Determine that flowers use different methods to signal to pollinators that they have food available. 2. Use texts and data to identify the flower preferences of pollinators.	Flowers "talk" to pollinators Pollinators have preferences for specific flower traits.	Pollinator structures often match flower traits. Some pollinators will go to many different flowers, while others are pickier.
2-4 day	**Lesson 9: Student assessment: Research project and pollination model**	Students will: 1. Participate in a shared research project about a specific kind of pollinator. 2. Record and share their research on a poster. 3. Develop a simple model that mimics the function of an animal in pollinating plants.	There are species of pollinators that live in Washington. Student assessment	Facts about different kinds of pollinators. Student assessment
1+ day	**Lesson 10: How will you help? Habitat connectivity in our community**	Students will: 1. Understand that urban/suburban habitat includes many small pieces of habitat within travel range for animals. 2. Brainstorm ways that they can put what they have learned about pollinators, habitat, and biodiversity into action in their schoolyard and communities. 3. Put their ideas into action!	Small changes throughout communities can have big impacts on the availability of habitat in urban and suburban areas.	We are responsible for helping pollinators- **they live where we live!**

Vocabulary

Biodiversity

Habitat

Habitat Connectivity

Nectar

Pollen

Pollination

Pollinator

Insect

Reproduce

Seed Dispersal

Structures

Lesson 1: Schoolyard biodiversity anchoring phenomenon

Standards

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

Science and engineering practices	Disciplinary core ideas	Crosscutting concepts
Analyzing and interpreting data Record information (observations, thoughts, and ideas). Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) to answer scientific questions and solve problems. *Planning and carrying out investigations* Make observations (firsthand or from media) to collect data which can be used to make comparisons. *Asking questions and defining problems* Ask questions based on observations to find more information about the natural and/or designed world(s).	*LS4.D: Biodiversity and humans* There are many different kinds of living things in any area, and they exist in different places on land and in water.	*Systems and system models* A system is an organized group of related objects of components. Models can be used for understanding and predicting the behavior of systems. *Patterns* Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

Integrated standards

CCSS.Math.Content.2.MD.D.10
Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories.

Materials

- Slideshow "Biodiversity and Pollinators"
- Student pages
- Driving questions board paper
- Videos:
  - Where plants and animals live
  - PBS Urban Habitat

- What is Biodiversity
- Schoolyard biodiversity investigation educator guide

Learning Objectives

Students will engage with anchoring phenomena to formulate questions about why different habitats support different living things.

Students will:

1. Identify the components of a habitat.
2. Make observations about two different schoolyard habitats to compare their biodiversity.
3. Graph the different kinds of plants and animals they observe in the schoolyard habitats.
4. Conduct a survey of their own schoolyard habitat.
5. Generate questions about how schoolyards can help support biodiversity and organize those questions into a driving questions board.

Essential questions

- What is biodiversity?
- Why does biodiversity matter?
- How do plant-animal relationships help living things survive where they live?

Anchoring Phenomenon

To begin this unit, students will be presented with an anchoring phenomenon of habitats existing in natural and built environments. Students will make observations of two very different schoolyard habitats and will work to discover how we can increase biodiversity and support healthy habitats for animals (especially pollinators!) where we live, learn, and play. Students will make close observations of photos, evaluate data, and look for patterns to support a claim. Finally, students will generate questions about how schoolyards can support biodiversity that will help drive the rest of the unit.

Procedure

Part 1: Habitats

1. Open Washington biodiversity and pollinators PowerPoint and begin by discussing where you and your students live, learn, and play.
2. Ask students to think about their morning. Where did they wake up? What did they do to get ready to come to school? What did they eat? What did they drink?
3. Explain that their home, community, and school are all part of their habitat.

4. Lead students through a review of what a habitat is, and how our neighborhoods help us meet our habitat needs (food, water, shelter, space). This is a refresher on habitats and the needs of living things.
5. Watch video "where plants and animals live". This link is embedded in the slideshow and can be found under materials at the top of this lesson.
6. Food, water, and shelter as habitat needs make sense to students. Space as a habitat need can be more challenging for students to understand. This demonstration will help students understand how plants and animals need space to survive in a habitat.
   A. Mark out an area in your classroom as a "habitat". A piece of string laid on the ground in a rough circle works well, or you could use hula hoops.
   B. One at a time, choose students to come stand together in the "habitat". Make sure you have enough students so that the habitat becomes very crowded.

> **Teacher's note:**
> The goal here is to have the area very crowded to show how living in limited space would be very difficult.

   C. Ask the following questions:
      a. What would it be like if you lived your whole life with this many people crowded around you?
      b. How would you sleep?
      c. How would you eat?
      d. How would you bathe?
      e. Now imagine one of you got sick. What would happen to the rest of the people living in this habitat?
      f. So many people living in this small space makes it hard for enough food to grow to feed everyone. Imagine if you only had one bowl of macaroni and cheese to share.
      g. What would happen if your population reproduced? Add more students to the habitat.

   This is why space is so important to plants and animals and is considered a habitat need.

7. Plants and animals don't only live in wild spaces, they also live in our neighborhoods and communities. Even in our schoolyards!!
8. Watch video clip on urban habitat from PBS. This link is embedded in the slideshow and can be found under materials at the top of this lesson.

9. Ask students to brainstorm what kinds of living things they have seen in their neighborhood (schoolyard, backyards, community), and identify how these plants and animals meet their habitat needs of food, water, shelter, and space.
10. Allow students to create a drawing of their home or school and include the animals and plants they have identified.

> **Teacher's note:**
> For more information on biodiversity, watch "Why is biodiversity important - with Sir David Attenborough from the Royal Society." This video introduces biodiversity and discusses why it is so important to the health of our planet. You may also wish to visit WDFW's Biodiversity page to learn about biodiversity in Washington.

Part 2: Schoolyard Habitats and Biodiversity

In this section, students will be introduced to the anchoring phenomenon of schoolyards as habitats. In any habitat, there are plants and animals that depend on each other for survival. Some habitats are better at self-sustaining many kinds of plants and animals than others. Many of our urban and suburban areas have changed the environment in ways that don't support many different plants and animals, but we can learn what makes healthy habitats and take steps to support plant and animal relationships where we live, learn, and play.

1. Open slideshow to Lesson 1, part 2. Advance through slides discussing how healthy habitats can support biodiversity.
2. Watch video "What is Biodiversity?" This link is embedded in the slideshow and can be found under materials at the top of this lesson.
3. Advance through the slides introducing anchoring phenomenon: Biodiversity in our Schoolyard Habitats.

We are going to look at two different schoolyards and evaluate their habitat and biodiversity. To do this we are going to look for different kinds of plants in the schoolyard habitats, but how can we tell different plants apart?

4. Open slideshow and advance to the slide depicting different plants. Discuss the ways we can tell plants apart: color, shape, size, texture. Go through example photo and count out the different kinds of plants you can find.

Comparing schoolyard habitats:

5. Pass out photo of "Typical Schoolyard Habitat" and have students identify the different kinds of plants they can see. (Remember, if there are two of the same kind of plant, we only count it once!) Tally up the different kinds of plants you could see in this schoolyard and record it in student pages and on a class chart.

> **Teacher's note:**
> You may wish to laminate the photos of the schoolyard habitats and have students circle the different plant life they can find using dry or wet erase markers.

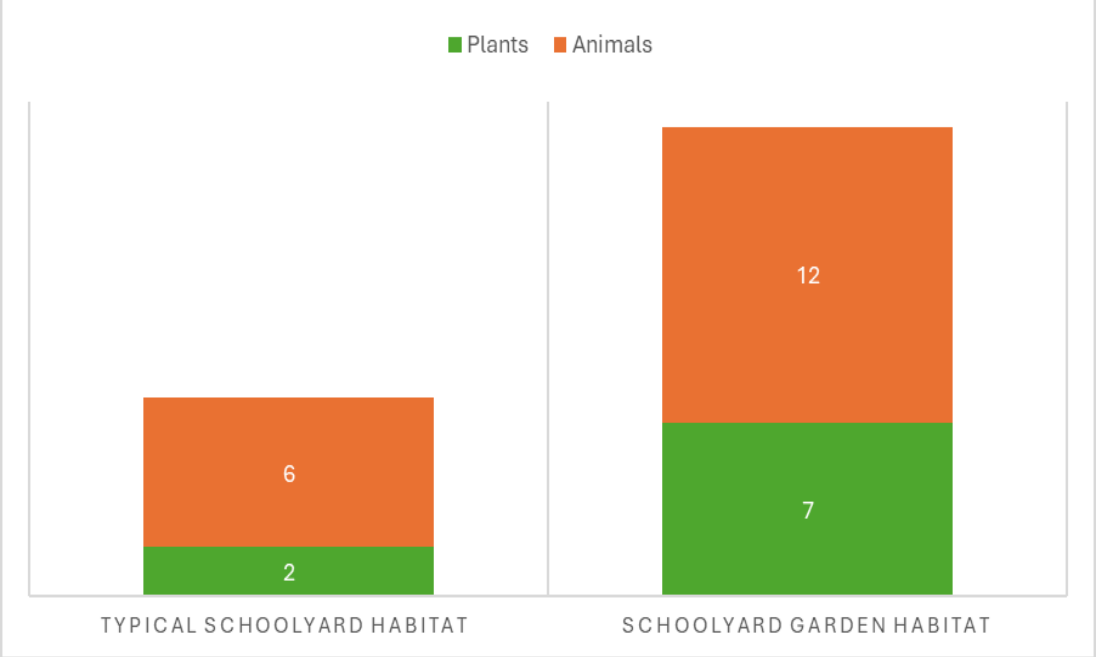
6. Next, have students evaluate the photo to determine if the schoolyard offers good habitat for animals. Does it have food, water, shelter, and space?
7. Repeat steps 4 and 5 for the photo of "Schoolyard Garden Habitat".
8. Explain that each schoolyard habitat also has animals that live there who were not captured in the photo. Luckily, there are studies that count the different types of animal visitors to these habitats, and we will look at data from those studies now. Pass out data sheet with information about the animal visitors.
9. Tally up the total number of different kinds of animals found in the schoolyard habitat. Record this information in student pages and in a class chart.

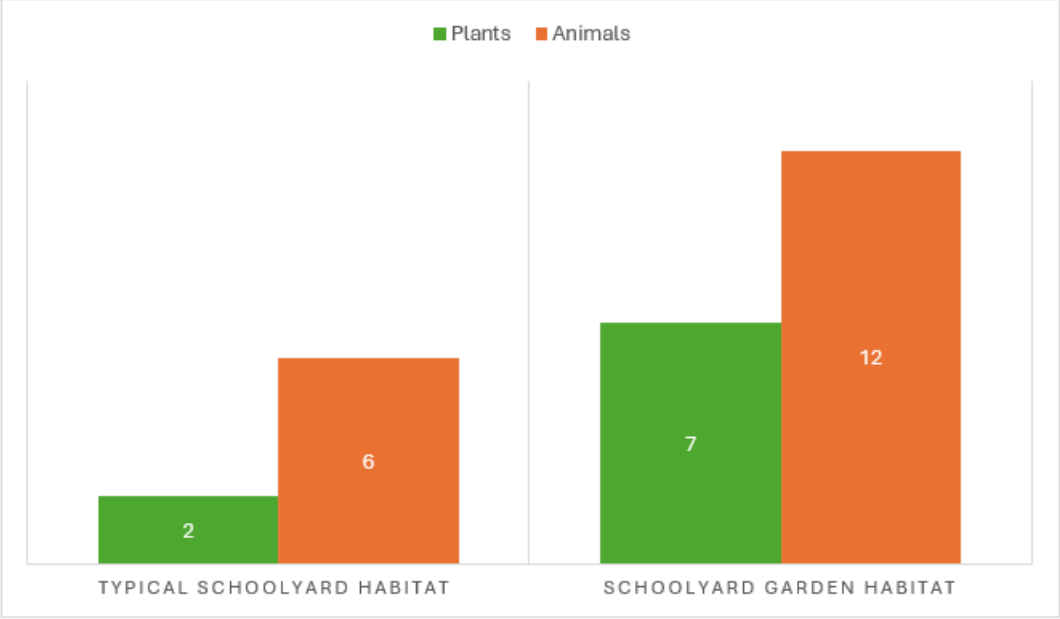
Graphing biodiversity:

1. Lead students through the creation of a simple bar graph depicting the number of different kinds of plants and number of different kinds of animals living in each schoolyard habitat.

> **Teacher's note:**
> You can opt to evaluate the data as a normal bar graph, or as a compound/stacked bar graph. To make a stacked bar graph, you could have students cut out their normal bar graph and glue the animals and plant bar on top of each other. Though compound graphs are not part of the 2nd grade Common Core math standards, they can be easier to compare.

2. Compare the graphs of the two schoolyard habitats.
    a. What information is shown on the graph?
    b. Which schoolyard habitat has more biodiversity?
    c. Is there a pattern that we are beginning to see between the number of different kinds of plants and the number of different kinds of animals?





Part 3: Schoolyard biodiversity survey

> **Teacher's note:**
> For support with helping your students design a schoolyard biodiversity survey, check out the "Schoolyard Biodiversity Investigation Educator Guide" from Pacific Education Institute.

This is an opportunity to take the anchoring phenomenon and bring it to your schoolyard. Allow students to develop a plan for how they will conduct a survey of your schoolyard. Schoolyard biodiversity surveys can be conducted in multiple ways. You could provide photos (including aerial photos), have students visit specific areas of the schoolyard, or make observations of the whole schoolyard.

1. Explain that the next step is to identify what living things we can find in our own schoolyard. We will be looking for different kinds of plants and animals.
2. Lead students through a discussion of what part(s) of the schoolyard you want to survey, and how you want to collect data.

> **Teacher's note:**
> The goal of the schoolyard biodiversity survey is to find out what lives in your schoolyard. There is no expectation that you will take this information and create a whole garden habitat. Lesson 10 shares small steps we can take to help connect habitat in our communities and ways that students can support biodiversity where they live, learn, and play.

Things to consider:

- Do we want to survey all or part of the schoolyard?
- Do we want to collect our information as a class?
- Do we want to collect our information in small groups (like we did with the other schoolyard photos)?
- How can we count different kinds of animals? Where would we look for animals?
- Since we know there will be animals that live in the schoolyard that we can't see all the time (hiding, nocturnal, etc.), how can we include those animals in our survey?
- How will we collect data about ways that animal needs are met in our schoolyard? Can we look for food, water, shelter, space?

3. Time to survey!

Part 4: Drawing Biodiversity in our Schoolyard

1. Have students create drawings of what they observed in the schoolyard. Be sure to have them label the plants and animals they recorded (including the names if they know them.) You can have students either create individual drawings, work in small groups to create their drawings, or create a larger scale class drawing of the schoolyard.

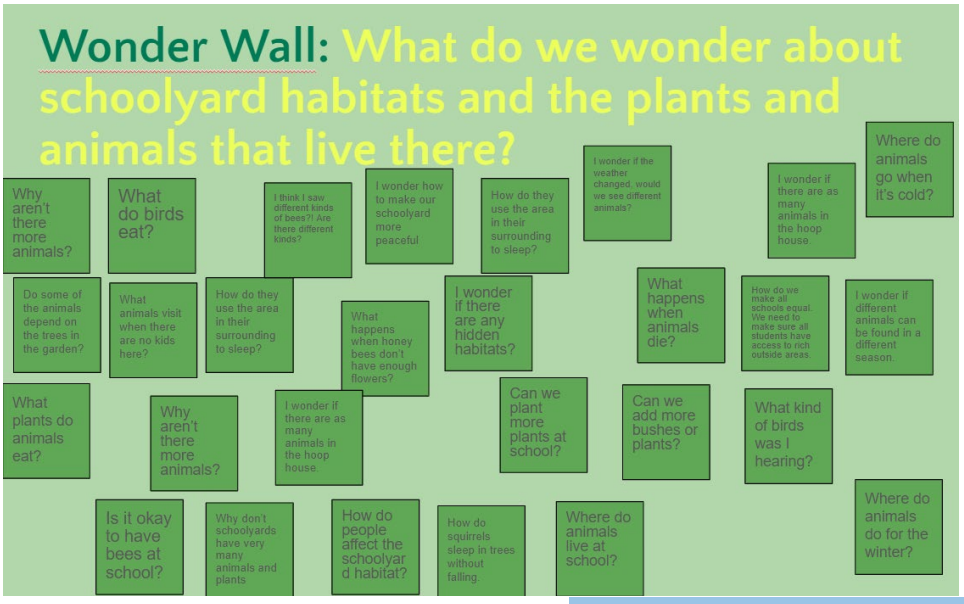
> **Teacher's note:**
> To facilitate a class drawing, you can begin by outlining the main structures of your schoolyard, and have students share out what plants and animals they saw. You could then either have students come up and draw directly on the paper, or have them draw the plants and animals individually and cut out and glue the drawings to the class poster.

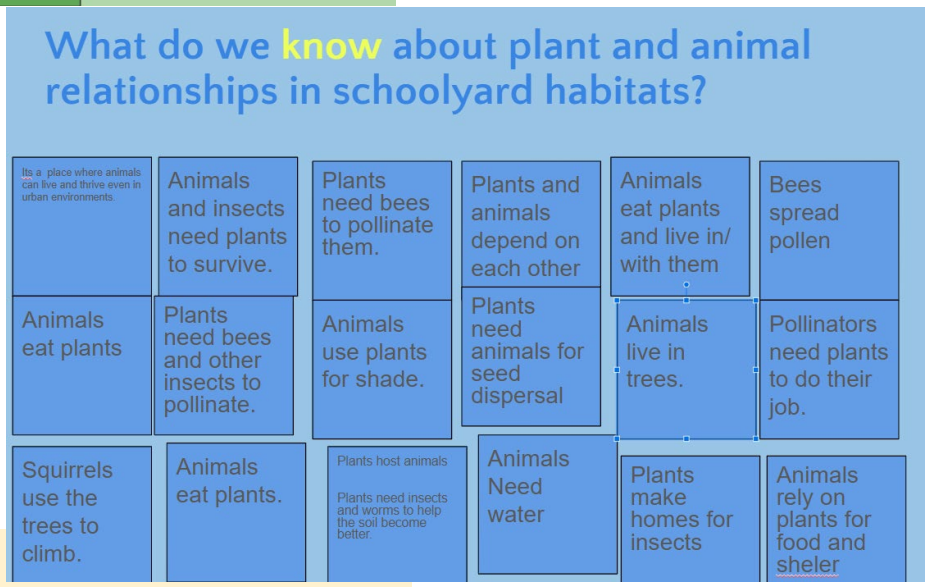
Part 5: Putting it together: Wonder wall and driving questions board

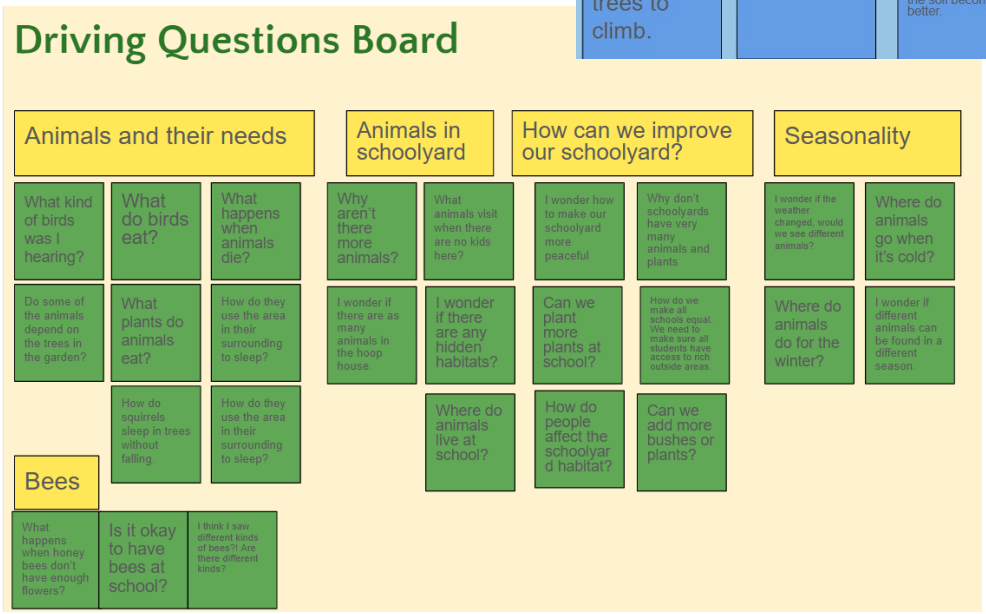
1. Review what we have learned and observed together throughout this lesson.
   - We noticed that the "Schoolyard Garden Habitat" had A LOT more plants and a lot more animals than the "Typical Schoolyard Habitat".
   - We figured out the biodiversity of our schoolyard habitat and compared it to the other two schoolyards.
   - We discovered that there is a relationship between plants and animals in habitats, and that there may be a pattern where habitats that have more kinds of plants also have more kinds of animals.

> **Teacher's note:**
> You may wish to create a central location in your classroom to gather information and questions generated in this unit. This location will include the know and wonder chart, the driving questions board, a chart to capture "what have we learned", and new science vocabulary with definitions.

2. Create an anchoring phenomenon chart with the following heading: "Biodiversity in our Schoolyards: Plants and Animals in Schoolyard Habitats". Include the following sections in your anchoring phenomenon chart: What do we know? Wonder Wall, Driving Questions Board, and What have we figured out? See example below.


Wonder Wall: What do we wonder about schoolyard habitats and the plants and animals that live there?
Why aren't there more animals?
What do birds eat?
I think I saw different kinds of bees?! Are there different kinds?
I wonder how to make our schoolyard more peaceful
How do they use the area in their surrounding to sleep?
I wonder if the weather changed, would we see different animals?
I wonder if there are as many animals in the hoop house.
Where do animals go when it's cold?
Do some of the animals depend on the trees in the garden?
What animals visit when there are no kids here?
How do they use the area in their surrounding to sleep?
What happens when honey bees don't have enough flowers?
I wonder if there are any hidden habitats?
What happens when animals die?
How do we make all schools equal. We need to make sure all students have access to rich outside areas.
I wonder if different animals can be found in a different season.
What plants do animals eat?
Why aren't there more animals?
I wonder if there are as many animals in the hoop house.
Can we plant more plants at school?
Can we add more bushes or plants?
What kind of birds was I hearing?
Where do animals do for the winter?
Is it okay to have bees at school?
Why don't schoolyards have very many animals and plants
How do people affect the schoolyard habitat?
How do squirrels sleep in trees without falling.
Where do animals live at school?


What do we know about plant and animal relationships in schoolyard habitats?
Its a place where animals can live and thrive even in urban environments.
Animals and insects need plants to survive.
Plants need bees to pollinate them.
Plants and animals depend on each other
Animals eat plants and live in/ with them
Bees spread pollen
Animals eat plants
Plants need bees and other insects to pollinate.
Animals use plants for shade.
Plants need animals for seed dispersal
Animals live in trees.
Pollinators need plants to do their job.
Squirrels use the trees to climb.
Animals eat plants.
Plants host animals
Plants need insects and worms to help the soil become better.
Animals Need water
Plants make homes for insects
Animals rely on plants for food and sheler


Driving Questions Board
Animals and their needs
Animals in schoolyard
How can we improve our schoolyard?
Seasonality
What kind of birds was I hearing?
What do birds eat?
What happens when animals die?
Why aren't there more animals?
What animals visit when there are no kids here?
I wonder how to make our schoolyard more peaceful
Why don't schoolyards have very many animals and plants
I wonder if the weather changed, would we see different animals?
Where do animals go when it's cold?
Do some of the animals depend on the trees in the garden?
What plants do animals eat?
How do they use the area in their surrounding to sleep?
I wonder if there are as many animals in the hoop house.
I wonder if there are any hidden habitats?
Can we plant more plants at school?
How do we make all schools equal. We need to make sure all students have access to rich outside areas.
Where do animals do for the winter?
I wonder if different animals can be found in a different season.
How do squirrels sleep in trees without falling.
How do they use the area in their surrounding to sleep?
Where do animals live at school?
How do people affect the schoolyard habitat?
Can we add more bushes or plants?
Bees
What happens when honey bees don't have enough flowers?
Is it okay to have bees at school?
I think I saw different kinds of bees?! Are there different kinds?

3. Ask students to share out what they already know about plants and animals in habitats. Record their observations and prior knowledge under the "what do we know" heading.

> **Teacher's note:**
> Question formulation is a technique students need to learn and practice. Scaffold teaching to support multilingual language learners (MLL) and emerging readers by reviewing how to formulate a question using "Wh" and "H" words (who, what, when, where, why, how). You could also offer sentence stems, example questions, and voluntary partner work to support sentence formulation.

4. Discuss how we can help plants and animals by incorporating their habitat needs (food, water, shelter, and space) into our communities.

> **Teacher's note:**
> This unit is designed to empower students to help plants and animals by learning about how animal and plant relationships support their habitat needs and applying what they learn to create better habitat where they live, learn, and play.

5. Allow students to start brainstorming questions they have about plants and animals in schoolyard habitats. You may want to give them time to discuss in partners or with table groups before you begin the class discussion.
6. Record student questions under the "what do we wonder" section.

> **Teacher's note:**
> To help students organize and prioritize questions, you may want to record their "wonderings" on a sticky note with their name or initials on the back. Then you can help students organize questions by physically grouping the sticky notes if they have related questions.

7. Finally, we are going to prioritize the wonderings by figuring out if there are questions we will need to answer to figure out the relationships between plants and animals in habitats.

The organized and prioritized questions will turn into the driving questions board that will be referred to throughout the rest of the unit.

Schoolyard Habitats

Name_____ **Date**_____

Typical Schoolyard Habitat

Use the photo of the Typical Schoolyard Habitat to answer the following questions.

Does the schoolyard offer good habitat for animals? Check the box for the habitat needs the habitat provides:

☐ food ☐ water ☐ shelter ☐ space

How many kinds of plants did you find? (use tally marks)

How many kinds of animals live in this habitat? (use tally marks)

On the next page, make a simple bar graph showing the number of different kinds of plants and the number of different kinds of animals found in the Typical Schoolyard Habitat.

Biodiversity in Typical Schoolyard Habitat

Number of Different Kinds

20		
19		
18		
17		
16		
15		
14		
13		
12		
11		
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		
	Plants	**Animals**

Schoolyard Garden Habitat

Use the photo of the Schoolyard Garden Habitat to answer the following questions.

Does the schoolyard offer good habitat for animals? Check the box for the habitat needs the habitat provides:

☐ food ☐ water ☐ shelter ☐ space

How many kinds of plants did you find? (use tally marks)

How many kinds of animals live in this habitat? (use tally marks)

On the next page, make a simple bar graph showing the number of different kinds of plants and the number of different kinds of animals found in the Typical Schoolyard Habitat.

Biodiversity in Schoolyard Garden Habitat

Number of Different Kinds

20		
19		
18		
17		
16		
15		
14		
13		
12		
11		
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		
	Plants	**Animals**

Your Schoolyard Habitat

Survey your schoolyard habitat to answer the following questions.

Does the schoolyard offer good habitat for animals? Check the box for the habitat needs the habitat provides:

☐ food ☐ water ☐ shelter ☐ space

How many kinds of plants did you find? (use tally marks)

How many kinds of animals live in this habitat? (use tally marks)

On the next page, make a simple bar graph showing the number of different kinds of plants and the number of different kinds of animals found in your schoolyard habitat

Biodiversity in Your Schoolyard Habitat

Number of Different Kinds

20		
19		
18		
17		
16		
15		
14		
13		
12		
11		
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		
	Plants	**Animals**

Typical Schoolyard Habitat

Schoolyard Garden Habitat

Photo credit: WDFW

Animal data set: Typical Schoolyard Habitat

Animal	Type of wildlife	Where they were seen
Douglas squirrel	Mammal	In and around the trees
Sparrow	Bird	In the grass and flying overhead.
Ant	Insect	On ground around the playground and in the grass
Common house spider	Arachnid	In corner of building
Ladybug	Insect	In the grass

Animal data set: Schoolyard Garden habitat

Animal	Type of animal	Where in the garden
Mason bee	Insect	Flowers
Monarch butterfly	Insect	Flowers
Ladybug	Insect	Leaves of plants
Hummingbird	Bird	Near flowering plants
American goldfinch	Bird	Trees and shrubs
Douglas squirrel	Mammal	Ground and trees
Red-breasted nuthatch	Bird	Trees
Ant	Insect	Soil and near plants
Bumblebee	Insect	Flowers
Painted lady butterfly	Insect	Flowers
Dragonfly	Insect	Near water sources
Common yellow swallowtail butterfly	Insect	Flowers
Hover fly	Insect	Flowers

Lesson 2: Relationships in habitats: How do plants help animals?

Standards

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.		
Science and engineering practices	**Disciplinary core ideas**	**Crosscutting concepts**
Developing and using models Using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. *Obtaining, evaluating, and communicating Information* Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).	*LS4.D: Biodiversity and humans* There are many different kinds of living things in any area, and they exist in different places on land and in water. *LS21.C Organization for matter and energy flow in organisms* Animals obtain food they need from plants or other animals.	*Systems and system models* A system is an organized group of related objects or components. Models can be used to for understanding and predicting the behavior of systems.

Learning objectives

Students will:

1. Develop models of interconnectedness between plants and animals in a schoolyard habitat.
2. Watch videos and make observations to identify how animals interact with plants in ways that help animals survive.

Essential question

What do animals get from plant-animal relationships?

Materials

- Biodiversity and pollinators slideshow
- Photo cards for relationships in habitats
- Chart paper for relationships in habitat models

Anchoring phenomenon

To connect with the anchoring phenomenon and engage in student-led learning, begin and end this lesson by looking at the driving questions board you created as a class. Start by identifying questions that will be addressed in this lesson.

Examples of student generated questions related to this lesson:

- Do wildlife eat all the plants in the school yard?
- Why do some wildlife only like certain kinds of plants?
- Do wildlife hurt plants or help plants?

At the end of the lesson add information they learned to their, "What We Have Learned" chart. It is likely that at the end of this lesson students will have a more questions about relationships between plants and wildlife in habitats. Take time to allow students to ask questions and add any new questions to the driving questions board.

Procedure

Part 1: Plant-animal relationships in habitats

Living things relationship match

1. Pass out photo cards depicting plants and wildlife. Have students make observations about what their photo card is depicting.
    - Who/what is shown in the photo?
2. Have students turn their photos over and identify the other kinds of plants or animals that their species has a relationship with.
    - Who/what is shown in the photos?
    - How do you think your plant/animal is connected to these other living things?
3. Next, have students move through the classroom and look for another student whose card matches one of the plants or animals that has a relationship with their card.
    - Example: Student has a card depicting a squirrel. On the back of their card, they have photos of trees, pinecones, seeds, and berries. They could pair up with the student with either the tree, pinecone, seeds, or berries card. Have students discuss the relationship between the animals and plants on their cards.
        - How do you think your plant/animal is connected to these other living things?
        - Does this relationship help meet a habitat need?
        - What does each living thing get from this relationship?

Relationships in habitats model

> **Teacher's note:**
> Set up the "relationships in habitats" poster ahead of time by cutting out the animal and plant photo cards and glueing them around the perimeter of the chart paper. As students describe their relationship card, draw lines to connect the animal and plant that are depicted.

4. Introduce the relationships in habitat model by showing students how each of their living things is included in the model. Tell students, "We are going to record how these living things are connected."
5. Ask students to raise their hand if their plant or animal has a connection with a flower. Call on one student and allow them to share out their relationship.
6. Draw a line between the student's living thing and the flower photo. If it is a relationship between a flower and an animal, discuss the habitat need that the relationship is providing for the animal.
7. Continue making connections until every student has had a chance to share.
8. There may be some relationships that we don't really understand yet. We know they are connected, but we don't know how. That is OKAY! We will learn more about these relationships in coming lessons and will return to this chart to add what we learn.

Part 2: Plant-animal relationships in media

1. Open slideshow and scroll to Lesson 2. Advance through the slides and have students watch the short video clips of animals interacting with plants.
2. After each video, lead students in discussion of what they have observed. Some questions you may ask students include:
    - What living things do you see?
    - What behaviors do you notice?
    - What are the animals doing?
    - How are animals and plants interacting?
    - How is the animal benefitting from this relationship?
    - How is the plant helping the animal meet its needs?
3. Return to the plant-animal relationships in habitats chart and add new information to the connections.
    - Example: In the videos we discovered that butterflies get food from flowers. Add "food" to the line connecting butterflies and flowers.

4. Create a new chart with the title "What have we learned?" Allow students to discuss in pairs or at table groups before recording student thoughts onto the chart.

> **Teacher's note:**
> You will return to the "What have we learned" chart throughout the rest of the lessons to help anchor student learning in student questions.

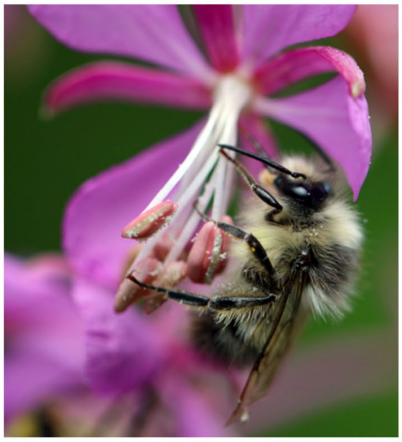
5. Return to the driving questions board from Lesson 1 and ask students if there are any new questions we should add. It is likely that at the end of this lesson students will have more questions about plant and animal relationships in habitats. Take time to allow students to ask questions and add key questions to the driving questions board.

Student pages

Photo credits: Douglas squirrel: Jim Cummins, American robin: Wren Bansbach, Rufous hummingbird: Taylor McDowell, Western serviceberry: National Park Service, Fuzzy horned bumblebee: U.S. Fish and Wildlife Service, Pacific Dogwood: U.S. Fish and Wildlife Service, Lupine flowers: WDFW, Sunflower Seeds: Sarit Richerson

Photo Cards to print for Relationships in Habitats Model

Hummingbird



Bumblebee

Fly

Butterfly

Bird

Fruit/Berry

Squirrel

Tree

Seed

Flower

Plant/Animal Relationship Cards to hand out to Students

Fruit

Tree

Seed

Squirrel

Fruit

Butterfly

Seed

Tree

Fly

Bird

Tree

Flower

Hummingbird

Tree

Flower

Bumblebee

Bird

Flower

Butterfly

Bird

Flower

Fly

Hummingbird

Bird

Squirrel

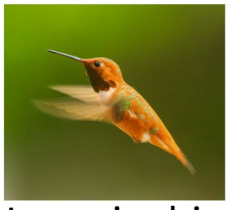
Bee

Seed

Tree

Fruit

Butterfly



Hummingbird

Bee

Fly

Seed

Flower

Bird

Squirrel

Seed

Bird

Squirrel

Berry/Fruit

Lesson 3: Relationships in habitats: seed dispersal!

Standards

2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Science and engineering practices	Disciplinary core ideas	Crosscutting concepts
Obtaining, evaluating, and communicating Information Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s). *Developing and using models* Develop a simple model based on evidence to represent a proposed object or tool.	*LS2.A: Interdependent relationships in ecosystems* Plants depend on animals for pollination or to move their seeds around. *ETS1.B: Developing possible solutions* Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (secondary)	*Structures and functions* The shape and stability of structures of natural and designed objects are related to their function(s).

Integrated standards

Common Core English Language Arts

CCSS.ELA-Literacy.RI.2.3
Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.

CCSS.ELA-Literacy.RI.2.9
Compare and contrast the most important points presented by two texts on the same topic.

Learning objectives

Students will:

1. Determine that many plant-animal interactions occur between an animal and either a seed or a flower.
2. Identify the parts of plants that animals (including humans) eat.
3. Read and compare the key points presented by two texts on how animals help plants move seeds.

4. Use observable features of seeds to design and create a "seed" for attachment dispersal.

Essential questions:

- What do plants get from plant-animal relationships?
- How do animals help plants reproduce?

Materials

- Slideshow Lesson 3
- Texts
    - A Fruit is a Suitcase for Seeds by Jean Richards
    - Read aloud video
    - A Seed Moves by Robin Page
    - Read aloud video
- Teach Engineering: Engineering Design Process
- Seed dispersal investigation materials:
    - Rubber bands
    - Glue
    - Scissors
    - Something to represent the seed:
        - Marshmallows
        - Cotton balls
        - Styrofoam balls
    - Materials to stick to fur or sock
        - Toothpicks
        - Pipe cleaners
        - Tape
        - Wire
        - Paper clips
        - Velcro

Anchoring phenomenon

To connect with the anchoring phenomenon and engage in student led learning, begin and end this lesson by looking at the driving questions board you created as a class. Start by identifying questions that will be addressed in this lesson.

Examples of student generated questions related to this lesson:

- Do wildlife hurt plants or help plants?
- Are insects good or bad?

At the end of the lesson, add information students have learned to their "What We Have Learned" chart, and add any new questions students may come up with to either "Our Wonderings" chart, or to the driving questions board.

Procedure

Part 1: Plant parts

Begin this lesson by reviewing what we learned about how plants help animals. You may refer to the relationships in habitats chart from Lesson 2, and to the questions developed in Lesson 1. Today we are going to focus on how plants benefit from this relationship.

1. Discuss what students discovered about relationships between plants and animals in Lesson 2. What parts of the plants were animals interacting with the most?

> **Teacher's note:**
> You may wish to revisit the photo cards students used in Lesson 2, or rewatch one of the videos.
> Students do not need to have the correct terms for the parts of the plants. We are looking for general terms like "fruit, seed, flower", etc.

2. Determine that many plant-animal interactions occur between an animal and either a seed or a flower.
3. Open the slideshow and advance to Lesson 3. Watch the video "What parts of plants do we eat" and discuss the parts of plants that animals eat (including humans).

Part 2: Seed dispersal

Optional: You could begin this section by conducting a dissection of a piece of fruit. An apple is a great fruit for this investigation. Slice the apple in half (a cross section is best) and have students identify the parts of the fruit including the part we eat and the seeds.

Seed dispersal in texts

Create a chart with the title "How do animals help move seeds?" Add to the chart as you read through the two texts: A Fruit is a Suitcase and A Seed Moves.

> **Teacher's note:**
> Links to video read-aloud of the two texts are available under "Materials" at the top of this lesson, and in the "Resources" page at the end of the unit. They are also embedded in the PowerPoint

1. Read A Fruit is a Suitcase. As you read, emphasize the page that explains why seeds need to disperse.
2. Read A Seed Moves. Take notes of the different ways seeds move. Pay close attention to the ways animals help seeds move. Do the animals know they are helping?
3. Compare the main ideas of the two texts and discuss how these two texts are similar and how they are different.

Seed dispersal videos

4. Open the slideshow to Lesson 3 and finish this section by watching videos of animals moving seeds.
5. Return to the "What have we learned" chart and ask students to share what new information you should add.

Part 3: Seed dispersal investigation

In parts one and two we discovered that animals help plants by moving their seeds around. They move the seeds by either eating the seeds (like birds), hiding the seeds (like squirrels), or having the seeds stick to their coats and getting carried away (like many other mammals). In this activity, we are going to design a seed to be moved by an animal through attachment. For more information on supporting your students through the engineering design process, check out the resources from the Teach Engineering website.

> **Teacher's note**
> To get a good idea of how to run this investigation, watch this Seed Dispersal Investigation video.

1. Open slideshow to Lesson 3 and show photos of seeds moved by attachment. Have students identify seed structures that allow them to stick to animal fur.
2. Introduce the materials available for seed design and test.
3. Design seed! Put students in small groups or work independently to design their seed. Have students draw their design first and identify the materials they will use.
4. Build the seed!

5. Test the seed! Try sticking the seed to a piece of felt or fake fur. Will it stick? Can you disperse it across the classroom without it falling off?
6. If it falls off too quickly, make changes to your design and retry!

Teacher's note:
If the weather is nice, this is a great activity to do outside! Even better, you can create an obstacle course and have students try to disperse their seed from one side to the other.

Lesson 4: Relationships in habitats: pollination!

Standards

2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.		
Science and engineering practices	**Disciplinary core ideas**	**Crosscutting concepts**
Obtaining, evaluating, and communicating information Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).	*LS2.A: Interdependent relationships in ecosystems* Plants depend on animals for pollination or to move their seeds around.	*Structures and functions* The shape and stability of structures of natural and designed objects are related to their function(s).

Integrated standards

Common Core English Language Arts

CCSS.ELA-Literacy.RI.2.4

Determine the meaning of words and phrases in a text relevant to a *grade 2 topic or subject area*.

CCSS.ELA-Literacy.RI.2.3

Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.

Learning objectives

Students will:

1. Determine that animals visit flowers for either nectar or pollen and inadvertently carry pollen from flower to flower as they forage.
2. Use non-fiction and fiction text and media to learn about pollination.
3. Read a passage about pollination and respond to questions about the text.
4. Collaborate to create their own definition of pollination using information from the reading passage and class discussion.

Essential questions

- How do animals help plants reproduce?
- What is pollination?

Materials

- Copies of the "Pollination: How plants make seeds" reading passage
- Student comprehension questions
- Pencils or highlighters for annotating the text
- What is pollination?
- Sip, Pick, and Pack: How Pollinators Help Plants Make Seeds by Polly W. Cheney, illustrated by Kim Overton.
    - Video read aloud

Anchoring phenomenon

To connect with the anchoring phenomenon and engage in student-led learning, begin and end this lesson by looking at the driving questions board you created as a class. Start by identifying questions that will be addressed in this lesson.

Examples of student generated questions related to this lesson:

- Do wildlife hurt plants or help plants?
- Are insects good or bad?

At the end of the lesson, add information they learned to their "what we have learned" chart, and add any new questions students may come up with to either "our wonderings" chart, or to the driving questions board.

Procedure

Part 1: Pollination: Animals moving things again!

1. Begin by opening the slideshow to Lesson 4 and watching videos of animals interacting with flowers. In the last lesson, we figured out these animals are coming to the flower for food. But what is the plant getting from this relationship?
2. Write the word "Pollination" on the board or on a piece of chart paper. Explain that today we are going to learn a lot about pollination and create a definition together.
3. Pass out the student reading passage "Pollination: how plants make seeds". Introduce the passage and highlight key vocabulary words (pollination, pollen, anther, stigma, nectar, pollinators, reproduce).

Teacher's note:
This student reading passage was written to be a grade appropriate non-fiction text for second grade. You can choose to read the passage aloud to the class, have students take turns reading aloud, or have them read the passage to themselves.

4. Encourage students to underline or highlight important details as they read.
5. After students have read through the passage, have them complete multiple-choice questions to check their understanding of the main idea, details, and vocabulary. For the fill-in-the-blank question, encourage students to use the word bank to reinforce vocabulary knowledge.
6. Review answers as a class, discussing any misconceptions. Highlight question four:

   Read the selected sentence from the text:
   Without pollination, we wouldn't have many of the fruits and vegetables we eat. Apples, strawberries, and even chocolate depend on pollinators!

7. Have students choose the correct meaning from the multiple-choice options and explain their reasoning.
8. Discuss why pollination is important for food production.

Part 2: Using text and media to learn about pollination

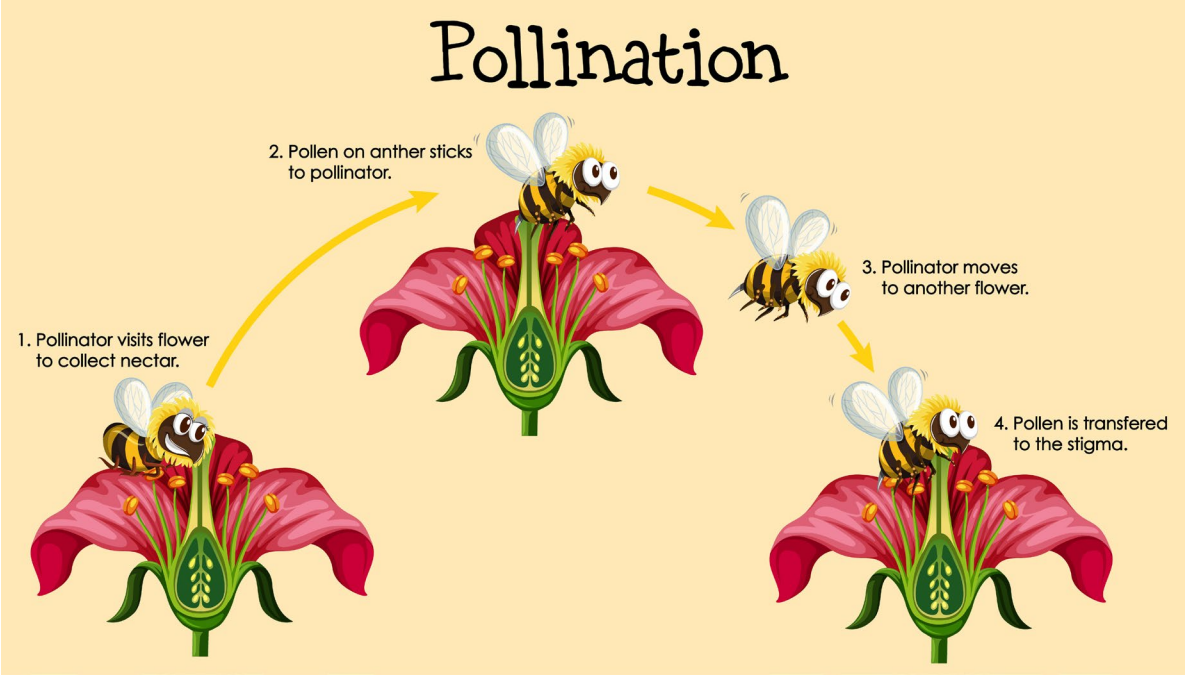
1. Read the book Sip, Pick, and Pack: How Pollinators Help Plants Make Seeds by Polly W. Cheney, illustrated by Kim Overton. (Read aloud link in slideshow and under "Materials.")
2. As you read the story, ask students to identify the main idea the author wishes to convey. Does this text tell us more information about pollination or pollinators?
3. Watch the video "What is Pollination". Link to the video can be found in the slideshow and under "Materials" in this lesson.
4. After watching the video, students should have a solid understanding of pollination. Return to the word you wrote on the board or chart paper at the beginning of the lesson. Explain that we are now going to write a class definition of pollination.
5. Ask guiding questions to help students think about key details and record their responses in a brainstorm-style format.
   - "What happens to pollen during pollination?"
   - "What parts of the flower are involved?"
   - "Who or what helps pollination happen?"
6. Using the information gathered, guide students in forming a simple, clear definition.

7. Example questions to help shape the definition:
    - "How can we explain pollination in one sentence?"
    - "Can we make it shorter while keeping the important details?"
8. As a class, agree on a final definition and record it with the driving questions board and “What we have learned” chart.

Pollination: How plants make seeds

Have you ever watched a bee buzzing from flower to flower or seen a butterfly fluttering by? Guess what—they're on an important mission! They're helping plants make seeds through a process called **pollination**!

Pollination happens when tiny bits of **pollen** move from one part of a flower to another. The pollen starts in the **anther** and needs to reach the **stigma** to help the plant grow seeds. Cool, right?



Graphic by blueringmedia

Many creatures assist with pollination! Bees, butterflies, and moths are common **pollinators,** but beetles, flies, and hummingbirds also play a role. In some states even bats are pollinators!

When a pollinator stops by a flower for some sweet nectar, pollen sticks to its body. Then, as it visits another flower—ta-da!—the pollen spreads, helping new plants grow.

Without pollination, we wouldn't have many of the fruits and vegetables we eat. Apples, strawberries, and even chocolate depend on pollinators! So next time you see a bee or butterfly, give them a little cheer-- they're helping plants **reproduce** through pollination!

Name:_____ **Date:**_____

Vocabulary words

- **Anther** – The part of the flower where pollen is made.
- **Nectar** – A sweet liquid inside flowers that bees and butterflies love to drink.
- **Pollen** – Tiny yellow dust-like grains that help plants grow new seeds.
- **Pollination** – The process of moving pollen from one part of a flower to another so plants can make seeds.
- **Pollinators** – Animals like bees, butterflies, birds, and even the wind that help move pollen between flowers.
- **Stigma** – The part of the flower that catches pollen.

Comprehension questions

1. **What do pollinators help plants do?**
   a) Grow bigger leaves
   b) Make seeds
   c) Drink water

2. **How does pollen move from one flower to another?**
   a) By insects, birds, and the wind
   b) By people planting new flowers
   c) By the rain washing it away

3. **What is the main idea of the text?**
   a) Bees and butterflies are the most important insects in nature.
   b) Pollination helps plants grow by moving pollen so they can make seeds.
   c) Flowers need water and sunlight to survive.

4. **What does this sentence from the text mean?**
   "Without pollination, there would be no apples, strawberries, or even chocolate to eat!"
   a) Pollination helps grow the fruits and foods we eat.
   b) Bees make apples, strawberries, and chocolate.
   c) Flowers turn into food without needing pollination.

5. **Fill in the blank**

Pollination helps plants _____. It helps plants make _____, which grow into new plants.

Word bank: seeds, flowers, food, reproduce, pollinate

Lesson 5: Pollinators and habitats

Standards

2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

Science and engineering practices	Disciplinary core ideas	Crosscutting concepts
Obtaining, evaluating, and communicating information Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).	*LS4.D: Biodiversity and humans* There are many kinds of living things in any area, and they exist in different places on land and in water. *LS21.C Organization for matter and energy flow in organisms* Animals obtain food they need from plants or other animals. *LS2.A: Interdependent relationships in ecosystems* Plants depend on animals for pollination or to move their seeds around.	*Systems and system models* Objects and organisms can be described in terms of their parts. Systems in the natural and designed world have parts that work together

Learning objectives

Students will:

1. Make observations of different plants and animals that live in different habitats around Washington.
2. Understand that pollinators contribute to biodiversity. Pollinators are responsible for helping over 80% of plants create seeds.
3. Compare the diversity of life in different habitats around Washington.

Essential questions:

- Why should we care about pollinators?
- How do pollinators support healthy habitat?

Materials

- Biodiversity and pollinators slideshow
- Pollinators: why we love them and how you can help
  - Video comprehension questions
- Comparing schoolyard habitats student page
- Videos for schoolyard habitat comparisons (also embedded in slideshow)
  - Sagebrush Country; Backbone of the West
  - This Land is Part of Us
  - Understanding Forest Ecosystems
  - Biodiverse Washington: West Cascades Ecoregion
- WDFW biodiversity in Washington webpage: Explore Washington's ecoregions

Anchoring phenomenon

To connect with the anchoring phenomenon and engage in student lead learning begin and end this lesson by looking at the driving questions board you created as a class. Start by identifying questions that will be addressed in this lesson.

Examples of student generated questions related to this lesson:

1. Without plants, would animals live there?
2. Why do animals need to be in areas where plants grow?
3. Do animals hurt plants or help plants?
4. Are bugs good or bad?
5. Why don't we see butterflies all the time at our school?
6. Where do the bugs come from?

At the end of the lesson, add information they learned to their "what we have learned" chart, and add any new questions students may come up with to either "our wonderings" chart, or to the driving questions board.

Procedure

Part 1: Why are pollinators important?

1. Watch the video Pollinators: Why we love them and how you can help. (This can be found in the slideshow or by following the link).

> **Teacher's note:**
> Included in this lesson are some video comprehension questions. Before moving to the discussion section, you may wish to lead students through these questions to ensure students are all on the same page. Questions are included in the student pages at the end of this lesson.

2. After watching the video, lead class in a discussion about some of the key points from the video:

Pollinators are fundamental to our ecosystems here in Washington.

- They provide pollination service to most flowering plants;
- Those plants make food for us and for animals;
- Those plants provide habitat for animals; and
- Without pollinators we wouldn't have rich biodiversity in Washington.

Part 2: Pollinator paradise: Prairie habitats in Washington

3. Open slideshow and advance through slides depicting prairie habitats in Washington. See slide notes for discussion questions.
4. Watch video of the Western Washington prairie habitat and have students tally the different kinds of plants and pollinators they can see.
    a. Have students discuss what about this habitat supports so many pollinator species.

Part 3: Schoolyard habitats across the state

In this section, students will look for biodiversity in two different habitats. This will help students understand that schoolyard gardens can look very different in different parts of the state but can help support biodiversity where they are located.

1. Begin this section by reviewing what students discovered about the importance of pollinators in helping plants reproduce and providing habitat for animals.
2. Around our state, there are many different types of habitats. Say, "Let's explore the habitats around two different schools to see what kinds of plants and animals live there."
3. Pass out school information sheets and begin by having students read the passage on **Schoolyard Habitat A: Shrubsteppe** and record the plants and animals the passage discusses.

4. Say, "Let's take a closer look at a shrubsteppe habitat to see what other plants and animals we can see."
5. Open slideshow to watch videos about shrubsteppe habitat. While watching the videos, pause to allow students to record the kinds of plants and animals they see.
6. Repeat steps 3-5 looking at **Schoolyard Habitat B: Temperate Forest**
7. Connect habitats with pollinators. Lead students in a discussion of the schoolyard habitats using the following prompts:
    a. Do pollinators live in both schoolyard habitats? If we can't see them, how could we know?
    b. What kind of habitat is our school located in?

> **Teacher's note:**
> WDFW has a series of short videos showcasing the diversity of life in different ecoregions across the state. Check them out on the Biodiversity in Washington webpage under "Explore Washington's Ecoregions" and share the ecoregion where your school is located.

    c. What kinds of plants and animals did you find in the schoolyard survey?
    d. If you increased the diversity of plants in your schoolyard habitat, do you think other animals could live in your schoolyard?

Video Comprehension Questions

1. **What is a pollinator?**
   a. An animal that eats flowers
   b. An animal that carries pollen from one flower to another
   c. An animal that grows plants
   d. An animal that makes honey

2. **How many species of bees are there in Washington?**
   a. 1
   b. 300
   c. 600
   d. 10,000

3. **Why are pollinators important?**
   a. They help plants produce seeds and fruits
   b. They make the weather better
   c. They are the fastest animals
   d. They eat all the flowers

4. **What is one way people can help pollinators?**
   a. By building tall buildings
   b. By installing bird feeders
   c. By planting native flowers in their gardens
   d. By mowing their lawns every day

5. **True or False**: One out of every three bites of food we eat depends on pollinators.

6. **True or False**: Pollinators do not provide food for other animals in the ecosystem.

Pollinator Paradise: Prairies!

Name: _____ Date:_____

Prairies support a lot of different kinds of pollinators and have a high biodiversity.

Why do you think there are so many kinds of pollinators in prairie habitats?

Western prairie habitat

Watch the video of the western prairie habitat. How many kinds of flowers and pollinators do you see?

Tally the different kinds of flowers you see. (example: tall red flower=1 tally mark)	Tally the different kinds of pollinators you see. (example: purple butterfly=1 tally mark)

Exploring habitats around two schools

Name: _____Date: _____

Comparing schoolyard habitats

Let's observe the areas around the two schools to see what plants and animals live there. By observing these schoolyard habitats, we can learn about the different kinds of plants and animals in various places.

Schoolyard habitat A: Shrubsteppe

School A is in a shrubsteppe habitat. This area has bunch grass and some shrubs like sagebrush. Around this school, you might see animals such as rabbits, hawks, and small birds, like sagebrush sparrows, during the day. At night, animals like coyotes and owls come out to look for food. The ground has tough plants like sagebrush and bunchgrasses, which give shelter and food for insects and pollinators like bumblebees.

What kinds of plants and animals live around School A?

Plants	Animals

Schoolyard habitat B: Temperate forest

School B is in a green forest with tall fir trees and a small stream nearby. Around this school, you can see squirrels and many different birds like robins and chickadees during the day. At night, animals like raccoons and bats come out to find food. The ground is covered with ferns and wildflowers, which are homes for many pollinating insects.

What kinds of plants and animals live around School B?

Plants	Animals

Lesson 6: Pollination and flower structures: Observations with an artist's eye

Standards

2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.		
Science and engineering practices	**Disciplinary core ideas**	**Crosscutting concepts**
Developing and using models Using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.	*LS2.A Interdependent relationships in ecosystems* Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)	*Structures and functions* The shape and stability of structures of natural and designed objects are related to their function(s).

Integrated standards

Art Anchor Standard 11

Relate artistic ideas and works with societal, cultural, and historical context to deepen understanding.

Learning objectives

Students will:

1. Make observations of cut flowers and identify their structures.
2. Engage with famous paintings by American artist Georgia O'Keeffe.
3. Use close observations of flowers to create their own Georgia O'Keeffe inspired flower paintings.

Essential questions

- How can art help us make observations and record what we see?
- What are the structures of flowers?
- What are their functions?

Materials

- Slideshow; Lesson 5
- The Reason for a Flower by Ruth Heller
  - Read aloud video
- Cut flowers – one per student pair

    - Look for flowers that have easily identifiable features such as alstroemerias, petunias, fuchsias, lilies, tulips, daffodils, hibiscus, gladiolus, iris, snapdragons, poppies, azaleas, nasturtiums, etc.
- Hand lenses
- Student worksheet: Observing a flower
- Optional video for instructing students to draw their flower
    - Georgia O'Keefe Flowers elementary art lesson
    - Happy Flower | Georgia O'Keeffe Art Project at Home
- Art materials
    - Watercolor paper or mixed media paper. 5x9 watercolor paper is ideal.
    - Pencils
    - Coloring materials, watercolors, or oil pastels

Anchoring phenomenon

To connect with the anchoring phenomenon and engage in student lead learning begin and end this lesson by looking at the driving questions board you created as a class. Start by identifying questions that will be addressed in this lesson.

Examples of student generated questions related to this lesson:

1. Without plants, would animals live there?
2. Are bugs good or bad?
3. Why do some animals only like certain kinds of plants?

At the end of the lesson, add information they learned to their "what we have learned" chart, and add any new questions students may come up with to either "our wonderings" chart, or to the driving questions board.

Procedure

Part 1: The reason for a flower

1. Begin this section by reading "The Reason for a Flower" by Ruth Heller. You can find the read aloud video in the slideshow.
2. As you read through the book, pause to discuss the flower parts and their functions.
3. Pass out live flowers (one flower per pair of students) along with hand lenses and student worksheet "observing a flower".
4. Have students follow instructions on the worksheet to make observations of their flower.

5. Open slideshow to Lesson 5 and show the diagram of a flower. Identify the structures of flowers that are important for pollination, as well as other identifiable features such as color, petal shape, petal number, scent, etc.
6. On the flower model page, ask students to sketch their flower. Encourage students to include labels for the flower structures.

Part 2: Georgia O'Keeffe background

1. Say," We have drawn a simple model of a flower and have identified some of the important structures of flowers. Next, we are going to explore some artwork created by a famous American artist who did just what you did: closely observed flowers and drew what she saw."
2. Open slideshow to Lesson 5: Georgia O'Keeffe. Begin by watching the video on the first slide of the section. This will give background information about Georgia O'Keeffe and her artistic style.

> **Teacher's note:**
> This is an opportunity to use Visual Thinking Strategies (VTS) in connecting famous works of art to science. For more info on VTS check out Education World.

3. Compare the two images of flowers depicted. How are the flowers painted by Georgia O'Keefe different from other flower paintings of her time?
4. Advance through the slides having students make observations of the flower paintings. Potential questions include:
   - What did Georgia mean when she said the flower in your hand becomes your whole world for a moment?
   - What structures of the flower can you identify?
   - What colors do you notice? Are they all the same value?
   - Notice how the flowers go off the edges of the paper. Why do you think Georgia decided to do that?
   - Notice the background. How does the background color help the painting?
   - What do the paintings make you feel?

Part 3: Georgia O'Keeffe flower art

1. Begin by explaining how we are going to take our initial drawing of a flower and zoom in even closer to match the style created by Georgia O'Keeffe.

> **Teacher's note:**
> The flower art created in this lesson can be used in the pollination investigation in Lesson 6. To make that possible, you will need to laminate the artwork when it is dry. It is best to use smaller sheets of paper for this project - 5x9 watercolor paper is ideal.

2. Guide students to create a sketch of the close-up view of a flower. You can lead this yourself or open the link to the video included in the "materials" section, and have students follow along with the video instructions.
3. Be sure to have students draw their flowers so they cover most of the page and have some parts that continue off the page, just like Georgie O'Keefe's flowers.
4. After students have created their sketch, it is time to add color. This can be done using any medium you prefer, though it is especially well suited to oil pastel or watercolor!

> **Teacher's note:**
> This is a great activity to do outside on a nice day. It builds connections to the art and nature when created, "en plein air" and has the bonus of decreasing the potential for classroom messes!

Student worksheet: Observing a flower

Name: _____ **Date:** _____

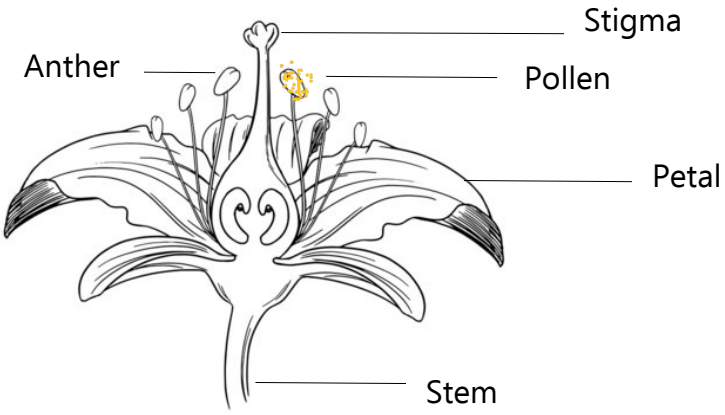
1. Look at your flower carefully. Use a magnifying glass if you have one.

What color(s) is the flower? _____

How many petals does it have? _____

Does the flower smell? Circle one: Yes / No

2. Point to these parts on your flower:
    - Petal
    - Stem
    - Anther
    - Stigma
    - Pollen



Draw your flower in the box below. Color your drawing to match your flower.

Lesson 7: Pollination and animal structures: Pollination investigation

Standards

2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

Science and engineering practices	Disciplinary core ideas	Crosscutting concepts
Developing and using models Using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.	*LS2.A Interdependent relationships in ecosystems* Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)	*Structures and functions* The shape and stability of structures of natural and designed objects are related to their function(s).

Integrated standards

Common Core English Language Arts

CCSS.ELA-Literacy.L.2.5.a

Identify real-life connections between words and their use (e.g., *describe foods that are spicy or juicy*).

CCSS.ELA-Literacy.CCRA.R.2

Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

Learning objectives

Students will:

1. Explore the properties of pollen and compare it to the pollen analog to be used in an investigation.
2. Compare the structures of different pollinating animals to the materials to be used in an investigation.
3. Test different materials to determine which are best able to move "pollen" from their flower paintings to a blank flower.
4. Work collaboratively in a small group to construct a claim with evidence of the type of animal pollinator that can move the most pollen.

Essential questions

- What are the properties of pollen that allow it to stick?
- What are the animal structures that allow animals to move pollen?

Materials

- Flowers are Calling by Rita Gray, illustrated by Kenard Pak.
  - Read aloud video
- Slideshow
- Flower art from previous lesson (laminated)
- Investigation student pages
  - Investigation data collection student page
  - Test flowers and flight path
- Investigation Materials:
  - Container for each small group/pair with the following:
    - Cheese puffs- both whole and crushed in small container
    - Feather
    - Cotton ball
    - Popsicle stick
    - Pipe cleaner
    - Inflated small balloon
    - Plastic spoons (have students only use the back of the spoons)

Anchoring phenomenon

To connect with the anchoring phenomenon and engage in student-led learning, begin and end this lesson by looking at the driving questions board you created as a class. Start by identifying questions that will be addressed in this lesson.

Examples of student generated questions related to this lesson:

1. Why do animals need to be in areas where plants grow?
2. Do animals hurt plants or help plants?
3. How do animals know which plants to visit?
4. Do animals eat all the plants in the school yard?

At the end of the lesson, add information they learned to their “what we have learned” chart, and add any new questions students may come up with to either “our wonderings” chart, or to the driving questions board.

Procedure

Part 1: Read aloud The Flowers are Calling (ELA Integration)

Read The Flowers are Calling by Rita Gray, illustrated by Kenard Pak. (Read aloud link can be found in "Materials" section).

As you read the story, pause to ask students to consider the following:

- How are the flowers "calling"?
- What are the flowers calling the animals to do?
- Identify specific verbs for the animal action with the flower (example: sip, fly, eat).

Part 2: Introduce materials and compare structures of pollinators and plants

1. Open slideshow and show photos of microscopic images of pollen. Ask if the shape of the pollen reminds students of anything. (Students should remember the shapes of the seeds they designed for the seed dispersal activity).
2. Advance to the next slide and ask students to compare the shapes of the seeds to the shape of pollen. Ask, "How do you think the pollen gets moved?"

> **Teacher's note:**
> Follow this link to learn how you can download file to 3D print a grain of dandelion pollen! This would be amazing to have in the class if you have a 3D printer!

3. Continue through slideshow to introduce the "pollen" we will use in our investigation. Ask students to guess what that substance is. (Answer: crushed cheese puffs!)
4. Ask, "Why can't we use real pollen?" (Allergies, pollen grains are super tiny so could be hard to see, difficult to get a lot of… etc.)
5. Compare properties of pollen to microscopic image of pollen analog (crushed cheese puffs).
    - How are pollen and crushed cheese puffs similar?
    - How are pollen and crushed cheese puffs different?

> **Teacher's note:**
> To explore the shape of pollen further, open the 3D Pollen Project's webpage. Look at the 3D renderings of different types of pollen. Based on the pollen properties, can you tell which kinds stick to animals? Can you find a kind of pollen that would be moved by wind?

Part 3: Pollen movement investigation overview and preparation

1. Introduce materials for investigation. Pass out hand lenses and investigation worksheet. Have students make observations of the properties of the materials.
2. Optional: Show images of materials under the microscope.
3. Identify structures of different animal pollinators: bees, hummingbirds, butterflies, bats. Compare the animal structures to the materials used in the investigation. Match the animal structures to the investigation materials.
4. Explain how the investigation will take place. Based on the properties of the "pollen" and the materials, make a prediction of which material will carry the most pollen from the flower painting to the test flower. Make a prediction of which material will carry the least pollen from the flower painting to the test flower.

Part 4: Conducting investigation

20-30 minutes for investigation

1. **Set up:** Place your flight path and test flower under the flower painting. You want to cover the shaded part of the flight path with the flower painting.

2. **Apply pollen:** Sprinkle some cheese puff dust onto the home flower.
3. **Pick a pollinator part:** Choose one of the materials (cotton ball, feather, etc.).
4. **Land on home flower:** Gently press your material onto the home flower to pick up pollen.
5. **Fly to the test flower:** Move your material through the air to the test flower.
6. **Land on the test flower:** Gently press it onto the test flower.
7. **Observe:** Look at how much pollen moved to the test flower. Use a magnifying glass if needed.
8. **Record results:** Write or draw how much pollen transferred.
9. **Repeat:** Try all materials and identify which one carries the most pollen.

Optional variation with balloon: Have students rub the inflated balloon on their shirt or head to charge it with static electricity. Repeat the balloon investigation to see if it changes the result.

    a. Results and predictions: Have students identify which material worked best in their investigation and compare their results to their prediction.

Name: _____Date_____

Pollination investigation

Question: What material can carry the most pollen from one flower to another?

1. **Pollination investigation materials observations** look at the materials under a hand lens, then draw or describe what you see on the data sheet.

Material properties descriptive words						
Fuzzy	Smooth	Rough	Hairy	Sharp	Spikey	Furry

2. **Materials and pollinator parts match:** After making close observations of the materials and viewing the photos of the pollinators, add the pollinator each material is most like.

3. **Make a prediction:** Based on the structures and properties of the materials and the pollen, which material do you think will carry the most pollen from your flower to the test flower?

   I predict the _____ will move the most pollen from the home flower to the test flower because it _____

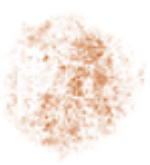
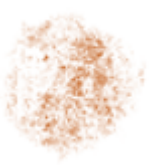
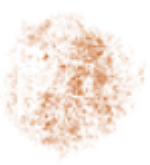
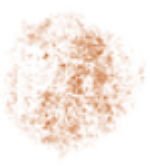
   _____

4. **Conduct investigation**
   1. **Set up:** Place your home flower and test flower a short distance apart.
   2. **Apply pollen:** Sprinkle some cheese puff dust onto the home flower.
   3. **Pick a pollinator part:** Choose one of the materials (cotton ball, feather, etc.).
   4. **Land on home flower:** Gently press your material onto the home flower to pick up pollen.
   5. **Fly to the test flower:** Move your material through the air to the test flower.
   6. **Land on the test flower:** Gently press it onto the test flower.
   7. **Observe:** Look at how much pollen moved to the test flower. Use a magnifying glass if needed.
   8. **Record results:** Write or draw how much pollen transferred.
   9. **Repeat:** Try all materials and compare which one carries the most pollen.

5. **Conclusion:**

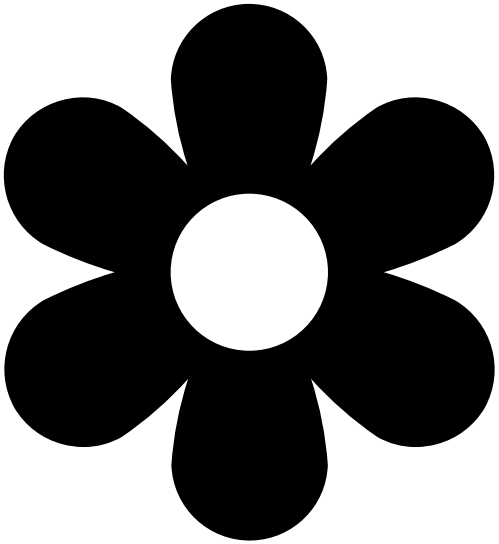
The material that carried the most pollen was: _____.
Was your prediction correct? circle Yes / No
Why or why not? _____

_____.

Material	Observation of material Draw or describe the material	What animal is this material most like?	Amount of pollen on test flower			
			None	Little	Some	Lots
Cotton ball						
Popsicle stick						
Pipe cleaner						
Feather						
Balloon						
Back of plastic spoon						

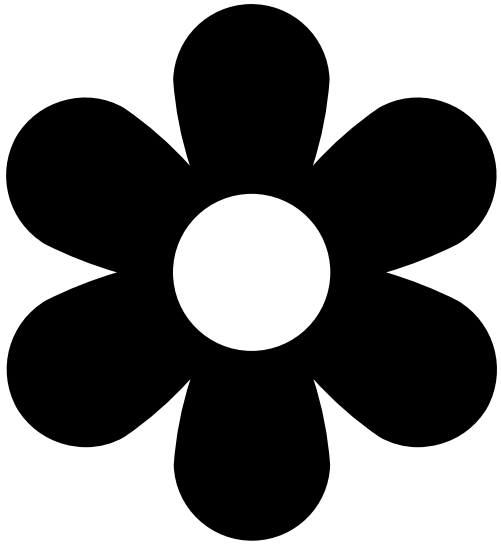
Flight Path

Test Flower



Flight Path

Test Flower



Lesson 8: Picky pollinators and their perfect plant

Standards

2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

Science and engineering practices	Disciplinary core ideas	Crosscutting concepts
Obtaining, evaluating, and communicating information Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).	*LS4.D: Biodiversity and humans* There are many kinds of living things in any area, and they exist in different places on land and in water. *LS21.C Organization for matter and energy flow in organisms* Animals obtain food they need from plants or other animals. *LS2.A: Interdependent relationships in ecosystems* Plants depend on animals for pollination or to move their seeds around.	*Systems and system models* Objects and organisms can be described in terms of their parts. Systems in the natural and designed world have parts that work together

Integrated standards

Common Core Math

CCSS.Math.Content.2.NBT.B.6

Add up to four two-digit numbers using strategies based on place value and properties of operations

Common Core ELA

CCSS.ELA-Literacy.RI.2.4

Determine the meaning of words and phrases in a text relevant to a *grade 2 topic or subject area.*

CCSS.ELA-Literacy.CCRA.R.2

Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

Learning objectives

Pollinators need our help; their habitats overlap with our habitats. We can have direct impacts on pollinator populations.

Students will:

1. Determine that flowers use different methods to signal to pollinators that they have food available.
2. Use texts and data to identify the flower preferences of pollinators.

Essential questions:

- How do flowers get pollinators to come to them?
- How do pollinators choose which flowers to visit?

Materials

- Flower Talk: How Plants Use Color to Communicate By Sara Levine, illustrations by Masha D'yans
  - Read aloud video
- Flowers Seeking Pollinators Lesson - California Academy of Sciences
- Student pages
  - Pollinator flower notes
  - Pollinator data sheets
- Pollinator profiles
- Pollinator garden:
  - Cards with photos
  - Flower tags

Anchoring phenomenon

If we wanted to support biodiversity in our schoolyard by creating habitat for pollinators, what kinds of plants would we want to plant?

To connect with the anchoring phenomenon and engage in student-led learning, begin and end this lesson by looking at the driving questions board you created as a class. Start by identifying questions that will be addressed in this lesson.

Examples of student generated questions related to this lesson:

1. Why do some animals only live in certain habitats?
2. What animals come to our schoolyard at night?

3. How do animals know which plants to visit?
4. Do animals eat all the plants in the school yard?

At the end of the lesson, add information they learned to their "What We Have Learned" chart, and add any new questions students may come up with to either "Our Wonderings" chart, or to the driving questions board.

Procedure

Part 1: Flower talk

Begin this section by reviewing what students have learned throughout the unit. We now know that plants are important parts of biodiverse habitats because they provide food, and shelter for animals. We have also figured out that plants need pollinators to help them make seeds. Pollinators come in all shapes and sizes, and some fit certain flower shapes better than others.

Today we will be looking at how flowers get the right pollinators to visit them.

1. Open slideshow to look at flower shapes. Allow students to make observations of the sizes and shapes of the different flowers.
    - Do pollinators only go to specific kinds of flowers?
    - How does a plant get a pollinator to come to it?
2. Read Flower Talk by Sara Levine. Pause to discuss how flowers are "talking" to pollinators.
    - Do flowers actually speak?
    - What does the author mean when flowers "talk"?
    - What is the main idea of this story?
    - Is this a nonfiction or fiction text?
3. Open slideshow and advance through slides discussing other ways flowers "talk" to pollinators.

Part 2: Flowers seeking pollinators: Do pollinators in Washington have favorite flowers?
"This lesson was inspired by the following: Flowers Seeking Pollinators lesson plan © 2014 California Academy of Sciences. Any associated text has been used with permission."

We now know that flowers work as advertisements for pollinators saying, "come here!!" But how does a pollinator choose which plants to go to? Do pollinators have favorite flowers?

> **Teacher's note:**
> This activity is looking at native pollinators in Washington. We aren't including bats in this activity because we don't have any pollinating bats that live here.

1. Arrange students into pairs or small groups for this activity.
2. Pass out photos of specific pollinators. Have students make observations about the features of their pollinator and record their features in the Pollinator Notes Worksheet.
3. Pass out data sheets with information about pollinators vising different flowers. Remind students that biologists collect this data by observing flowers over long periods of time, in this case, over the course of a day.
4. Have students look at the data and decide which kind of flower their pollinator visits the most.
5. On the student worksheet, instruct students to record the features of their pollinator's favorite flower.
6. Have students read through the flower traits info on the data sheet and the pollinator preferences on their pollinators card.
7. On their worksheet, tell students to record the features of the flower that their pollinator prefers.

> **Teacher's note:**
> This activity relies on generalizations about pollinator categories that may not be accurate for every species. There are hundreds of different species of pollinators of each kind, and those species may exhibit traits and behaviors that differ from the generalizations in this activity and listed on the cards below.

Pollinators in Washington data sheets

Flower traits		Number of pollinator visits				
		Moth	Bee	Butterfly	Fly	Bird
A  Orange honeysuckle Photo credit: National Park Service	**Scent:** No scent **Nectar:** Sweet nectar at base **Shape:** Long tube-shaped flower, flower points down **Bloom time:** During day	0	0	5	2	28
B  Arrowleaf balsamroot Photo credit: WDFW	**Scent:** Sweet, fragrant smell **Nectar:** In center of flower **Shape:** Bulls-eye design in center of flower - visible to insets. **Bloom time:** During the day	0	65	15	30	0
C  Small-flowered penstemon Photo credit: Jim Cummins	**Scent:** Sweet, fragrant smell **Nectar:** Sweet nectar at base **Shape:** Purple tube-shaped flowers **Bloom time:** at night	25	10	7	0	0

Flower traits		Number of pollinator visits				
		Moth	Bee	Butterfly	Fly	Bird
D  Skunk cabbage Photo credit: WDFW	**Scent:** Stinky/rotten smell **Nectar:** None-tricks pollinators **Shape:** Flower is low to the ground **Bloom time:** During the day	18	0	0	42	0
E  Rattlesnake phlox Photo credit: Alan Bauer	**Scent:** No **Nectar:** Yes, at base of small flowers **Shape:** Many small tube-shaped flowers clustered together **Bloom time:** During the day	3	14	55	0	0

Student notes: Pollinators and flowers

Who is your pollinator? _____

Pollinator features

What features do you see on your pollinator that will interact with flowers? Draw or write them below.

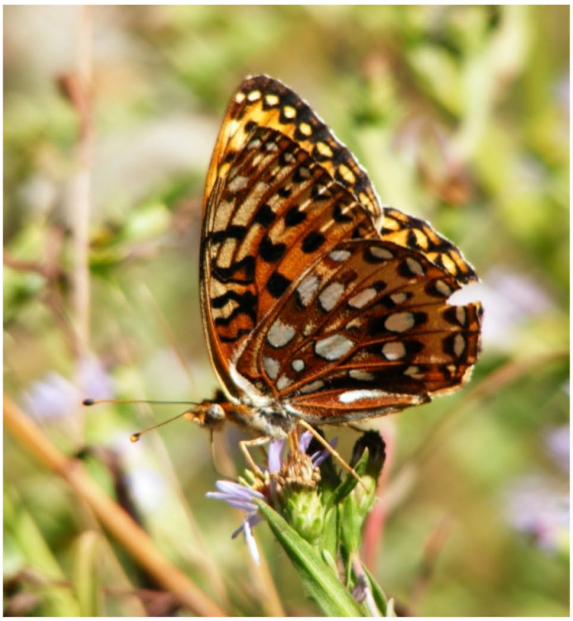
Which flower did your pollinator visit the most? (circle one) A B C D E

What features of the flower did your pollinator prefer? (scent, color, bloom time, etc.)

Some pollinators like more than one flower type, while others are more picky.

Did your pollinator visit any other flowers? (circle one) YES NO

Butterflies



Valley silverspot butterfly
Photo Credit WDFW

Butterflies:

- visit flowers during the day
- use long mouths to drink nectar from flowers
- like flowers that are bright colors, like violet, red, or orange
- can see well but cannot smell well
- can see colors that people cannot see

Bees

Fuzzy Horned Bee
Photo Credit Peter Pearsall, U.S. Fish and Wildlife Service

Bees:

- visit flowers during the day
- like flowers that smell sweet
- like bright colors, such as yellow, blue, and violet
- can see colors that people cannot see

Birds

Rufous Hummingbird
Photo Credit Bill Hebner

Birds:

- visit flowers during the day
- use their beaks to drink nectar from flowers
- can see well but cannot smell well
- like bright colors, such as red and orange

Moths

Sand verbena moth
Photo Credit WDFW

Moths:

- visit flowers at night.
- use long mouths to drink nectar from flowers
- like flowers that are light colors, or white
- like flowers that smell sweet

Flies

Hoverfly
Photo Credit: WDFW

Flies:

- visit flowers during the day
- like flowers that have a strong smell, both sweet and stinky
- like flowers that are low to the ground.
- like flowers that are light colors with dark brown or purple spots

Lesson 9: Student assessment: Research project and pollination model

Standards

2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

Science and engineering practices	Disciplinary core ideas	Crosscutting concepts
Developing and using models Using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.	*LS2. Interdependent relationships in ecosystems* Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)	*Structures and functions* The shape and stability of structures of natural and designed objects are related to their function(s).

Integrated standards

CCSS.ELA-Literacy.W.2.7

Participate in shared research and writing projects (e.g., read several books on a single topic to produce a report; record science observations).

Learning objectives

Students will participate in a shared research project about a specific kind of pollinator. They will then record and share their research through a poster.

Students will demonstrate their understanding of the interdependent relationships in habitats between plants and animals by performing the expectation for NGSS 2-LS2-2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

Materials

- Poster template
- Student instructions page
- Evaluation rubrics
    - Pollinator research poster
    - Pollination model

- Optional materials for pollinator puppet
  - Cardstock of any color
  - Crayons, markers, or colored pencils
  - Twigs, flower petals, and leaves
  - Glue
  - Scissors

Procedure

Part 1: Introducing student project "Washington pollinators in action!"

This project is designed to be a summative assessment, and will support learning that will be used in the final lesson of the unit: "How will you help?" The research project will support ELA standards for research: Research to build and present knowledge. Students will work in small groups or pairs to research a native Washington pollinator and will record their information on a poster. (A poster template is included on the unit plan home page).

Students will then work independently (or in their research groups) to create a simple model of their pollinator pollinating a flower. Through their model, students should display mastery of the information supporting NGSS Performance Expectation 2-LS2-2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

Shared pollinator research poster

1. Put students into pairs or small groups for the research part of this assessment.

> **Teacher's note:**
> Alternatively, you could opt to have class posters of the pollinators and add to them collectively by researching each pollinator together as a class.

2. Introduce the project and pass out student instructions.
3. Show students the poster template, and point out the six things students will have to learn and communicate about their pollinator:
   - Structures of the pollinator that help them pollinate
   - Features of their favorite kinds of flowers
   - Three fun facts
   - How we can help this pollinator
   - Species native to Washington
   - Habitat for the native species

4. Explain how the poster project will be graded and share the pollinator research poster rubric.
5. Share some of the ways students can research their pollinator: Trusted websites, videos, and books that students can use. (See resources page for resources.)
6. Allow students to work together to research their pollinator and add the information to their poster.

Pollination model

Introduce the project and pass out student instructions. Students will create a simple model of an animal pollinator helping to pollinate a plant. Models could be a diagram or drawing with labels, a physical 3D model or diorama, or a dramatization with explanation.

> **Teacher's note:**
> This assessment is designed to be open ended for students, but you could choose to identify a format you would prefer to have them use and provide the materials for only that format.

Included in the resources for this lesson are a **modifiable rubric** and **instructions** page. You can find the fixed version at the end of this lesson, and the Word versions on the Washington biodiversity and pollinators unit webpage.

- Go over instructions for creating their model.
- Review the ways that this project will be evaluated including the pollination model rubric.

Optional: Make a pollinator puppet

> **Teacher's note:**
> This is a fun art integration and could be used as a starting point for students to then create their model of pollination. Students would have to add feet and a proboscis to the butterfly to allow it to interact with the flower.

Make some butterflies of your own with this simple and fun butterfly finger puppet craft. This can be used as part of your model!

Gather your materials

- Cardstock of any color
- Crayons, markers, or colored pencils
- Twigs, flower petals, and leaves
- Glue
- Scissors

Each finger puppet can be unique to the items you find in your yard or neighborhood!

Instructions

1. Draw a butterfly or bee shape on cardstock and cut it out.
2. Fold the butterfly or bee in half and cut two lines into the center to create a loop to place your finger.

3. Glue leaves, flower petals, and other decorations firmly onto the cutout. *Optional:* Attach some twigs to the center of the butterfly or bee.
4. Once dry, place butterfly or bee on your finger and have fun making it flutter around!

Pollinators in action research poster!

In this project, you will show how animals and plants work together. You will work with your classmates to research a pollinator. You will learn what kinds of flowers the pollinator prefers and share some interesting facts. You will then research the species that are native to Washington and learn about the habitat the native species lives in.

Research plan

1. **Choose pollinator:** Choose the kind of pollinator you would like to research.
2. **Research your pollinator:** Use texts, videos, and trusted websites to gather information about your pollinator. Record your information on your pollinator notes page.

    a. Draw a detailed picture of your pollinator and label the structures of the pollinator that help them pollinate.
    b. Draw or write the features of your pollinator's favorite kinds of flowers.
    c. Find and share three fun facts!
    d. How can we help this pollinator?
    e. Research to find a species of your pollinator that makes their home in Washington
    f. Give habitat information about where this species lives.

Create your research poster

Fill out the poster template with the information you gathered in your research.

What makes a great poster:

- Neat and clean
- Easy to read
- Colorful illustrations
- Interesting information
- Shows what you've learned!

Poster checklist:

☐ Used colorful markers/crayons

☐ Wrote big and clear

☐ Checked spelling

☐ Organized information

☐ Made my poster fun to look at!

Pollinators in action pollination model

You will make a simple model that shows how your pollinator helps flowers make seeds through pollination.

Plan your model

Identify and label the plant and animal structures:

- **Animal structures**: Think about what parts of the animal help it do its job. Label the parts of the animal that are involved in pollination.
    - For example, a bee has a fuzzy body that pollen sticks to, and legs that collect pollen.
- **Animal features:** Include the features of your pollinator that allow us to identify it.
- **Plant structures**: Think about what parts of the plant are involved. Label the parts of plants that are involved in the relationship you are modeling.
- **Flower features**: Include the features of your flower that make your pollinator prefer it.
    - For example, the flower has a scent or a specific shape.

Create your model

You can make your model in different ways, including:

- Draw a picture and label the parts.
- Make a 3D model using clay or paper.
- Make a diorama using a box and other materials
- Act out the interaction and write out the explanation. (You would also explain it to your classmates.)
- Create a pollinator puppet and use it in either a 3D model or diorama.

Write a description of the model

- **How does this help the plant?** Explain how the animal helps the plant.
- **How does this help the animal?** Explain how the plant is helping the animal meet its habitat needs of food, water, shelter, and space.

How will your model be graded?

- **Animal structures:** Did you label the animal's body parts correctly?
- **Plant structures:** Did you label the plant's parts correctly?
- **Interaction description:** Did you explain how both the plant and the animal benefit?
- **Model presentation:** Is your model clear and creative?
- **Scientific accuracy:** Did you show an understanding of how pollination works?

Pollination model rubric

Criteria	4 - Exceeding standards	3 - Meeting standards	2 - Approaching standards	1 - Below standards
Animal structures	Accurately and precisely identifies specific animal body parts directly related to seed dispersal or pollination (e.g., bee legs, bird beak) with detailed, clear labels	Identifies animal body parts related to interaction with clear labels	Identifies animal body parts with minimal or unclear labeling	Minimal or no identification of animal structures
Plant structures	Precisely identifies specific plant structures involved in seed/pollen interaction (e.g., flower and pollen, or seed and attachment structures) with accurate, detailed labels	Identifies plant structures with clear labels	Identifies plant structures with minimal labeling	Minimal or no identification of plant structures
Model presentation	Creates a highly detailed, creative model that clearly demonstrates the plant-animal interaction through diagram, 3D model, or dramatization	Creates a clear model that shows the basic plant-animal interaction	Creates a model with some elements of the interaction	Model is unclear or does not demonstrate the interaction
Information	Model shows advanced understanding of pollination with precise scientific details	Model shows accurate basic scientific understanding	Model shows some scientific understanding with minor inaccuracies	Model contains significant scientific inaccuracies

Scoring guide:

- **Total points possible: 20**
- **16-20 points: Exceeding standards**
- **12-15 points: Meeting standards**
- **8-11 points: Approaching standards**
- **0-7 points: Below standards**

Lesson 10: How will you help? Habitat connectivity

Science standards

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.
2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

Science and engineering practices	Disciplinary core ideas	Crosscutting concepts
Obtaining, evaluating, and communicating information Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s). *Constructing explanations and designing solutions* *This is a somewhat advanced use of this SEP. Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.	*LS4.D: Biodiversity and humans* There are many kinds of living things in any area, and they exist in different places on land and in water. *LS21.C Organization for matter and energy flow in organisms* Animals obtain food they need from plants or other animals. *LS2.A: Interdependent relationships in ecosystems* Plants depend on animals for pollination or to move their seeds around.	*Systems and system models* Objects and organisms can be described in terms of their parts. Systems in the natural and designed world have parts that work together

Learning objectives

Students will:

1. Understand that urban and suburban habitat includes many small pieces of habitat within travel range for animals.
2. Brainstorm ways that they can put what they have learned about pollinators, habitat, and biodiversity into action in their schoolyard and communities.
3. Put student ideas into action.

Essential question:

How can we help support biodiversity and pollinators where we live, learn, and play?

Materials

- WDFW-Habitat at Home program
- Building Pollinator Habitat video
- Slideshow

Anchoring phenomenon

This lesson will wrap up the unit on biodiversity and pollination by having students and teachers work together to identify ways the class can help support biodiversity and pollinators where they live, learn, and play. It begins by showing how habitat for wildlife is often bigger than the schoolyard, and that small changes throughout a community can have big impacts on habitat.

Procedure

Part 1: Habitat connectivity

This section introduces students to the idea that for most urban and suburban wildlife, habitat is bigger than just the schoolyard or a backyard. A healthy habitat can have small pieces of habitat spaced all throughout a community as long as the animal (in this case pollinators) can travel easily between patches of habitat.

This also takes some pressure off the idea of needing to create a big habitat project at the school if that is not feasible!

1. Open slideshow and advance through slides showing how urban habitats are usually made up of many small pieces of habitat that connect.
2. Open Google maps and zoom into your school. You can toggle the map type to show a satellite view.
3. Look at the aerial view of your school and notice if there are other large natural spaces nearby such as parks, community gardens, or natural areas.
4. Are there small green spaces nearby?
5. How can we provide habitat for pollinators as they are trying to move between the other habitat areas we identified in the map?

Part 2: How could we increase pollinator biodiversity in our schoolyard habitat?

This is an invitation to engage students in a design project to create or enhance some pollinator habitat in the schoolyard. This could be as small as a pot with a couple of flowers outside of the classroom or school, or as large as a schoolyard garden. Alternatively, you could also engage students in a project at a local park or community garden.

> **Teacher's note:**
> This section offers a great lead-in to another investigation on the needs of plants and could involve students planting and growing their own pollinator friendly plants in the classroom.

1. Open slideshow and watch video.
2. Return to your schoolyard garden survey from Lesson 1. What kinds of plants and animals did you find? Could you increase or enhance your schoolyard habitat to support biodiversity and pollinators?
3. Return to the slideshow and advance through the slides on pollinator habitat.
4. Identify habitat components that could be added to the schoolyard. You can brainstorm as a class about what will be feasible in your schoolyard, and what kinds of things might be done at home.
    - **Food:** Plants
        - Flowering plants for pollinators
        - Fruiting plants for birds and squirrels (and students!)
        - Seed plants for birds and squirrels
    - **Water:**
        - Pollinator puddles
        - Shallow moving water (solar water pump in bird bath)
        - Water fountain
        - Pond
    - **Shelter:**
        - Bee houses: Tubes for bees
        - Leaves on the ground around plants
        - Leave the stems until late spring
        - Trees and bushes can provide cover and shelter for birds and butterflies
    - **Space:** Habitat in the schoolyard can be any size! What size would work for your school?
        - Container
        - Vertical garden
        - Pollinator patch or pocket garden
        - Large garden

Teacher's note:
For more information about creating schoolyard habitat, check out the Habitat at Home program with Washington Department of Fish and Wildlife! You can even get your schoolyard certified as a backyard habitat!

Resources

If you're using the print version of this lesson, please visit the online version to access the web links at: https://wdfw.wa.gov/get-involved/environmental-education-curriculum/lesson-plans/washington-biodiversity-and-pollinators-unit

Books used in lessons:

- A Fruit is a Suitcase for Seeds by Jean Richards
  - Read aloud video
- A Seed Moves by Robin Page
  - Read aloud video
- Sip, Pick, and Pack: How Pollinators Help Plants Make Seeds by Polly W. Cheney, illustrated by Kim Overton
  - Read aloud video
- The Reason for a Flower by Ruth Heller
  - Read aloud video
- Flowers are Calling by Rita Gray, illustrated by Kenard Pak
  - Read aloud video
- Flower Talk: How Plants Use Color to Communicate by Sara Levine, illustrations by Masha D'yans
  - Read aloud video

Videos used in lessons (many of these videos are embedded in the slideshow)

- Where plants and animals live
- Habitat loss
- Urban wildlife
- Look who visits my pollinator garden
- Trillium flowers and ants
- What is pollination?
- WDFW video "Pollinators: why we love them and how you can help
- Sagebrush Country; Backbone of the West
- This Land is Part of Us
- Understanding forest ecosystems
- Biodiverse Washington: West Cascades Ecoregion
- Building pollinator habitat

Additional Resources

- Habitat at Home website
- Habitat at Home brochure
- Native Plants for Pollinators and Beneficial Insects: Maritime Northwest Region | Xerces Society
- Native Plants for Pollinators and Beneficial Insects: Inland Northwest Region | Xerces Society
- 10 Principles for Pollinator Habitat-Oregon State University
- Wildlife coloring pages
- Question Formulation Technique (QFT)- The Right Question Institute

Raising and Releasing butterflies in Washington

Butterflies are a powerful gateway to learning. From exploring life cycles and pollination to sparking curiosity about conservation, they offer endless opportunities for hands-on education. Many educators and community groups consider raising and releasing butterflies as part of their programs—but it's important to know the rules and best practices that apply in Washington state.

Rearing and releasing live Butterflies

In Washington, **a permit is required** to:

- **Raise butterflies** from eggs or caterpillars (called "rearing").
- **Release butterflies into the wild for any purpose**—including classroom activities or community events.

Butterflies are considered wildlife under state law, so releasing them—just like releasing fish, birds, or other animals—is generally prohibited to protect native species and ecosystems. Permits for raising and/or releasing butterflies are typically only given for the direct conservation of endangered and/or threatened species by professionals and are not given for education or classroom activities.

Risks of releasing butterflies

While releasing butterflies may seem harmless or even helpful, it unintentionally harms wild populations though:

- **Disease transmission**
  Captive butterflies, even those from reputable sources, can carry diseases that may spread to wild populations.
- **Genetic impacts**
  Butterflies bred in human care may develop traits that don't benefit survival in the wild. If they breed with wild butterflies, it can weaken the entire population of wild butterflies.
- **Confusion in scientific research**
  Released butterflies can interfere with data on wild populations, migration, and how climate or habitat changes impact native species.

Displaying butterfly or insect collections

Good news—no permit is needed if you're:

- Using non-living insect or butterfly specimens in your displays.
- Sharing an existing collection purely for educational purposes.

Engaging alternatives to releasing butterflies

Supporting butterflies and pollinators doesn't require butterfly raising or release. By creating habitat, planting native species, and teaching students about the importance of these remarkable insects, we can inspire the next generation of conservationists while keeping Washington's wild species healthy and thriving.

Here are alterative activities that can support hands-on learning while protecting wild populations.

Create a pollinator garden or butterfly buffet:

Have students plan a "butterfly buffet" by drawing or mapping out a garden with nectar plants, native milkweed, and water spots (like a sponge dish or mud puddle).

Resources:

- Native Plant Finder (National Wildlife Federation)
- Habitat Kits & Plant Guides (PNW) (Xerces Society)
- Create Schoolyard Habitat for Pollinators (National Wildlife Federation)

Butterfly life cycle activities (without live insects)

Learn all about metamorphosis using models, art, and movement. Use pasta shapes to represent each stage of the butterfly's life cycle (egg, caterpillar, chrysalis, butterfly). Then let students create a "life cycle plate."

Learn more:

- Butterfly Life Cycle Crafts (University of Arkansas)
- Butterfly Life Cycle with Pasta (YouTube)

Pollinator observation walks

Take a walk around the schoolyard or neighborhood to observe bees, butterflies, and flowers in action. Let students draw what they saw in a pollinator journal and share their "top bug moment" with a partner.

Observation tools:

- Nature Notebook (WDFW)
- Native Plant Guides for Kids (Native Plant Society)

Make a bee or butterfly watering station

Pollinators need clean water just like we do! Assign students to "pollinator patrol" to help check and refill the water during recess or garden time.

Instructions:

- Use a shallow dish, add small rocks or marbles for landing spots, and keep it filled with water.
- Pollinator Water Station (Kids Gardening)

Adopt a butterfly (Virtually!)

Follow real monarchs online and help students connect with butterfly journeys. Track monarch migration on a map and write letters "from the butterfly's point of view" about where it has traveled and what it sees.

Track monarchs:

- Journey North: Monarch Migration Maps & Classroom Tools

Need more help getting started with pollinator-friendly plants for your school? We're here to support you. Please email habitatathome@dfw.wa.gov for more information.

NGSS 2-LS2-2

2-LS2-2 Ecosystems: Interactions, Energy, and Dynamics

Students who demonstrate understanding can:

2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool.

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

- Plants depend on animals for pollination or to move their seeds around.

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.*(secondary)*

Crosscutting Concepts

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s).

Observable features of the student performance by the end of the grade:		
1	Components of the model	
	a	Students develop a simple model that mimics the function of an animal in seed dispersal or pollination of plants. Students identify the relevant components of their model, including those components that mimic the natural structure of an animal that helps it disperse seeds (e.g., hair that snares seeds, squirrel cheek pouches that transport seeds) or that mimic the natural structure of an animal that helps it pollinate plants (e.g., bees have fuzzy bodies to which pollen sticks, hummingbirds have bills that transport pollen). The relevant components of the model include:
		i. Relevant structures of the animal.
		ii. Relevant structures of the plant.
		iii. Pollen or seeds from plants.
2	Relationships	
	a	In the model, students describe* relationships between components, including evidence that the developed model mimics how plant and animal structures interact to move pollen or disperse seeds.
		i. Students describe* the relationships between components that allow for movement of pollen or seeds.
		ii. Students describe* the relationships between the parts of the model they are developing and the parts of the animal they are mimicking.
3	Connections	
	a	Students use the model to describe*:
		i. How the structure of the model gives rise to its function.
		ii. Structure-function relationships in the natural world that allow some animals to disperse seeds or pollinate plants.

NGSS 2-LS4-1

2-LS4-1 Biological Evolution: Unity and Diversity

Students who demonstrate understanding can:

2-LS4-1. **Make observations of plants and animals to compare the diversity of life in different habitats.** [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [*Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.*]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education:*

Science and Engineering Practices

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Make observations (firsthand or from media) to collect data which can be used to make comparisons.

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world.

Disciplinary Core Ideas

LS4.D: Biodiversity and Humans

- There are many different kinds of living things in any area, and they exist in different places on land and in water.

Crosscutting Concepts

Observable features of the student performance by the end of the grade:		
1	Identifying the phenomenon under investigation	
	a	Students identify and describe* the phenomenon and purpose of the investigation, which includes comparisons of plant and animal diversity of life in different habitats.
2	Identifying the evidence to address the purpose of the investigation	
	a	Based on the given plan for the investigation, students describe* the following evidence to be collected:
		i. Descriptions* based on observations (firsthand or from media) of habitats, including land habitats (e.g., playground, garden, forest, parking lot) and water habitats (e.g., pond, stream, lake).
		ii. Descriptions* based on observations (firsthand or from media) of different types of living things in each habitat (e.g., trees, grasses, bushes, flowering plants, lizards, squirrels, ants, fish, clams).
		iii. Comparisons of the different types of living things that can be found in different habitats.
	b	Students describe* how these observations provide evidence for patterns of plant and animal diversity across habitats.
3	Planning the investigation	
	a	Based on the given investigation plan, students describe* how the different plants and animals in the habitats will be observed, recorded, and organized.
4	Collecting the data	
	a	Students collect, record, and organize data on different types of plants and animals in the habitats.