

# “Solutions-Oriented Learning” Storyline

## 2nd grade Regenerative Agriculture: Pollinators

### Storyline introduction and overview:

Pollinators are key to creating regenerative relationships between the Earth, plants, humans, and agricultural processes. In this storyline, students will be introduced to seed dispersers and pollinators in Washington state. Students will gain a deep understanding of pollination, plant and animal interdependence, native plant habitats and the engineering process. To end the storyline, students engineer a model that mimics the buzz pollination process.

**[NGSS Learning Progression for this Storyline](#)**: The 2nd grade storyline is part of a larger learning progression that includes students mastering standards pre-K to 12th grade. Look at how the 2nd grade performance expectations fit in a continuum of learning for your students.

<p><b>Placemaking:</b></p> <p>Take students outside or have them go outside at their home (with parent permission) and participate in a sit spot for 5 to 10 minutes. Have the students select a spot and have them make observations focused on plants, especially paying attention to any interactions with other living things.</p>	<p><b>Anchoring phenomena:</b></p> <p>Show the video <a href="#">Slo- Mo of a Bumble Bee Dislodging Pollen</a> without sound for the first time through. This video will be watched later with sound when the students have been able to explore the idea of pollination.</p> <p>See learning session 2 for more information.</p>	<p><b>Drawdown:</b></p> <p><a href="#">Regenerative Agriculture Nutrient Management</a></p> <p><a href="#">Conservation Agriculture</a></p> <p><a href="#">Composting</a></p> <p><a href="#">Indigenous Peoples' Forest Tenure</a></p>
<p><b>Indigenous and other relevant cultural connections:</b></p> <p>Indigenous people have been living with plants and pollinators since time immemorial. Tribes across Washington are working towards restoring prairies, cultivating community gardens and planting pollinator gardens. Suggested story to share with your students: <a href="#">Who Painted the Flowers story (Tulip)</a></p>	<p><b>NGSS PEs (progress towards):</b></p> <p>2-LS2-2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.</p>	

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**Estimated time required to implement this storyline:** two to three weeks

### NGSS PEs:

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

Science & Engineering Practice (SEP)	Disciplinary Core Idea (DCI)	Cross Cutting Concept (CCC)
<b>Developing and Using Models</b> 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.	<b>LS2.A: Interdependent Relationships in Ecosystems</b> Plants depend on animals for pollination or to move their seeds around.  <b>ETS1.B: Developing Possible Solutions</b> Drawings can be conveyed through sketches, drawings or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.	<b>Structure and Function</b> The shape and stability of structures and designed objects are related to their function (s).

### Materials:

Learning Session	Materials
1	<a href="#">Who Painted the Flowers story (Tulalip)</a> (suggested starting story)
2	<a href="#">Slo- Mo of a Bumble Bee Dislodging Pollen</a>
3	<a href="#">2<sup>nd</sup> grade Regenerative Agriculture: Pollinators Pre- Assessment</a> (one per student)  <a href="#">2<sup>nd</sup> grade Regenerative Agriculture: Pollinators Rubric</a> (one per student)
4	seeds of different kinds (examples: peas, sunflower, coconut, maple (helicopter), corn, beans, apple seeds, mustard seeds)  paper plates  socks (one per student)  <a href="#">Seeds Move</a>
5	<a href="#">Busy as a Bee</a>  Paper plates (one per student)  yellow powder (example: country time lemonade mix, powdered cheese,

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	<p>flour/glitter, table sugar, stevia packets etc)</p> <p>pipe cleaners (one per student)</p>
6	<p><a href="#">Pollination of Flowers for kids HomeschoolPop</a></p> <p><a href="#">template</a> (one per student)</p>
7	<p><a href="#">Writing Template</a> (one per student)</p>
8	<p><a href="#">Seeds Move!</a></p> <p><a href="#">Flowers and Their Pollinators</a></p> <p><a href="#">graphic organizer</a>(one per student)</p> <p>Create a Wall Story or place on the wall at student level using pages 23-37 of this document <a href="#">Pollination and Seed Dispersal</a></p>
9	<p><a href="#">Plants and Animals need each other! (Diggy dog’s kids club)</a></p> <p><a href="#">Pollinator Activity Book pages 4 and 5</a> (one per student)</p> <p><a href="#">The Pollinators</a> (one per student)</p> <p>Index cards (one per student)</p>
10	<p>Seed bomb supplies: flower seeds, compost, water, powdered clay, bowl, and baggies</p>
11	<p><a href="#">Male Hummingbirds Fight for Nectar</a></p> <p><a href="#">Hummingbird Performance Task</a> (one per student)</p>
12	<p>Teacher choice</p>
13	<p><a href="#">Slo-Mo Footage of a Bumblebee Dislodging Pollen</a></p> <p><a href="#">2nd Grade Regenerative Agriculture: Pollinators Post Assessment</a> (one per student)</p> <p><a href="#">2<sup>nd</sup> grade Regenerative Agriculture: Pollinators Rubric</a> (one per student)</p>

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### Learning Sessions

1.	Grounding Native Ways of Knowing:	Estimated time: minutes
<p><b>Teacher Background</b></p> <p>To connect to native ways of knowing, consider exploring the following ideas in connection with your local tribal nation by researching stories of the past and learn about current work and actions the Tribe is taking to mitigate, adapt to, and find solutions to a changing climate.</p> <ul style="list-style-type: none"> <li>● Medicinal and native plant gardens</li> <li>● Relationships between living things</li> <li>● Relationships with foods</li> <li>● First foods</li> </ul> <p>To access information on how to reach out and build relationships with local tribes, visit the <a href="#">OSPI Office of Native Education: Partnering with Tribes</a>, and contact your district’s tribal liaison/Title VI coordinator.</p> <p>To learn more about respecting and building upon Indigenous Peoples’ Rights visit the <a href="#">Learning in Places website</a>, a project led by Dr. Megan Bang then read Practice Brief #10: <a href="#">Teaching STEM In Ways that Respect and Build Upon Indigenous Peoples' Rights</a> and Practice Brief #11: <a href="#">Implementing Meaningful STEM Education with Indigenous Students &amp; Families</a> published on the University of Washington’s <a href="#">STEM Teaching Tools website</a></p> <p>Below are some examples of regional tribal connections to plants, gardens and pollinators for teacher background.</p> <ul style="list-style-type: none"> <li>● <a href="#">Traditional Food and Medicine Garden (Nisqually)</a></li> <li>● <a href="#">Indigenous Walking Tour of the Wild Foods and Medicine Garden at University of Washington</a></li> <li>● <a href="#">The Indigenous Origins of Regenerative Agriculture</a></li> <li>● <a href="#">Coast Salish Food Traditions- When the Tide is Out, The Table is Set</a></li> <li>● <a href="#">Muckleshoot Food Sovereignty</a></li> </ul> <p><b>Suggested Activities with Students</b></p> <p>Suggested activity for teachers and students: 3-2-1 research process (one as a class for elementary)</p> <ul style="list-style-type: none"> <li>● Three new learnings about the Tribe most local to you</li> <li>● Two questions that you still have about the Tribe most local to you</li> <li>● One action you can commit to begin a partnership with the Tribe most local to you</li> </ul> <p>Below are some examples of tribal connections to plants, gardens, food and pollinators to use</p>		

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with students.	<ul style="list-style-type: none"> <li>● <a href="#">Who Painted the Flowers story (Tulalip) (Suggested starting point)</a> <ul style="list-style-type: none"> <li>○ <a href="#">Burke Storytelling resources including a transcript for “Who Painted the Flowers”</a></li> </ul> </li> <li>● <a href="#">Roger Fernandes- Native American Story Connections</a> <ul style="list-style-type: none"> <li>○ Directions to access: scroll to the bottom and select “Native American Story Connections”</li> <li>○ The stories “The Coming of Slahal” and “The Huckleberry Medicine”</li> </ul> </li> <li>● <a href="#">Tend, Gather, Grow’s Wild Food and Medicine resources</a></li> <li>● <a href="#">Poetry Reading: Joseph Bruchac reads "What We Eat" from "Here We Go: A Poetry Friday Power Book" - YouTube</a></li> <li>● <a href="#">The First Strawberry</a></li> </ul>
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<b>2.</b>	<b>Examine phenomena: Buzz pollination</b>	Estimated time: 45 minutes
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	<p>Show the video <a href="#">Slo- Mo of a Bumble Bee Dislodging Pollen</a> without sound for the first time through. This video will be watched later with sound when the students have been able to explore the idea of pollination.</p> <p>After watching the video, create a classroom OWL (observe, wonder, learn) chart focusing on the observation and wondering sections. You will come back to this chart later in the storyline to input the learning section. Below is a sample OWL chart. <u>Possible prompt questions to start the discussion:</u></p> <ol style="list-style-type: none"> <li>1. What do you see the bee doing?</li> <li>2. How is it using its body?</li> <li>3. What is the “powder”?</li> </ol>		
	<p><b>OWL chart (Observations, Wonderings, Learnings)</b> <b>Sample Responses from Students</b></p>		
	Observations	Wonderings	Learnings <b>(to be added as we learn new things)</b>
	The bee is moving fast	How is the bee affecting the flower?	
	The bee is shaking	Why is the bee doing that?	
	The bee is eating	Is the powder	

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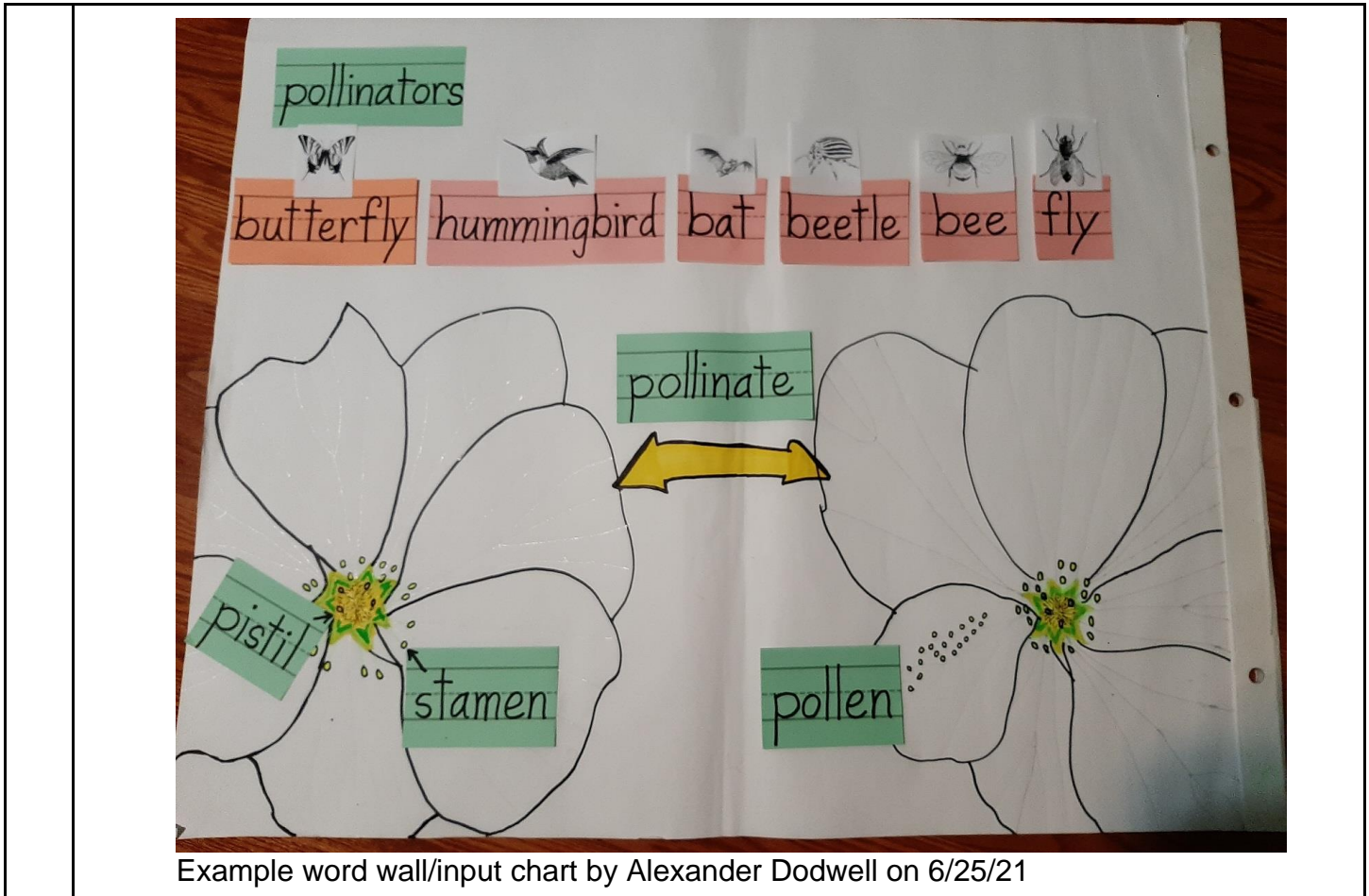
	nectar?	
The flower is losing the powder	What are those yellow things on the bees legs?	
The bees legs are tickling the flower	Is this helping or hurting the flower?	

Placemaking: Take students outside or have them go outside at their home (with parent permission) and participate in a sit spot for 5 to 10 minutes. Have the students select a spot and have them make observations focused on plants, especially paying attention to any interactions with other living things.

<b>3.</b>	<b>Pre-Assessment:</b>	Estimated time: 15 minutes
<p>Students will circle three images and color in what body part if used to spread seeds or collect pollen. The students will then explain their reasoning using this sentence frame: A _____ can spread seeds or collect pollen with _____.</p> <p><a href="#">2<sup>nd</sup> grade Regenerative Agriculture: Pollinators Pre- Assessment</a></p> <p><a href="#">2<sup>nd</sup> grade Regenerative Agriculture: Pollinators Rubric</a></p> <p>Teacher create: “Thank a Bee” word wall to use throughout the storyline:</p> <ul style="list-style-type: none"> <li>• Suggested tier 3 vocabulary: pollination, pollen, pistil stamen, pollinator, naturalist</li> <li>• This will be used in an activity later</li> </ul>		

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<b>4. Guiding question: What is seed dispersal?</b>	Estimated time: 95 minutes
<p>This learning session will include four activities: seed observations, a lab to collect/examine seeds (exploratory), a read aloud and a class chart.</p> <p><b>Seed observations (30 minutes)</b></p> <ol style="list-style-type: none"> <li>1. Gather seeds of different kinds (examples: peas, sunflower, coconut, maple (helicopter), corn, beans, apple seeds, mustard seeds)</li> <li>2. Have students in small groups with a variety of seeds on a paper plate/tray and hand lenses.</li> <li>3. Allow students to explore the seeds for 10 minutes.</li> <li>4. Have students tape their favorite seed that they want to share about to their plate.</li> <li>5. Bring students together to share their observations. Possible prompts:                         <ol style="list-style-type: none"> <li>a. How are the seeds different? How are the seeds alike?</li> <li>b. What is inside of the seed?</li> <li>c. How do you think it gets to a good place to grow?</li> </ol> </li> </ol>	



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#### Sock Lab (35 minutes)

1. Gather one sock for each student.
2. Explain to the students that we are going outside to collect seeds using socks.
3. Have students put on a sock over one of their shoes.
4. Walk around for 3 to 5 minutes outside in a grassy/plant filled area (examples: field, along sidewalks, ditches, forested areas etc.).
5. Students should remove their sock before entering the building to make sure the seeds stay on the sock.
6. Once inside, students put their socks on a plate and examine it with a hand lens.
7. Share with small group observations.
8. As a whole group discuss the question “What part of an animal does a sock mimic to help disperse seeds and pollen?”
  - After student discussion, be clear that the sock mimics the fur/feathers of animals

For teacher reference [Sock Lab- Plant Your Sock](#) or to extend the sock lab see [Sock Seeds](#)

#### Seed Moves story (15 minutes)

- Read aloud “Seeds Move” by Robin Page or watch this video [Seeds Move](#)

#### Seed Moves chart (15 minutes)


Create a classroom chart. Below is an example.

How Animals Help Seeds Move/Disperse	
Animal	Move/Disperse (Verb)
Ant	burrow
Beetle	roll
Bird	bury or hide
Orangutan	squirt
Mice	scatter
Hawk	falls
Bear	plop
Human	plant
Raccoon	hitchhike
Any animal or the wind	shoots



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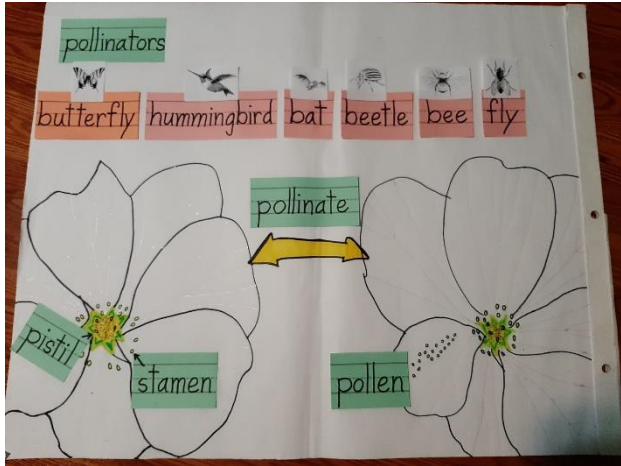
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5.	<b>Guiding question: What is pollination?</b>	Estimated time: 45 minutes
<p>Watch <a href="#">Busy as a Bee</a> (4 minutes)</p> <p>Watch <a href="#">Busy as a Bee</a> (4 minutes) again and have each student color a paper plate like it is a flower during the video.</p> <p>Discuss with students that we are going to be modeling bee pollination and that we need to behave like bees. Some guidelines could include “be responsible” “be safe” “be watching” “be slow” “be respectful of space”. Play this video <a href="#">Bees Buzzing</a> (for a few minutes) and observe the bee behavior. This is also an opportunity for the teacher to set up for the modeling activity.</p> <p><b>Model bee pollination (Indoor or outdoor activity)</b></p> <ol style="list-style-type: none"> <li>1. Gather yellow powder (example: country time lemonade mix, powdered cheese, flour/glitter, table sugar, stevia packets etc.) and one pipe cleaner per student.</li> <li>2. Spread plates around the space.</li> <li>3. Pour some yellow powder on the plates.</li> <li>4. Have the students coil the pipe cleaner around their finger creating little bee bodies and legs.</li> <li>5. On the teacher signal, have students walk around “pollinating” flowers using “bee behavior” to model pollination. <ul style="list-style-type: none"> <li>• A suggestion to help with management is to have a chant or song to help students mimic the bee behaviors.</li> </ul> </li> </ol> <p>Watch <a href="#">Like Fruit? Thank a Bee</a> (4 minutes)</p>  <p>Bee pollination photo by Alexander Dodwell 6/25/21</p>		

6.	<b>Guiding question: How would a naturalist describe the pollination process?</b>	Estimated time: 30 minutes
<p>Watch this video <a href="#">Pollination of Flowers for kids HomeschoolPop</a></p>		

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 <p>Example word wall/input chart by Alexander Dodwell 6/25/21</p>	<p>Writing activity:</p> <ul style="list-style-type: none"> <li>Using this <a href="#">template</a> and your input chart, have students label the parts of the chart. It is suggested to put this in a place that they can access it (example: science notebook).</li> </ul>
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7.	<b>Guiding question: How do plants depend on animals to reproduce?</b>	Estimated time: 40 minutes
<p>With your students, review the “Thank a Bee” word wall</p> <p>With your students, revisit the OWL chart and add any learnings or wonderings</p> <p>Writing activity: Students will write a short story with illustrations about bee pollination. Use the prompt “Tell me a realistic story about how a bee pollinates plants using sentences and illustrations.”</p> <ul style="list-style-type: none"> <li>Teachers: scaffold this activity for your students dependent on time of year and student needs</li> </ul> <p><a href="#">Writing Template</a></p> <p>Teacher tip: check for misconceptions/concept understanding and review previous videos/activities if needed</p>		

8.	<b>Guiding question: What are the structures (body parts) that help an animal collect pollen or disperse seeds? How do those structures (body parts) perform that function (action word/verb)?</b>	Estimated time: 30 minutes
<p>Revisit the book <a href="#">Seeds Move!</a> By Robin Page and the chart you made to review the many ways seeds are dispersed.</p> <p>Watch the video <a href="#">Flowers and Their Pollinators</a> (5 minutes) and have the students fill in the <a href="#">graphic organizer</a> identifying the structures that bats, butterflies, hummingbirds and student</p>		

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	<p>choice have that help them spread pollen.</p> <p>Teacher prep: Create a Wall Story or place on the wall at student level using pages 23-37 of this document <a href="#">Pollination and Seed Dispersal</a> (this will be helpful in the next learning session)</p>
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<b>9.</b>	<p><b>Guiding question: Who are the pollinators in Washington state? Who are the seed dispersers in Washington state?</b></p>	<p>Estimated time: 60 minutes (Dependent on teacher choice)</p>
<p>Watch to review: <a href="#">Plants and Animals need each other! (Diggy dog’s kids club)</a> then discuss which animals are native to Washington state. Here are some resources about local pollinators:</p> <ul style="list-style-type: none"> <li>• <a href="#">Native Bee resource guide (Washington)</a></li> <li>• <a href="#">Native Pollinators: Protection and Enhancement</a></li> </ul> <p>Suggestion: While kids are watching the video have them color page 4 and 5 of the <a href="#">Pollinator Activity Book</a></p> <p>Read (each students with their own copy): <a href="#">The Pollinators</a></p> <p>Create a class collage of pollinators and seed dispersers using resources like informational text or charts as inspiration. There are several ways you could do this activity:</p> <ul style="list-style-type: none"> <li>• Using 3 by 5 cards, have each student illustrate an animal then put all cards on a chart paper</li> <li>• Put butcher paper on the wall then have kids illustrate</li> <li>• During a center time, have kids add to a class mural             <ul style="list-style-type: none"> <li>○ Be clear with expectations</li> </ul> </li> </ul>		

<b>10</b>	<p><b>Guiding question: Why are native plant habitats important?</b></p>	<p>Estimated time: 45 minutes</p>
<p>Read: <a href="#">Skunk Cabbage Story (Page 19) from the Kathlamet Tribe</a> (connection to flies as pollinators)</p> <p>Placemaking: Take students outside or have them go outside at their home (with parent permission) and participate in a sit spot for 5 to 10 minutes. Have students be observant about pollinators and native plants/wildflowers that they see.</p> <p>Then discuss with students what they observed. Here are some prompting questions:</p> <ul style="list-style-type: none"> <li>• Did you see pollinators? What kinds?</li> <li>• Did you see flowers?</li> <li>• If you didn’t see pollinators or flowers, why might that be? What might be a solution?</li> </ul>		

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	<p>After the discussion, have students create seed bombs. Here is a seed bomb activity to use: <a href="#">Plant wildflowers with a seed bomb!</a></p> <ul style="list-style-type: none"> <li>• Suggestion: use baggies to keep seed bombs safe.</li> <li>• Suggestion: Order free seeds from Washington Noxious Weed Control Board at this <a href="#">link</a></li> </ul>
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<b>11</b>	<b>Guiding question: What models the job that a pollinator does?</b>	Estimated time: 45 minutes
	<p><i>(This learning session is to model the post assessment performance task. This will check their conceptual knowledge and give them experience with the format. You will need to provide items that the students can engineer with. Suggested items include tape, paper, pipe cleaners, pom-pom balls, glue, feathers, toothpicks etc.)</i></p> <p>Tell students that they will be building a model pollinator that will mimic a hummingbird’s structure and function. Show this video to get them started: <a href="#">Male Hummingbirds Fight for Nectar</a></p> <p>Then have students work with pairs on the rest of the activity: <a href="#">Hummingbird Performance Task</a></p>	

<b>12</b>	<b>Possible next steps/off-ramps/actions:</b>	
	<ul style="list-style-type: none"> <li>• <a href="#">Learn to draw a butterfly</a></li> <li>• Build a schoolyard pollinator garden</li> <li>• <a href="#">The Buzz   Science Learning Game (myamericanfarm.org)</a></li> <li>• <a href="#">Pollinator Bingo</a></li> <li>• <a href="#">Project Learning Tree Pollinator Projects</a></li> </ul>	

<b>14</b>	<b>Post -Assessment:</b>	Estimated time: 45 minutes
	<p>Return to OWL chart as a class add final learnings</p> <p><i>(This assessment is a performance task. You will need to provide items that the students can engineer with. Suggested items include tape, paper, pipe cleaners, pom-pom balls, glue, feathers, toothpicks etc.)</i></p> <p>Tell students that they will be building a model pollinator that will mimic a bumblebee’s structure and function. Show this video to get them started: <a href="#">Slo-Mo Footage of a Bumblebee Dislodging Pollen</a></p>	

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Then have students work with individually on the rest of the assessment: [2nd Grade Regenerative Agriculture: Pollinators Post Assessment](#)

[2nd grade Regenerative Agriculture: Pollinators Rubric](#)

### Teacher Resources

#### [2nd Grade Regenerative Agriculture: Pollinators OER Tracker](#)

Pacific Education Institute would like to acknowledge and thank the writing team for their work. The team included Crystal Fissler-Jones, Emily Hopple, Alexander Dodwell, and Hattie Osborne. In you have comments or questions please contact [info@pacificeducationinstitute.org](mailto:info@pacificeducationinstitute.org)

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