

**Grade 5:** Life Science Module

# Lesson Sequence 6: Producers, Consumers, and Decomposers

## Lesson Sequence 6: Producers, Consumers, and Decomposers

### Overview

**Total Time: 2 hours of instruction (divided into three sections)**

In this lesson sequence, students learn about producers, consumers (including carnivores, herbivores, and omnivores), and decomposers. As a class, they return to the Schoolyard Ecosystem Poster-Size Explanatory Model and add labels for the producers, consumers, and decomposers present there. They then learn about the producers, consumers, and decomposers that are present in their ecosystem expert group and add this information to their expert ecosystem explanatory model.



### Lesson Sequence Focusing Question and Big Ideas

**How are matter and energy transferred among organisms in an ecosystem?**

- Producers convert water and air (matter) using sunlight (energy) into matter that contains usable (chemical) energy for animals.
- Primary consumers then consume plant matter and break down this matter into various forms of chemical energy that is used for body function and repair, as well as stored in their bodies.
- Secondary consumers consume primary consumers, moving the matter and energy that originally came from the sun further along the food chain.
- Eventually, decomposers break down the body matter of dead producers and consumers into nutrients that can be used again by producers. Decomposers also release heat energy as they do their work.

### Long-Term Learning Addressed (Based on NGSS)

Develop a model (food web) that describes phenomena that the energy that producers, consumers, and decomposers gain from food can be traced back to the sun. (Based on NGSS 5LS2-1 and 5-PS3-1)

This lesson sequence explicitly addresses:

#### Science and Engineering Practices:

- **Developing and Using Models:** Develop a model to describe phenomena. *Students add information to their expert ecosystem explanatory model to show how matter and energy pass from the sun to producers to consumers and then to decomposers, who return matter to producers.*

#### Crosscutting Concepts:

- **Energy and Matter:** Energy can be transferred in various ways and between objects. Matter is transported into, out of, and within systems. *Students learn that matter and energy move from organism to organism through the food web.*

#### Disciplinary Core Ideas:

- **LS2.A: Interdependent Relationships in Ecosystems:** The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plant parts and animals)

and therefore operate as decomposers. Decomposition eventually restores (recycles) some materials back to the soil. *Students view a video about producers, consumers, and decomposers and add this information to their expert ecosystem explanatory model.*



### Lesson Sequence Learning Targets

- I can create a model of a food web.
- I can use a food web to show how matter and energy are transferred among organisms in an ecosystem.

### Ongoing Assessment

- Scientists Meeting: Building Understanding
- Student science notebook: Producers, Consumers, and Decomposers entry
  - Food web sketch
- Expert ecosystem explanatory model

### Agenda

**Total Time: 2 hours of instruction**

#### Section 1

##### 1. Opening

A. Introducing Learning Targets and Focusing Question (10 minutes)

##### 2. Obtaining Information

A. Viewing “The Food Chain” and “Food Web” (20 minutes)

*Optional Extension: Additional Information about Decomposers*

##### 3. Developing a Model

A. Revising the Schoolyard Ecosystem Explanatory Model (20 minutes)

#### Section 2

##### 1. Obtaining Information

A. Gathering Information about Expert Ecosystems (20 minutes)

*Optional Extension: Additional Information about Rainforest Organisms*

##### 2. Developing a Model

A. Revising Expert Ecosystem Explanatory Models (30 minutes)

#### Section 3

##### 1. Communicating Information

A. Scientists Meeting: Building Understanding (20 minutes)

*Optional Extension: Create Independent Models of Food Webs*

## Teaching Notes

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### **Purpose of lesson sequence and alignment to NGSS standards:**

- This is the second lesson sequence in a series aligning to LS2.A: Interdependent Relationships in Ecosystems. In this lesson sequence, students learn about the different roles in the food web and how food (and therefore, matter and energy) can be traced back to plants (a Disciplinary Core Idea).
- In Section 1, students are introduced to the food web (a Disciplinary Core Idea) and see how organisms transfer energy and matter in an ecosystem (a Crosscutting Concept). They learn how to revise a model to reflect this new learning (a Science and Engineering Practice).
- In Section 2, students learn about some of the plants and animals in the food web in their expert ecosystems. They then use this learning to revise their expert ecosystem explanatory model.
- In Section 3, students participate in a Scientists Meeting to synthesize their learning about food webs and think about how food webs work in a healthy ecosystem.

### **How it builds on previous work in the Life Science Module:**

- In this lesson sequence, students continue to identify the criteria of a healthy ecosystem. This lesson sequence focuses on the organisms of an ecosystem and how they form a food web where all organisms can get their needs met and matter and energy can be transferred.

### **How it connects to the CCSS Standards and EL Education's Language Arts Grade 5**

#### **Module 2:**

- Students may be familiar with some of the animals in the Food Web Organism cards from their study of the rainforest in Language Arts Grade 5 Module 2. Consider discussing some of the general food webs they may already be familiar with through their study of the rainforest.
- The Food Web Organism cards in Section 2 provide students the opportunity to practice reading informational texts and explaining the relationship between two or more ideas (CCSS ELA RI.5.3).
- The Scientists Meeting in Section 3 provides students the opportunity to practice their speaking and listening skills while collaborating in whole group discussions (CCSS ELA SL.5.1).

### **Possible student misconceptions:**

- Students may think that plants create energy because plants use energy from the sun to change water and air into food that has stored energy. This is an example of plants being part of the process of energy transfer, not of plants creating energy. Consider asking: "Why do plants need sunlight? What happens when a plant does not have sunlight?" (Plants need sunlight for solar energy so that photosynthesis can happen, which causes plants to grow. When there is no sunlight, plants cannot perform photosynthesis and thus cannot grow.)
- Students may not think animals that eat only bugs are carnivores because they do not associate bugs as meat and often carnivores are described as animals that eat meat. Address this misconception by describing carnivore as an animal that eats other animals.
- Students may claim to be carnivores because they eat meat and may not like vegetables. Consider asking students if they eat food items that are made of plants, such as bread and potato chips.

**Possible broader connections:**

- Connect to students' lives by asking them to describe themselves as omnivores or herbivores (see misconception about carnivores above).

**Areas where students may need additional support:**

- For students who need support with auditory processing or ELLs: Consider providing running notes or an outline of the video.
- Students may need additional support categorizing animals as primary consumers and secondary consumers versus herbivores, omnivores, and carnivores as these categories overlap and are merely different ways to categorize the same organisms.

**Down the road:**

- Continue to provide time for students to make informal observations of the ecosystems in a baggie until Lesson Sequence 8, when students formally revisit their ecosystems in a baggie. Creating a regular schedule for observation of the ecosystems will help integrate the use of live plants into your classroom.
- Students will return to their expert ecosystem explanatory models in Lesson Sequences 7–8. Post (or store) them in a safe and easily accessible location.

**In advance:**

- Read each section and complete the Preparing to Teach: Self-Coaching Guide.
- Prepare technology necessary to play:
  - “The Food Chain” <<http://www.pbslearningmedia.org/resource/idptv11.sci.life.oate.d4kfch/food-chain/>>.
  - “Food Web” <<http://www.pbslearningmedia.org/resource/idptv11.sci.life.eco.d4kfwf/food-web/>>.
- Create the Food Web Organism cards and the Forest Organism picture cards (see supporting materials). Consider copying the images in color and laminating the cards for future use.
- Pre-determine:
  - Triads for Section 1.
  - Specific constraints for the number of organisms that groups must include on their expert ecosystem explanatory model. Examples: three to five producers, two decomposers, and six to eight consumers—including examples of herbivores, carnivores, and omnivores.
- Post: Lesson sequence learning targets, lesson sequence focusing question, Schoolyard Ecosystem Poster-Size Explanatory Model, Life Science Module guiding question, Scientists Do These Things anchor chart, Concepts Scientists Think About anchor chart, and Criteria for Healthy Ecosystems anchor chart.

**Optional extensions:**

- *Additional Information about Decomposers:* View 9:56–10:40 of “Food Web: The Show” <[http://idahoptv.org/sciencetrek/topics/food\\_chain/index.cfm](http://idahoptv.org/sciencetrek/topics/food_chain/index.cfm)>. Ask students: “Why do they say you are a producer when you die?” (You can be thought of as a producer when you die because decomposers consume your body and break down the nutrients from your body into small enough parts that plants can use.)

- *Additional Information about Rainforest Organisms:* Students can independently learn more about a particular rainforest organism by visiting <<http://www.rainforest-alliance.org/kids/species-profiles>>.
- *Create Independent Models of Food Webs:* Have students create their own independent model of a food web for assessment purposes.

### Vocabulary

**food chain:** a series of organisms that each depend on the next for food; often begins with plants

**food web:** the system of interlocking food chains that depend on one another producer = plants produce matter with stored energy that other animals are able to consume

**consumer:** an animal that eats plants or animals

**primary consumer:** animals that eat plants

**secondary consumer:** animals that eat animals that eat plants

**tertiary consumer:** animals that eat animals that eat animals that eat plants

**decomposers:** fungi or bacteria that break down plants or animals into nutrients

**nutrients:** substances that provide nourishment that is necessary for growth and life

**herbivores:** animals that eat only plants

**carnivores:** animals that eat only other animals

**omnivores:** animals that eat both plants and other animals

### Materials

#### General Materials

- ✓ Student science notebook (from Lesson Sequence 1; one per student)
  - Producers, Consumers, and Decomposers entry (page 26 of student science notebook)
  - Anchoring Phenomenon entry (from Lesson Sequence 1; page 2 of notebook)
- ✓ “The Food Chain” (video; play in entirety; see Teaching Notes)
- ✓ “Food Web” (video; play in entirety; see Teaching Notes)
- ✓ Food Web Organism cards (one set per triad)
- ✓ Chart paper (one piece per triad)
- ✓ Markers (one per triad)
- ✓ Schoolyard Ecosystem Poster-Size Explanatory Model (from Lesson Sequence 5; added to during Section 1)
- ✓ Schoolyard Ecosystem Explanatory Model: Model for Lesson Sequence 6 (for teacher reference)
- ✓ Scientists Do These Things anchor chart (begun in Lesson Sequence 2; added to during Section 1; see supporting materials)
- ✓ Forest Organism picture cards (one set per ecosystem expert group)
- ✓ Expert ecosystem explanatory model (begun in Lesson Sequence 5; added to during Section 2; one per expert group)
- ✓ Concepts Scientists Think About anchor chart (begun in Lesson Sequence 2; added to during Section 3; see supporting materials)
- ✓ Criteria for Healthy Ecosystems anchor chart (begun in Lesson Sequence 1; added to during Section 3; see supporting materials)

**Science-Specific Materials (gathered by the teacher)**

- ✓ Teacher science notebook (from Lesson Sequence 1; for teacher reference)

## Section 1: Opening

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**A. Introducing Learning Targets and Focusing Question (10 minutes)**

- Direct students' attention to the posted lesson sequence learning targets and read them aloud as students follow along, reading them silently in their heads:
  - “I can create a model of a food web.”
  - “I can use a food web to show how matter and energy are transferred among organisms in an ecosystem.”
- Underline the phrase *food web* in both learning targets <sup>(1)</sup>.
- Tell students that although they may not know what a food web is yet, they will learn about food webs through multiple methods in this lesson sequence.
- Tell students they have been learning a lot about how the different abiotic and biotic parts of a healthy ecosystem interact. They have also been thinking about the big cycles, like the matter and energy cycles in an ecosystem. Today, they will learn more about how the organisms, like the plants and animals and decomposers, form a food web and what this has to do with matter and energy.
- Invite students to take out their **student science notebooks** and open to the **Producers, Consumers, and Decomposers entry**.
- Select a volunteer to read the focusing question listed under the “Opening” section aloud while the other students follow along, reading silently in their heads:
  - “How are matter and energy transferred among organisms in an ecosystem?”
- Invite students to record their ideas about the lesson sequence focusing question or learning targets under the “Opening” section of their student science notebook.

**Preparing to Teach: Self-Coaching Guide**

1. What experience do my students have with food webs? Do not define food webs for students at this time.

## Section 1: Obtaining Information

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**A. Viewing “The Food Chain” and “Food Web” (20 minutes)**

- Tell students that they are going to watch a video to understand more about the food chain. Explain that similar to reading a complex text, they will view the video several times, each time for a different reason. While watching it for the first time, they should focus on determining the gist and noting any unfamiliar vocabulary, and they should record these things in the “Obtaining Information” section of the Producers, Consumers, and Decomposers entry in their student science notebooks <sup>(1)</sup>.
- Show **“The Food Chain.”**

- Ask students to turn and talk to an elbow partner:
  - “*What is the gist of the video?*” (*The food chain is about connections.*)
- Play the video again and pause it as new concepts are introduced. At each pause point, discuss the big ideas from the video. Ask <sup>(2)</sup> <sup>(3)</sup>:
  - “*What is the food chain?*” (*the chain of animals that eat each other; the way energy is passed in nature*)
  - “*What is the beginning or bottom of the food chain?*” (*sunlight—solar energy*)
  - “*How does energy move from organism to organism?*” (*when animals eat other organisms*)
  - “*Why are plants producers?*” (*Plants are producers because they produce food through photosynthesis.*)
  - “*How do dead animals pass on energy?*” (*Bacteria and insects break down the dead animal.*)
  - “*What is fertilizer?*” (*digested plants*)
  - “*What are primary consumers?*” (*organisms that eat a plant*)
  - “*What are secondary consumers?*” (*organisms that eat an animal that ate plants*)
  - “*What are scavengers?*” (*nature’s cleanup crew—they take energy from dead animals*)
- Once students have completed their second viewing, invite them to turn and talk to an elbow partner:
  - “*What new information have we learned about food chains?*” (*Food chains pass energy from producer to primary consumer to secondary consumer.*)
- Tell students they are now going to watch a second video to understand the difference between a food web and a food chain. Explain that, just as they did for the last video, they should record the gist and unfamiliar vocabulary words in the “Obtaining Information” section of the Producers, Consumers, and Decomposers entry.
- Show “**Food Web.**”
- Ask students to turn and talk to an elbow partner:
  - “*What is the gist of the video?*” (*The food webs are about food chains that interconnect.*)
- Play the video again and pause it as new concepts are introduced. At each pause point, discuss the big ideas from the video. Ask:
  - “*How are food webs different from food chains?*” (*Food webs think about all the animals that might eat an organism, whereas a food chain looks at one path of energy.*)
- Tell students they are now going to practice making their own food webs in small groups.
- Move students into pre-determined triads and distribute the **Food Web Organism cards**, **chart paper**, and **markers**.
- Post and review the following directions:
  1. Read the Food Web Organism cards as a group.
  2. As a group, agree upon definitions for herbivore, carnivore, and omnivore and record them in your student science notebook.
  3. As a group, arrange the Food Web Organism cards into a food web on the chart paper and then use the marker to draw arrows on the chart paper to show how the organisms are connected.
- Invite students to begin working with their triads <sup>(4)</sup>.

- Circulate to discuss with each group that herbivores are always primary consumers, whereas carnivores must be secondary or tertiary consumers, and omnivores can be any level of consumer depending on what they are consuming.
- Circulate to provide assistance as students work, asking questions to help them think about how the path of energy can be traced:
 

*“If you trace the path of energy that producers, consumers, and decomposers gain from food, where does the energy start?” (Food starts with plants and plants create the food, which is stored energy. Plants use sunlight energy to create the food; therefore, all energy can always be traced back to the sun.)*
- As groups finish constructing their food webs, invite them to sketch their food web in the space provided in their student science notebook.
- Consider having students walk around the room to view other groups’ food webs if there are differences among the created food webs <sup>(5)</sup>.

### Preparing to Teach: Self-Coaching Guide

1. What experience do my students have with the food chain or food webs?
2. What are some examples of a food chain they may have observed?
3. After previewing the video, which of these questions will be the most useful? What additional questions may I need to ask?
4. Which groups may need more direct support during this activity?
5. If my students need more practice with this idea, there is an optional extension in Lesson Sequence 8 that may be useful.

## Section 1: Developing a Model

### A. Revising the Schoolyard Ecosystem Explanatory Model (20 minutes)

- Draw students’ attention to the **Schoolyard Ecosystem Poster-Size Explanatory Model** and explain that they are going to add labels for producers, consumers, and decomposers represented on the model <sup>(6)</sup>.
- Work with students to add the labels *producer* to any plants on the model and *consumer* to any animals on the model. See **Schoolyard Ecosystem Explanatory Model: Model for Lesson Sequence 6 (for teacher reference)**.
- Ask:
 

*“What are the producers in this model? Why is it a producer?” (Responses will vary depending on the specific model, but in the example the producers are grass and tree.)*

*“What are the primary consumers? Why is it a primary consumer?” (Responses will vary depending on the specific model, but in the example the primary consumers are bugs, worms, and squirrels; some birds eat both insects and seeds.)*

*“What are the secondary consumers? Why?” (Responses will vary depending on the specific model, but in the example the secondary consumers are the birds that eat bugs or worms that ate plant matter, and the lady bugs that eat other bugs that ate plant matter.)*
- If there are not already any decomposers on the model, discuss with students whether or not there are any decomposers in their schoolyard (e.g., earthworms) and if these organisms should be added.

- Discuss how to show the relationships among organisms on the explanatory model:
  - “I want to show the relationships among these animals so I can see the food web that they create. How can I do that?” (with arrows)*
  - How can I show that the energy comes from the sun? (with arrows)*
  - How can I show that the energy is stored in the matter? (with labels)*
  - “I’m going to add this information in a new color because I want to keep track of new information that I’m adding.”*
- As you revise the explanatory model, think aloud for students. This will help guide them when they work with their ecosystem expert group to revise their own explanatory models <sup>(2)</sup>.
- Draw students’ attention to the **Scientists Do These Things anchor chart** and select a volunteer to read the second bullet in the “Develop a Model” column.
  - “Collaborate to revise models based on evidence.”
- Tell students that they are going to work with their ecosystem expert group to revise their own explanatory models to demonstrate their understanding of how a food web works in their particular ecosystem.
- Add “Revise expert ecosystem explanatory models to add food web” to the “Develop a model” column on the Scientists Do These Things anchor chart.

### Preparing to Teach: Self-Coaching Guide

1. In thinking about the specific schoolyard explanatory model that I’m creating, what are the producers and primary and secondary consumers?
2. How can I model revising the explanatory model without creating a lot of confusion?

## Section 2: Obtaining Information

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### A. Gathering Information about Expert Ecosystems (20 minutes)

- Ask students to move to sit with their ecosystem expert group.
- Tell students that in order to revise their expert ecosystem explanatory models, they must learn about the food webs that exist in their particular ecosystem.
- Invite students to open their student science notebook to the Producers, Consumers, and Decomposers entry and find the three-column chart about producers, primary consumers, and secondary consumers.
- Distribute **Forest Organism picture cards**.
- Post and review the following directions:
  1. As a group, read and look at the picture cards.
  2. As a group, categorize the organisms on the picture cards as producers, primary consumers, or secondary consumers.
  3. Individually record your findings in the three-column chart in your student science notebook.
- Invite students to begin working.

- Circulate to monitor them as they work collaboratively to examine and categorize the organism cards <sup>(1)</sup>.
- After 15 minutes, refocus whole group.
- Using a total participation technique, invite responses from the group:  
*“Is it possible for an organism to be listed as both a primary consumer and secondary consumer?” (Yes, omnivores can be listed as both depending on what they are consuming.)*

### Preparing to Teach: Self-Coaching Guide

1. Which ecosystem expert groups may need more direct support during this time?

## Section 2: Developing a Model

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### A. Revising Expert Ecosystem Explanatory Models (30 minutes)

- Distribute expert **ecosystem explanatory models** and markers.
- Tell students that they are now prepared to revise their group’s explanatory model.
- Explain any pre-determined constraints for the number of organisms that models must include (see Teaching Notes).
- Remind students that their models should show how energy flows through the ecosystem, as well as where the energy begins.
- Ask students to give a quick thumbs-up, thumbs-down, or thumbs-sideways for how well they understand their task. Check in with students showing a thumbs-sideways or thumbs-down.
- Remind students to work cooperatively with the members of their ecosystem expert group.
- Invite students to begin working to revise their models <sup>(1)</sup>.
- Circulate to support students and consider capturing student thinking in the **teacher science notebook**.
- After 25 minutes, collect and post explanatory models until the next lesson sequence.

### Preparing to Teach: Self-Coaching Guide

1. I may want to have additional chart paper ready in case groups need to quickly create a new explanatory model.

## Section 3: Communicating Information

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### A. Scientists Meeting: Building Understanding (20 minutes)

- Ask students to bring their science notebooks and gather for a Scientists Meeting.
- Using a total participation technique, invite responses from the group:  
*“What are the norms of a Scientists Meeting?” (take turns talking, build on one another’s ideas, disagree respectfully, ask questions to clarify information)*
- Remind students that a Scientists Meeting is a conversation where they speak to one another as scientists and not just to the teacher <sup>(1)</sup>.

- Direct students' attention to the posted Life Science Module guiding question and read it aloud:
  - “How do we assess and improve the health of an ecosystem?”
- Share with students that the goal of today's meeting is to build their understanding about how food webs move matter and energy through an ecosystem.
- Ask for a volunteer from each group to explain the food web on their group's explanatory model to the class <sup>(2)</sup>.
- After a few groups have shared, using a total participation technique, invite responses from the group:
 

***“What type of matter is being discussed here?” (The bodies of plants and animals are solid matter.)***
- After students share, emphasize that all the energy that moves through the ecosystem can be traced back to the sun. Ask a student to explain why that statement is true. (Plants use the energy of sunlight—and air and water—to create food matter. The food matter is stored energy. Animals eat the plants, and the energy is transferred through the food web. Food is energy.)
- Listen for students to name the movement of energy and then draw students' attention to the “Matter and Energy” column of the **Concepts Scientists Think About anchor chart**.
- Add “Matter and Energy flow in an ecosystem through the food web.” to the “Energy and Matter” column on the Concepts Scientists Think About anchor chart.
- Direct students' attention to the posted Life Science Module guiding question and remind students that their goal is to answer this question by the end of the module:
  - “How do we assess and improve the health of an ecosystem?”
- Remind students that in Lesson Sequence 1 they viewed the Assessing the Health of an Ecosystem slideshow to see pictures of the Olympic National Forest ecosystem. Their job is to assess the health of that ecosystem.
- Ask students questions to elicit how food webs relate to the health of an ecosystem. Consider using turn and talk or Think-Pair-Share <sup>(3)</sup>:
 

***“How might different types of organisms—producers, consumers, decomposers—be important to a healthy ecosystem?” (Producers change energy into matter with chemical energy that other organisms can use and then consumers pass the matter and energy on to other organisms by eating and being eaten; decomposers recycle some of the energy and the matter back into the system.)***

***“What might happen if you didn't have primary consumers in an ecosystem? What about if you didn't have producers?” (Responses will vary, but may include: The ecosystem wouldn't work very well, and not all organisms would be able to get their needs for energy met.)***

***“How do energy and matter keep flowing through an ecosystem?” (All parts of a food web including producers, consumers (herbivores, carnivores, and omnivores), and decomposers interact, which moves energy and matter through the ecosystem.)***

***“What might happen if the energy and matter didn't flow through an ecosystem?” (Animals that are further up in the food chain would die because they wouldn't be able to get the energy that they need to survive.)***

*“What might you collect as evidence if you wanted to see if an ecosystem had all parts of the food web?” (You would see different types of animals and plants that fill different parts of the food chain.)*

- As students share out, capture their thinking on the **Criteria for Healthy Ecosystems anchor chart** and in the teacher science notebook. Refer to the Criteria for Healthy Ecosystems anchor chart in the support materials as necessary.
- Invite students to turn to the **Anchoring Phenomenon entry** in their student science notebook and put their finger on the “Scientists Meeting” section.
- Ask students to revisit their initial thinking about the health of an ecosystem and then add evidence based on information from the videos, their work with the Food Web Organism cards, and their work revising their expert group’s explanatory model.
- Invite students to return to their seats.

### Preparing to Teach: Self-Coaching Guide

1. What norms will I emphasize in this Scientists Meeting?
2. What specific students will I draw into the conversation?
3. Students will continue to learn more about food webs in subsequent lesson sequences. Where will I capture this information so that I can leverage this initial understanding in later lesson sequences?

