Food Webs

You Are What You Eat

By Tam O'Shaughnessy
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Correlation to Science Standards
For information on alignment to state science standards and NGSS, visit

Correlation to Common Core
Sally Ride Science’s Key Concepts and Cool Careers book series provide students with authentic literacy experiences aligned to Common Core in the areas of Reading (informational text), Writing, Speaking and Listening, and Language as outlined in Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects. Food Webs: You Are What You Eat and the accompanying activities align to the following standards:

Reading Standards for Informational Text K-5 (RI), Grades 3-5
Key Ideas and Details
1. Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. Grade 3
   - Refer to details and examples in a text when explain what the text says explicitly and when drawing inferences from the text. Grade 4
   - Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. Grade 5
2. Determine the main idea of a text; recount the key details and explain how they support the main idea. Grade 3
   - Determine the main idea of a text and explain how it is supported by key details; summarize the text. Grade 4
   - Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text. Grade 5

Craft and Structure
4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade appropriate topic or subject area. Grades 3-5

Integration of Knowledge and Ideas
7. Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). Grade 3
   - Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. Grade 4

Range of Reading and Level of Text Complexity
10. By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts. Grades 3-5

Writing Standards K-5 (W), Grades 3-5
Text Types and Purposes
1. Write opinion pieces on topics or texts, supporting a point of view with reasons. Grades 3-5 a.-d.
2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly. Grade 3 a.-d., Grade 4 a.-e., Grade 5 a.-e.
Production and Distribution of Writing
4. With guidance and support from adults, produce writing in which the development and organization are appropriate to task and purpose. **Grade 3**

    Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. **Grades 4 and 5**

Research to Build and Present Knowledge
7. Conduct short research projects that build knowledge about a topic. **Grade 3**

    Conduct short research projects that build knowledge through investigation of different aspects of a topic. **Grade 4**

    Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. **Grade 5**

9. Draw evidence from literary or informational texts to support analysis reflection, and research. **Grade 4 b., Grade 5 b.**

Range of Writing
10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. **Grades 3-5**

Speaking and Listening Standards K-5 (SL), Grades 3-5
Comprehension and Collaboration
1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade appropriate topics and texts, building on others' ideas and expressing their own clearly. **Grades 3-5 a.-d.**

2. Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally. **Grade 3**

    Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally. **Grade 4**

    Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally. **Grade 5**

Language Standards K-5 (L), Grades 3-5
Knowledge of Language
3. Use knowledge of language and its conventions when writing, speaking, reading, or listening. **Grade 3 a.-b., Grade 4 a.-c., Grade 5 a.-b.**

Vocabulary Acquisition and Use
4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade appropriate reading and content, choosing flexibly from a range of strategies. **Grade 3 a.-d., Grade 4 a.-c., Grade 5 a.-c.**

6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that:
   > signal spatial and temporal relationships. **Grade 3**
   > signal precise actions, emotions, or states of being (e.g., quizzed, whined, stammered) and that are basic to particular topic (e.g., wildlife, conservation, and endangered when discussing animal preservation.) **Grade 4**
   > signal contrast, addition, and other logical relationships (e.g., however, although, nevertheless, similarly, moreover, in addition). **Grade 5**

*Book pages pictured in the Teacher Guides are from eBook editions. Some pages in the print books have different images or layouts.*

**Cool Careers**
- Cool Careers in Biotechnology
- Cool Careers in Earth Sciences
- Cool Careers in Engineering (Upper Elementary)
- Cool Careers in Engineering (Middle School)
- Cool Careers in Environmental Sciences (Upper Elementary)
- Cool Careers in Environmental Sciences (Middle School)
- Cool Careers in Green Chemistry
- Cool Careers in Information Sciences
- Cool Careers in Math
- Cool Careers in Medical Sciences
- Cool Careers in Physics
- Cool Careers in Space Sciences

**Key Concepts in Science**
- Adaptations
- Biodiversity
- The Biosphere
- Cells
- Earth’s Air
- Earth’s Climate
- Earth’s Energy
- Earth’s Natural Resources
- Earth’s Water
- Elements and Compounds
- Energy Basics
- Energy Transformations
- Flowering Plants
- Food Webs
- Forces
- Genetics
- Geologic Time
- Gravity
- Heat
- Life Cycles
- Light
- Motion
- Organic Molecules
- Photosynthesis and Respiration
- Physical Properties of Matter
- Plant and Animal Systems
- Plate Tectonics
- The Rock Cycle
- Solids, Liquids, and Gases
- Sound
- Space Exploration
- Sun, Earth, and Moon
- Units of Measurement
- Vertebrates
- The Water Cycle
- Weathering and Erosion

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**FOOD WEBS: Earth’s Life Zone**

**About the Book**

*Food Webs: You Are What You Eat* uses experiences from students’ lives to help them understand the movement of energy through ecosystems. Students learn that food chains form in ecosystems because all organisms need food for energy to stay alive. The book explains that plants on land and phytoplankton in water are producers because they are able to make their own food through photosynthesis. Other organisms—consumers—eat the food that producers make. Students discover that ecosystems are complex—most have many food chains that link together as food webs. At the end of each two-page spread, *The Bottom Line* sums up the key ideas about food webs covered in those pages.

*In Your World* engages students by asking what they have in common with a polar bear, a butterfly, and a pine tree. The feature helps students understand that all living things need energy to carry out their activities. The brief scenario sets the stage for the chapters to follow by piquing students’ curiosity about how the energy in sunlight powers life on Earth.

**Chapter 1** introduces the concept of organisms as producers. The chapter identifies plants and phytoplankton as the producers in most food chains. Students learn that producers have chlorophyll in their cells. This allows the cells to transform light energy from the Sun into chemical energy stored in molecules of sugar. Students learn that producers use some of the food they make to power their activities, and they store the rest. Organisms that eat producers obtain the chemical energy stored in sugar molecules to fuel their activities. This food also provides the chemical elements living things need to grow and to stay healthy.

**Chapter 2** explains the role of consumers in food chains. Students learn that consumers are classified as herbivores, carnivores, omnivores, or decomposers based on what they eat. A diagram helps students grasp that herbivores are first-level consumers because they eat producers. Carnivores are second- or third-level consumers depending on their role in a food chain. Students then learn about decomposers—an ecosystem’s “cleanup crew” and the recycling engine for the chemical elements of life, including carbon, nitrogen, and oxygen.

**Chapter 3** expands the discussion of energy in ecosystems by explaining that most ecosystems contain many food chains linked together as food webs. Students learn how the relationships among species in an ecosystem can be shown by a diagram of a food web or by a pyramid-of-numbers diagram that shows how many producers supply food for an ecosystem and how many consumers that food supports.

**Thinking Like a Scientist** explains the importance of determining the population sizes of species in an ecosystem to predict the future of the ecosystem. The feature describes how ecologists determine the population size of sea urchins in a kelp forest by counting the sea urchins in a certain area and extrapolating the numbers to a larger area. Students use actual sea urchin counts to predict how a kelp forest might change.

**How Do We Know?** introduces students to Scott Schliebe, a wildlife biologist with the U.S. Fish and Wildlife Service who studies polar bears in the Arctic. Scott’s team attaches radio collars to the bears to track their movements. In *Technology Connection*, students design a new tracking collar that meets certain criteria.

**Hey, I Know That!** allows students to assess their own learning through a variety of assessment tasks relating to the key concepts covered in *Food Webs.*
Preview the book
Ask students to browse through *Food Webs: You Are What You Eat*. Have them look at the table of contents and the chapter titles. Draw their attention to the special features. Encourage them to look at each of the photos and diagrams. Explain that most of the images show a living thing interacting with something in its environment.

Call on two or three students to choose an image. Say,

*What interactions do you see?*  
*Sample answers: The sunflower plant on Page 10 is spreading its roots out in the soil as it grows. The bee on page 12 is about to land on a flower. The gull on page 16 is grabbing a fish from the water.*

**Read In Your World** (pages 4 and 5) **and discuss key concepts**
Tell students to read *In Your World*. After students have finished reading the text, pair them up. Start a discussion of the meaning of the word *energy*. Say,

*Energy is the ability to cause change and make something happen.*

Have pairs discuss answers to these questions:

*What kinds of changes happen to a polar bear?*  
*It grows, moves, eats, heals wounds, mates, and breathes.*

*How does a pine tree change?*  
*It grows and makes pine needles, cones, and seeds.*

*What would happen if the polar bear suddenly had no energy?*  
*It could not continue to grow, move, eat, or do any of its other activities.*

*What is the ultimate source of energy for most life on Earth?*  
*The Sun is the source of energy for most life on Earth.*

Call on two or three pairs of students to share their ideas with the class.
Read Chapter 1: The Producers

Before reading: Model asking questions while reading

Have students turn to page 6 in Food Webs. Read aloud the title and subtitle of Chapter 1: The Producers: It All Starts with a Sunny Day. Say,

Hmm, the book is called Food Webs: You Are What You Eat. The chapter is titled The Producers, and the subtitle is It All Starts with a Sunny Day. Food, producers, and the Sun must be related somehow, but how? I’ll write this as a question I want to answer.

Write on the board, How are food, producers, and the Sun related? Have students look at the picture on Page 6. Read aloud the caption and the text as students read silently along with you. Then say,

I’m beginning to see the answer to my question. Sunlight provides the energy for a forest ecosystem. And food contains energy. I’m going to predict that sunlight provides the energy to make food in most ecosystems. And I suspect that producers are the living things that make the food because the word produce means “to make.” I’ll read on to see if I’m right.

Call on two or three students to read aloud the paragraphs on page 7. Then say,

Ah, I was right. Producers are the living things in an ecosystem that make food. They use the energy of sunlight to make the food. And look, The Bottom Line statement confirms it: Sunlight is the source of energy for most ecosystems. Now I see how food, sunlight, and producers are related.

Explain to students that asking themselves questions as they read will help focus their attention on important points of the reading. The questions and the answers might come from images or text.

Read Chapter 1: The Producers (pages 6-11)

Give students the Chapter 1: The Producers handout. Have them read the rest of Chapter 1. As they read, they should use the handout to write down any questions that occur to them and any answers that they find in the chapter.

After reading: Discuss key concepts

To make sure students have grasped what happens during photosynthesis, review the diagram on page 9 with them. Say,

Look at the equation in the diagram on page 9. The equation is like a recipe. The arrow shows you the direction of the process of photosynthesis. You can substitute the word produces for the arrow.
FOOD WEBS: CHAPTER 1
The Producers

Then ask,

*What two substances are the ingredients for photosynthesis?*
[Carbon dioxide and water are the two ingredients for photosynthesis.]

*What is the source of the energy needed to run the process?*
[Sunlight is the source of energy for photosynthesis.]

*What is produced as a result of photosynthesis?*
[The products of photosynthesis are sugar and oxygen.]

Call on two or three students to read the equation as a sentence.
*[Using energy from sunlight, carbon dioxide reacts with water to produce sugar and oxygen.]*

Then have groups of students look at the other labels in the diagram and discuss how each label is related to photosynthesis.

SCIENCE BACKGROUND

Plants and phytoplankton are the most common types of producers. However, thriving ecosystems exist where there is no sunlight, such as around deep-sea volcanic vents and in hot springs. In sunless ecosystems, the producers are organisms that use the chemical energy in inorganic molecules, such as hydrogen sulfide, to produce sugars for food. The process is called chemosynthesis, as opposed to photosynthesis.
Write a persuasive paragraph

Give students the Science Writing: Photosynthesis handout. The handout presents a statement:

*Without photosynthesis, most living things could not survive on Earth.*

Divide students into groups and have them discuss whether the statement is true or false. Then have students write a paragraph stating whether they think the statement is true or false and explaining their reasoning. Call three or four students to share their explanations. Encourage students to refine their explanation if they wish.

Sample paragraph:

*[It is true that without photosynthesis, most living things could not survive on Earth. Photosynthesis is a series of chemical reactions in which plants or phytoplankton use energy from sunlight to transform carbon dioxide and water into sugar and oxygen. Photosynthesizers use some of the energy to keep them alive and allow them to grow and reproduce. They store the rest as sugar. This sugar is eaten by first-level consumers, which are eaten by second-level consumers, and so on up the food chain. The energy from photosynthesis is the starting point of the energy flow in most food webs. Without photosynthesis, there would be no flow of energy to keep living things alive and power all of their activities.]*
Read Chapter 2: The Consumers

Before reading: Model summarizing with a concept map

Give students the Chapter 2: The Consumers handout. Tell them that as they read the chapter, they will summarize what they are reading by drawing a concept map. To get them started, draw an oval near the top of the board. Write Consumers in the oval. Draw four ovals beneath the top oval and draw an arrow from the top oval to each of the four second-level ovals.

Tell students to look at the diagram on page 13 of Food Webs. Ask,

What are the two of the groups into which we can divide consumers, according to this chart? [According to the chart, consumers can be classified herbivores or carnivores.]

Write Herbivores and Carnivores in two of the second-level ovals. Tell students to copy the chart on their handouts. As they read, they will learn about two other kinds of consumers—omnivores and decomposers—and fill in the remaining ovals. Tell them they can add another row of ovals with details about how each kind of consumer obtains energy.

Read Chapter 2: The Consumers (pages 12–19)

Tell students to read Chapter 2: The Consumers. As they read, they should take notes on their handouts and complete the concept map about different kinds of consumers.

After reading: Review key concepts

Reinforce the role of decomposers in a food chain by having students discuss how they could add decomposers to the food chain shown on page 13. Ask,

How could you change the food chain to show that decomposers are at every level of it? [I could show that by drawing an arrow coming off each photo in the food chain and pointing to the word Decomposers.]

What would these arrows mean? [The arrows would mean that when the plant or animal dies, decomposers break it down and use it for food.]

Call on several students to share their ideas.
Read Chapter 3: *Food Webs*

**Before reading: Model summarizing with a diagram**

Give students the Chapter 3: *Food Webs* handout. Tell them that as they read the chapter, they will take notes on the handout and also summarize some of the key ideas in the chapter by making a diagram of a food web.

To get students started, draw a rectangle on the board. Say,

*We are going to draw a food-web diagram of a pond. What are some producers I could draw in my pond? [Producers could include different kinds of water plants and algae.]*

Then ask,

*What is a first-level consumer I could draw in my diagram? [A snail that eats algae is one type of first-level consumer.]*

*How would I show the relationship between the snail and the algae? [An arrow should point from the algae to the snail to show that the snail eats the algae and gets energy from it.]*

Tell students to copy the diagram on their handouts. Tell them that after they read Chapter 3, they should add more producers and consumers to their pond food-web diagrams, along with arrows showing how energy flows.

**Read Chapter 3: *Food Webs* (pages 20–23)**

Have students read Chapter 3: *Food Webs*. As they read, they should record notes on the handout. They should also add to their diagrams to show the relationships among different living things in a pond food web.

**After reading: Discuss key concepts**

Call on a few students to share and explain their pond food-web diagrams. Ask,

*What are the living parts of this ecosystem? [Sample answer: The living parts of this ecosystem include herons, fish, crayfish, snails, water plants, and algae.]*

*What are the nonliving parts of this ecosystem? [Sample answer: The nonliving parts of this ecosystem include water, oxygen, carbon dioxide, rocks, and sand.]*

*How do the living parts of the system interact with the nonliving parts of the system? [Sample answer: The fish hide in the plant leaves. The fish and snails take in oxygen from the water, and they release carbon dioxide into it. The oxygen was added to the water by the plants. The plants and algae take in the carbon dioxide released by the fish and snails and use it during photosynthesis.]*

*How does energy move through this ecosystem? [Sample answer: The plants and algae make food for themselves through photosynthesis. The snails eat the plant leaves and algae. The fish may eat the snails. Then herons may eat the fish. When creatures in the ecosystem die, they may be eaten by microorganisms.]*

Encourage students to comment on each other’s diagrams. Guide the discussion to help clear up any misconceptions.
Create a brochure of a prairie food web

Give students the *Create a Science Brochure* handout. Tell them they will create a science brochure that illustrates and explains a prairie food web. Have students work in groups of three to five, and assign different roles, such as researcher, writer, editor, and artist.

Tell students that their prairie food web should include the food chain shown on page 8 of *Food Webs*. They should add at least six more organisms to create the food web. Tell them they can refer to the information about a prairie food chain on pages 22 of *Food Webs*. Allow students to do research on the Internet to find out about other producers and consumers in a prairie food web.

Design a brochure

Students can start by folding a sheet of paper in thirds, as if folding a business letter to be mailed. The paper will then have six panels.

> Students should draw their food web across the three inside panels as the paper is held sideways and opened.

> The top outside panel is the brochure cover and should have the title and limited copy, such as a question or two to entice readers to open the brochure.

> The second outside panel and back panel can contain information about the food web.

Suggest that students reread *The Bottom Line* statements throughout the book as a guide for what to write. Remind students that informative text should include facts that answer the 5 *W*s and *H*—*who*, *what*, *where*, *when*, *why*, and *how*.

Students can use their folded paper as a “working brochure” to jot down and sketch out ideas as they research the kinds of organisms in a prairie and how the organisms interact. Then they can transfer their ideas neatly to their final group brochure.

When the brochures are finished, have each group present and explain the food web described in their brochure. Prompt students to elaborate on their descriptions by asking:

*What are the producers in the food web?*

*What are the first-level consumers? The second-level consumers? The third-level consumers?*

*How do decomposers play a role in the food web?*

Encourage students to give feedback and suggestions on other groups’ brochures.
Read *Thinking Like a Scientist* (pages 24 and 25) and answer the questions

Give students the *Thinking Like a Scientist* handout. Tell them to read *Thinking Like a Scientist*, about scientists monitoring sea urchin populations, and use the information in the table and the graph to answer the questions on their handouts. Have students work in pairs to discuss the questions and come to agreement on the answers. Then discuss the questions and answers together as a class.

### ANSWER KEY

1. What happened to the number of sea urchins between the years 1993 and 2000? *The number of sea urchins increased from 64 to 291, an increase of four and a half times.]*

2. What was the number of sea urchins per square meter in 1997? *The number of sea urchins per square meter in 1997 was 118.*

3. Explain what may have caused this change in the sea urchin population. *Sample answer: There may have been a decrease in the population of animals that eat sea urchins, such as octopuses and sea otters.*

4. Predict what might happen to the kelp forest in the next few years. *Sample answer: The greater number of sea urchins may eat more and more of the kelp until the kelp forest is gone. Small fish that eat the kelp and sea stars and crabs that eat those fish might die out.*
Read *How Do We Know?* (pages 26-29) and answer the questions

Give students the *How Do We Know?* handout. Have them read the questions about *The Issue* section, then read that section of the book and answer the questions. Have them complete the rest of the sections (*The Expert*, page 27; *In the Field*, page 28; *Technology*, page 29) in the same way. Tell students to share their answers in pairs. Then go over each question as a class. Call on two students to share their answers to each question.

**ANSWER KEY**

1. How does the science writer capture your interest at the beginning of the feature? [Sample answer: The writer captured my interest by describing an extreme environment that I don’t know much about. The writer also said something I didn’t expect—that a very cold environment is crowded with life. This makes me want to know what kinds of living things are found there.]

2. How does the picture on page 26 help you understand the topic? [Sample answer: The picture shows a food web so I can see what polar bears eat and understand how the polar bear and its food are connected to other organisms.]

3. What has Scott Schliebe’s research shown about polar bears? [Scott’s research has shown that sea ice is crucial for polar bears to survive because they spend most of their life on the ice hunting and raising their young.]

4. Why does Scott Schliebe need a team of scientists to help him in the field? [Sample answer: It takes several people to quickly obtain samples from a tranquilized polar bear, to check out its young, and to put on a radio collar before the bear awakens.]

5. Why don’t male polar bears get radio collars? [Radio collars slip off male polar bears too easily because they have thick necks and thin heads.]
Give students the *Invention Connection* handout. Students will design and draw a radio collar for polar bears. Remind students to use the specifications listed in Invention Connection as they create their designs.

**Invention Connection: Design-a-Collar**

You’re a techno-whiz engineer. A team of polar bear scientists asks you to design a new tracking collar. Here’s their list of specifications.

- Can’t bother the bear or interfere with feeding
- Can withstand cold temperatures
- Can’t be ripped off by the bear’s razor-sharp claws
- Can transmit signals for one year
- Is easy to attach

Design and draw your new tracking collar. Be sure to label and describe its features.

*Students’ designs for the radio collar should meet all of the listed specifications. The collar should not be too bulky so it won’t interfere with feeding. It should be made of a tough material that can withstand freezing temperatures and sharp claws. The transmitter should be well protected. And the buckle or latch on the collar should be easy to fasten.*
Ask students to use the *Hey, I Know That!* handout to answer the questions on page 30 of *Food Webs*. Have pairs of students discuss their answers. Then call on student pairs to share their answers and explain how they arrived at those answers.

**Desert Food Web**

**ANSWER KEY**

1. Make a list of all the living things in this desert food web. Classify each one as either a producer or a consumer. (pages 7 and 10) *Producers in the food web are ocotillo, prickly pear cactus, and saguaro cactus. Consumers in the food web are the roadrunner, western diamondback rattlesnake, red-tailed hawk, zebra-tailed lizard, grasshopper mouse, desert hairy scorpion, field cricket, darkling beetle, white-winged dove, and desert shaggy mane mushroom.*

2. Now, classify each consumer as an herbivore, a carnivore, an omnivore, or a decomposer. (pages 12, 13, and 14) *Herbivores include the field cricket, darkling beetle, and white-winged dove. Carnivores include the western diamondback rattlesnake, red-tailed hawk, grasshopper mouse, desert hairy scorpion, and zebra-tailed lizard. The roadrunner is an omnivore. The desert shaggy mane mushroom is a decomposer.*

3. There are several food chains in this food web. Find one food chain, and then draw and label it. Don’t forget to add the arrows. Which way should they point? Why? (page 21) *Sample answer: One food chain starts with the prickly pear cactus, which is eaten by the field cricket, which is eaten by the grasshopper mouse, which is eaten by the western diamondback rattlesnake, which is eaten by the roadrunner. The arrows point in the direction energy flows, from the cactus to the cricket to the mouse to the rattlesnake to the roadrunner.*

4. How do producers make their own food? What do they start with? What do they end with? (page 9) *During photosynthesis, producers such as plants take in carbon dioxide from the air and water from the ground. They use the energy in sunlight to turn these substances into sugar molecules. This sugar is the source of food for almost all living things. As part of the process, oxygen is made, and it floats into the air.*

5. What are the two main reasons all living things need food? (page 14). *Food powers all the activities of living things. It also can be used to make new cells or repair injuries.*
The Producers: Notes for Chapter 1

As you read Chapter 1, write down any questions that occur to you, along with any answers to your questions that you find in the chapter.

IT ALL STARTS WITH A SUNNY DAY

__________________________________________________________________________________________
__________________________________________________________________________________________
__________________________________________________________________________________________

WORKING ON THE FOOD CHAIN

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__________________________________________________________________________________________
__________________________________________________________________________________________

WHO’S ON FIRST?

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__________________________________________________________________________________________
__________________________________________________________________________________________

THE GREEN MACHINE

__________________________________________________________________________________________
__________________________________________________________________________________________
__________________________________________________________________________________________

FOOD FOR THOUGHT

__________________________________________________________________________________________
__________________________________________________________________________________________
__________________________________________________________________________________________

NATURE’S PANTRY

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__________________________________________________________________________________________
__________________________________________________________________________________________
PICTURE THIS

Review your notes for Chapter 1. Summarize your notes by drawing a diagram of a plant showing the process of photosynthesis. Use arrows and labels to show what is entering the plant so that photosynthesis can happen and what substances are produced and released as a result of photosynthesis.

PUT IT ALL TOGETHER

Use your notes and diagram to help you identify and list the most important ideas—the key concepts—in Chapter 1.

__________________________________________________________________________________________
__________________________________________________________________________________________
__________________________________________________________________________________________
__________________________________________________________________________________________
Science Writing: Photosynthesis

True or false?

Without photosynthesis, most living things could not survive on Earth.

As a group, discuss whether the statement is true or false. Then write a paragraph stating whether you think the statement is true or false and explaining your reasoning. Be sure to give evidence to support your view.

Title: __________________________________________________

Paragraph: ________________________________________________________________________________
__________________________________________________________________________________________
__________________________________________________________________________________________
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__________________________________________________________________________________________
The Consumers: Notes for Chapter 2

As you read Chapter 2, write down the most important information you come across. Resist the urge to write down everything that you read. Instead, focus on the big ideas, or gist, of what you are reading.

YOU ARE WHAT YOU EAT

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

A RABBIT BY ANY OTHER NAME

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

BEING HUNGRY IS A SIGN OF LIFE

__________________________________________________________________________________________

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THOSE ANIMALS!

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ALL Omnivores GREAT AND SMALL

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WHAT’S FOR LUNCH?

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CLEAN-UP CREW

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RECYCLERS TO THE RESCUE

PICTURE THIS

Review your notes for Chapter 2. Summarize your notes by developing a concept map. Draw an oval at the top of the space and write Consumers in the oval. Draw four ovals beneath the top oval and draw an arrow from the top oval to each of the two second-level ovals. As you read, add the four kinds of consumers to the concept map. Then add another level of ovals with details about how each kind of consumer gets energy.

PUT IT ALL TOGETHER

Use your notes and concept map to help you identify and list the most important ideas—the key concepts—in Chapter 2.
Food Webs: Notes for Chapter 3

As you read Chapter 3, write down the most important information you come across. Resist the urge to write down everything that you read. Instead, focus on the big ideas, or gist, of what you are reading.

PASS THE ENERGY, PLEASE

EVERYTHING’S CONNECTED

A NUMBERS GAME
PICTURE THIS
Review your notes for Chapter 3. Summarize your notes by developing a diagram of a pond food web. Draw producers and consumers, and use arrows to show how energy flows in the food web.

PUT IT ALL TOGETHER
Use your notes and diagram to help you identify and list the most important ideas—the key concepts—in Chapter 3.

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You will work with a group to create a science brochure that illustrates and explains a prairie food web. Start with the prairie food chain on page 8 of *Food Webs*, shown here. Add at least six more organisms to create the food web. Your teacher will direct you to resources you can use to find out about other producers and consumers in a prairie food web. Use arrows to show which way energy flows in the food web.

**Design a brochure**

Start by folding a sheet of paper in thirds, as if folding a business letter to be mailed. The paper will then have six panels.

> Draw your food web across the three inside panels as the paper is held sideways and opened.
> The top outside panel is the brochure cover and should have the title and limited copy, such as a question or two to entice readers to open the brochure.
> The second outside panel and back panel can contain information about the food web.

Be prepared to present your finished brochure to the class.
Thinking Like a Scientist

Read *Thinking Like a Scientist* on pages 24 and 25 of *Food Webs*. Use the information in the table and the graph to answer the questions on this sheet.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of sea urchins per square meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>64</td>
</tr>
<tr>
<td>1997</td>
<td>118</td>
</tr>
<tr>
<td>1999</td>
<td>258</td>
</tr>
<tr>
<td>2000</td>
<td>291</td>
</tr>
</tbody>
</table>

1. What happened to the number of sea urchins between the years 1993 and 2000?

_______________________________________________________________________________________
_______________________________________________________________________________________

2. What was the number of sea urchins per square meter in 1997?

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3. Explain what may have caused this change in the sea urchin population.

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4. Predict what might happen to the kelp forest in the next few years.

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_______________________________________________________________________________________
How Do We Know? On Thin Ice

Review the questions below for each section of How Do We Know? Then read each section in the book and answer the questions.

THE ISSUE
As you read, analyze the writing by thinking about these questions:

1. How does the science writer capture your interest at the beginning of the feature?

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_______________________________________________________________________________________

2. How does the picture on page 26 help you understand the topic?

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_______________________________________________________________________________________
_______________________________________________________________________________________

THE EXPERT
3. What has Scott Schliebe’s research shown about polar bears?

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_______________________________________________________________________________________
_______________________________________________________________________________________

IN THE FIELD
4. Why does Scott Schliebe need a team of scientists to help him in the field?

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TECHNOLOGY
5. Why don’t male polar bears get radio collars?

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_______________________________________________________________________________________
_______________________________________________________________________________________
Invention Connection: Design-a-Collar

You’re a techno-whiz engineer. A team of polar bear scientists asks you to design a new tracking collar. Here’s their list of specifications.

> Can’t bother the bear or interfere with feeding
> Can withstand cold temperatures
> Can’t be ripped off by the bear’s razor-sharp claws
> Can transmit signals for one year
> Is easy to attach

Design and draw your new tracking collar. Be sure to label and describe its features.

Describe the features of your polar bear collar.

__________________________________________________________________________________________
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__________________________________________________________________________________________
1. Make a list of all the living things in this desert food web. Classify each one as either a producer or a consumer. (pages 7 and 10)

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_______________________________________________________________________________________
_______________________________________________________________________________________

2. Now, classify each consumer as an herbivore, a carnivore, an omnivore, or a decomposer. (pages 12, 13, and 14)

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3. There are several food chains in this food web. Find one food chain, and then draw and label it. Don’t forget to add the arrows. Which way should they point? Why? (page 21)

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4. How do producers make their own food? What do they start with? What do they end with? (Page 9)

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5. What are the two main reasons all living things need food? (page 14)

__________________________________________________________

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