

Food Chains and Webs



Delta Science Readers are nonfiction student books that provide science background and support the experiences of hands-on activities. Every **Delta Science Reader** has three main sections: *Think About . . .*, *People in Science*, and *Did You Know?*

Be sure to preview the reader Overview Chart on page 4, the reader itself, and the teaching suggestions on the following pages. This information will help you determine how to plan your schedule for reader selections and activity sessions.

Reading for information is a key literacy skill. Use the following ideas as appropriate for your teaching style and the needs of your students. The After Reading section includes an assessment and writing links.

OVERVIEW

In the Delta Science Reader *Food Chains and Webs*, students read about what an ecosystem is, how living things in an ecosystem get energy, and how ecosystems can change. Students explore the interaction of living things and discuss food chains and webs. The book presents biographical sketches of key scientists in this field—Charles Darwin and Rachel Carson—and describes the work of ecologists. Students also will discover the relationship between moose and wolf populations on Isle Royale and consider the varied ecosystems on a mountain.

Students will

- ▶ discover facts about ecosystems
- ▶ learn about food chains and webs
- ▶ discuss the function of a table of contents, headings, and a glossary
- ▶ interpret photographs and graphics—illustrations, diagrams, and a chart
- ▶ use a KWL chart
- ▶ organize information in different ways

READING IN THE CONTENT AREA SKILLS

- Determine main ideas and supporting details about ecosystems
- Compare and contrast camouflage and mimicry and types of living things
- Draw conclusions about food chains
- Recognize cause-effect relationships in an ecosystem
- Demonstrate critical thinking
- Interpret graphic devices
- Summarize

NONFICTION TEXT ELEMENTS

Food Chains and Webs includes a table of contents, headings, question-answer format, photographs and illustrations, captions, diagrams, a chart, boldfaced terms, biographies, and a glossary.

CONTENT VOCABULARY

The following terms are introduced in context and defined in the glossary: *adaptation, camouflage, carnivore, community, consumer, decomposer, diversity, ecosystem, endangered, energy pyramid, environment, extinct, food chain, food web, habitat, herbivore, host, interact, mimicry, nutrients, omnivore, organism, parasite, population, predator, prey, producer, scavenger, species.*

BEFORE READING

Build Background

Access students' prior knowledge of how living things survive and interact by displaying and discussing the cover. Ask, *What is the chameleon looking at? (an insect) What do you think will happen next? (The chameleon will eat the insect.)* Then read the title aloud and invite students to share what they know about

the topic from their personal experiences and hands-on explorations in science.

To stimulate discussion, ask questions such as these: *How do you get energy to live and do all the things that you do? How do other living things get energy? What do you think a food chain is?*

Begin a class KWL chart by recording facts students know about food chains and food webs in the K column. You may wish to copy the KWL chart and ask students to maintain their own charts as they read.

K What I Know	W What I Want to Know	L What I Learned	+ What I Want to Explore Further

Preview the Book

Take a few minutes to have students survey the book by reading the title, table of contents, headings, and boldfaced words and examining the photographs, illustrations, and graphics.

Call attention to the various nonfiction text elements and explain how each feature can help students understand what they read. Point out that the table of contents lists all the main headings in the book and their page numbers. Ask, *How do the headings help you know what you will learn about?* Point to some of the illustrations and ask questions such as: *What does this picture show you? How do you think it will help you understand the text?* Explain that the words in boldface type are important words related to how living things survive that students will learn when they read the book. Point out that these words are defined in the glossary. Choose one word and have students find its definition in the glossary.

Following the preview, ask, *What questions do you have about food chains and webs that you would like this book to answer?* Record students' responses in the second column of the KWL chart. Explain that they will add to the chart as they are reading and complete it when they finish reading.

Preview the Vocabulary

You may wish to preview some of the vocabulary words before reading, rather than waiting to introduce them in the context of the book. Possibilities include creating a word wall, vocabulary cards, sentence strips, or a concept web.

For example, develop a semantic feature analysis chart that identifies common and unique traits of words classified in the same category. The chart might resemble the following:

consumer	eats animals	eats plants
carnivore	✓	
herbivore		✓
omnivore	✓	✓

▲ A semantic feature analysis chart for the category *consumers*.

Set a Purpose

Discuss with students what they might expect to find out when they read the book, based on their preview. Encourage them to use the questions on the KWL chart to set an overall purpose for reading.

GUIDE THE READING

Preview the book yourself to determine the amount of guidance you will need to give for each section. Depending on your schedule and the needs of your class, you may wish to consider the following options:

- **Whole Group Reading** Read the book aloud with a group or the whole class. Encourage students to ask questions and make comments. Pause as necessary to clarify and assess understanding.
- **Shared Reading** Have students form pairs or small groups and read the book together. Ask students to pause after each text section to clarify as needed. Discuss any questions that arise or have been answered.
- **Independent Reading** Some students may be ready to read independently. Have them rejoin the class for discussion of the book. Check understanding by asking students to explain in their own words what they read.

Tips for Reading

- If you spread out the reading over several days, begin each session by reviewing the previous day's reading and previewing what will be read in the upcoming session.
- Begin each text section by reading or having a volunteer read aloud the heading. Discuss what students expect to learn, based on the heading. Have students examine any illustrations or graphics and read accompanying captions and labels.
- Help students locate context clues to the meanings of words in boldface type. Remind them that these words are defined in the glossary. Provide help with words that may be difficult to pronounce.
- As appropriate, model reading strategies students may find helpful for nonfiction: adjust reading rate, ask questions, paraphrase, reread, visualize.

Think About . . . (pages 2–10)

Pages 2, 3 *What Is a Pond Ecosystem?*

- After reading the heading on page 2, explain that an ecosystem is a community of living things and the environment in which they live.
- Have students study the illustration of the pond ecosystem. Ask, *What do you see in this picture?* (Answers may include general or specific names of plants and animals as well as such features as water, soil, hollow log, hill, and air.)

Explain, *Everything you see is a part of the pond ecosystem.*

- After you read the text, ask, *What is a population of organisms?* (all the members of one species that live in one area) *What nonliving things are part of a pond ecosystem?* (sand or mud, rocks, water, energy from the sun)
- Ask, *What is the main idea—the most important idea—in this section?* (An ecosystem is all the interacting living and nonliving things in one area.) Help students understand that each ecosystem on Earth has its own kinds of living and nonliving things.
- Invite students to suggest other ecosystems in addition to the ones listed on page 3. (Students might suggest river, rain forest, and polar ecosystems, among others.)
- If necessary, provide help with the pronunciation of *species* (SPEE-sheez) and *ecosystem* (EK-oh-sis-tuhm).

Pages 4, 5 *Living Things Interact*

- Ask students what the word *interact* means. If necessary, explain that it refers to how things act on each other. Have students look at the photographs on pages 4 and 5 and read the captions. Encourage them to tell how the subjects pictured are interacting.
- Have students read the text to learn about ways living things interact. Ask, *What are some of the ways living things interact?* (Animals eat other animals. Plants may get food from other plants.) *What main idea do these details support?* (Living and nonliving things in ecosystems interact with other living and nonliving things.)
- After reading the section on camouflage and mimicry, ask, *How are camouflage and mimicry alike? How are they different?* (Both are adaptations that help plants and animals avoid predators.

Camouflage makes an animal blend in with its environment. Mimicry makes an animal look like something else.)

- Extend the learning by asking students to provide examples of camouflage and mimicry they have observed or read about. If necessary, spark ideas by mentioning such examples as a polar bear's white fur or a grasshopper's green color (camouflage); and eye spots on a moth's wings or walking stick insects that resemble twigs (mimicry).
- After reading about parasites, ask, *What other types of parasite do you know about?* (Students may mention fleas, lice, tapeworms, heartworm in dogs.)
- If necessary, provide help with the pronunciation of *camouflage* (KAM-uh-flahzh) and *mimicry* (MIM-i-kree).

Page 6 *Energy in an Ecosystem*

- Have students look at the illustrations on page 6 and read the captions. Ask, *What do you see in these pictures?* (different kinds of animals eating different kinds of food) *What do you think the pictures show about energy in an ecosystem?* (They show how animals in an ecosystem get energy to live and grow.)
- Guide students to compare and contrast producers, consumers, and decomposers. Ask, *How are producers, consumers, and decomposers alike?* (all need energy to live) *How are they different?* (Producers like green plants get energy from the sun and use it to make food. Consumers get energy by eating plants or animals. Decomposers get energy by breaking down the matter in dead organisms.)
- Ask, *How can humans be classified?* (as consumers and omnivores; vegetarians might be considered herbivores)

Page 7 Food Chains

- Invite students to examine the illustration on page 7. Ask students to describe what it shows. (It shows how living things in an ecosystem get energy from other things in the ecosystem.) Encourage them to discuss any questions they have.
- Read page 7 to learn about food chains. Ask, *What is a food chain?* (the way energy flows from one living thing to another) *What is the energy source for most food chains?* (the sun) *From what you have learned about food chains, what conclusion can you draw about all living things on Earth?* (All living things are part of a food chain.)
- If necessary, provide help with the pronunciation of *nutrients* (NOO-tree-uhnts), *decomposers* (dee-kuhm-POH-zers), *herbivore* (HUR-buh-vor), and *omnivore* (OM-nuh-vor).

Page 8 Food Webs

- Ask students to look at the diagram of a meadow food web on page 8. Invite discussion of what it shows. (It shows food chains overlapping and connecting because many animals get energy from more than one source.)
- Read the text to discover what a food web is. Ask, *What is a food web?* (all the food chains in an ecosystem) *What are some of the food chains in the food web shown on this page?* (Among those pictured are grass → grasshopper → spider → toad → hawk, grass → rabbit → hawk, and grass → grasshopper → bird.) Ask students what other arrows would be appropriate in the diagram.

Page 9 Energy Pyramids

- Direct students' attention to the diagram of an energy pyramid on page 9 and have them read the text. Invite volunteers to describe what is happening in the diagram.

Ask, *In what direction does energy flow through the pyramid?* (from bottom to top) *What kinds of organisms are at the bottom of all energy pyramids? Why?* (producers, because most food energy starts with green plants that use energy from the sun to produce food) *Where would humans be on an energy pyramid? Why?* (at the top, because humans get all their energy from the organisms below)

- Ask, *Why doesn't an animal that eats another animal get all the energy that animal consumed?* (The animal it ate used up some of its energy breathing, moving around, and doing things.)
- If necessary, provide help with the pronunciation of *algae* (AL-jee).

Page 10 How Do Ecosystems Change?

- Before reading page 10, review with students that an ecosystem is all the living and nonliving things interacting in the same area. Invite students to share their own ideas about how an ecosystem can change. Use the photographs on page 10 to stimulate discussion. For example, ask, *What might happen to the rain forest if all the trees were cut down?*
- Read page 10 about how ecosystems change. Explore the causes and effects that can take place. Ask, for instance, *What might happen when a pond becomes a meadow?* (The pond animals and plants will die off. New kinds of plants will grow. New kinds of animals will come to live in the meadow.)
- Guide students to understand the concept of diversity. Ask, *Why isn't there diversity in a herd of cattle?* (Usually, a herd is all the same species.) *What makes a garden that has tomato plants, carrots, broccoli, and squash diverse?* (The plants are different species.) Invite students to suggest other ecosystems with much diversity. (coral reef, grassland) Discuss how diversity is helpful to an ecosystem.

- If necessary, provide help with the pronunciation of *diversity* (di-VUR-suh-tee).

People in Science (pages 11–13)

Page 11 *Charles Darwin*

- Before reading, access students' prior knowledge of Charles Darwin by inviting them to share what they may know about this scientist and his work. Explain that Darwin taught the world a great deal that was previously unknown about species and how they adapt to their environments.
- After reading page 11, ask, *What discovery did Charles Darwin make about finches on the Galápagos Islands?* (There were thirteen different species, each of which had a different beak and ate different food.) *How did these adaptations make it possible for so many different species of finch to live together?* (Because the finches ate different types of food, they didn't compete with each other. There was enough food for all of them.)
- If necessary, provide help with the pronunciation of *Galápagos* (guh-LAHP-uh-gohs).

Further Facts

Charles Darwin (1809–1882)

- Darwin was an English scientist born in Shrewsbury, England. He died in Downe (a village in Kent), where he spent most of his adult life.
- He studied medicine at the University of Edinburgh and theology at Christ's College, Cambridge.
- He was inspired to study plants and insects by his botany professor, John Stevens Henslow (who secured Darwin a job as naturalist on the *Beagle*) and his cousin William Darwin Fox, an entomologist.

- He published his journal of his famous voyage, *The Voyage of the Beagle*, in 1839.
- He was well known for developing the theories of natural selection and evolution.
- He published his most famous works, *On the Origin of Species* and *The Descent of Man*, in 1859 and 1871 respectively.

Page 12 *Rachel Carson*

- Before reading, access students' prior knowledge of Rachel Carson by inviting them to share what they know about this scientist and her work. Point out that this marine biologist wrote books that made many people aware of dangers to the environment.
- After reading page 12, explain that the poison Carson identified was DDT, which endangered many different kinds of birds. Carson's work led to a ban on DDT in 1972. Since then, birds that had almost become extinct, such as the peregrine falcon and bald eagle, have increased in number. Ask, *Why do you think it took ten years after Carson's warnings for DDT to be banned?* (Accept reasonable responses.)
- Invite students to speculate about both of the scientists they have read about. Ask, *If Charles Darwin or Rachel Carson were alive today, what questions would you like to ask them? What do you think he or she might say about the environment today?* (Responses will vary.)

Further Facts

Rachel Carson (1907–1964)

- Rachel Carson was a biologist born on a farm in Springdale, Pennsylvania. She died in Silver Spring, Maryland, of cancer.

- She has been called the mother of the modern environmental movement.
- She was trained as a marine biologist and taught zoology at the University of Maryland (1931–1936).
- She worked at the U.S. Bureau of Fisheries (renamed U.S. Fish and Wildlife Service) as an aquatic biologist and editor from 1936 to 1952.
- She wrote three popular books about the sea: *Under the Sea Wind* (1941), *The Sea Around Us* (1951), *The Edge of the Sea* (1955).
- The pesticide industry tried to suppress *Silent Spring*; the book influenced President John F. Kennedy to call for testing of the chemicals mentioned.

Page 13 *Ecologists*

- After reading the description of an ecologist’s work in the first paragraph on page 13, you may wish to expand on it. Explain that an ecologist is a scientist who studies the relationship between living things and everything in their environment that affects them—such as rainfall, pollution, temperature changes, and the actions of humans.
- Ask, *Would Charles Darwin and Rachel Carson be considered ecologists? Why?* (yes, because they studied the environment, kept track of what they observed, and wrote about their work)
- If necessary, provide help with the pronunciation of *ecologist* (ee-KOL-uh-jist).

Did You Know? (pages 14–15)

Page 14 *About Wolves and Moose on Isle Royale*

- After students read the heading on page 14, tell them that Isle Royale is an island in Lake Superior, the largest of the Great Lakes, which form part of the boundary

between the United States and Canada. Help students locate Lake Superior on a map or globe. You might inform students that Lake Superior is one of the largest freshwater lakes in the world.

- Have students read the caption and study the chart on page 14. Based on the chart, discuss what students think they might find out in the text.
- Read page 14 to learn what ecologists discovered about the relationship between wolves and moose on Isle Royale. Have students explain the relationship in their own words. (When there are large numbers of moose for wolves to eat, the number of wolves increases. Because there are more wolves, more moose are killed. As the numbers of moose go down, there is less food for the wolves, so soon the wolf population gets smaller. When there are fewer wolves to kill moose, the number of moose begins to increase again.)

Further Facts

- Scientists have been studying the wolf and moose populations in Isle Royale National Park since 1958. It is the longest-running study of predator-prey relationships. The study is run by wildlife ecologists from Michigan Technological University.
- Weather plays an important role in population size. For example, during a mild winter with light snowfall, moose can move around more easily. They are not as easy prey for the wolves. With less to eat, the wolf population may get smaller. With fewer predators, the moose population may increase.
- Weather also can affect available food sources. Moose eat fir trees. In very windy weather, stands of fir trees can blow down and die. Without this food source, the moose population may decrease.

Page 15 *About Mountain Ecosystems*

- Ask students to look at the diagram on page 15 and read the labels. Ask, *What kinds of things does this diagram show?* (different kinds of plants and trees) *What do you think you will learn about the diagram when you read the text?* (why the plants are different)
- Read page 15 to learn about mountain ecosystems. Ask, *What causes the different ecosystems on a mountain?* (At different heights the temperature changes and different amounts of rain fall.) Explain that climbing a mountain is like making a trip from the south to the far north, and similar changes in ecosystems take place.
- Tell students that some mountains in the United States are higher than the mountain shown in the diagram. Mount Rainier in Washington is 4,392 meters (14,410 feet) high, and the tallest peak in the Rocky Mountains, Mount Elbert, is 4,399 meters (14,433 feet) high.

AFTER READING

Summarize

Complete the KWL chart you began with students before reading by asking them to share the answers to their questions. Call on volunteers to retell each text section. Then have students use the information in the KWL chart to write brief summary statements.

Discuss with students how using the KWL strategy helped them understand and appreciate the book. Encourage them to share any other reading strategies that helped them understand what they read.

Direct attention to the fourth column in the chart and ask, *What questions do you still have about food chains and food webs? What would you like to explore further?* Record students' responses. Then ask, *Where do you think you might be able to find this information?* (Students might mention an encyclopedia, science books, and the Internet.) Encourage students to conduct further research.

Review/Assess

Use the questions that follow as the basis for a discussion of the book or for a written or oral assessment.

1. What makes up an ecosystem? (All the things—living and nonliving—in one area.)
2. What kinds of adaptations help living things survive? (Students may mention animals' specialized body parts, such as a rabbit's hearing or an owl's eyesight; behaviors such as a prey animal remaining still; or physical characteristics such as camouflage and mimicry.)
3. What is a food chain? Provide an example. (A food chain shows how living things get energy. An example would be a mouse eating seeds, a snake eating the mouse, and a hawk eating the snake.)
4. What is a food web? Provide an example. (A food web shows how food chains in an ecosystem overlap. Each animal or plant may be part of many different food chains. For example, in a meadow, a grasshopper eats grass. So does a mouse. Both spiders and mice may eat grasshoppers. Both snakes and hawks might eat mice.)

Writing Links/Critical Thinking

Present the following as writing assignments.

1. Think about the interaction of the living and nonliving things in an ecosystem. Imagine what might happen if a new organism were introduced into the ecosystem. It might be a new predator or a plant that grows quickly. Describe ways in which the ecosystem might change. (Accept reasonable responses.)
2. Choose one living thing—an animal or a plant—and draw a food chain for that organism. Describe what the food chain shows.

Science Journals: You may wish to have students keep all the writing activities related to the reader in their science journals.

References and Resources

For trade book suggestions and Internet sites, see the References and Resources section of this teacher's guide.