



February: 3-5

Food Plants and Ecosystems

WINTER SQUASH



South Carolina Farm to School Lessons

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Overview

Welcome to the South Carolina Farm to School February Nutrition Education Lesson. This lesson contains information & hands on activities where 3-5 students will be learning about plants and how components in nature interact with each other in ecosystems. Our goal for this lesson is to help children explore the connection between food production and ecosystems interactions.

These lessons are designed to be delivered over a four week period, noting that introduction & activities will be supplemental to existing curriculum.
Estimated Total time: 60 minutes

Teacher Background

Most plants and animals live in areas with very specific climate conditions, such as temperature and rainfall patterns, that enable them to thrive. Any change in the climate of an area can affect the plants and animals living there, as well as the makeup of the entire ecosystem. Some species are already responding to a warmer climate by moving to cooler locations. For example, some North American animals and plants are moving farther north or to higher elevations to find suitable places to live. Climate change also alters the life cycles of plants and animals. For example, as temperatures get warmer, many plants are starting to grow and bloom earlier in the spring and survive longer into the fall. Some animals are waking from hibernation sooner or migrating at different times, too.

Plants and animals have adapted to changes in the environment for millions of years. However, today's changes are happening faster and on a larger scale than in the past, which makes it difficult for plants and animals to adapt. Changes in climate can affect the types of plants that can grow in an area. Animals' food supplies, water, life cycles, breeding habits, and ranges will be affected, too. Some animals will adapt to changing conditions or move elsewhere, but others could have trouble surviving. Some unwelcome invaders (invasive species) could benefit from climate change by expanding their range or being able to survive through the winter in new places. All these changes will affect the way ecosystems function, and changes to ecosystems affect people, too. That's because we rely on ecosystems to provide us with many services, like clean water, food, and medicines.¹

It is easy to forget that food is a product of ecosystems. We usually purchase it in supermarkets and restaurants, where it bears little resemblance to the original plant or animal. Yet, without sunlight, soil, water, plants, and animals interacting in an ecosystem, we would have no food. Food gives us the energy we need to stay alive, grow, and reproduce, and we can get this energy only from other organisms. Although the sun emits enormous quantities of radiant energy every day, our bodies cannot use it directly. Instead, we rely on plants to convert it to chemical energy (food) through photosynthesis. This energy may then pass through a food chain to us. Photosynthesis, pollination, predation, decomposition, the cycling of nutrients, and water are all involved in creating our food.

Although farms and gardens depend on ecosystem processes, they are different from natural ecosystems. Natural ecosystems contain plant and animal populations interacting in balance with one another and nonliving things, and can sustain themselves over time. In farms and gardens, people plant seeds, add water, amend the soil, weed, and remove pests to increase production, all of which can affect both balance and sustainability.

As seen in Nourish, these human impacts are often far-reaching, especially with industrial agriculture. For example, pesticides and fertilizers applied to industrial farms in the Midwest have created a dead zone—where almost nothing can live—thousands of miles away in the Gulf of Mexico.²

¹ Adapted from: A Student's Guide to Global Climate Change (<http://www.epa.gov/climatechange/kids/impacts/effects/ecosystems.html>)

² Adapted from: Nourish Life (http://www.nourishlife.org/pdf/Nourish_Curriculum_Guide.pdf)

Lesson checklist



F2S Aim: Explore the connection between food and ecosystems interactions.

F2S Objectives

Students will be able to:

- * Explain the term "ecosystem".
- * Discuss the parts of the food chain.
- * Discuss the role that plants play in nature (food chains, food webs, ecosystems).
- * Taste the Palmetto Pick of the Month (winter squash).



Materials:

- * Food Chain Chart (Appendix A)
- * Food Chain Worksheet (Appendix B)
- * Answers (Appendix C)
- * Optional Food Web Activity (Appendix D)
- * Farm to School Planting Sheet (Appendix E)
- * Winter Squash Powerpoint (Appendix F)
- * Tasting activity materials
- * Family Activity Sheet (Dropbox)
- * Copies of the February Farm to School Lesson Assessment



National Health Education Standards

1.5.1 2.5.4 2.5.5 5.5.5 5.5.6
8.5.2

SC State Standards

ELA 4.2.1	Summarize evidence that supports the central idea of a given informational text .
ELA 4.2.2	Analyze informational texts to draw conclusions and make inferences .
ELA 4.2.3	Analyze informational texts to locate and identify facts and opinions
ELA 4.2.4	Create responses to informational texts through a variety of methods (for example, drawings, written works, and oral presentations).
ELA 4.3.1	Generate the meaning of unfamiliar and multiple-meaning words by using context clues (for example, those that provide an example or a definition).

SC 4-2.1	Compare how various animals obtain and use food for energy.
SC 4-2.4	Distinguish between the characteristics of an organism that are inherited and those that are acquired over time.
SC 4-2.5	Explain how an organism's patterns of behavior are related to its environment (including the kinds and the number of other organisms present, the availability of food, and other resources, and the physical characteristics of the environment).

Lesson Essential Components

Lessons profile	Page(s)	Yes	No	Notes
Palmetto Pick of the Month	10	★		Tasting activities with Winter Squash
Health Education Standards	5	★		
SC-Cross Curricular Standards	6	★		
SC-F2S Behavioral Goals	8-10	★		
Cooking Activities	9-10	★		
Tasting Activities	9-10	★		
Physical Activity	9-10	★		
Food Safety	9-10	★		
School Food Garden			★	
Student to Farmer Connections (i.e. field trips, talks)	8-10	★		
Student to Chef Connections			★	
Farm to Cafeteria			★	
Provision of scientific knowledge/rationale	8-10	★		
Risk and benefits about healthy behaviors			★	
Obstacles, Barriers & Solution	8-9	★		
Family involvement and other supports		★		Family Activity Letter
Set goals and monitoring progress			★	
Other hands on activities:	8-10	★		Team Activities, Presentations

Let's Learn!

What is an ecosystem?¹

Estimated Time: 15 minutes

1. Review with the students what they have learned about food chains (This topic was introduced in the "November Farm to School Lesson: All about Food Plants").
2. Point out that most often when we imagine a food chain, we are thinking about one that includes green plants and animals that depend on these plants. If necessary, review the plant parts (roots, stems, leaves, flowers, fruits, and seeds) learned in the Farm to School November lesson.
3. Introduce the word "Ecosystem" by asking the following questions:

- Can anyone tell me what an **ecosystem** is?

An **ecosystem** is a living community which depends on each member and its surrounding environment. The living part of an ecosystem is sometimes called a **food chain**. (See Appendix A)

- What makes up an ecosystem?

Producers

These are living things which take the non living matter from the environment, such as minerals and gases and uses them to support life. Green plants are considered producers and they are at the beginning of the food chain.

Consumers

These living things need the producers to be their food. Animals who eat plants are called **herbivores**. They are considered consumers and are next on the food chain. Animals who eat other animals are called **carnivores**. They also are considered consumers. They are farther down the food chain since they need herbivores for their food. Animals and people who eat both animals and plants are called **omnivores** and are also part of the consumer piece of the ecosystem.

Decomposers

The last part of the ecosystem is this. These are living things which feed off dead plants and animals and reduce their remains to minerals and gases. Example: fungi, like mushrooms and bacteria.

Note: For an additional classroom activity or homework assignment see Food Chain worksheet (Appendix B).

Food Chain Video (Optional)

<http://www.youtube.com/watch?v=cWh-XKhh8xo&feature=related>

Food Chain Flashcards:

<http://www.totally3rdgrade.com/Flashcards/Food%20Chain.pdf>

Activity

Eco Hunt

Estimated Time: 15 minutes

1. Have students observe one or more local ecosystems, such as a schoolyard, backyard, neighboring lot, or local pond. In order to focus students' observation, it may be helpful to rope off a specific area.
2. Have students count and record the number of living things that they encounter in this area. Encourage students to look for examples of living things interacting. Have students draw or write about the living things that they observe.
3. Students can use their Farm to School Journals to record their findings. Use words and pictures to create a story of what living things they encounter, along with any interactions that appear to exist.
4. Construct a classroom graph, showing each living thing and the number of students who observed it. You can also engage in sorting (Classifying as plants or animals) and counting lessons (finding the total number of living things observed by the whole class) related to student findings.
5. Questions you may want to ask students during the hunt:
 - Where did you find animal/plant?
 - How would you describe it? Draw a picture.
 - Were there any other animal/plants nearby?Did you see any interaction?

Optional: Have students create/draw their own food chain to turn in for review. Post them somewhere where all students can view and benefit.

Note: For an additional Ecosystem activity, see Appendix D.

★ Gardening Activity

Preparing the Spring Garden

Estimated Time: 15-30 mins

Materials Needed:

Farm to School Planting Sheet (Appendix E)

Plant Guide (Appendix F)

Note: This activity is designed to help the school prepare for Spring planting in their Farm to School raised beds/in-ground gardens. Because schools are implementing lessons at different levels, please consult with the Farm to School Team at your school about the direction the school would like to take for planting the garden before doing this activity.

1. Review with the class the purpose of the school garden.
2. Explain the purpose of this activity is to design how the school garden will be planted. Take a few minutes to watch the following video:
<http://www.youtube.com/watch?v=a-WMWISI12s>
It will discuss considerations when designing your garden such as water and sun access.
3. Next, review the produce that grows successfully in SC in the Spring. See Appendix F for more information. Decide which plants you would like to grow. Remember to look at the plants that will be most successful in your region of the state. For additional information about growing in SC regions, please visit <http://www.clemson.edu/extension/hgic/plants/vegetables/gardening/hgic1256.html>.

4. Use the **Farm to School Planting Sheet** (Appendix E) to design where your seeds/plants will be planted in your raised beds. Think about height of plants, width of plants, varieties of plants, etc. Do not forget to visit your raised beds with your students and take pictures of the raised beds prior to planting. Have your students envision how the garden will look. Have them record in their garden journal predictions on how quickly the plants will grow. Monitor this and write about it throughout the Spring till harvest.

You can also divide the class into groups and each group will monitor and journal about different aspects of the school garden. Groups can journal about how each of these affect the garden: weather, sun, water/rain, etc.

★ Palmetto Pick Activity

Noodle Mania!

Estimated Time: 15-20 mins

1. Have students wash their hands (with soap & warm water for 20 seconds) & reinforce that it is important. Show the students that you have washed the spaghetti squash before beginning.
2. Display the **Winter Squash** power point (will be sent electronically-Appendix G) while you are preparing the spaghetti squash.
3. Cut spaghetti squash in half. Scrape out the seeds or select two-three students to help scrape out the seeds.
4. Steam the squash in the microwave, rind side up, for six to eight minutes. *Be careful removing the squash, it will be hot. Wear oven mitts.
5. Separate strands with a fork. When finished, toss with olive oil and parmesan cheese.
6. Serve a 1 oz. portion for each student to taste.

Ingredients:

1 spaghetti squash
Olive Oil (to taste)
Parmesan Cheese (to taste)

Encourage students to discuss the “noodles” of the spaghetti squash. Record on the board some of their perceptions of the spaghetti squash:

- Did it taste like they thought it would taste?
- Does it taste like noodles?
- Is it fun to eat like spaghetti?

Note: One spaghetti squash should yield roughly 40 oz. of “spaghetti”. If you are serving more than 30 students, add additional spaghetti squash. The squash will be very hot, please use caution and wear oven mitts. Spaghetti squash are hard, you may want

assistance in cutting the squash and/or you may want to have it cut before you begin the PPM Activity

Evaluation

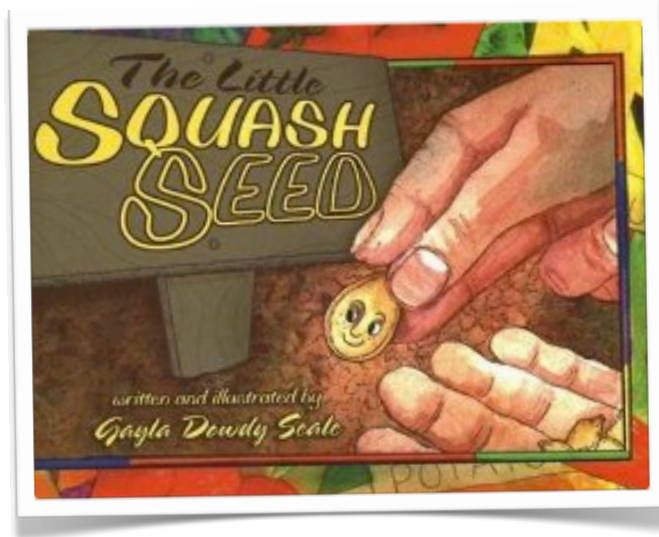
Formal Assessment:

1. Review **Living things/Ecosystems** and the importance of how all living things work together.
2. Optional resource: Administer the Farm to School February
2. Lesson Assessment to your students (the electronic copy is in Dropbox). If you decide to use this assessment with your students, please contact us because we would like to summarize any information collected.

Informal Assessment: Observe participation in lesson activities. Complete survey at end of month (survey will be sent electronically).

¹ Adapted from Koch P.A., Barton A.C., Contento I.R. (2007). Growing Food: Lesson 11 Webs of Interaction. Teachers Columbia University & the National Gardening Association, New York, NY.

Resources



Books:

Koch P.A., Barton A.C., Contento I.R. (2007). Growing Food. Teachers Columbia University & the National Gardening Association, New York, NY.

Magic School Bus Chapter Books #17: Food Chain Frenzy by Anne Capeci

Pumpkins by Ken Robbins

The Little Squash Seed by Gayla Dowdy Seale

Who Eats What? Food Chains and Food Webs by Patricia Lauber and Holly Keller

Websites:

To request nutrition education materials visit the Clemson University Nutrition and Resource Center (NIRC):
www.clemson.edu/nirc

Nourish Curriculum Guide: [/www.nourishlife.org/pdf/Nourish_Curriculum_Guide.pdf](http://www.nourishlife.org/pdf/Nourish_Curriculum_Guide.pdf)

Winter squash information guide:

http://www.clemson.edu/extension/hgic/food/nutrition/food_shop_prep/food_prep/hgic4258.html

Video:

Winter Squash (PAllen Smith)

<http://www.youtube.com/watch?v=AJj5hv3Bk28&feature=related>

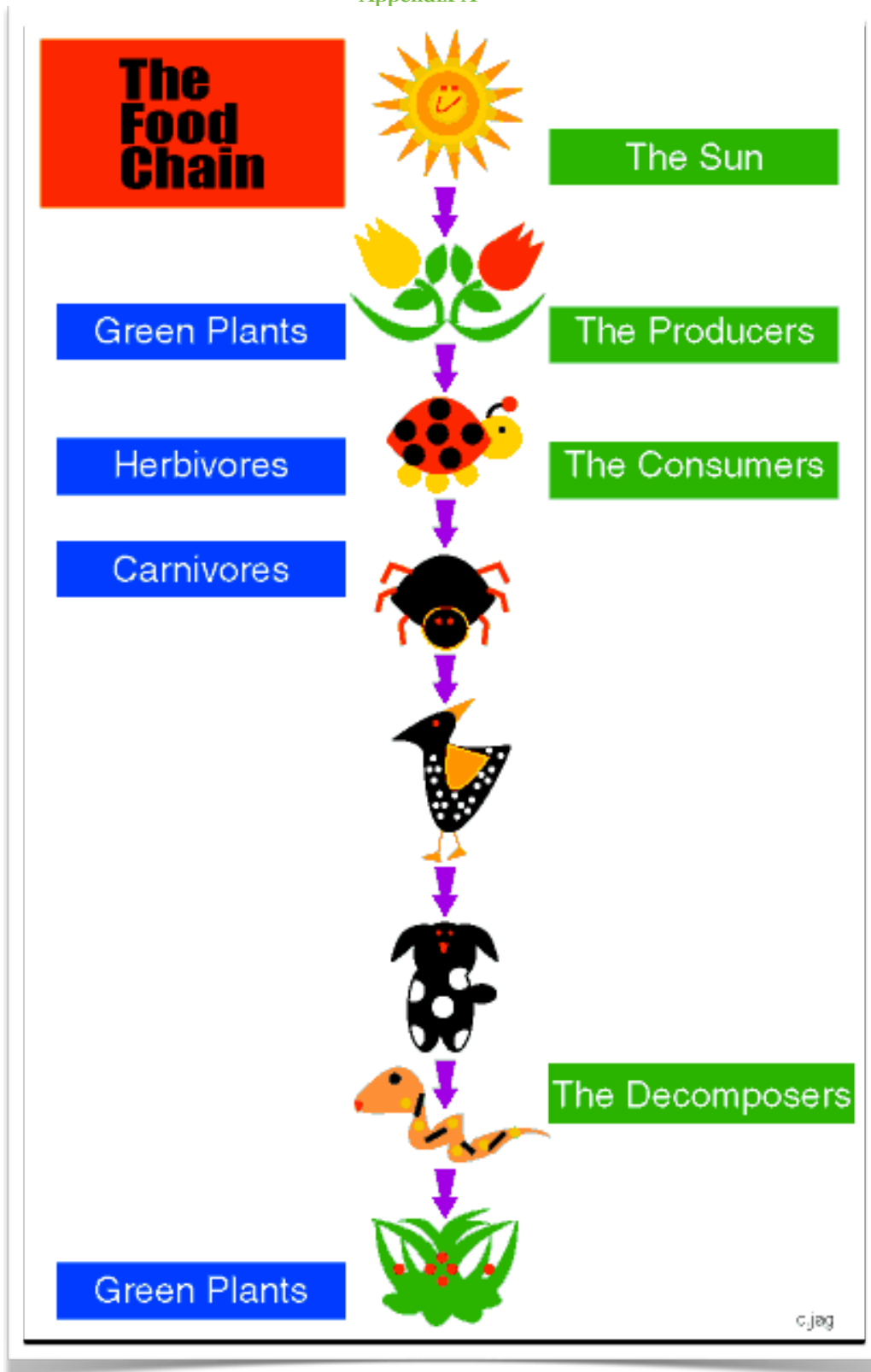
Winter Squash (Natural Markets)

<http://www.youtube.com/watch?v=VOsir2ESuis&feature=related>

Food Chain <http://www.youtube.com/watch?v=JvqMNQuYqBk&feature=related>

Poem http://www.totally3rdgrade.com/food_chain.html

Appendix A



Name _____

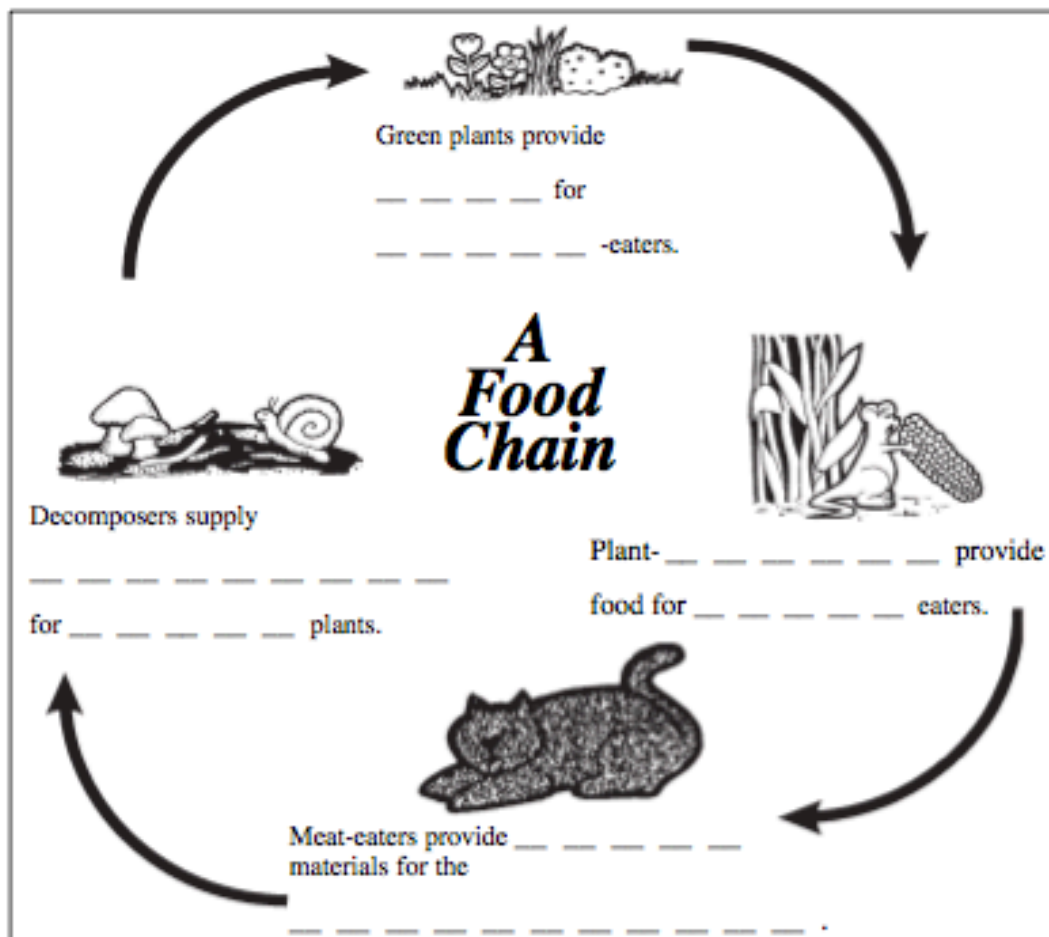
Science

The Food Chain

Plants and animals have an interdependent relationship. Insects, fungi, and micro-organisms act as decomposers and provide **chemicals** for green plants. In turn, plants provide **food** for plant-eaters which provide food for **meat-eaters**. Plants, plant-eaters, and meat-eaters all supply **waste** materials for **decomposers**.

When this chain is broken, consequences can be serious. For example, if **green** plants were destroyed in great numbers by pesticides, deforestation, or forest fires, there might be no food for the **plant-eaters**. Then the plant-eaters would have to move away or they could face starvation.

Find out more about the food chain. Label the diagram with the **boldfaced** words from the paragraph above.



Appendix C

Food Chain Worksheet Answer Key

Green plants provide **food** for **plant**-eaters.

Plant-**eaters** provide food for **meat**-eaters.

Meat-eaters provide **waste** materials for **decomposers**.

Decomposers supply **chemicals** for **green** plants.

Classroom Activity

Grades 1-3

An Ecosystem Escapade



Objective

To learn how animals and plants depend on each other in ecosystems.



Activity Description

Students will role-play elements of a food web to illustrate the connections in ecosystems.



Materials Needed

- Paper or cardboard
- Crayons or markers
- Scissors and string
- Hole-punch



Subjects Covered

Food chain
Food web
Ecosystem



Duration

1 hour



Skills Used

Communications
Motor skills



science



art



Activity

Step 1: If possible, take the students outside into a natural environment, such as woods (otherwise, ask them to use their imaginations and conduct the lesson indoors). Explain what an ecosystem is and what types of ecosystems are in your area. Ask them to identify different animals and plants that they see when they go outside. Discuss in a group what all animals and plants have in common (i.e., that they need to eat). Explain how some animals eat plants, some plants eat animals (e.g., a Venus Fly Trap), and some animals eat other animals. Ask the students what they eat.

Step 2: Explain that animals and plants rely on each other for food and for survival. All of the plants and animals working together, eating each other and being eaten, is part of nature and can be

Sample Food Chain:

(in an Eastern U.S. deciduous wooded ecosystem)



Sample Food Web:

(in an Eastern deciduous wooded ecosystem)



Arrows indicate the direction that energy is transferred.

described as “food chains” or “food webs.” Show the students an example on the board (see sidebar for examples of food chains and food webs).

Step 3: Based on the animals and plants that are named by the students, create a food web on the board and have students help you decide which animals and plants eat each other.

Step 4: Have each student pick one animal or plant in the ecosystem described on the board. Instruct each student to draw a picture on a piece of paper or cardboard of their animal or plant and write its name near the picture.



Step 5: Using a hole-punch and string, help students create a placard to identify them as a particular animal or plant.



Step 6: Facilitate an exercise with the students in which they find the animal or plant that they eat and link hands with that person. If the food web is created properly, many people should be holding hands.

Assessment

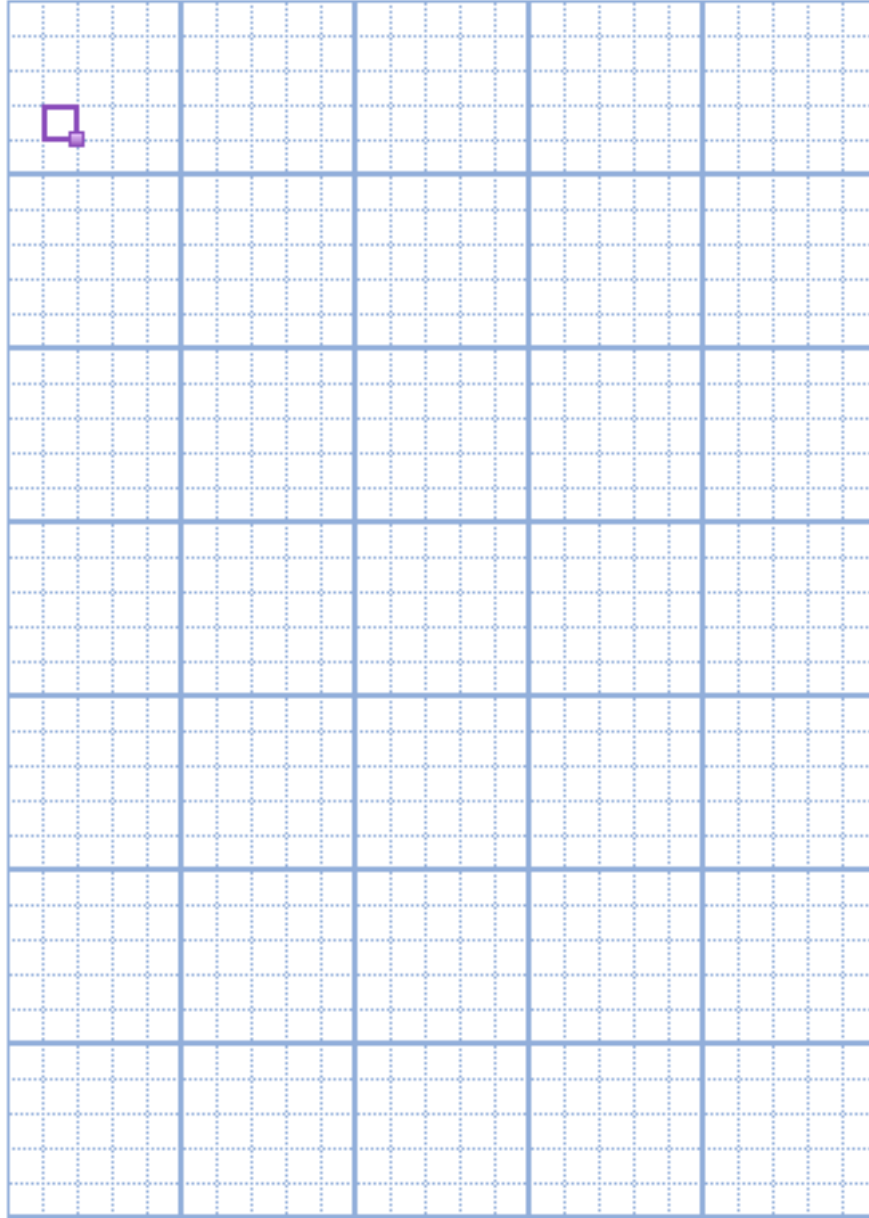
1. As Step 6 is being conducted, ask students to remember what eats what. If there is more than one option, acknowledge students when they say a correct answer, even if no one in the class is role-playing that particular plant or animal.
2. Ask students why animals eat other animals or plants.
3. Ask students what would happen to the plants and animals in the food web if one plant or animal disappeared. Explore with students reasons why an animal or plant would disappear.

Enrichment



1. Create illustrations and placards exemplifying a chain of foods that the students eat. Then link hands to create one or more chains (for example, people eat hamburger, which is made from cows, which eat grass).
2. Teach the students the words to “This Land Is Your Land” and sing it as a class. Discuss some of the lyrics that describe particular ecosystems (e.g., redwood forests).
3. Tell students the different types of ecosystems that exist in your geographic location, such as streams, ponds, forests, deserts, and meadows. Have each student pick one and draw a picture of it, including animals and plants that live in it. If possible, have students collect items in nature, such as leaves, acorns, bones, bark, to include in their artwork.

Appendix E

Farm to School Planting Sheet



Appendix F
Winter Squash Power Point
(will be sent electronically at Dropbox)

<p>PALMETTO PICK OF THE MONTH</p>  <p>WINTER SQUASH (JANUARY)</p> <p><small>Adapted from www.palmettothefair.com</small></p>	<p>Reason to Eat Winter Squash</p> <ul style="list-style-type: none">• Excellent source of Vitamin A• Excellent source of Vitamin C• Good source of fiber• Healthy vision• Healthy immune system• Strong bones & teeth	<p>Winter Squash Varieties</p> <p>Acorn</p> <p>Butternut</p> <p>Buttercup or Tiran</p> <p>Hubbard</p> <p>Spaghetti</p>
<p>ACORN SQUASH</p> 	<p>BUTTERNUT SQUASH</p> 	<p>BUTTERCUP SQUASH</p> 
<p>HUBBARD SQUASH</p> 	<p>SPAGHETTI SQUASH</p> 	<p>FAMILY ACTIVITY...</p> <p>Go to the grocery store with your parents and identify all of the different varieties of winter squash. Do a price cost comparison. What are the most and least expensive varieties?</p>