

# 5<sup>th</sup> Grade Life Science: Ecosystems Unit



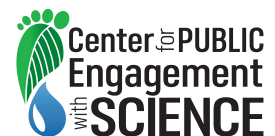
Developed for Chapel Hill Carrboro City Schools  
Northside Elementary School Outdoor Wonder & Learning (OWL) Initiative

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**INSTITUTE FOR  
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## *Overarching Unit Question*

How and why do organisms (including humans) interact with their environment, and what are the effects of these interactions?

## *Essential Questions*

Arc 1: How can I describe and compare different ecosystems?

Arc 2: How is energy transferred through an ecosystem?

How can I explain the interconnected relationships between organisms and their environments?

## *Transfer Goals*

- Use scientific thinking to understand the relationships and complexities of the world around them.
- Identify real-world dilemmas and opportunities and apply scientific thinking to develop solutions for them.

## *Enduring Understandings (Science)*

- The world has many different environments, and distinct environments support the life of different types of organisms.
- Organisms within ecosystems are interdependent and can survive only in environments in which their needs can be met.
- All organisms cause changes in the environment where they live and they, in turn, are affected by changes in their environment.

## *Target Science Essential Standards*

**5.L.2 Understand** the interdependence of plants and animals with their ecosystem.

**5.L.2.1 Compare** the characteristics of several common ecosystems, including estuaries and salt marshes, oceans, lakes and ponds, forests, and grasslands.

**5.L.2.2 Classify** the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors).

**5.L.2.3 Infer** the effects that may result from the interconnected relationship of plants and animals to their ecosystem.

## *Secondary Target Standards (ELA, Math, Social Studies)*

### **ELA**

**RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

**RI.5.2** Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.

**RI.5.4** Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

**SL.5.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

- SL.5.4** Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; adapt speech to a variety of contexts and tasks.
- L.5.4** Determine and/or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 5 reading and content, choosing flexibly from a range of strategies: context clues, word parts, word relationships, and reference materials.
- L.5.6** Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships.

### **Math**

**5.MD.2** Represent and interpret data.

### **Social Studies**

**5.G.1.1** Explain the impact of the physical environment on early settlements in the New World.

**5.G.1.2** Explain the positive and negative effects of human activity on the physical environment of the United States, past and present.

## *Unit Overview*

In this unit students will learn how all living organisms are interdependent upon each other, as well as the non-living factors within an ecosystem. The activities in this unit provide students with opportunities to develop skills such as observation, critical thinking, communication, collaboration, and creativity. They will investigate their school yard and ecosystems surrounding it by using direct observations and completing nature journaling activities.

In Arc 1, students learn about the abiotic and biotic factors in ecosystems. They begin exploring the ecosystem around their schoolyard and record their observations in a nature journal. Students then take a virtual trip down the Cape Fear River and discover different types of aquatic and terrestrial ecosystems. They explore ocean habitats and the creatures that inhabit different ocean zones and play a game to match animals to their ecosystems. The Arc wraps up by having students revisit their schoolyard to compare and contrast how it looks now and how it may have looked 250 years ago.

Arc 2 provides students with opportunities to learn how energy flows through ecosystems by studying food chains and food webs. The Arc begins with students learning about ecology, which is the study of the relationships between plants, animals, people, and their environment. Other activities allow students to analyze what happens when food chains and food webs become unbalanced through changes in the environment. As students work through these activities, they gain an understanding of how organisms are interdependent within an ecosystem. The unit wraps up with an exploration of how ecosystems provide services that impact human health.

## *Duration*

- 20-24 days of 45 minute learning activities

## *Vocabulary\**

Ecosystem, environment, biome, terrestrial, tundra, taiga, deciduous forest, rainforest, grassland, desert, aquatic, wetland, ocean, river, lake, pond, estuary, organism, biotic, abiotic, producer, consumer, decomposer, predator, prey, herbivore, carnivore, omnivore, scavenger, food chain, food web, population, community, competition, photosynthesis, organic, biodiversity, interdependence, conservation, limiting factor

*\* Definitions of vocabulary words can be found on the arc overview pages. Relevant vocabulary is listed on each learning activity page.*





## Go Outdoors! Tips & Tools

Taking your class outside for science or any lessons can be rewarding and challenging. Along with behavior and materials management tips with each lesson, this section is intended to help you have the tools you need to successfully take your class outside.

### Before You Go Outside

- Create **ground rules** with students for all outdoor lessons. Post the rules for students to be able to easily see.
- Ask for **parent volunteers**. Extra help can make an outdoor learning experience much more manageable.
- Teach students proper use, including safety, of the science tools they will be using.
- Set expectations before go. Give instructions both inside and repeat once outside.
- Have a clear **objective** for going outdoors. This will help focus students' attention.
- Be flexible. Structure lessons to take advantage of **opportunities and challenges**.
- Establish a meeting spot and emergency plan. Have a signal for emergency situations.
- Take students outside for short exercises to practice rules before longer outdoor lessons.
- Use **same door** to always go outside for learning. Emphasize this is different than going outside for recess.

### While You Are Outside

- **Model** the activities and outdoor skills for students. Show them what you expect them to be doing.
- **Participate in the activity**. Get down on your students' level. Get your hands dirty.
- Model **respect for nature** with your students.
- The outdoors is full of **teachable moments**. Use "I wonder" statements to engage students in questioning the experience. Have students write down questions to be researched back in the classroom.
- Allow students to be **leaders** in the activity. Ask students to volunteer as teacher assistant or materials manager.
- Acknowledge that students want to explore and can do so once the assigned task is complete.

### Safety First!

- Scout outdoor areas ahead of time if possible, to note **potential hazards** such as poison ivy.
- Students should **never be alone**. If a student needs to go back to the building, send 2 students.
- Take a **first aid kit and phone/walkie-talkie**. Consider bringing along staff trained in first aid/CPR.
- Let office staff know where you and your class are going if headed out on a walking field trip.
- **Stay on the trail/path**, unless otherwise directed. On the greenway, stay on the right side of path.
- **Do not eat wild plants**, unless harvesting in the garden with a teacher.
- Set **boundaries** for the students to stay within. You have to be able to see me and I have to be able to see you!

### A Note on Nature Journaling

Nature journals that you use with your class should be small composition books or other blank books that students use to make outdoor observations, including writing, drawing, and painting. Students can use colored pencils, watercolor pencils, or other materials to remember details of plants, animals, and habitats they are investigating around the schoolyard. This is different from a science notebook. However, some teachers may choose to have students paste blank pages into their science notebook to use for nature journaling pages.

### *Essential Questions*

How can I describe and compare different ecosystems?

### *NC Science Essential Standards – Unpacked Content*

**5. L.2.1** Students know that there are different types of ecosystems (terrestrial and aquatic). These ecosystems can be divided into two types according to their characteristics:

#### **Terrestrial**

Land-based ecosystems include forests and grasslands.

**Forests** have many trees (with needles or with leaves), shrubs, grasses and ferns, and a variety of animals. They usually get more rain than grasslands. Diverse types of animals can be found in forests, depending on their type. Deciduous: black bear, deer, red fox, vole, rabbit, cardinal. Rainforest: panther, monkeys, capybara, snakes, spiders. Temperatures in the forests may vary depending on where the forest is located.

**Grasslands** have fertile soil and are covered with tall grasses. They usually get a medium amount of rain, but less than forests. Temperatures may also vary depending on where the grassland is located. Some examples of animals that live in the grasslands are prairie dogs, bison, and grasshoppers.

#### **Aquatic**

Water-based ecosystems may be fresh water (lakes and ponds) or saltwater (oceans, estuaries and saltwater marshes).

**Lakes and ponds** are bodies of freshwater that are surrounded by land. Ponds are usually shallower than lakes and the temperature of the water usually stays the same from top to bottom. Plants and algae usually grow along the edges where the water is shallow. Some examples of animals may be different types of fish, amphibians, ducks, turtles, or beavers.

**Oceans** are large bodies of saltwater divided by continents. Oceans have many types of ecosystems depending on the conditions (sunlight, temperature, depth, salinity) of that part of the ocean.

Most organisms live where the ocean is shallow (from the shoreline to the continental shelf) because sunlight can reach deep and the water is warm making food abundant. Some examples of organisms that live in the shallow ocean are drifters (jellyfish or seaweed), swimmers (fish), crawlers (crabs), and those anchored to the ocean floor (corals).

Some organisms live in the open ocean, near the surface or down to the deep ocean bottom. Plankton float in the upper regions of the water.

Some organisms swim to the surface to find food or for air (whales, turtles, sharks) while others live closer to the bottom (certain fish, octopus, tubeworms).

Students know typical visual representations of the various ecosystems, as well as graphic representations of the food chains and webs, cycles and energy pyramids that are commonly associated with ecosystems.

## Lessons in this Arc

- ❖ Engaging Activity: What's in your Ecosystem?
- ❖ Learning Activity 1: Reading About Ecosystems
- ❖ Learning Activity 2: Ecosystems Around the School
- ❖ Learning Activity 3: Exploring the Cape Fear River Basin
- ❖ Learning Activity 4: Ocean Habitats
- ❖ Learning Activity 5: Move Over Rover
- ❖ Learning Activity 6: Your School Ecosystem: Then & Now

## Go Outdoors!



- ✓ Engaging Activity: What's in your Ecosystem?
- ✓ Learning Activity 2: Ecosystems Around the School
- ✓ Learning Activity 6: Your School Ecosystem: Then & Now

## Nature Journal Connection



- Engaging Activity: What's in your Ecosystem?
- Learning Activity 6: Your School Ecosystem: Then & Now

## Duration:

- 9 to 11 days of 45 minute learning activities

## Background Information

An **ecosystem** includes the living things interacting in an area along with the non-living environment. **Abiotic factors** are the non-living components of an ecosystem, such as precipitation, oxygen and sunlight. **Biotic factors** describe all the living components of an ecosystem, including various organisms. An **organism** is a living thing, such as animal, plant, or micro-organism, capable of reproduction, growth and maintenance. The **environment** is comprised of the abiotic and biotic influences that act upon an organism, population, or ecological community.

A **biome** is a distinct biological community consisting of plants and animals in a shared environment. A biome just considers the living components in an area, while an ecosystem considers both living and non-living components in an area. More than one ecosystem can make up a biome.

Ecosystems are classified based on their different characteristics. **Terrestrial** ecosystems are found on land. Among terrestrial ecosystems, the **tundra** is an arctic ecosystem with permanent layers of frozen soil and lacks trees. The **taiga** is a forest ecosystem with conifer trees which produce cones. It begins where the tundra ends. A **deciduous forest** is characterized by trees that lose their leaves each fall. The **rainforest** ecosystem has high levels of rain and many trees. The **grassland** ecosystem is covered with tall grass and has fertile soil. The **desert** receives very little rainfall and as a result, has very few plants. Plants that exist in the desert, such as cacti, are adapted to living in dry environments.

**Aquatic** ecosystems are located in water or wet environments. A **wetland** has saturated soil due to standing water most of the year and includes many plants. The **ocean** is a large body of salty water. A **river** is a flowing body of water surrounded by land on two sides. A **lake** is a body of freshwater surrounded by land. The temperature difference is significant from the surface to the bottom of the lake. A **pond** is a body of fresh water with a consistent temperature from the surface to the bottom. It is also surrounded by land. An **estuary** is the convergence point of freshwater and saltwater, resulting in brackish water.



## Vocabulary

- **Abiotic** factors are the non-living characteristics of an ecosystem (e.g. temperature, precipitation).
- **Aquatic** means growing or living in or often found in water.
- **Biome** is a large region of Earth that has a certain climate and certain types of living things.
- **Biotic** factors are living things.
- **Deciduous Forest** is a type of ecosystem with many trees that lose their leaves in the fall.
- **Desert** is a type of ecosystem with very little rainfall and few plants.
- **Ecosystem** includes all of the living things (plants, animals and organisms) in a given area, interacting with each other, and also with their non-living environments (weather, earth, sun, soil, climate, atmosphere).
- **Environment** is all of the biotic and abiotic factors that act on an organism, population, or ecological community and influence its survival and development.
- **Estuary** is a type of aquatic ecosystem where freshwater and saltwater mix creating brackish water.
- **Grassland** is a type of ecosystem with fertile soil and are covered with tall grasses.
- **Lake** is a type of aquatic ecosystem that is a body of freshwater surrounded by land and deep enough that the temperature changes from the top to the bottom.
- **Ocean** is a type of aquatic ecosystem that is a large body of salt water.
- **Organism** is a living thing, such as animal, plant, or micro-organism, that is capable of reproduction, growth and maintenance.
- **Pond** is a type of aquatic ecosystem that is a body of freshwater surrounded by land and is shallow enough that the temperature is the same from the top to the bottom.
- **Rainforest** is a type of ecosystem with many trees and abundant rainfall.
- **River** is a type of aquatic ecosystem in which the water is flowing in one direction and has land on two sides.
- **Taiga** is a type of forest ecosystem that consists mostly of cone-producing trees (as pines, spruces, and firs) and begins where the tundra ends.
- **Terrestrial** means living on or growing from land.
- **Tundra** is a type of ecosystem in the arctic having a permanently frozen layer of soil and no trees.
- **Wetland** is a type of ecosystem with abundant plant life where there is standing water and the soil stays saturated most of the year.

## Literature Connections

### Book sets

- *Forests: Inside Out* by James Bow, *Mountains: Inside Out* by James Bow, *Wetlands: Inside Out* by James Bow, *Rivers and Lakes: Inside Out* by Megan Kopp, *Islands: Inside Out* by Megan Kopp\*
- *Explore the Deciduous Forest* by Linda Tagliaferro, *Explore the Tundra* by Linda Tagliaferro, *Explore the Tropical Rain Forest* by Linda Tagliaferro, *Explore the Grasslands* by Kay Jackson, *Explore the Deserts* by Kay Jackson, *Explore the Ocean* by Kay Jackson\*
- *Habitat Survival: Grasslands* by Buffy Silverman, *Habitat Survival: Polar Regions* by Melanie Waldron, *Habitat Survival: Wetlands* by Buffy Silverman, *Habitat Survival: Mountains* by Melanie Waldron, *Habitat Survival: Forests* by Claire Llewellyn, *Habitat Survival: Rivers* by Melanie Waldron, *Habitat Survival: Deserts* by Melanie Waldron, *Habitat Survival: Oceans* by Claire Llewellyn\*

\*currently available in Northside Elementary's media center

### Lesson Prep

- ✓ Find an area where students can work in their nature journals without being disturbed.
- ✓ Make sure students have nature journaling materials or have pasted blank paper into a page of their science notebooks ahead of time.


### Vocabulary

Abiotic factors, biotic factors

### Procedure



#### Independent Work:

- Take students outdoors and invite each student to find a spot where he/she can sit and complete their nature journaling activity.
- **Nature Journaling** prompt: 
  - Using your senses of sight, hearing, smell, and touch, make a list of everything you notice around you.
  - Give students a time limit.
  - Instruct students to leave enough room next to each item to label it with a letter.

#### Mini Lesson:

- After writing in their Nature Journals, explain the terms biotic and abiotic to the class.
- Biotic refers to anything in an ecosystem that is or once was living, such as plants, animals, fungi, fallen logs, and leaves on the ground.
- Abiotic refers to anything in an ecosystem that is **not nor ever has been living**, such as rocks, soil, sun, clouds, precipitation, and anything else weather-related.
- Ask students to write these definitions in their journals.
- Ask students to label each item they listed in their journals with an "a" or a "b" to indicate whether the item they observed is abiotic or biotic.
- On chart paper, make a T-Chart. Label one side "Abiotic" & the other side "Biotic". Have students take turns writing their items in the correct column.
- Ask students if they saw any of the abiotic and/or biotic factors interacting such as a bird drinking water, etc.
- Explain that all living things (biotic) and all non-living things (abiotic) interacting together make up an ecosystem. What the students observed on the school grounds is an example of a small ecosystem.
- Ask students if they can think of larger ecosystems.

#### Learning Objectives:

Students will be able to identify abiotic and biotic features of a schoolyard ecosystem.

#### Nutshell/Skills:

Students can make observations about parts of an ecosystem.

#### Science Essential Standards:

5.L.2.2

#### ELA Essential Standards:

L.5.6

#### Time:

45 minutes

#### Teacher Materials:

- Chart paper

#### Student Materials:

- Nature Journals
- Pencils
- Private Eyes

### *Assessment:*

- Exit ticket: Describe the difference between “biotic” and “abiotic” and provide an example of each.

### *Opportunities for Extended Learning*

1. Provide students with additional nature journaling opportunities where they can practice making observations by drawing and labeling what they see around them. This will help improve their observational skills.

### *Behavior Management Tips*

- ◆ Prior to going outdoors, discuss with students the importance of respecting nature both biotic and abiotic things. Examples include things such as:
  - leave worms and other animals alone
  - leave rocks, soil, and grass where you found them
- ◆ Define the boundary for where the students can sit and work on their nature journaling prompt.

### Lesson Prep

- ✓ Make copies of the graphic organizers, 1 of each per student.
- ✓ Preview and be prepared to show the BrainPOP videos.
- ✓ Gather book sets. Ideally, get books that cover 5 different ecosystems, including forests, grasslands, oceans, and fresh water.

### Vocabulary

Ecosystem, environment, biome, terrestrial, tundra, taiga, deciduous forest, rainforest, grassland, desert, aquatic, wetland, ocean, river, lake, pond, estuary, organism, biotic, abiotic

*Note: The vocabulary in this lesson can be impacted by which books you choose for the class to use.*

### Procedure Part 1

#### Mini-Lesson

- Show the BrainPOP video on [Ecosystems](#) (1:40) to reinforce the Engaging Activity lesson on ecosystems and the various types of ecosystems. Then show [Land Biomes](#) (2:32).

#### Independent Group Work

- Choose a group of book sets that covers multiple ecosystems, such as the *Ecosystems Inside Out* series, *Explore the Biomes* series, or the *Habitat Survival* series.
- Have a student pass out a copy of the *Reading About Ecosystems* graphic organizer to each student.
- Divide the class into groups and allow each group to choose which ecosystem they will read about.
  - Each student in a group will receive a book about their selected ecosystem.
- Tell the students they are going to become “experts” on their selected ecosystem and will be responsible for teaching other students about that ecosystem.
- Ask students to begin reading to themselves or have them take turns reading aloud to their group.
  - Groups should spend time responding to the prompts on the *Reading About Ecosystems* graphic organizer including the vocabulary section on the back of the sheet.

#### Learning Objectives:

Students will describe the characteristics of different ecosystems.

#### Nutshell/Skills:

Students can describe the characteristics of different types of ecosystems.

#### Science Essential Standards:

5.L.2.1

#### ELA Essential Standards:

RI.5.2, RI.5.4, RF.5.4, SL.5.1, SL.5.4

#### Social Studies Essential Standards:

5.G.1.2

#### Time:

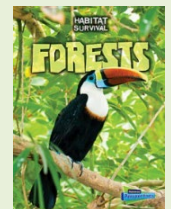
1-2 sessions of 45 minutes each

#### Teacher Materials:

- BrainPOP on [Ecosystems](#)
- BrainPOP on [Land Biomes](#)
- BrainPOP Login

#### Student Materials:

- Book sets about ecosystems with preference to *Ecosystems Inside Out* series
- Copies of *Reading About Ecosystems* and *Reading About Ecosystems - Jigsaw* graphic organizers, one set per student



## Procedure Part 2

### Independent Group Work

- Regroup the students so that each new group will have at least one member representing each of the featured ecosystems.
- The students will take turns teaching what they have learned about their chosen ecosystem to their new group.
- Students will complete the *Reading About Ecosystems – Jigsaw* graphic organizer while learning about the other ecosystems.
- By the end of the activity, the students will have recorded information on at least five different ecosystems.

### Assessment

- Use the rubrics provided to assess the *Reading About Ecosystems* graphic organizer and the *Reading About Ecosystems – Jigsaw* graphic organizer.

## Opportunities for Extended Learning

1. Show additional BrainPOP videos that focus on specific habitats: Oceans "[Underwater World](#)", Wetlands "[Everglades](#)", "[Tropical Rainforests](#)", "[Taiga](#)", "[Tundra](#)", "[Savanna](#)", "[Deserts](#)"
2. Have students use the ecosystems vocabulary foldable throughout the unit to take notes or at the end of the unit as review. It can also be used as an assessment. Students should fold it into thirds to make a brochure of ecosystems information.



## Reading About Ecosystems

Read the book about your assigned ecosystem and complete this worksheet. You will then share what you learned with your classmates.

1. Identify your ecosystem. \_\_\_\_\_
2. Make a diagram to show an example of a food web or food chain in your ecosystem. Label your diagram. Draw arrows to show the flow of energy. *Remember, food webs and food chains show energy flow in an ecosystem through what eats what, including plants and animals.*



3. Describe 3 things about your ecosystem, such as the types of plants, animals, and weather conditions.

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4. List 2 examples of your ecosystem and tell where they are located.

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5. What is one threat to your ecosystem?

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6. What is one way you can protect your ecosystem? \_\_\_\_\_

7. Determine the meaning of 4 vocabulary words by completing the chart below. Use context clues to write a definition before using the glossary to write the book's definition of the words.

Vocabulary Word	The sentence in the book	What I think the word means	The context clues I used	The definition from the glossary
a)				
b)				
c)				
d)				

## Reading About Ecosystems - Jigsaw

Record information about each ecosystem shared with you.

<p>Ecosystem: _____</p> <p>Describe: _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>Examples: _____</p> <p>_____</p> <p>_____</p> <p>Human impact: _____</p> <p>_____</p> <p>_____</p>	<p>Ecosystem: _____</p> <p>Describe: _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>Examples: _____</p> <p>_____</p> <p>_____</p> <p>Human impact: _____</p> <p>_____</p> <p>_____</p>
<p>Ecosystem: _____</p> <p>Describe: _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>Examples: _____</p> <p>_____</p> <p>_____</p> <p>Human impact: _____</p> <p>_____</p> <p>_____</p>	<p>Ecosystem: _____</p> <p>Describe: _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>Examples: _____</p> <p>_____</p> <p>_____</p> <p>Human impact: _____</p> <p>_____</p> <p>_____</p>

### Rubric for Reading About Ecosystems

	4—Excellent	3—Good	2—Fair	1—Needs Improvement
Identify your ecosystem	Ecosystem is correctly identified.	Ecosystem is identified by specific example rather than general type.	Ecosystem is incorrectly identified.	Ecosystem is not identified.
Food web or chain	Diagram of food chain or web including at least 4 organisms with all organisms labeled. Arrows show the flow of energy from producers to consumers to decomposers.	Diagram of food chain or web including at least 3 organisms with most organisms labeled. Arrows show the flow of energy from producers to consumers to decomposers.	Food chain or web missing some of the labels or otherwise incomplete.	Food chain or web missing all labels OR arrows incorrectly show the flow of energy (decomposers to consumers to producers).
Describe 3 things specific to ecosystems	3 aspects of the ecosystem are described.	2 aspects of the ecosystem are described.	1 aspect of the ecosystem is described.	0 aspects of the ecosystem are described.
Name 2 examples of ecosystem with location	At least 2 specific examples of the type of ecosystem with location i.e. Amazon Rainforest in Brazil.	2 specific examples of the type of ecosystem but missing 1 location.	2 specific examples of the type of ecosystem but missing both locations.	1 specific example is listed.
Threat to ecosystem	Identifies a threat specific to the ecosystem.	Identifies a threat to the ecosystem.	Identifies a generic threat to ecosystems.	Answer is not something that is a threat to ecosystems.
Ways to protect the ecosystem	Identifies a way to protect the ecosystem and how they can help.	Identifies a way to protect the ecosystem.	Identifies a generic way to protect ecosystems.	Answer is not something that protects ecosystems.
Define 4 Vocabulary Terms	4 columns and rows are complete with accurate definitions for each.	3 columns and/or rows are complete with accurate definitions for each.	2 columns and/or rows are complete with accurate definitions for each.	1 column and/or row is complete with accurate definitions for each.

Comments \_\_\_\_\_

### Rubric for Reading About Ecosystems - Jigsaw

	4—Excellent	3—Good	2—Fair	1—Needs Improvement
Ecosystem	4 different ecosystems named	3 different ecosystems named	2 different ecosystems named	1 ecosystem named
Describe	4 detailed descriptions of the ecosystems	3 detailed descriptions of the ecosystems	2 detailed descriptions of the ecosystems	1 detailed description of the ecosystems
Examples	4 examples of types of ecosystems	3 examples of types of ecosystems	2 examples of types of ecosystems	1 example of an ecosystem
Human Impact	4 examples of human impact, one per ecosystem	3 examples of human impact, one per ecosystem	2 examples of human impact, one per ecosystem	1 example of human impact

Comments

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# Types of Ecosystems

## Terrestrial Ecosystems

Rainforest: \_\_\_\_\_

\_\_\_\_\_

Deciduous Forest: \_\_\_\_\_

\_\_\_\_\_

Grassland: \_\_\_\_\_

\_\_\_\_\_

Desert: \_\_\_\_\_

\_\_\_\_\_

## Aquatic Ecosystems

Ocean: \_\_\_\_\_

\_\_\_\_\_

Wetland: \_\_\_\_\_

\_\_\_\_\_

River: \_\_\_\_\_

\_\_\_\_\_

Lake: \_\_\_\_\_

\_\_\_\_\_

# Interdependence

\_\_\_\_\_ is the different types of life in an ecosystem.

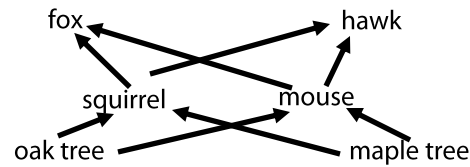
An ecosystem with high **biodiversity** would have a \_\_\_\_\_ number of different types of animals.



Describe interdependence.

\_\_\_\_\_

\_\_\_\_\_



If the number of squirrels decreases, what likely will happen to 2 other organisms in the above food web?

\_\_\_\_\_

\_\_\_\_\_ is careful preservation and protection of ecological processes and \_\_\_\_\_ of the environment.

Give two examples of **limiting factors**.

\_\_\_\_\_

# ECOSYSTEM

## Vocabulary

An ecosystem is the \_\_\_\_\_ and its \_\_\_\_\_.



An environment is \_\_\_\_\_.

## A Biome

is made up of

**Ecosystems**

which can be either

**Aquatic**

or

**Terrestrial**

and contain both

**Biotic**

and

**Abiotic**

factors.

An **organism** is a \_\_\_\_\_, such as an animal, a plant, or a micro-organism, which is capable of reproduction, growth, and maintenance.

# Food Chains & Food Webs

 = \_\_\_\_\_

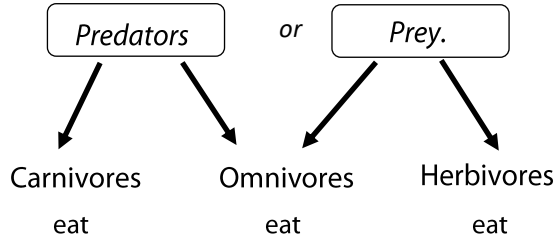


Producers = \_\_\_\_\_



Consumers = \_\_\_\_\_

Consumers can be classified as



\_\_\_\_\_ and \_\_\_\_\_

Carnivore, omnivore, and herbivore are derived from Latin words. The suffix *-vore* comes from the Latin "vorare" which means to devour.

\_\_\_\_\_ are organisms that feed on and break down dead plant or animal matter, thus making organic nutrients available to the ecosystem.



5th Grade Ecosystems Unit

A \_\_\_\_\_ shows a flow of \_\_\_\_\_ between **producers, consumers, and decomposers.**

Label the parts of the food chain below.



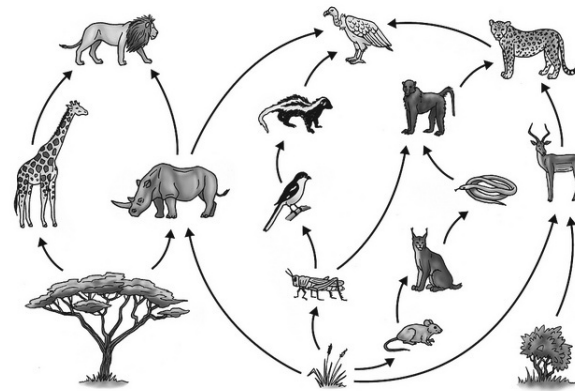
What is missing from the food chain? \_\_\_\_\_

How are a **food web** and a **food chain** different?

\_\_\_\_\_

How are they the same?

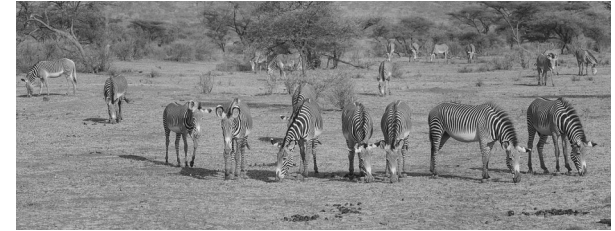
\_\_\_\_\_



What does the direction of the arrows in a food chain or food web show you?

\_\_\_\_\_

## Population



## Community



What is the difference between a **population** and a **community**?

\_\_\_\_\_

\_\_\_\_\_

Give an example of **competition** in an ecosystem. Be specific.

\_\_\_\_\_

\_\_\_\_\_

Draw a food web.

### Lesson Prep

- ✓ Prior to this activity, identify at least three local ecosystems that the students can access safely.
- ✓ Make copies of the *Ecosystem Around the School* Datasheet and Questions, 1 per group of 3 or 4 students.
- ✓ Gather field guides and other reference materials students can use to identify plants and animals. The Northside Media Center has several, along with classroom collections.
- ✓ Obtain iPads or other electronic devices to take photos if desired.
- ✓ This activity benefits from having extra adult helpers. Check to see if parent volunteers or other staff are available on the day you plan to conduct this activity.

### Vocabulary

Ecosystem, abiotic factor, biotic factor, ecologist, ecology

### Procedure

#### Mini-Lesson

- Review the characteristics of ecosystems as well as abiotic and biotic factors.
- Discuss with students how learning about ecosystems is not just about science, it is about understanding where we live as humans and how we impact our environment in both positive and negative ways.
  - We are still learning about interactions that happen within ecosystems, and also how human activity impacts these interactions in different ways.
  - Careful observations and data collection are important skills needed by **ecologists** in order to gain new understanding about ecosystems and our role in the environment.
- Share the video "[How Wolves Change Rivers](#)" with your students to illustrate this point and spark discussion about how data can be used to understand ecosystem changes.
- Tell students that they are going to work in groups to investigate features of local ecosystems. They are going to record information about the biotic and abiotic factors in several different ecosystems around the school. They will then have an opportunity to compare and contrast those ecosystems to infer why they are classified as different ecosystems.
- Review the Ecosystem Datasheet with the students and procedures for collecting data.

#### Learning Objectives:

Students will compare and contrast local ecosystems found on their school grounds and make inferences as to why they are classified differently.

#### Nutshell/Skills:

Students can compare and contrast the ecosystems found at their school.

#### Science Essential Standards:

5.L.2.1

#### Social Studies Essential Standards:

5.G.1.2


#### Time:

2-3 sessions of 45 minutes  
(data collection: 20-30 minutes per ecosystem; travel time between ecosystems; analyzing and answering questions about data)

#### Student Materials:

- *Ecosystems Around the School* Datasheet
- *Ecosystems Around the School* Questions
- Thermometer
- Field guides relevant to the ecosystems being studied
- iPads or other electronic device to take photos (optional)

## Independent Group Work

- Before heading outside, divide the class into groups of 3 or 4. Assign one student to record data and the others to collect data. At each ecosystem, students can rotate roles.
- Have students write the name of the first ecosystem they will study in the first row/first column of the Ecosystem Datasheet (e.g. stream, forest, grassland). Explain that they will collect the data described in the first column and record the results in the column under the name of the ecosystem.
- If visiting multiple ecosystems in one session, give each group one ecosystem to start and allow 20-30 minutes for data collection. Then have the groups rotate to the next ecosystem. Otherwise, if doing this activity over the course of several field experiences, allow about 20-30 minutes for data collection at each ecosystem that students visit.
  - **Note:** students can also use iPads or other devices to take photos of the various ecosystems and the abiotic/biotic factors encountered.
- Head outside with students to the selected ecosystem(s). 
- Before breaking up into groups to complete the datasheet, discuss with students the importance of respecting nature, both biotic and abiotic factors. Examples include things such as:
  - Leave worms and other animals alone.
  - Leave rocks, soil, and grass where you found them.
  - If collecting items to bring back to the classroom for further study, give students parameters for how many items they can collect (e.g. 2 leaves).
- Model how to use any equipment students will be using and give specific guidelines for proper use. For example, demonstrate how a net can be used to investigate the biotic factors in the creek and explain that putting rocks in the nets will break the nets.
- After data has been collected for all ecosystems, have students use their datasheet to answer the *Ecosystems Around the School Questions*.

## Assessment

- Bring the group back together for discussion. If students studied more than one ecosystem in a session, have them share with a partner and then the group their ideas of what makes ecosystems different from one another. Ask them to provide evidence from their datasheets to back up their statements.
  - If studying only one ecosystem in a given session, you could also have this discussion later, after students have had an opportunity to study at least two ecosystems around the school.
- Use the answers from student discussion and their *Ecosystems Around the School Datasheet* and *Ecosystems Around the School Questions* to assess student learning.

## Opportunities for Extended Learning

1. Take a field trip to visit a Piedmont prairie and other local ecosystems at locations such as the [NC Botanical Garden](#), [Prairie Ridge Ecostation](#), or [Sarah P. Duke Gardens](#).

## Behavior & Materials Management Tips

- ◆ In each ecosystem, make sure you give students clear boundaries where they can go, but allow room for groups to explore and be somewhat separated from each other.
- ◆ Between studying each ecosystem, have students debrief through a +/Δ conversation, discussing what went well in their investigation and what they would change for the next exploration.
- ◆ Set a timer for a little less than how long you want to spend studying an ecosystem. This allows you to give students a warning that time is almost up and time to clean up materials.
- ◆ Have students check the area for any forgotten materials.
- ◆ Remind students that they must wear shoes for their safety as there may be broken glass on the ground.
- ◆ Ask students to remind you of the learning goal.

Team Members: \_\_\_\_\_

### Ecosystems Around the School Datasheet

<b>Ecosystem Type</b>				
<b>Topography</b> (flat, hills, mountains)				
<b>Soil</b>	<b>Moisture</b> (wet, moist, dry)			
<b>Temperature</b>	3 feet <b>above ground</b>			
<b>Water</b> (if water is in this ecosystem)	<b>Temperature</b>			
	<b>Flow:</b> Fast Slow Not Moving			
<b>Aquatic Plants</b> algae plants under water plants growing out of the water				
<b>Terrestrial Plants</b> grass, plants shrubs, trees: how many				
<b>Animal Life</b> Animals seen or signs of life (scat, tracks, chewed twigs, etc.)				
<b>Positive Impacts on Ecosystem by Humans</b>				
<b>Negative Impacts on Ecosystem by Humans</b>				
<b>Other Observations</b>				



Team Members: \_\_\_\_\_

## Ecosystems Around the School Questions

1. What data was easiest to collect? \_\_\_\_\_
2. What data was hardest to collect? \_\_\_\_\_
3. Compare the plant life you found in each ecosystem. Why do you think there are differences? (think about the interaction between biotic and abiotic factors) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. What data results did you find interesting? \_\_\_\_\_  
\_\_\_\_\_
5. What did you observe something you perhaps would not have observed if you were just walking by?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



### Lesson Prep

- ✓ Review the following interactive maps from the NC Office of Environmental Education website to learn more about NC's River Basins:
  - [Discover North Carolina's River Basins](#)
  - [North Carolina River Basins](#)These maps are in the same format as the *Ecosystems of the Cape Fear River Basin* story map that students will use in this activity.
- ✓ Preview and be prepared to show the video [Cape Fear River Basin](#).
- ✓ Review and be prepared to demonstrate how to navigate the *Ecosystems of the Cape Fear River Basin* story map.

### Vocabulary

Ecosystems, aquatic ecosystems, saltwater, brackish, freshwater, estuary, wetlands, ponds, lakes, oceans, terrestrial ecosystems, deciduous forest, food chains, food webs, consumers, producers, decomposers, biotic, abiotic, carnivore, herbivore, omnivore, population

### Procedure:

#### Mini-Lesson

- Ask students to name different types of water bodies.
- Introduce the vocabulary term *aquatic ecosystems*.
- Show students a map of NC's River Basins and point out the Cape Fear River Basin and show the video [Cape Fear River Basin](#).
- Ask students "what other activities can you do in the Cape Fear River Basin besides fishing and canoeing?" One possible answer: Hiking in the forests. Introduce the vocabulary term *terrestrial ecosystem*.

#### Guided Practice

- Demonstrate for students how to navigate the [Ecosystems of the Cape Fear River Basin Story Map](#).

#### Group Work/Independent Work

- Students will use the story map to complete the graphic organizers and answer questions about the ecosystems of the Cape Fear River Basin.

#### Assessment

- Completed graphic organizers can serve as assessments.

#### Learning Objectives:

Students will identify and label ecosystems of the Cape Fear River Basin.

#### Nutshell/Skills:

Students can identify ecosystems found in the Cape Fear River Basin.

#### Science Essential Standards:

5.1.2.1, 5.L.2.2, 5L.2.3

#### ELA Essential Standards:

RI.5.1, RI.5.4

#### Time:

45 minutes

#### Teacher Materials:

- Ecosystems of the Cape Fear River Basin Graphic Organizer Answer Key
- Questions: Ecosystems of the Cape Fear River Basin Answer Key
- Video [Cape Fear River Basin](#) (3:16)

#### Student Materials:

- Computers
- [Ecosystems of the Cape Fear River Basin Story Map](#) (bit.ly/ECFRB)
- Ecosystems of the Cape Fear River Basin Graphic Organizer
- Questions: *Understanding the Ecosystems of the Cape Fear River Basin*

## *Opportunities for Extended Learning*

The following resources can be used to enhance instruction:

- [Interactive Wetlands Map](#) provides locations of public wetlands.
- The NC Wetlands website provides free, downloadable material to use in class. [NC Wetlands Factsheets](#)
- Another regional terrestrial ecosystem is a type of grassland known as the Piedmont Prairie.
  - Story of Sarah P. Duke Gardens and Hoffman Nursery creating a Piedmont prairie: <http://hoffmannursery.com/blog/article/growing-a-piedmont-prairie>
  - Controlled burn of Duke Garden's Piedmont prairie (note: weeding can be used in place of controlled burns): <http://gardens.duke.edu/controlled-burn>
  - Information on Prairie Ridge Ecostation including plant list: <https://naturalsciences.org/prairie-ridge/ecosystem>
- Although not about grasslands specific to NC, this game about Great Plains prairie does help students learn about choosing the right plants and animals for an ecosystem: <http://games.bellmuseum.umn.edu/prairie/index.html>

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Ecosystems of the Cape Fear River Basin

Use the Ecosystems of the Cape Fear River Basin Story Map to complete the chart below:

<b>Aquatic Ecosystems</b>	<b>Type of water:</b> Freshwater, Saltwater or Brackish	<b>Characteristics</b>
River		
Pond		
Lake		
Ocean		
Estuary		
Wetlands		

<b>Terrestrial Ecosystems</b>	<b>Characteristics</b>	<b>Plants</b>	<b>Animals</b>
Deciduous Forest			
Longleaf Pine Forest			
Maritime Forest			

Name: \_\_\_\_\_

Date: \_\_\_\_\_

# Understanding the Ecosystems of the Cape Fear River Basin

Use the Ecosystems of the Cape Fear River story map to answer the following questions.

1. What is a river basin? \_\_\_\_\_

\_\_\_\_\_

2. Where is the Cape Fear River Basin located? \_\_\_\_\_

\_\_\_\_\_

3. What two rivers join to form the Cape Fear River? \_\_\_\_\_

\_\_\_\_\_

4. Where does the Cape Fear River empty? \_\_\_\_\_

\_\_\_\_\_

5. What is an estuary? \_\_\_\_\_

\_\_\_\_\_

6. What are the main rivers in the Cape Fear River Basin? \_\_\_\_\_

\_\_\_\_\_

7. What is an ecosystem? \_\_\_\_\_

\_\_\_\_\_

8. What is an aquatic ecosystem? \_\_\_\_\_

\_\_\_\_\_

9. What is a terrestrial ecosystem? \_\_\_\_\_

\_\_\_\_\_

10. What is a food chain? \_\_\_\_\_

\_\_\_\_\_

11. What is a food web? \_\_\_\_\_

\_\_\_\_\_

12. What organism makes its own food? \_\_\_\_\_  
\_\_\_\_\_

13. What is the source of energy for producers? \_\_\_\_\_  
\_\_\_\_\_

14. Use the Freshwater Pond Food Web diagram in the story map to answer the following question:

a. What would happen to the Heron population if the fish population decreased?

\_\_\_\_\_  
\_\_\_\_\_

15. Draw a Venn diagram to compare and contrast a pond and a lake.

16. Draw a Venn diagram to compare and contrast an estuary and an ocean.

17. Draw a Venn diagram to compare and contrast a longleaf pine ecosystem to a maritime forest ecosystem.

## Answer Key: Ecosystems of the Cape Fear River Basin

Use the Ecosystems of the Cape Fear River Basin Story Map to complete the chart below:

Aquatic Ecosystems	Type of water: Freshwater, Saltwater, or Brackish	Characteristics
River	fresh	<ul style="list-style-type: none"> <li>● flow in one direction.</li> <li>● many important habitats for many land and water animals.</li> </ul>
Pond	fresh	<ul style="list-style-type: none"> <li>● shallow bodies of water</li> <li>● surrounded by land on all sides</li> <li>● plants can grow across ponds</li> <li>● plants that grow along the edges.</li> <li>● <b>The temperature of a pond is usually the same from top to bottom.</b></li> </ul>
Lake	fresh	<ul style="list-style-type: none"> <li>● deeper and bigger than ponds</li> <li>● plants grow along the edges of lakes</li> <li>● plants cannot grow across them.</li> <li>● surrounded by land on all sides.</li> <li>● temperature changes from top to bottom</li> <li>● <b>The bottom of the lake is much colder than the top of the lake.</b></li> </ul>
Ocean	salt	<ul style="list-style-type: none"> <li>● The Atlantic Ocean covers 41.1 million square miles</li> <li>● which makes it the second largest ocean</li> <li>● saltiest ocean</li> <li>● many types of ecosystems depending on conditions such as sunlight, temperature, depth, and salinity (the amount of salt in the water) of that part of the ocean</li> <li>● Phytoplankton are producers that float in the upper part of the ocean where they will get sunlight to produce their energy.</li> <li>● Most organisms live where the ocean is shallow, and the water is warm so food is abundant.</li> </ul>
Estuary	brackish	<ul style="list-style-type: none"> <li>● Cape Fear River Estuary is a 35-mile section of the river that is brackish</li> <li>● It is an important nursery area for juvenile fish, crabs, and shrimp.</li> </ul>
Wetlands	Freshwater Brackish water Saltwater	<ul style="list-style-type: none"> <li>● Wetlands are regions where there is standing water</li> <li>● soil stays saturated most of the year</li> <li>● located along rivers and coastal areas</li> <li>● along the banks of rivers, swamps</li> <li>● Salt Marshes are coastal wetlands that are regularly flooded by the tides of the ocean.</li> </ul>



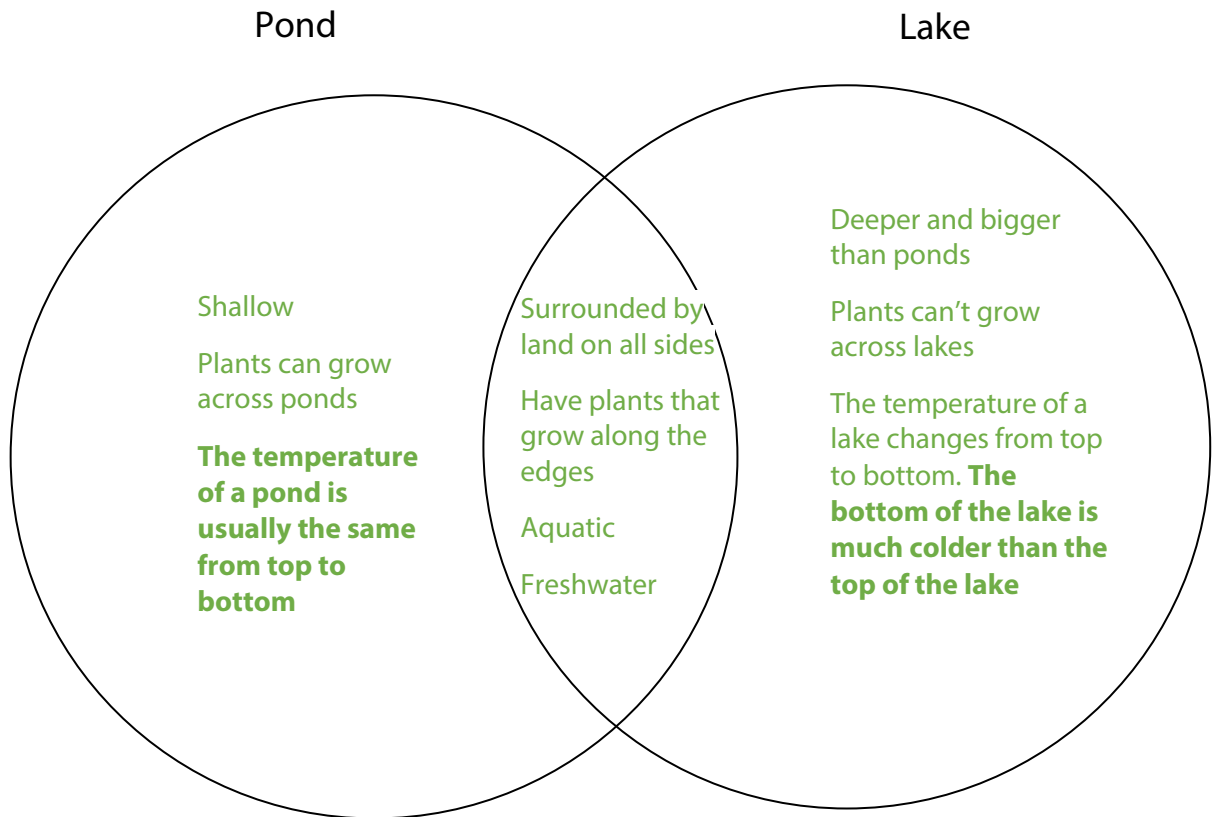
Terrestrial Ecosystems	Characteristics	Plants/Trees	Animals
Deciduous Forest	<ul style="list-style-type: none"> <li>● cold winters and hot, wet summers</li> <li>● 30-60 inches of rain</li> <li>● fertile soil</li> <li>● four distinct seasons: summer, fall, winter, and spring.</li> <li>● In the fall the trees drop their leaves.</li> </ul>	<ul style="list-style-type: none"> <li>● hickory</li> <li>● oak</li> <li>● short-leaf pine</li> <li>● loblolly pine</li> </ul>	<ul style="list-style-type: none"> <li>● white-tailed deer</li> <li>● bears</li> <li>● squirrels</li> <li>● wild turkeys</li> <li>● woodpeckers</li> <li>● owls</li> <li>● hawks</li> <li>● salamanders</li> <li>● frogs</li> <li>● eastern box turtles</li> <li>● snakes</li> <li>● butterflies</li> <li>● ants</li> </ul>
Longleaf Pine Forest	<ul style="list-style-type: none"> <li>● diverse ecosystems</li> <li>● grow in dry soils.</li> <li>● do not grow well in shaded areas or places where there are several other plants like grasses and weeds</li> <li>● nearly 900 plant species</li> <li>● Several types of the animals that live here are either endangered.</li> </ul>	<ul style="list-style-type: none"> <li>● longleaf pine</li> <li>● roughleaf loosestrife</li> <li>● Venus fly-trap</li> <li>● pitcher plants</li> </ul>	<ul style="list-style-type: none"> <li>● southeastern fox squirrel</li> <li>● gopher tortoise</li> <li>● red-cockaded woodpecker (endangered)</li> <li>● northern pine snake</li> <li>● quail</li> <li>● turkey</li> <li>● deer</li> <li>● blue birds</li> </ul>
Maritime Forest	<ul style="list-style-type: none"> <li>● found along the dunes of coastal areas.</li> <li>● can survive the salty winds that come from the ocean</li> <li>● plants can also live in sandy soil</li> </ul>	<ul style="list-style-type: none"> <li>● live oak</li> <li>● sand laurel oak</li> <li>● wax myrtle</li> <li>● yaupon hollow</li> </ul>	<ul style="list-style-type: none"> <li>● green tree frogs</li> <li>● eastern grass lizards</li> <li>● white footed mouse</li> <li>● southern hog nosed snake</li> <li>● birds such as the eastern painted bunting.</li> </ul>

## Answer Key: Understanding the Ecosystems of the Cape Fear River Basin?

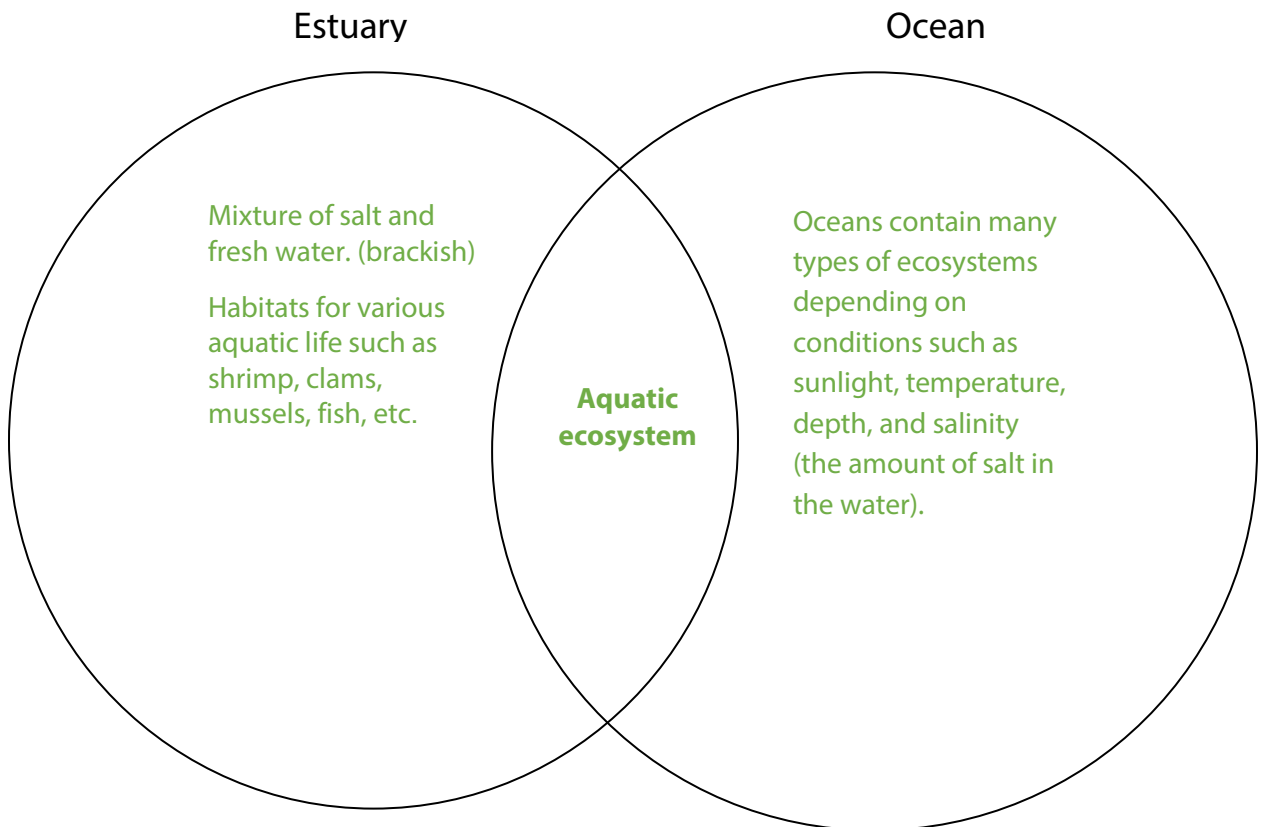
Use the Ecosystems of the Cape Fear River Basin story map to answer the following questions.

1. What is a river basin? A river basin is an area of land where the run-off water empties into a river or its tributaries (small streams & creeks).
2. Where is the Cape Fear River Basin located? Completely in North Carolina's border
3. What two rivers join to form the Cape Fear River? Deep River and Haw River
4. Where does the Cape Fear River empty? The Atlantic Ocean
5. What is an estuary? Mixture of salt and fresh water. Habitats for various aquatic life such as shrimp, clams, mussels, fish, etc.
6. What are some of the main rivers in the Cape Fear River Basin? Deep River, Haw River, Cape Fear River, Northeast Cape Fear River, Black River, Reedy Fork River
7. What is an ecosystem? An ecosystem includes all of the living things (plants, animals, and organisms) in a given area, interacting with each other, and also with their non-living environments (weather, earth, sun, soil, climate, atmosphere).
8. What is an aquatic ecosystem? Aquatic ecosystems are water based ecosystems such as rivers, lakes, ponds, estuaries, wetlands, saltwater marshes, and oceans. These ecosystems can be freshwater, brackish (mixture of salt and freshwater), or saltwater.
9. What is a terrestrial ecosystem? Terrestrial ecosystems are land based ecosystems. Examples of terrestrial ecosystems in the Cape Fear River Basin include deciduous forests and maritime forests.
10. What is a food chain? Food chains show how energy flows from one organism to another.
11. What is a food web? shows how energy flows through several connected food chains.
12. What organism makes its own food? producers
13. What is the source of energy for producers? sun
14. Use the Freshwater Pond Food Web diagram in the story map to answer the following question:
  - a. What would happen to the Heron population if the fish population decreased?  
The heron population would decrease.

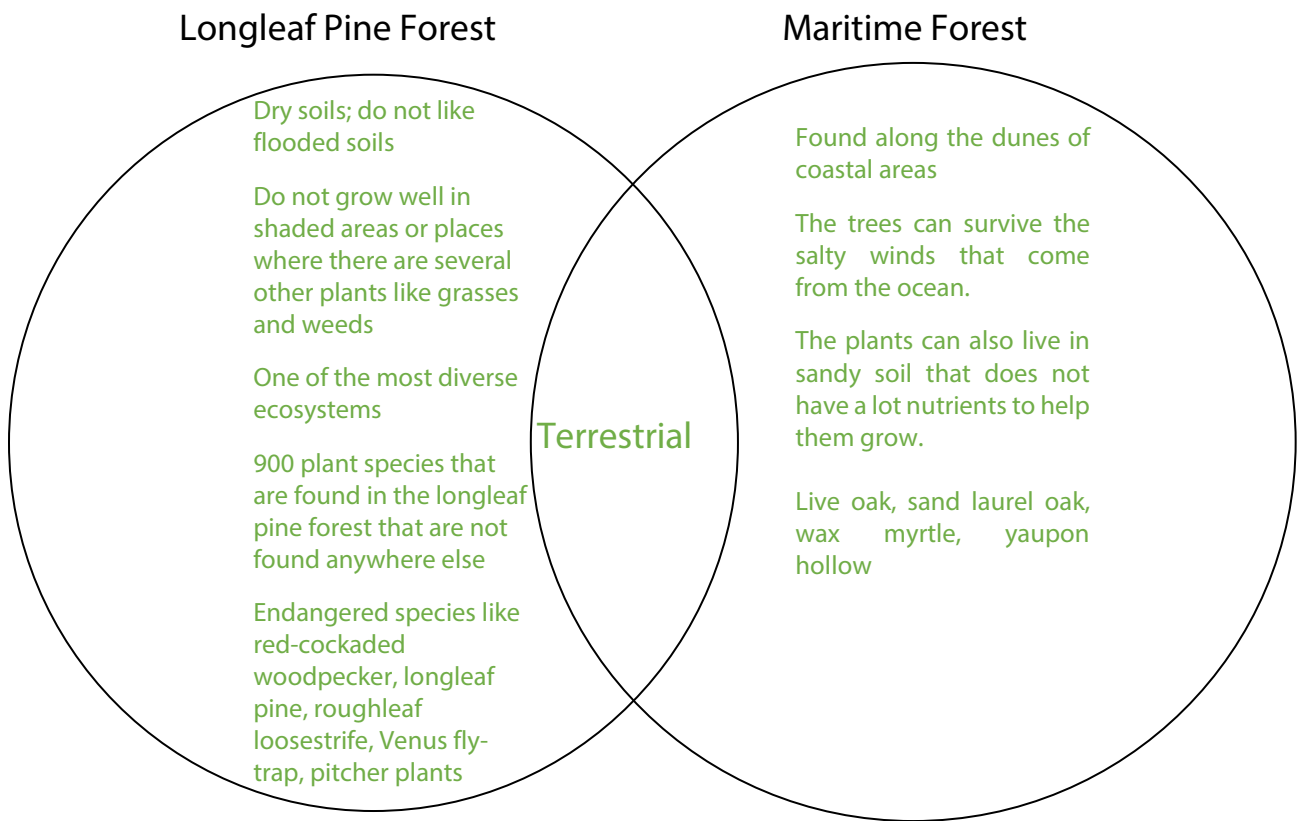
15. Draw a Venn diagram to compare and contrast a pond and a lake.



16. Draw a Venn diagram to compare and contrast an estuary and an ocean.



17. Draw a Venn diagram to compare and contrast a longleaf pine ecosystem to a maritime forest ecosystem.



*Ocean Habitats* is an activity from the international water literacy program, [Project WET](#), and is included with permission of the NC Project WET Coordinator, Lauren Daniel. To learn more about this activity and other resources to support water education at [www.NCWater.org](http://www.NCWater.org).

## Lesson Prep

- ✓ Read through the *Ocean Habitats* activity from Project WET (p.73-94).
  - A Project WET guide is available in the Northside Media Center Professional Collection.
- ✓ Make one set of *Creature Cards Warm Up*.
- ✓ Make copies of *Creature Cards* and *Race to the Bottom* pages, one per group.

## Vocabulary

Ecosystems, aquatic, ocean, plankton

## Procedure

### Mini-Lesson

- Introduce students to the different ocean zones and describe how they are different (depth, sunlight, pressure, salinity, temperature).

### Guided Practice

- As a class, use the *Creature Cards Warm Up* activity to match each animal to its ocean zone.

### Group Work

- Divide the class into groups of five. Students will play a game called *Race to the Bottom* where they “travel” to the various ocean zones and learn about the organisms that live in each zone.

### Assessment

- **Exit ticket:** List the five ocean zones and one organism that can be found in each.

## Opportunities for Extended Learning

1. Play song about the ocean zones: “[200 Meters Down](#)” by [Lodge McCammon](#).
2. [Build An Ecosystem](#) - Students create an aquatic ecosystem in a jar.
3. Explore a career connection by learning about Sylvia Earle (oceanographer/National Geographic explorer).
4. Visit Discovery Education for additional idea and resources.

### Learning Objectives:

Students will be able to identify marine inhabitants and the various ocean zones which they occupy

### Nutshell/Skills:

Students can identify ocean zones and the organisms that live there

### Science Essential Standards:

5.L.2.1

### Time:

45 minutes

### Teacher Materials:

- *Ocean Habitats* activity from Project WET (p. 73-94)
- *Creature Cards Warm Up*

### Student Materials:

- *Creature Cards*
- *Race to the Bottom* pages

## Lesson Prep

- ✓ Read through the *Move Over Rover* activity in the *Project WILD* Activity Guide (p.144-151), available in the Northside Media Center Professional Collection.
- ✓ Make copies of animal cards from *Move Over Rover*.
- ✓ Gather book sets about ecosystems with preference to Ecosystems Inside Out series (from Learning Activity 1).

## Vocabulary

Terrestrial ecosystems, abiotic factor, biotic factor, biome

## Procedure Part 1

### Mini-Lesson

- Review the different types of terrestrial ecosystems.
- List several abiotic and biotic factors on the board.
- Have students draw a T-Chart in their science notebooks and label one column *abiotic factors* and the other column *biotic factors*. Then write the words on the board in the correct column.

### Independent Group Work

- Divide students into groups.
- Invite students to conduct research on a certain biome looking for biotic and abiotic factors (including temperature, precipitation, and vegetation). The resources listed under “Student Materials” will be useful during their research.
- Ask students to create a poster describing their biome to be displayed in the classroom.

## Procedure Part 2

### Independent Group Work

- Follow the procedure for the *Move Over Rover* activity from *Project WILD*
  - Students work in groups to determine if a specific animal is in the correct ecosystem.

### Assessment

- **Exit ticket:** List 3 things you learned, 2 things you want to know more about, and 1 question you have.
- **Note:** this activity can be used as an assessment of the previous activities in this arc, to determine what students know about the differences between various ecosystems and their inhabitants.

## Opportunities for Extended Learning



**Nature Journal** prompt: Select two different spots in the schoolyard and compare the characteristics, including the plants and animals you see. If you don't see any animals, do you see any signs of animal life? Record your observations.

### Learning Objectives:

Students will list the factors that influence the distribution of animals in an ecosystem.

### Nutshell/Skills:

Students can apply understanding of ecosystems to identify animals that live there.

### Science Essential Standards:

5.L.2.1

### ELA Essential Standards:

5.RI.5.1, SL.5.1, SL.5.4, L.5.6

### Time:

Part 1: 45 minutes

Part 2: 45 minutes

### Teacher Materials:

- *Move Over Rover* from *Project WILD* Activity Guide (p.144-151)

### Student Materials:

- Animal cards
- iPads
- Biome Viewer-HHMI Biointeractive app
- Book sets about ecosystems with preference to Ecosystems Inside Out series
- *Kids Do Ecology: Biomes*

### Lesson Prep

- ✓ **Note:** this lesson is offered as an optional activity to integrate Science and Social Studies lessons. It can be conducted during Social Studies in conjunction with studying the Revolutionary War period. It may also be conducted within the Science unit, but students should have covered the Revolutionary War period in class at some time prior to completing this activity.
- ✓ Identify an outdoor area where students can sit quietly to write in their Nature Journals, i.e. the green roof or the school garden.

### Vocabulary

Ecosystems, biotic, abiotic, terrestrial, aquatic, forest, stream

### Procedure

#### Mini-Lesson

- Review the characteristics of ecosystems as well as abiotic and biotic factors.
- Ask students, "What type of terrestrial and aquatic ecosystems do you think would have been here during the Revolutionary War?"
- Tell students that Orange County was founded in 1752, UNC was founded in 1789, Chapel Hill was founded in 1793. Carrboro was not founded until 1911.
- Ask students, "Why do you think settlers picked this area to build towns and homes?" "What could the ecosystems that were here provide the settlers to aid in their survival?"
- Take students to an outdoor area where they can sit quietly to write in their Nature Journals, i.e. the green roof or the school garden.

#### Independent Work



- Have students copy the **Nature Journal** prompt into their journals:
  - Observe the ecosystem around you. How do you think the ecosystem you are observing is different from the one that would have been here in the late 1700s? Why?

#### Assessment:

- **Exit Ticket:** Why do you think the ecosystem looks different now?

### Behavior Management Tips

- ◆ Ask students to remind you of the expectations for outdoor learning.
- ◆ Discuss with students the importance of respecting nature both biotic and abiotic factors.

#### Learning Objectives:

Students will compare and contrast local ecosystems currently found on their school grounds and historic ecosystems from 250 years ago.  
NOTE: Social Studies connection

#### Nutshell/Skills:

Students can apply what they know about the ecosystems around the school to predict what the ecosystems might have been in the past.

#### Science Essential Standards:

5.L.2.1

#### Social Studies Essential Standards:

5.G.1.1, 5.G.1.2

#### Time:

45 minutes

#### Student Materials:

- Nature Journals
- Pencils





## Arc 2 – Flow of Energy & Interdependence in Ecosystems

### *Essential Questions*

How is energy transferred through an ecosystem?

How can I explain the interconnected relationships between organisms and their environments?

### *NC Science Essential Standards – Unpacked Content*

**5.L.2.2** Students know that organisms in an ecosystem can be producers, consumers, or decomposers. Students know that producers convert energy from the sun into organic matter through the process of photosynthesis. This organic matter is used by producers and consumers as food which provides the energy that fuels basic life processes. Consumers sometimes consume only or mostly other consumers as a food source. Producers and consumers produce wastes as they perform their life processes and become waste organic matter when they die. Decomposers use these waste materials and other non-living organic matter to fuel their life processes and recycle nutrients that are necessary for producers to carry out their life processes.

**5.L.2.3** Students know that all the organisms in an ecosystem have interconnected relationships. Students know that because of this, factors that impact one population within an ecosystem may impact other populations within that ecosystem.

### *Lessons in this Arc*

- ❖ Learning Activity 7: Ecology
- ❖ Learning Activity 8: Who Lives Here?
- ❖ Learning Activity 9: Rainforest Food Chains
- ❖ Learning Activity 10: Food Web Connections Card Game
- ❖ Learning Activity 11: Predator/Prey
- ❖ Learning Activity 12: The Forest of S.T. Shrew-Project Learning Tree
- ❖ Learning Activity 13: Decomposition and the FBI (Fungi, Bacteria, and Invertebrates)
- ❖ Learning Activity 14: Turtle Hurdle-Project WILD
- ❖ Learning Activity 15: Web of Life

### *Go Outdoors!*

- Learning Activity 7: Ecology
- Learning Activity 8: Who Lives Here?
- Learning Activity 11: Predator/Prey
- Learning Activity 12: The Forest of S.T. Shrew
- Learning Activity 13: Decomposition and the FBI (Fungi, Bacteria, and Invertebrates)
- Learning Activity 14: Turtle Hurdles

### *Nature Journal Connection*

- ✓ Learning Activity 7: Ecology
- ✓ Learning Activity 8: Who Lives Here?
- ✓ Learning Activity 12: The Forest of S.T. Shrew

### *Duration:*

- 11 to 13 days of 45 minute learning activities



## Background Information

**Organisms** interact with one another in their ecosystem in order to receive the resources they need to survive. The flow of energy through the ecosystem originates from the sun. **Producers** utilize sunlight to make their own energy through the process of **photosynthesis**. A **consumer** must eat other organisms in order to obtain its energy. Consumers are grouped based on the other organisms they eat. A **carnivore** eats other animals while an **herbivore** eats only plants. An **omnivore** eats a combination of plants and animals. **Scavengers** eat dead plants and animals. The **prey** is the animal being eaten by the **predator**, which is also another animal. **Decomposers** return materials to the ecosystem by breaking down dead organisms. They receive energy from these other organisms and create **organic** matter from previously living things. The **food chain** outlines the flow of energy from producers to consumers to decomposers. In most ecosystems, a **food web** is more accurate because it links different food chains together in an ecosystem.

All organisms in an ecosystem are interdependent. **Interdependence** is the reliance of every life form on other organisms and the environment. **Limiting factors** are in place to ensure the population in an ecosystem remains balanced due to limited resources. **Competition** occurs among organisms in an ecosystem for resources. This could be food, water, sunlight, nutrients, habitat or any other resource an organism needs to be able to survive. The **population** of a species is all members of the group in close enough proximity to be able to breed. Interacting populations belong to an ecological **community**.

Changes in the environment can disrupt the natural balance of an ecosystem. Human interaction has been the cause of many changes in environment. Because of this, humans have a role in trying to **conserve** environments to protect the **biodiversity** of species. Life forms are adapted to the **climate** they live in but that is changing, in part due to humans. The climate is the average weather in a certain area over a period of time.

## Vocabulary

- **Biodiversity** is the different types of life in an ecosystem.
- **Carnivore** is an animal that eats other animals.
- **Climate** is the average weather conditions of a particular place or region over a period of years.
- **Community** is an association of interacting populations.
- **Competition** is the contest among organisms for the limited resources of an ecosystem.
- **Conservation** is careful preservation and protection of ecological processes and biodiversity of the environment.
- **Consumer** is an organism that eats other organisms to obtain energy.
- **Decomposer** is an organism that feeds on and breaks down dead plant or animal matter, thus making organic nutrients available to the ecosystem.
- **Food Chain** is a representation of the flow of energy between producers, consumers, and decomposers.
- **Food Web** is a representation of the linkages between food chains in a community.
- **Herbivore** is an animal that eats plants.
- **Interdependence** is the dependence of every form of life on other living things and on the natural resources in its environment, such as air, soil, and water.
- **Limiting factor** is an environmental factor that limits the size of a population in an ecosystem.
- **Omnivore** is an animal that eats both plants and animals.
- **Organic** is relating to or obtained from living things.
- **Photosynthesis** is the process through which plants use water and carbon dioxide to create their food, grow, and release excess oxygen into the air.
- **Population** is a group of organisms of the same species that are in close enough proximity to allow them to interbreed.

- **Predator** is an animal that obtains its food by killing and eating other animals.
- **Prey** is an animal that is eaten by another animal for food.
- **Producer** is an organism that creates its own energy from sunlight through photosynthesis.
- **Scavenger** is an animal that eats dead animals or plants.

## *Literature Connections*

### **Books**

*The Great Kapok Tree: A Tale of the Amazon Rain Forest* by Lynne Cherry (E CHE)\*

### **Book Sets**

*Explore the Tropical Rain Forest* by Linda Tagliaferro\*

*Protecting Food Chains: Rain Forest Food Chains* by Heidi Moore\*

\*currently available in Northside Elementary's media center



### Lesson Prep

- ✓ Determine the areas where students will be allowed to complete their nature journals.

### Vocabulary

Ecosystems, abiotic, biotic, ecologist, interdependence


### Procedure

#### Mini-Lesson

- Review the components of an ecosystem with students.
- Now that students have an understanding of what an ecosystem is, we are going to start examining how an ecosystem functions. Questions we will examine though this arc include:
  - How do the biotic and abiotic factors within an ecosystem interact?
  - How do they depend on one another?
  - How are humans a part of an ecosystem and what impacts do we have?
- Tell students they are going to head outside to look for interactions between different components of an ecosystem.

#### Independent Work



- Students will go outside and record their observations in their nature journals. Give students approximately 15-20 minutes to make their observations and describe the interactions they see.
- **Nature Journal** prompt: 
  - Observe two plant-animal interactions. Draw what you see and describe their interaction – is the animal eating the plant, seeking shade/protection within the plant, etc.
  - If students do not see any interactions, have them write about an interaction they could see, such as watching a squirrel climb a tree to look for food or seek protection from a predator.

#### Guided Practice

- Ask students to share their observations aloud.
- Ask students what they think “interdependence” means? Use examples from their journals to help them understand the term.
- Ask students what they think ecology is and what they think an ecologist studies. Ecology is the study of the relationships between plants, animals, people, and their environment. It is the study of ecosystems and their interdependence. An ecologist is a person who studies ecosystems.

#### Learning Objectives:

In this engaging activity, students will be introduced to the concept of interdependence and describe how ecosystems rely on these connections.

#### Nutshell/Skills:

Students will observe interactions between plants and animals on their school grounds.

#### Science Essential Standards:

5.L.2.1, 5.L.2.2, 5.L.2.3

#### Time:

45 minutes

#### Student Materials:

- Nature Journals
- Pencils
- Private Eyes

## *Opportunities for Extended Learning*

1. Invite an ecologist to come speak to the class.

## *Behavior Management Tips*

- ◆ Give students clear boundaries where they can go, but allow room for groups to explore and be somewhat separate from each other
- ◆ Discuss with students the importance of respecting nature, including both biotic and abiotic things. Examples include things such as:
  - leave worms and other animals alone
  - leave rocks, soil, and grass where you found them
- ◆ Define the boundary for where the students can sit and work on their nature journaling prompt.

### Lesson Prep

- ✓ Review *Flow of Energy* PowerPoint.
- ✓ Preview and be prepared to show the Brain POP video.
- ✓ Determine where students will sit for the Nature Journaling activity.

### Vocabulary

Deciduous forest, food chain, producers, consumers, decomposers, scavengers

### Procedure

#### Mini-Lesson

- Show the BrainPOP video "*Food Chains*" to introduce students to food chains and food webs.
- Use the *Flow of Energy* PowerPoint to delve further into the concepts including descriptions of producers, consumers, and decomposers.

#### Independent Work



- Take students outside and invite them to hypothesize about food chains on the school grounds.
- Have students copy the **Nature Journal** prompt below into their journals:
  - Choose a plant or animal at school. Look around and consider the food chain that includes this plant or animal. Draw and label a possible food chain.
- Have students conduct research using the following websites in order to check the accurateness of the food chains they completed while observing their schoolyard.
  - <http://www.whateats.com/>
  - <http://www.kidrex.org/>



#### Option

- Assign each student a different plant or animal from the list of schoolyard organisms and ask them to make a list describing what eats it, what it eats and then diagram a food chain that includes the animal or plant. (See *Pictures of organisms* that can be found in a schoolyard.)
  - Note: these are the same organisms used for Learning Activity 15: Web of Life.
- Local and schoolyard organisms likely include:  
*Oak tree, maple tree, pine tree, grass, zinnia, milkweed, dandelion, clover, monarch butterfly, honey bees, squirrel, chipmunk, mouse, cardinal, rabbit, grasshopper, deer, robin, red shouldered hawk, red fox, raccoon, spider, snake, frog, barred owl, skunk, earthworm, mushroom*

#### Learning Objectives:

Students will be able to describe a food chain found in their schoolyard and the flow of energy through the food chain.

#### Nutshell/Skills:

Students can create a food chain.

#### Science Essential Standards:

5. L.2.1, 5.L.2.2, 5.L.2.3

#### Time:

45 minutes

#### Teacher Materials:

- *Flow of Energy* PowerPoint
- *Pictures of organisms* found in schoolyard
- BrainPOP video "*Food Chains*" (3:19)

#### Student Materials:

- Nature Journals
- Pencils
- Computers with Internet connection

## Assessment

- Completed Nature Journal prompts and/or research lists can serve as an assessment.

## *Opportunities for Extended Learning*

1. Watch Crash Course Kids video "[Feed me: Classifying Organisms](#)" about herbivores, carnivores, and omnivores (3:13)
2. Watch Crash Course Kids video "[Fabulous Food Chains](#)" explains food chains and webs (3:24)

## *Behavior Management Tips*

- ◆ In each ecosystem, make sure you give students clear boundaries where they can go, but allow room for groups to explore and be somewhat separate from each other.
- ◆ Discuss with students the importance of respecting nature both biotic and abiotic factors. Examples include:
  - leave worms and other animals alone
  - leave rocks, soil, and grass where you found them

### Lesson Prep

- ✓ Make copies of the rainforest food chain cards, 1 set per student or small group.
- ✓ Make copies of the *Rainforests 101 National Geographic* Graphic Organizer, 1 per student.
- ✓ Preview and be prepared to show the video.

### Vocabulary

Food chain, food web, rainforest, biodiversity, producer, consumer, decomposer

### Procedure

#### Mini-Lesson

- Give students a few minutes to describe the relationship between a food chain and a food web in their science notebooks.
- Ask for volunteers to share their descriptions.
- Tell students that they will watch a video called, "[\*Rainforests 101 by National Geographic\*](#)."
- Tell students to complete questions 1-7 on the graphic organizer as they are watching the video.
- Discuss student answers to these questions.
- Give students a few minutes to work on questions 8-10 and then discuss their answers to these questions.
- Use question 10 as a springboard to review food chains and food webs using the first page of the Rainforest Food Chains.
- Explain to students that the diagrams show animals from the Australian Rainforest.

#### Independent Work

- Ask students to create a food chain using the rainforest food chain cards. The cards have information about the organisms.
- If black and white copies of the cards are made, have the students circle the organism's name with the color that corresponds to its trophic level.
- Check students' work to ensure that the food chain is correct.
- Tell students to use the rest of the cards to create a food web.
- After creating the web, the cards can be pasted into students' science notebooks.
- Students need to leave enough room in between cards so they can draw the arrows to show the transfer of energy. (The cards can be laminated so they can be used more than once. Then students would write the names of the animals in their notebooks rather than pasting the cards).

#### Learning Objectives:

Students will apply their knowledge of food chains and food webs to create a food web for a rainforest ecosystem.

#### Nutshell/Skills:

Students can create a food chain and food web for an ecosystem different from the one in which they live

#### Science Essential Standards:

5.L.2.2, 5.L.2.3

#### Time:

45-60 minutes

#### Teacher Materials:

- Rainforest Food Chains (Creative Commons)
- Video [\*Rainforests 101 by National Geographic\*](#) (3:40)
- *Rainforests 101 National Geographic* Graphic Organizer Answer Key

#### Student Materials:

- *Rainforests 101 National Geographic* Graphic Organizer
- Rainforest Food Chain Cards
- Science notebooks

## Assessment

- **Exit ticket:** Pick one of the animals and describe how the food web would be affected if that animal population increased or decreased.

## *Opportunities for Extended Learning*

1. Read *The Great Kapok Tree* by Lynne Cherry
  - Students will research the kapok tree and how its role in the rainforest is vital to the survival of the animals. Then they will write a letter to the man in the story asking him not to cut down the Kapok tree citing evidence from their research.
2. Listen to a song about the tropical rainforest: "[\*Tropical in the First\*](#)" by [Lodge McCammon](#).





## Rainforests 101 National Geographic

### Graphic Organizer – Answer Key

1. Place a tally mark in the box every time you see an animal. (Use 1 tally mark for each population of insects.)

Answers will vary

2. Do rainforests grow on every continent? **No** \_\_\_\_\_
3. Circle the type of rainforest that grows in between the Tropic of Capricorn and the Tropic of Cancer:  
temperate and **tropical**
4. How much rainfall does a rainforest receive per year? **33 feet** \_\_\_\_\_
5. The rainforest covers **6%** of the Earth’s surface area.
6. The rainforest is home to **50%** of the earth’s plants and animals.
7. Plants and trees provide \_\_\_\_\_ **medicine** \_\_\_\_\_ and \_\_\_\_\_ **food** \_\_\_\_\_.

**Do this section after watching the video.**

8. In your own words, describe a rainforest ecosystem. **Answers will vary** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
9. Biodiversity refers to the many different types of life in an ecosystem. Explain how a rainforest is an ecosystem that has biodiversity. Use evidence from your graphic organizer to help with your explanation.  
**Answers will vary** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
10. Human Development and the need for natural resources cause deforestation (removal of trees). What effect does this have on the animals of the rainforests?  
**The animals will lose their habitats and food sources.**

# RAINFOREST FOOD CHAINS

ENERGY FROM SUN, SOIL & WATER

⇒ **PRODUCER**  
Plants make food - leaves, flowers, nectar, fruit and litter

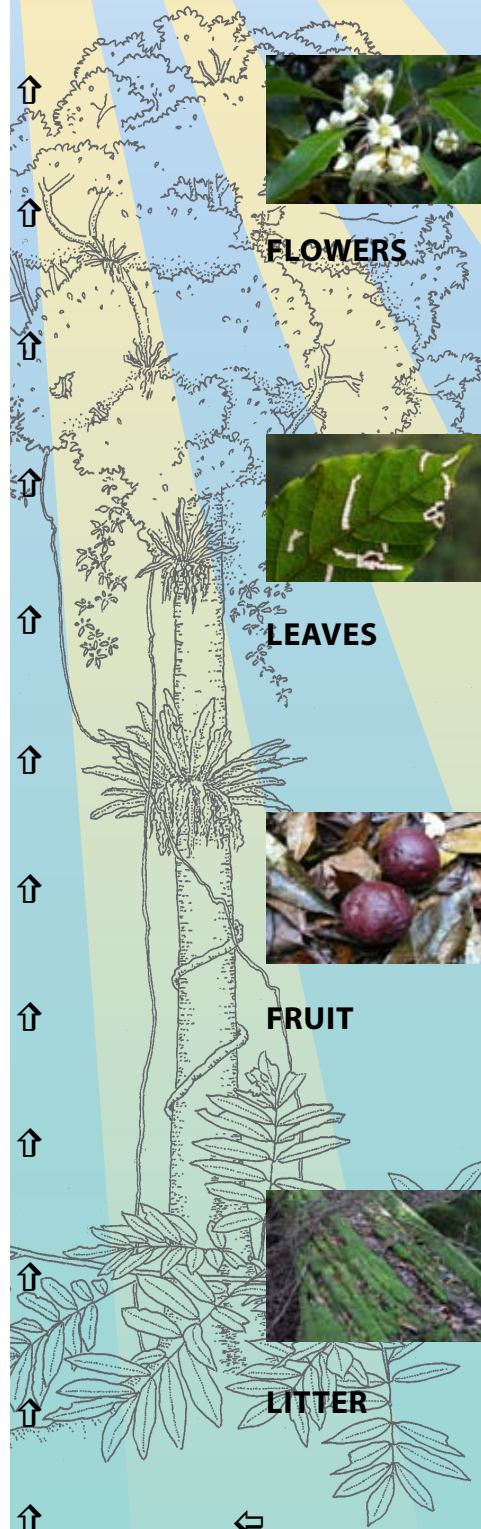
⇒ **1ST CONSUMER**

⇒ **2ND CONSUMER**

⇒ **3ND CONSUMER**

⇒ **DECOMPOSER**

## EXAMPLES:



**FLOWERS**



⇒ Moth eats nectar at night



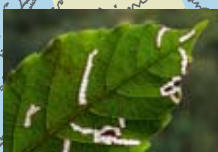
⇒ Spider eats moth



⇒ Grey Shrike Thrush eats spider



⇒ Shrike Thrush dies and is eaten by decomposers



**LEAVES**



⇒ Hawk Moth caterpillar eats leaves



⇒ Tawny Frogmouth eats Hawk Moth



⇒ Lace Monitor eats eggs of Tawny Frogmouth



⇒ Lace Monitor dies and is eaten by decomposers



**FRUIT**



⇒ Wonga Pigeon eats fallen fruit and seeds



⇒ Diamond Python eats Wonga Pigeon



⇒ Diamond Python dies and is eaten by decomposers



**LITTER**



⇒ Fungi lives on dead wood



⇒ Snail eats fungi



⇒ Noisy Pitta eats snail



⇒ Noisy Pitta dies and is eaten by decomposers

# RAINFOREST FOOD CHAINS


Copy this page and cut out each of the cards.

Read the information on each, and arrange them to make your own rainforest food web.

Colour code : **Energy** ⇒ **Producer** ⇒ **1st Consumer** ⇒ **2nd & 3rd Consumer** ⇒ **Decomposer**

⇒ indicates a transfer of energy between trophic levels of photosynthesis and eating

**Wanderer Butterfly**  
sips nectar




**Booyong**  
leaves are edible



**Lyrebird**  
scratches in the leaf litter for worms and insects




**Lace Monitor**  
eats insects, reptiles, eggs, birds, mammals & carrion




**Looper Caterpillar**  
eats leaves



**Forest Owl**  
nocturnal predator of rats, possums, birds and bats



**Ants**  
eat remains of dead animals



**Echidna**  
digs for ants and termites




**Green Tree Frog**  
eats insects




**Maggots**  
live on dead animals



**SUN, SOIL & WATER**



**Worms**  
eat dead plant material in the soil




**Ring-tailed possum**  
eats flowers, leaves and fruit



**Red-necked Pademelon**  
eats leaves and fruit




**Rainforest tree**  
makes nectar in flowers from the sun's energy




**Fruit dove**  
eats fruit and seeds




**SUN, SOIL & WATER**




**Diamond Python**  
hunts for possums, birds, and frogs



**Grey-headed Fruit Bat**  
feeds on rainforest fruits and nectar



**Strangler Fig**  
produces plentiful figs



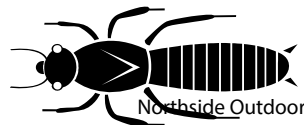
**Domestic cat**  
eats small birds, mammals and lizards



**Huntsman Spider**  
hunts for insects in bark



**Termites**  
Insect colony eats wood



**Noisy Pitta**  
eats snails and insects



This activity is adapted from the *Project Learning Tree K-8 Environmental Education Activity Guide* with permission of Sustainable Forestry Initiative, Inc.

### Lesson Prep

- ✓ Review *Project Learning Tree Activity 8 - The Forest of S. T. Shrew*, included at the end of this lesson. A full copy of the *Project Learning Tree K-8 Activity Guide* is available in the Northside Media Center Professional Collection. Teachers can also obtain their own copy of the guide by attending a PLT Educator Workshop - [www.plt.org](http://www.plt.org).
- ✓ **Note:** this activity can be conducted as an introduction for Learning Activity 13, to allow students to become familiar with inhabitants of a fallen log habitat before going outside to study them.
- ✓ Make copies of *In the Forest of S.T. Shrew*, 1 per student.
- ✓ Make copies of *What's the Connection* graphic organizer, 1 per student.
- ✓ Make a copy of *Forest Characters*, preferably in color.

### Vocabulary

Ecosystem

### Procedure Part 1

#### Mini-Lesson

- Students will be introduced to microhabitats in a forest ecosystem by reading *In the Forest of S. T. Shrew*.
- Have students read the story on their own.
- Use the *Forest Characters* pictures and information to ask students how these animals are connected.


#### Independent Work

- Have students complete the *What's the Connection* graphic organizer in order to show their understanding of interconnectedness and energy flow between the organisms in S.T. Shrew's ecosystem.

### Procedure Part 2



#### Independent Work

- Take the students outside to explore the microhabitats mentioned in the story, such as a fallen log, leaf litter, bark on a tree, etc.
- Have students respond to the **Nature Journaling** prompt: 
  - What are similarities and differences between what you see and what Jackie saw?
- **Note:** If desired and time allows, Learning Activity 13 can take place in conjunction with this part of the activity.

#### Learning Objectives:

Students will describe some of the plants and animals that characterize several microhabitats within the forest.

#### Nutshell/Skills:

Students can identify plants and animals found in some forest microhabitats.

#### Science Essential Standards:

5.L.2.1, 5.L.2.2

#### ELA Essential Standards:

RI.5.1

#### Time:

Part 1: 45 minutes  
Part 2: 45 minutes

#### Teacher Materials:

- *Project Learning Tree Activity 8 - The Forest of S. T. Shrew* (p. 40-44)
- *In the Forest of S. T. Shrew* story
- *What's the Connection* graphic organizer

#### Student Materials:

- Private Eyes
- Nature Journals
- *In the Forest of S. T. Shrew* story
- *What's the Connection* graphic organizer
- Writing utensils



## Assessment

- The completed *What's the Connection* graphic organizer can be used as an assessment.
- Assessment questions on the top of p. 40 discuss and formatively assess the story of Jackie's adventure with S. T. Shrew.

## *Opportunities for Extended Learning*

1. Have students draw one of the microhabitats described in the story.
2. Have students write a story about Jackie's next adventure visiting a microhabitat found at school. Students could use the green roof garden or the school garden as inspiration and a place to write.

## *Behavior Management Tips*

- ◆ Discuss with students the importance of respecting nature both biotic and abiotic things. Examples include things such as:
  - leave worms and other animals alone
  - leave rocks, soil, and grass where you found them
- ◆ Define the boundary for where the students can sit and work on their nature journaling prompt.

### Lesson Prep

- ✓ Make copies of the datasheet, 1 per student.
- ✓ Have at least one field guide or identifying key available per group.
- ✓ Identify where students will be observing fallen logs and what boundaries you will set.

### Vocabulary

Decomposers, fungi, bacteria

### Procedure

#### Mini-Lesson

- Clearly explain what decomposition is - the breakdown of organic matter into smaller pieces and simpler parts. Both a physical and chemical changes take place during decomposition. You can use the slides from the [Flow of Energy](#) PowerPoint for this.
- Ask students to name different decomposers. Explain they will be learning about these decomposers or FBI (fungi, bacteria, invertebrates) today.
- Show students one of the keys or field guides they will be using. Explain how the animals that are decomposers are invertebrates and what invertebrate means (no backbone). Ask why bacteria are not on the keys. (too small) Discuss the variety of fungi that they might see.
- Ask students "What would happen if there were no decomposers in the forest?". Prompt students as needed to get them to think about fallen trees and leaves over hundreds of years as well as the remains of dead animals.
- If you look around a forest, there are signs and evidence of decomposition everywhere.
- We are going to go outside to observe fallen logs as an ecosystem and as a place we can observe decomposition in action.

#### Guided Practice

- Before going outside, remind students of the rules for learning outside and create groups of about four students per group.
- Once outside model what you expect the students to do as they observe fallen logs as an ecosystem.
- Show them how to roll a log towards them so that animals underneath can escape safely. Ask students why this is important. This is also to keep them safe so that if there is animal that could be

#### Learning Objectives:

Students will be able to describe examples of organisms and their roles in a fallen log ecosystem.

#### Nutshell/Skills:

Students can make observations about decomposition and a fallen log ecosystem.

#### Science Essential Standards:

5.L.2.2, 5.E.1.1

#### Time:

45 minutes

#### Teacher Materials:


- Slides on decomposers and decomposition from [Flow of Energy](#) PowerPoint from Arc 2: Learning Activity 1: Who Lives Here?

#### Student Materials:

- Private Eyes
- Copies of "Fallen Logs and FBI" datasheet
- Field guides or copies of keys for identifying possible organisms
- Trays, cups, bowls, or other containers that can be used to temporarily hold organisms for closer examination
- Thermometer per group

- dangerous to them, such as a copperhead, that animal has the choice to leave and feels less threatened.
- Model how to gently pick up and examine animals such as ants, millipedes, or beetles found on the logs.
- Model how they can pull off and break off parts of the log to look for more evidence. Remind them to be gentle as their log is an ecosystem and home to the organisms they find.
- Students record their observations on a datasheet. Students may want to use clipboards, binders, or something else to create a writing surface while outdoors.
- If available, students could use iPads to photograph the organisms and the evidence of decomposition that they see.
- When a group finds something they want to share with others, choose one student from the group to carefully take the organism to the other groups or have them continue working while you take the organism around.
- Allow for a few minutes for each group to share something from the activity. You may choose to do this back in the classroom.
- Clean up – Have students gently return all living things back to their log ecosystem. Remind them to leave all nature in nature. Have one student per group confirm that all materials have been collected to take back inside.

### *Opportunities for Extended Learning*

1. Create a worm column or bin.
2. Observe decomposition in the compost pile in the garden. Students could make observations of the compost pile various times throughout the unit, noting signs of decomposition. Students could make temperature recordings of the compost pile. Students could add clippings (leaves) or vegetables (lettuce, kale, spinach) from the garden to observe the rate of decomposition.
3. **Nature Journal** prompt: Describe and draw one item in the compost pile. What evidence of decomposition do you observe? 
4. Crash Course Kids video "[The Dirt on Decomposers](#)" (3:18)
5. Students could compare their data. What factors may have been causes for differences? Are all the logs from the same type of tree?
6. Students could do a separate leaf litter exploration and compare what they find in the leaf litter to what is found on the fallen log. [Leaf Litter exploration lesson](#).
7. [Time lapse video of decomposition in a compost pile](#). (Shows a minute and a half overview and then parts of it slower with more detail.) [Time lapse of a pear decaying](#). (1:27)

### *Behavior Management Tips*

- ◆ Make sure you give students clear boundaries where they can go, allowing room for some exploration.
- ◆ Circulate between groups asking questions as well as using the opportunity to remind students to stay on task.





Name: \_\_\_\_\_

## Fallen Logs and FBI

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Place: \_\_\_\_\_

Temperature: \_\_\_\_\_

Weather Conditions: \_\_\_\_\_

*Record your observations of the fallen log.*

	On the log	Under the bark	In the log	Under the log	Near the log
Evidence of how the tree died?					
Evidence of when the tree died?					
Describe and sketch any plants.					
Describe and sketch any fungi.					
Evidence of animal activity?					
Draw a sketch of an animal.					
What color is the animal?					
How many legs does the animal have?					
How might the animal move?					
What kind of animal is it?					
What else do you observe?					

This activity is part of the *Understandings of Consequence Project* of Project Zero, created by the Harvard Graduate School of Education. Full curriculum available at <https://www.cfa.harvard.edu/smg/Website/UCP/pdfs/CausalPatternsInEcosystems.pdf>.

### Lesson Prep

- ✓ Read the directions for the *Food Web Connections Game* (p. 37-40).
- ✓ Make enough copies to create 64 *Web of Life Game Cards* (p. 29-33), 1 set per group. Note: use the *Web of Life Game Cards* instead of the *Food Web Connection Cards*.
- ✓ Make copies of the set of *Interact! Cards* (p. 44-46), 1 per group.
- ✓ Make copies of the *Food Web Connections Game Directions* (p. 39-40), 1 per group.

### Vocabulary

Food chain, food web, producer, consumer, decomposer

### Procedure

#### Mini-Lesson

- Use a food web diagram to discuss the different levels of the food consumers.
- Explain to students that there are 5 levels to a food web. Draw 5 boxes on the board and label each box with a level and its name (Level 5 Tertiary Consumers, etc.).
- Ask students to name some consumers and producers and decide which box to place them in.
- Discuss what each level means and have students make corrections to the chart if needed.
- Tell students they will be playing a game called *Food Web Connections Game*.
- Give each group of 4 students a copy of the directions in case they have a question during the game.

#### Guided Practice

- Students will play the game until all the cards have been used. The player with the most levels in their web wins. After playing the game, ask students the following questions.
  - Is it important to have producers in your web? Why?
  - If you had a choice between choosing a card to place on a level where you already have many cards and a level where you only have one card, which should you choose? Why?
  - Is it better to extend your web to higher levels or make sure that you have enough cards at lower levels to support the ones above it? Why?

#### Learning Objectives:

Students will be able to describe interdependence of organisms in an ecosystem.

#### Nutshell/Skills:

Students can summarize the importance of producers, consumers, and decomposers as well as the connection between them in a food web.

#### Science Essential Standards:

5.L.2.2, 5.L.2.3

#### Time:

45 minutes

#### Teacher Materials:

- *Food Web Connections Game*

#### Student Materials:

- *Web of Life Game Cards*
- *Interact! Cards*
- *Food Web Connections Game Directions*
- Science notebooks


### **Independent Work**

- Students will answer the following questions in their science notebooks:
  - Do you think the food web members needed producers (plants) to be in the game? Why? Is this true of a real ecosystem?
  - Do you think the game could be played without decomposers? Why? Would that work in a real ecosystem?
  - Can you think of a way that mice and plants are connected in a food web? What about earthworms and owls?

### **Assessment**

- Answers to questions from independent work can serve as an assessment.

### *Opportunities for Extended Learning*

1. **Nature Journal** prompt: 
  - Select a spot and take few minutes to observe all of the living organisms you notice. See if you can find examples of producers, consumers, or decomposers and draw an example of each.

### *Behavior Management Tips*

- ◆ Discuss with students the importance of respecting nature both biotic and abiotic things.
- ◆ Define the boundary for where the students can sit and work on their nature journaling prompt.

This activity adapted from *Predator & Prey* developed by the Central Wisconsin Environmental Station.

### Lesson Prep

- ✓ This game is best played outside in a large open area so that students have room to move. Determine where you will play the game and how you will mark the boundaries.
- ✓ Gather bandanas to use as squirrel "tails."
- ✓ Make copies of the *Predator and Prey Populations Graphs*.
- ✓ Have a copy of the *Population Changes Data* table with a clipboard and pencil.
- ✓ Have a copy of the *Predator Prey Interaction Activity Rules*.

### Vocabulary

Predator, prey, food chains, population

### Procedure

#### Mini-Lesson

- Ask the class to explain what a food chain is and how energy is moving through the food chain.
- Give them the example of clover providing energy for rabbits which provides energy for foxes.
  - Ask, "Which organism is the predator?" (fox)
  - Ask the student who answers correctly to define what a predator is.
  - Ask, "Which organism is the prey?" (rabbit)
  - Ask for a definition of prey. If needed, clarify that the clover is a producer.
- Tell students they will be learning more about the effects which predator, prey, and producer populations have on an ecosystem.
- Ask, "When we are talking about populations within an ecosystem, what do we mean?" (A population is group of organisms of the same species living in the same area.)
- Ask for predictions about how predators and prey affect populations of predators, prey, and producers.
- Briefly explain the game before rearranging the room or going outside to play.
- Write the food chain of acorns -> squirrels -> hawks on the board. This is a food chain found at your school. Students will be acorns, squirrels, and hawks trying to survive.
- Show the students the rules of the game and read aloud. (Rules also on a separate full page below to show students.)

#### Learning Objectives:

Students will be able to describe predator and prey, how they interact, and how populations can fluctuate with changes to the environment.

#### Nutshell/Skills:

Students can describe how interactions between predators and prey and environmental changes can affect population size.

#### Science Essential Standards:

5.L.2.2

#### Math Essential Standards:

5.MD.2

#### Time:

1-2 sessions of 45 minute each

#### Teacher Materials:

- Large area to play game (preferably outdoors)
- *Predator Prey Interaction Activity Rules*
- *Population Changes Data* table
- Bandanas or flags for squirrel "tails."

#### Student Materials:

- Large area to play game (preferably outdoors)
- *Predator and Prey Populations Graphs*

## Predator Prey Interaction Activity Rules

1. Each **squirrel** gets a tail. The squirrel's tail must be visible (tucked in a pocket or waistband) and cannot be tied on.
2. If a **hawk** grabs a squirrel's tail, the squirrel has been eaten by the hawk and dies on the spot. The **squirrel** returns to the hawk's roost with the hawk.
3. If a squirrel is caught, any **acorn** they have with them must go back to the oak tree, because they have not been "eaten" yet by the squirrel.
4. The **squirrels** are safe only in their tree and the oak tree with the acorns.
5. Any **squirrel** not in its tree with an acorn when the "day" ends becomes an acorn the next day.
6. Any **squirrel** who does not get an acorn or any **hawk** who does not get a squirrel, dies, decomposes, and becomes an acorn on the next day.
7. **Acorns** who are safely taken back to the squirrels' tree turn into squirrels on the next day.
8. **Squirrels** who are caught change into hawks on the next day.
9. Each day a **squirrel** can only "eat" *one acorn* and a **hawk** can only "eat" *one squirrel*.
10. **When I say "freeze", the "day" ends, and everyone stands still.**

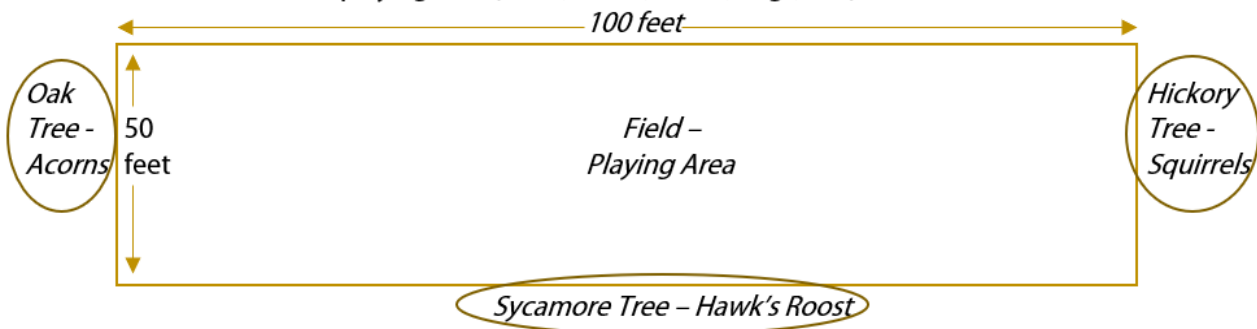
### Guided Practice



The game is played in a series of rounds with each round representing one day. A round should last only 1-5 minutes. You can choose to have each round last the same amount of time or wait for several squirrels and hawks to have captured their food to end a round. **The object of the game is to eat or die.**

### Playing field:

If possible, set the "oak tree" full of "acorns" 100 feet from the "hickory tree" where the "squirrels" live. Make the field about 50 feet wide. The "hawks" will "fly" in the field between the two "trees" attempting to catch their prey. The "hawks" roost (rest and sleep) in a "sycamore tree" along the edge of the playing field in between the "oak and hickory trees". Mark the boundaries of the playing field (chalk, chairs, cones, flags, etc.).



All squirrels start in their hickory tree. All acorns start in their oak tree. All hawks begin in their sycamore tree. Squirrels must run to the oak tree, grab an acorn gently by the hand and get back to the safety of their hickory tree without a hawk grabbing their tail. If a hawk grabs a squirrel's tail, the squirrel immediately dies. The hawk then takes the squirrel back to the sycamore tree to "eat" it. Ask students what type of ecosystem this is. (deciduous forest)

Assign students to be acorns, squirrels, and hawks. You want to start off with a ratio of 3 acorns to 2 squirrels to 1 hawk (3:2:1) (somewhat realistic to nature). For example, if you have 24 students, you will start with 12 acorns, 8 squirrels, and 4 hawks.

- If you have students count off by 6's, the ones, twos, and threes will be acorns. The fours and fives will be squirrels. The sixes will be hawks.
- You can also have the students line up and count them off as acorn, acorn, acorn, squirrel, squirrel, hawk, acorn, acorn, acorn, squirrel, squirrel, hawk, etc.

Be sure to record the initial numbers of each before you begin. Record the numbers of acorns, squirrels, and hawks in the *Data of Population Changes Table* on the separate page below. Once students are in place, ask an acorn, squirrel, and hawk to model what to do. Have them do it twice so that in one version the squirrel gets eaten and one version the squirrel safely returns to the hickory tree. Include in the modeling you are beginning and ending each round with words such as “sunrise” or “begin” and “freeze” or “pause”.

At the end of each round, record the number of acorns, squirrels, and hawks. Record these numbers in the *Data of Population Changes Table* on the separate page below.

**To begin a new round/day**, collect the squirrel tails from the hawks.

- The squirrels that were eaten become new hawks, as the hawks that eat can reproduce.
- Hawks and squirrels that did not eat that round die and become acorns. Explain that as they decompose their nutrients would be used by the oak tree allowing it to produce more acorns.
- Acorns that are eaten by squirrels become new squirrels as the squirrels that eat can reproduce.

After a few rounds, pause to discuss how the populations have changed. Ask for predictions of what will happen to the populations next. If one species is eliminated from the ecosystem, ask students what they think would happen in a real ecosystem if this happens. Ask about ways humans could intervene to help rebalance the ecosystem.

#### **Variations:**

- A drought occurs. The oak tree produces less acorns. (Redistribute some of the acorns to the squirrel and hawk populations.)
- The boundary opposite the hawk’s roost becomes a highway. Any animal that crosses it is hit by a truck, dies, and becomes an acorn.
- Mange (a mammalian skin disease) strikes, killing a fourth of the squirrel population.
- Additional squirrels and/or hawks have moved into the area, increasing the population. (Redistribute some of the acorns.)
- Have a hunter remove squirrels during a round. Give the hunter a limited area in which they can tag squirrels. The squirrels caught by the hunter would be removed from the game as the hunter would remove them from that ecosystem.
- A house is built in part of the field, altering the animals’ routes. (Block or mark off part of the playing field.)

#### **Independent Work**

Take the class back inside for them to complete the assessment worksheet and to discuss the activity.

- Students will use the information recorded during the game in the Population Changes Data Table to create four line graphs. The fourth graph combines the first three graphs into one graph for easier analysis of the data. Students will then answer the question based on their analysis.
- While the students are working on the *Predator and Prey Populations Graphs* worksheet, graph the data yourself.

After collecting the students’ worksheets, use your graphs to discuss the activity. Prompt a discussion of population dynamics with questions like:

- What relationships between populations can you see illustrate on the graphs?
- Are there upper limits to the sizes of these populations?
- Is one population of organisms always directly affected by decreases in another population? Why not? What is the lapse time? Why?
- Was our activity an accurate representation of nature? How does nature differ? (Talk about food chains versus food webs. In nature, hawks eat more than just squirrels (songbirds, mice, snakes, lizards) and squirrels are more than just acorns (nuts, berries, fruits, vegetables, fungi). Most animals eat more than one type of food so if something happens to one food source, they still have other options.)
- How would you describe the relationship between the hawk population and the acorn population?
- What are some adaptations of the hawks? Of squirrels?

## Assessment

- The completed *Predator and Prey Populations Graphs* can be used as an assessment.

## *Opportunities for Extended Learning*

1. Divide the class into small groups of 3 or 4 students. Assign each group a “controversial” predator such as mountain lion, black bear, red wolf, coyote, snake, and fox. Have the group research the animal and design an ad campaign promoting the importance of their animal. They will then present the ad campaign to the class. Give options such as a poster/billboard, tv ad, radio ad, or flyer.

## *Behavior Management Tips*

- ◆ Discuss with students the importance of respecting nature both biotic and abiotic things. Examples include things such as:
  - leave worms and other animals alone
  - leave rocks, soil, and grass where you found them
- ◆ Ask for parent volunteers to assist with outdoor activities. An extra set of hands and eyes can make an outdoor learning experience much more manageable, especially when students are still learning the outdoor classroom rules or when doing lessons around water

## *Predator Prey Interaction Activity Rules*

1. Each **squirrel** gets a tail. The squirrel's tail must be visible (tucked in a pocket or waistband) and cannot be tied on.
2. If a **hawk** grabs a squirrel's tail, the squirrel has been eaten by the hawk and dies on the spot. The **squirrel** returns to the hawk's roost with the hawk.
3. If a squirrel is caught, any **acorn** they have with them must go back to the oak tree, because they have not been "eaten" yet by the squirrel.
4. The **squirrels** are safe only in their tree and the oak tree with the acorns.
5. Any **squirrel** not in its tree with an acorn when the "day" ends becomes an acorn the next day.
6. Any **squirrel** who does not get an acorn or any **hawk** who does not get a squirrel, dies, decomposes, and becomes a acorn on the next day.
7. **Acorns** who are safely taken back to the squirrels' tree turn into squirrels on the next day.
8. **Squirrels** who are caught change into hawks on the next day.
9. Each day a **squirrel** can only "eat" *one acorn* and a **hawk** can only "eat" *one squirrel*.
10. **When I say "freeze", the "day" ends, and everyone stands still.**



## *Population Changes Data*

	<b># of Acorns</b>	<b># of Squirrels</b>	<b># of Hawks</b>
<b>Day 1</b>			
<b>Day 2</b>			
<b>Day 3</b>			
<b>Day 4</b>			
<b>Day 5</b>			
<b>Day 6</b>			
<b>Day 7</b>			
<b>Day 8</b>			
<b>Day 9</b>			
<b>Day 10</b>			

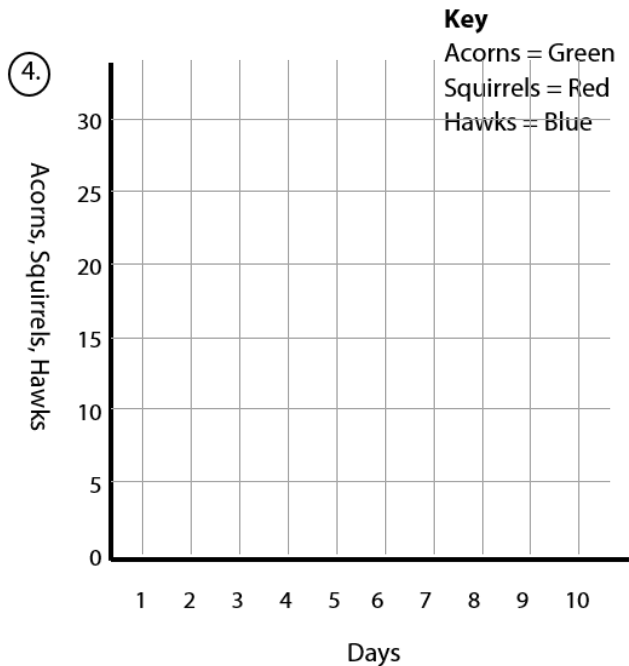
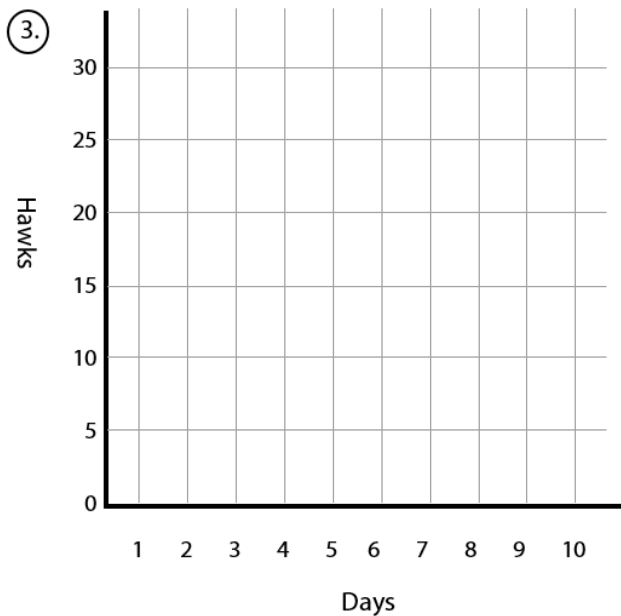
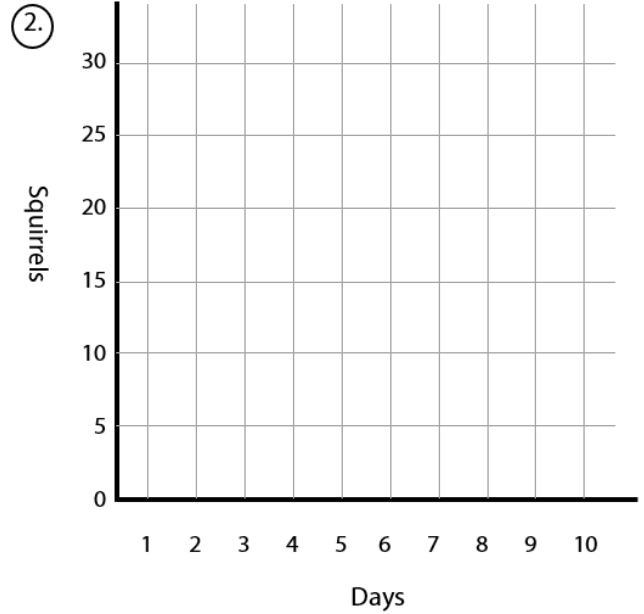
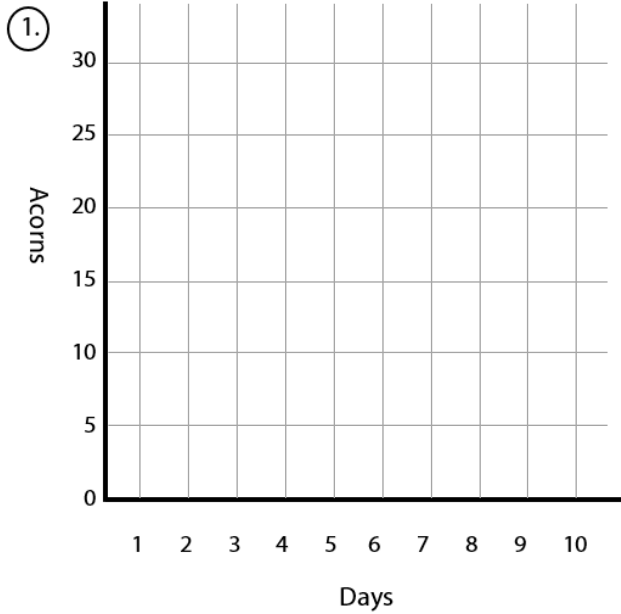
**Use this data for your Predator and Prey Population Graphs.**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Predator and Prey Population Graphs

Using the data from our activity, make a line graph of each population. Then make a line graph with all three populations on one graph for number 4 to help us analyze our data. Use the key to draw three lines on one graph for number 4.



5. What can you infer from graph number 4? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Lesson Prep

- ✓ Review *Turtle Hurdles* activity in *Project WILD Aquatic* (p. 172-176). A copy of *Project WILD Aquatic* is available in the Northside Elementary Media Center professional collection.
- ✓ Determine where to play the game (preferably outdoors).
- ✓ Print copies of *Turtle & Limiting Factors* signs.

### Vocabulary

Ocean, biodiversity, predator, prey, limiting factors, conservation, competition, climate

### Procedure

#### Mini-Lesson

- Discuss the life cycle of sea turtles and limiting factors that affect them using *Sea Turtles: Life Cycles and Limiting Factors*. Limiting factors for sea turtles include predators on land, predators in the ocean, and human activities.

#### Group Work



- Students will play an active game simulating the life of sea turtles. Some students will be turtles while others will represent limiting factors.

#### Assessment

- **Exit ticket:** Name 4 limiting factors that prevent sea turtles from reaching the adult breeding stage.

### Opportunities for Extended Learning

1. Use the *Plastics in the Ocean Infographic (NOAA)* as a writing prompt: How do plastics in the ocean affect sea turtles? What can you do to help minimize plastics in the ocean?
2. More information and resources on sea turtles: <https://conserveturtles.org/information-about-sea-turtles-an-introduction/>

### Behavior Management Tips

- ◆ Discuss with students the importance of respecting nature both biotic and abiotic factors. Examples include:
  - leave worms and other animals alone
  - leave rocks, soil, and grass where you found them
- ◆ Ask for parent volunteers to assist with outdoor activities. An extra set of hands and eyes can make an outdoor learning experience much more manageable, especially when students are still learning the outdoor classroom rules or when doing lessons around water.

#### Learning Objectives:

Students will be able to describe the life cycle of sea turtles and infer how limiting factors (including other organisms in their ecosystem) may impact sea turtles

#### Nutshell/Skills:

Students can infer how populations of sea turtles will change due to limiting factors.

#### Science Essential Standards:

5.L.2.1, 5.L.2.2, 5.L.2.3

#### Time:

45 minutes

#### Teacher Materials:

- *Sea Turtles: Life Cycles and Limiting Factors* slideshow
- *Turtle & Limiting Factors* signs
- *Turtle Hurdles - Project WILD Aquatic* (p. 172-176)

### Lesson Prep

- ✓ Make copies of the *Characteristics of Ecosystems A and D Statements*.
- ✓ Make copies of the signs you will use for the plants and animals.
- ✓ **Note:** this activity can be done either in the classroom or in a large outdoor area.

### Vocabulary

Food web, food chain, abiotic, biotic, producer, consumer, decomposer

### Procedure

#### Guided Practice

- Students will physically create a food web using yarn while holding pictures of plants and animals.
  - Use the food chains students researched in Learning Activity 1: *Who Lives Here?* and the [pictures of organisms](#) that can be found in a schoolyard.
- Have students stand in a circle. Give each student a sign to wear.
  - To start, use the sun and a variety of plants and animals. (The other abiotic factors are for later in the activity.)
- Explain to students that the class is going to make a food web to learn more about how an ecosystem is interconnected and interdependent.
  - Ask “What does interconnected mean?” **Interconnected** is how all aspects of an ecosystem are connected to each other.
  - “What about interdependence?” **Interdependence** refers to the fact that every form of life is dependent on other living things and natural resources in its environment, such as air, soil, and water.
- Give the yarn to the student wearing the sun, because all life on earth starts with the sun. Have that student hold one end of the yarn and then pass the rest to a producer.
- The producer holding the yarn then should pass the yarn to a consumer connected to it. That consumer can pass the yarn to a producer or consumer connected to it.
- If a student is struggling to find a food web connection for their organism, you can add the option of using a different connection, such as “I am a barred owl. I find shelter in the oak tree.”
- Continue having students pass the yarn until everyone is holding a piece of it. Some students may end up holding more than one piece of yarn.

#### Learning Objectives:

Students will understand that ecosystems are made up of interdependent biotic and abiotic factors.

#### Nutshell/Skills:

Students can describe how changes to one population in an ecosystem can impact many species.

#### Science Essential Standards:

5.L.2.1, 5.L.2.2, 5.L.2.3

#### Time:

45 minutes

#### Teacher Materials:

- Skein of yarn
- [Pictures of plants and animals](#)

#### Student Materials

- *Characteristics of Ecosystems A and D Statements*

- Have students move backwards until the yarn is taut.
- Explain that they will be using the yarn to see connections within the food web and ecosystem using the web of life they have created. If they feel a tug on the yarn, then they should gently tug in response. When they hear “pause”, they should stop tugging but still hold onto the yarn. Model this for students. Reinforce that everyone is gentle and still holding onto the yarn. Start by having the sun tug on the yarn and keep gently tugging until the whole web is moving. Point out that the whole web is connected. Once the whole web has been moving for a few seconds, ask the students to “pause.”
- Ask “How does this illustrate the interconnectedness of an ecosystem?” (When one piece of the web pulls on the yarn, the rest of the web feels the effect.)
- Go through several scenarios (see below) in which one or more organisms is initially affected, pulling on the yarn. Have students again tug on the yarn if they feel a tug. The whole web should be vibrating at the end of each scenario. You can ask students for scenarios suggestions, come up with your own, or use some of the suggestions below.
- After a few rounds swap out some organisms for some of the abiotic factors. Ask what is missing from our ecosystem? (abiotic factors)
- Scenario ideas:
  - The winds from a hurricane (or tornado) knock down all the trees.
  - A bird drops a kudzu (or wisteria or other invasive species) seed. The kudzu quickly blocks the sunlight and crowds out the milkweed and zinnias.
  - People harvest the pine trees for wood.
  - Lightning strikes the maple tree, knocking it down.
  - A rainstorm causes flooding. The earthworm drowns.
  - Drought causes all the plants, except the trees, to die.
  - A road is built through the area. The squirrel, deer, and fox are hit and killed by cars.
  - The raccoon eats a granola bar wrapper and chip bag dropped by humans. The raccoon gets sick and dies.
  - Part of the land is cleared to build a house. The milkweed only grew where the land was cleared.
  - To reduce mosquitoes, pesticides are sprayed in the area killing all the insects (honeybees, butterfly, grasshopper).
  - A nearby restaurant starts using the land as a place to dump their used cooking oil. This kills the clover and snake that were living where the oil is dumped.
- With at least one scenario, talk through what would happen in more detail. What organism would be affected next? Would it be a negative effect on all the organisms? Which organisms might benefit? How? For example, if the raccoon dies from eating trash the animals it eats like the frog and grasshopper would increase in numbers which in turn causes what they eat to decrease, like the dandelions and clover.
- Ask the students which piece of the ecosystem is the least important. Once they decide on one organism or abiotic factor, explain that this time instead of tugging on the yarn to see the connections that student will drop their piece of the yarn and step back from the circle. How does this affect our web of life?
- You may want to briefly talk about positive impacts that people could have on this ecosystem. Ask the students for ideas. Ideas might include planting more native plants such as more milkweed to help the monarch butterfly and honeybees, picking up litter, and planting new trees.
- Clean up: To undo the web, you can see if the students can remember the connections they made and pass the yarn in the opposite direction with each student winding back up the yarn into a ball. Another option is to have everyone drop their piece of yarn and have two students carefully wind up and untangle the yarn. To help keep the signs from getting tangled, you can store them on a coat hanger.

### Independent Work

- Have students complete the *Characteristics of Ecosystems A and D Statements*.

### Assessment

- Use the *Characteristics of Ecosystems A and D Statements* as an assessment to check for student understanding of food webs and the role organisms play in the food web.

## Opportunities for Extended Learning

1. **Activity:** Have students stay in a circle with their signs but put away the yarn. If any students have abiotic factors currently, trade for a biotic factor. Have students think about yes or no questions about their food web. Give some examples such as “Do you eat plants? Are you a carnivore? Are you a decomposer? Do you eat small mammals?” If the answer to the question is yes for the picture you have, move to a new spot in the circle. Remind students about how to move safely. To determine the leader for each round, you can mark a spot in the circle as the leader’s spot, so that whoever is standing there asks the next question.
2. **Activity:** Take the Web of Life one step further to help students understand the connections between ecosystems, ecosystem services they provide to humans (air quality, water quality, etc.), and human health by conducting the [Connecting Ecosystems and Human Health](#) activity from the US EPA.
3. **Videos:**
  - Crash Course Kids video “[Home Sweet Habitat](#)” (introduction to food webs including decomposers) (4:41)
  - Crash Course Kids video “[Food Webs](#)” (how a change to one species affects whole web) (3:51)

## Behavior Management Tips

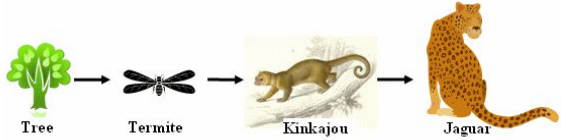
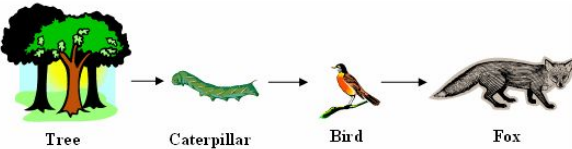

- ◆ You can do the activity sitting or standing. You may choose to start standing up and once the web is complete challenge students to sit in unison so that the web is not changed or vice versa.
- ◆ Make sure to model behavior for passing, holding, and tugging on the yarn. Be sure to remind them of this throughout the activity.

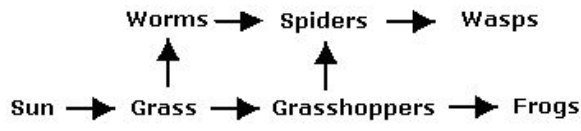
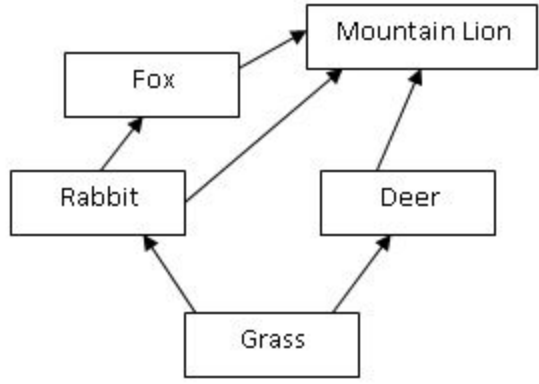
Name \_\_\_\_\_

Date \_\_\_\_\_

Characteristics of Ecosystems A and D Statements

Directions: Read the following statements and place a checkmark next to the agree, disagree, or it depends. In the “My Thoughts” column, you must state why you place the checkmark next to the agree, disagree, it depends.

Statement	My Thoughts	Statement	My Thoughts
<p><b>1. If the number of kinkajous increases, the number of Jaguars will increase, too.</b></p>  <p>_____ agree            _____ disagree            _____ it depends</p>		<p><b>2. If the trees were cut down in this food chain, the caterpillar population will increase.</b></p>  <p>_____ agree            _____ disagree            _____ it depends</p>	
<p><b>3. When an earthworm feeds upon the remains of a dead raccoon, it is acting as a decomposer.</b></p> <p>_____ agree            _____ disagree            _____ it depends</p>		<p><b>4. Plants make food through the process of photosynthesis.</b></p> <p>_____ agree            _____ disagree            _____ it depends</p>	
<p><b>5. If the water plant population decreases, the tadpole population will increase.</b></p>  <p>_____ agree            _____ disagree            _____ it depends</p>		<p><b>6. After an organism in an ecosystem dies, the body of the organism decays and is recycled back into the ecosystem.</b></p> <p>_____ agree            _____ disagree            _____ it depends</p>	
<p><b>7. Tadpoles are a producer in the following food chain:</b></p> <p><b>Sunlight → Algae → Tadpole → Duck</b></p> <p>_____ agree            _____ disagree            _____ it depends</p>		<p><b>8. In the following food chain, frogs eat snakes.</b></p> <p><b>Grass → Grasshopper → Frog → Snake</b></p> <p>_____ agree            _____ disagree            _____ it depends</p>	

<p><b>9. Plants depend on decomposers to release the nutrients they need into the soil.</b></p> <p><input type="checkbox"/> agree</p> <p><input type="checkbox"/> disagree</p> <p><input type="checkbox"/> it depends</p>		<p><b>10. If worms were removed from the food web below, there would be more energy for grasshoppers.</b></p>  <pre> graph LR     Sun --&gt; Grass     Grass --&gt; Worms     Grass --&gt; Grasshoppers     Worms --&gt; Spiders     Grasshoppers --&gt; Spiders     Grasshoppers --&gt; Frogs     Spiders --&gt; Wasps   </pre> <p><input type="checkbox"/> agree</p> <p><input type="checkbox"/> disagree</p> <p><input type="checkbox"/> it depends</p>	
<p><b>11. Consumers feed upon other organisms.</b></p> <p><input type="checkbox"/> agree</p> <p><input type="checkbox"/> disagree</p> <p><input type="checkbox"/> it depends</p>		<p><b>12. In the following food web, some animals eat plants and some eat animals.</b></p>  <pre> graph BT     Grass --&gt; Rabbit     Grass --&gt; Deer     Rabbit --&gt; Fox     Rabbit --&gt; MountainLion[Mountain Lion]     Deer --&gt; MountainLion     Fox --&gt; MountainLion   </pre> <p><input type="checkbox"/> agree</p> <p><input type="checkbox"/> disagree</p> <p><input type="checkbox"/> it depends</p>	





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