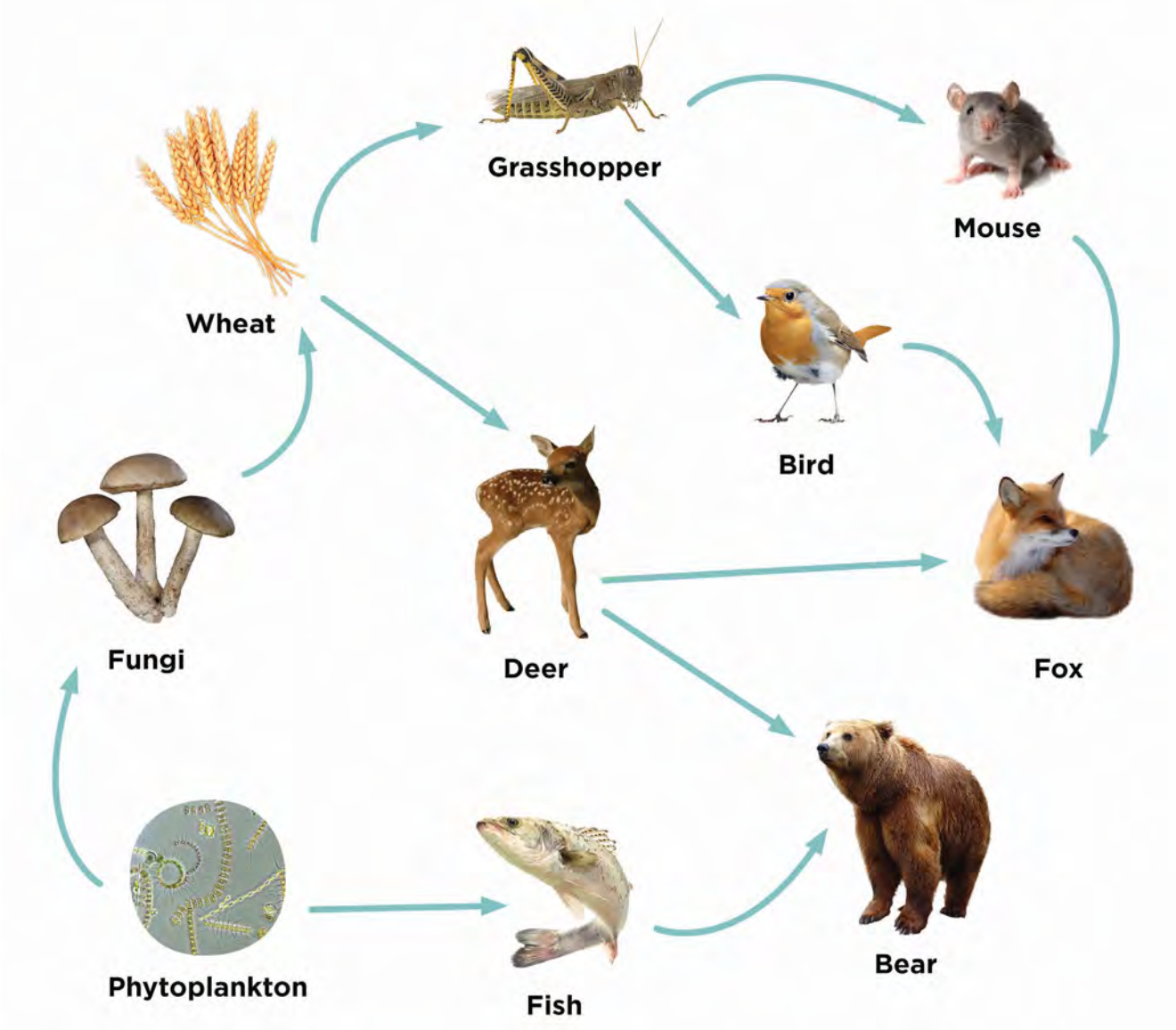
FOOD AND THE ENVIRONMENT:
THE NATURAL FOOD CYCLE



SUMMARY

In this lesson, we explain why all living things need energy and nutrients to survive and introduce the concept of the food web. By showing the complex interplay between the natural environment, humans, and the plants and animals that we eat, we teach the origins of food.

Duration: 90 mins, 2 Sessions | Grade Level: 4th–7th

Module 1: Food and the Environment
The Natural Food Cycle

LESSON CONTENTS

LESSON RESOURCES

greenbeetz.org

our website hosts lesson slides, lesson videos, and teacher training videos, glossary, standards alignment and more

Worksheets

- Breakfast Challenge/Pledge
- Video Worksheets
- Food Web activity and activity cards
- Exit Card Assessments

THE NATURAL FOOD CYCLE: AT A GLANCE

ESSENTIAL QUESTION

How are plants and animals dependent on each other and what would happen if a plant or animal was completely removed from our environment?

STUDENT LEARNING GOALS AND OBJECTIVES

After this lesson students will be able to:

- Define, compare, and identify consumers, producers, and decomposers.
- Define and compare food chains and food webs.
- Identify what role we play as humans in the food web.
- Understand what would happen if there is a missing link from food chains and food webs.

KEY POINTS

- All living things need energy and nutrients to survive; the food we eat provides our energy and gives us the building blocks of our bodies. In other words, we are what we eat!
- A food web shows how energy and nutrients are passed between living things; it is made up of many different intersecting food chains. In a food web, living things can be divided into three categories: producers, consumers, and decomposers.

VOCABULARY

- **Producers** - produces its own food (plants)
- **Consumers** - animals that get their energy by eating plants or other animals
  - **Herbivores** - only eats plants
  - **Carnivores** - only eats other creatures/animals
  - **Omnivores** - eats both plants and animals
- **Decomposers** - organisms that breaks down dead organic materials (plants and animals)

PRIOR KNOWLEDGE AND MISCONCEPTIONS

PRIOR KNOWLEDGE

- 5th Grade students have not formally studied food chains as part of the Next Gen Standards, but some may be familiar with the terms "prey" and "predator."
- Be sure to make the connection between this background information and the terms in this lesson - producers, consumers, and decomposers.
- Middle school students will have studied the food chain in 5th grade, but benefit from reviewing the terms and cause/effect relationships in today's lesson.

COMMON MISCONCEPTIONS	POSSIBLE RESPONSE
Students may not have considered the role of humans in a food chain, especially if they are only familiar with the concept of animals being predator and prey.	Make sure to use examples of food webs and food chains that involve humans and emphasize the interconnectedness of all creatures on Earth.
Students may be more familiar with small and simple food chain, for example grass, insect, bird.	Give examples of primary and secondary consumers so they can see how food chains can involve many creatures.
Students may get confused about what the arrows indicate in the Food Web diagrams. Instead of seeing the arrows as representing the flow of energy (which is why the arrow goes from producer to consumer), students may think the arrows indicate which animal is eating the other.	Be sure to spend time on this concept and give enough examples so that students really understand both the concept and how to read the diagrams.

LESSON BREAKDOWN

TIME	ACTIVITY	MATERIALS/RESOURCES
PART 1		
4–7 min	Breakfast Challenge Review	• Breakfast Challenge • **Lesson Slides**
4–10 min	Lesson Video: The Natural Food Cycle	**Vimeo** or **Youtube** • Video Worksheets
15–20 min	Class Discussion	--
3–5 min	Food Chain Activity	• Food Chain Worksheet & Answer sheet
10 min	Food Detective Assessment	Exit Card
PART 2		
5 min	Small Group Activity	Food Chain Activity Cards (pre-cut)
20 min	Food Web Activity	• Food Chain Activity Cards • Ball of yarn • Food Web Sun Image
7 min	Snackz & Factz	Cheese and whole grain crackers
8 min	Test Your Noodle & Green Beetz Points	**Slides**
5 min	Food Detective Assessment	Exit Card

DETAILED LESSON SCRIPT: PART 1

Breakfast Challenge

4–7 minutes

This activity is a continuation from our Welcome Lesson where the Breakfast Challenge is first introduced.

LESSON SLIDES

BREAKFAST CHALLENGE PLEDGE

I_____ pledge to take the Green Beetz Breakfast challenge!! I will do my best to eat a healthy breakfast every morning and drink a glass of water instead of a sugary drink. I promise to write in my Food Diary about what I eat every morning and how it makes me feel throughout the day.

_____ Signature

_____ Date

DO

Display the Breakfast Challenge on the whiteboard or as a printout.

SAY

Ask students to show you their weekly breakfast log from the Welcome to Green Beetz Lesson.

Ask if anybody would like to share their challenges or successes in keeping a daily breakfast log.

Remind students that they'll do this again for the final lesson to make comparisons.

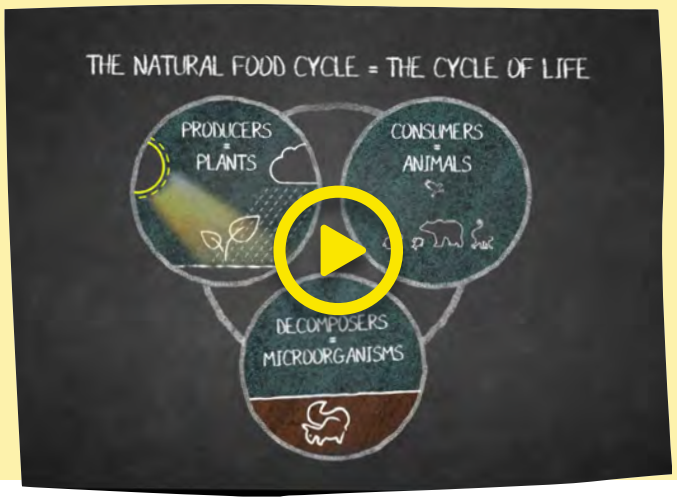
TRANSITION TO TODAY'S LESSON OBJECTIVES:

Define, compare, and identify consumers, producers, and decomposers.	Define and compare food chains and food webs.	Identify what role we play as humans in the food web.

Lesson Video: The Natural Food Cycle

4–10 minutes

To help students understand and retain information, have them use the video worksheets. If you don't want to use the worksheet, you can instead ask them to pay attention to the key words (producer, consumer, decomposer, food cycle, herbivore, carnivore, and omnivore).



DIFFERENTIATION VIDEO WORKSHEETS

OPTION A	• Repeats most of the information from the video and asks students to identify a word or phrase that matches the definition. • Supports students who struggle to write or process quickly. • Better if you only want to watch the video once.
OPTION B *(more challenging)*	• Asks students to provide definitions for key words. • Requires students to watch the video twice and is a bit more challenging.

Class Discussion

15–20 minutes | Lesson Slides

As you lead the discussion, refer to the following questions and concepts to assist:

Discussion questions for consideration:

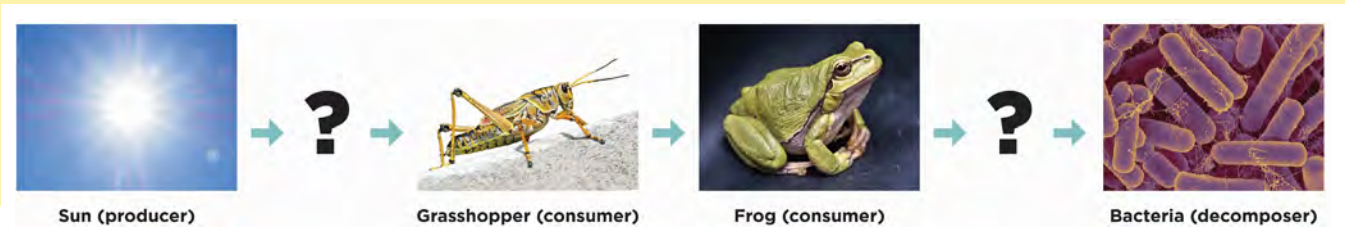
- *How can the health of plants and animals affect our health as humans?*
- *How is energy passed from the sun —> plants —> animals —> humans?*
- *What is the difference between a consumer and a producer?*
- *Why are humans considered consumers?*
- *Why is the quality of soil and water important to us as humans?*
- *What does a food web show us?*

Key Points & Vocabulary

We Are What We Eat 	All living things need energy and nutrients to survive; the food we eat provides our energy and gives us the building blocks for our bodies. In other words, we are what we eat!
Food Webs 	A food web shows how energy and nutrients are passed between living things. It is made up of many different intersecting **food chains**. In a food web, living things can be divided into three categories: **producers, consumers,** and **decomposers**.
Producers 	Plants are able to capture all the energy they need from sunlight. Plants capture the sun's energy in a process called photosynthesis. Through this process, plants create many nutrients necessary for life, such as complex carbohydrates, fats, and proteins. These are the building blocks for all living things. Plants get the additional nutrients they need, including water and carbon, from the air and soil they grow in.
Consumers 	Animals get their energy and nutrients from eating (consuming) other living things, like plants or animals. Some animals only eat plants (herbivores), some animals only eat animals (carnivores), and some eat both (omnivores). • **Primary consumers** eat producers and are herbivores. • **Secondary consumers** eat primary consumers and can be omnivores or carnivores.
Decomposers 	Decomposers are tiny organisms like bacteria or fungi that break down plants or animals after they die and return many of the nutrients back into the soil.
Humans 	Humans, like all animals, are consumers. As a species, we are omnivores, which means we can eat plants and animals.

Food Chain Activity

5 minutes



Partner or Team Work:

- Make copies of the Food Chain Activity worksheet.
- Have students work with their partner/team to complete 3 Food Chains using the producers, consumers, and decomposers listed on the worksheet.
- Once finished, provide students with the answer key to see how they did and what other food chains they could make.

MATERIALS

- Food Chain Activity worksheet
- Answer Key

Exit Card *(optional)*

10 minutes

Students can complete all questions or choose just one, depending on what you emphasized during the lesson OR what you want to follow-up on. This will allow you to see who has a clear understanding of the lesson objectives. You will be returning to food chains/webs during the next session, so use this information to clear up any misunderstandings, better differentiate questions and activities, add insight on particular aspects of the lesson, and meet the needs of individuals for future lessons.

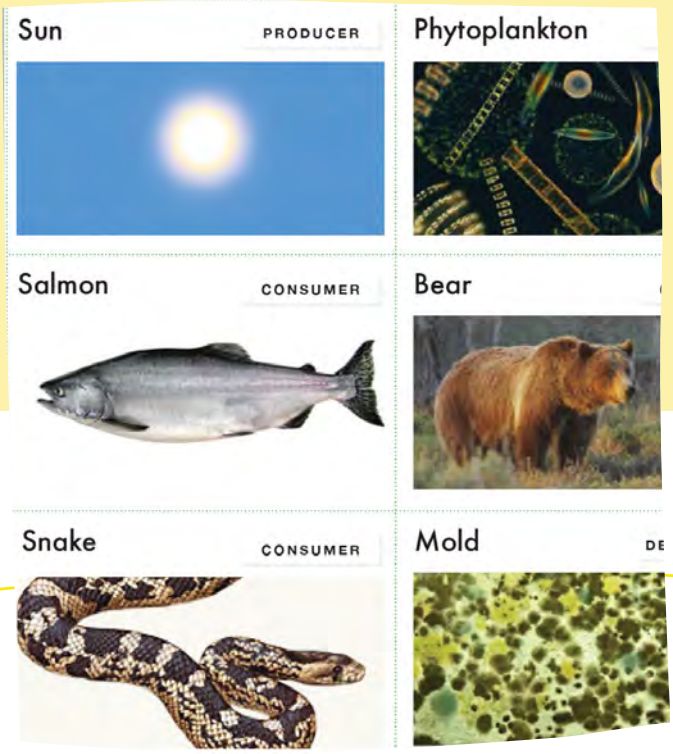
1. *Compare and contrast producers, consumers, and decomposers.*
2. *What role do we play as humans in the food web?*
3. *What is the difference between a food chain and a food web?*

DETAILED LESSON SCRIPT: PART II

Small Group Activity

5 minutes

In preparation for today's activity, we must make sure students understand food chains and the flow of energy.



DO

Briefly review the Food Chain Activity Worksheet and vocabulary from Part 1 if needed.

Give each team/group a set of Food Chain Activity Cards and have them show how energy would flow.

SAY

Using the food chain Activity cards, show how energy would flow from one living creature to the next.

Share your answers.

MATERIALS

- Food Chain Activity Worksheet
- Vocab from Lesson Slides
- Food Chain Activity Cards *(pre-cut)*

Food Web Activity - Let's make a Food Web!

20 minutes

This activity can take place in the classroom, a hallway, or even outside - select a location with space to spread out. You may want your students to sit on the floor instead of stand.

MATERIALS

- Food Chain Activity Cards
- Ball of string/yarn
- Food Web SUN Image *(printed or displayed on white board)*
- Food Detective Activity - Google Form *(optional)*

SET-UP FOR TEACHERS

DIRECTIONS

Each student needs a card and there can be only ONE sun card.

You will need enough space for students to form one big circle (or, if students are able to work independently, two or more circles).

Have your students either keep their card from the Small Group Activity or allow them to switch with someone in their group (to give them choice) or redistribute all cards (to challenge them as they will not have discussed the new card's role in the food web).

Redistribute copies of the Food Web for students who may not be able to read the diagram from the smart board.

Food Web Activity - Let's make a Food Web! (CONTINUED)

DIRECTIONS TO YOUR STUDENTS

1. Keep your card facing out towards the group.

2. The string represents ENERGY from the sun

3. When you have the string, decide who to throw it to by thinking:
   Who can I GIVE my energy to (i.e. who might EAT me)?

4. When someone tosses you the string, decide if you should take it:
   Who could GIVE ME energy (i.e. who could I eat?)

5. HOLD ON TO THE STRING AS YOU PASS IT!

DIFFERENTIATION OPTION

If you predict students will get upset if they are "wrong" about who to throw their string to, you can instead:

1.	Have the student with the string announce what they are (e.g. I am GRASS)
2.	Then have that student ask: WHO THINKS I SHOULD SHARE MY ENERGY WITH YOU?
3.	Have anyone who thinks they should take the energy (string), raise their hands.
4.	You can then have them say what they are and have the whole class give a thumbs up/down as to whether they agree.

This allows the student to decide who to pass the string to based on their class' ideas rather than being put on the spot

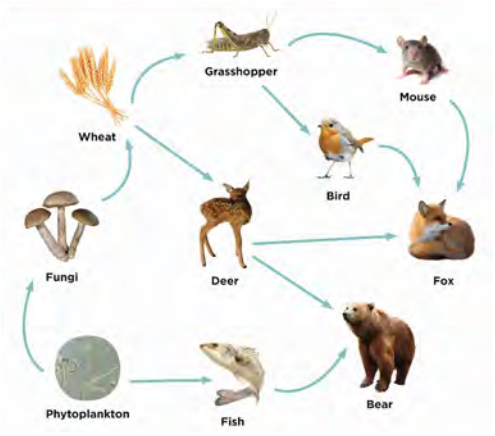
Food Web Activity - Let's make a Food Web! (CONTINUED)

Questions to consider as the string is being passed around:

- *Do decomposers have to be at the end of a food chain? Do some decomposers give their energy to animals?* **(Edible fungus, such as mushrooms).** *What does this do to our food web?*
  (Makes it more complicated).
- *Does every food chain need to include consumers? Could producers give their energy to decomposers?*
  (Decomposers also break down plants and use the energy).
- *Where do nutrients go at the end of the food chain?*
  (Nutrients are used for growth in decomposition or go into the soil)
- *Where does the energy go at the end of a food chain?*
  (The energy has been completely used up in cellular processes necessary for life or has been lost in the form of heat. Decomposers put nutrients back into the soil, but not energy).

Questions to discuss once the web is "complete":

- *Is the web really "complete"? Could we continue adding in food chains, making it more and more complex?*
- *What would happen if one type of plant, such as all of the grass, died? How could we show that in our food web?*
  (Have students come up with a way to show what would happen if all grasses died. The class should also discuss the consequences, which might include complete loss of food or greater competition for food – both of which could have effects further up several food chains).
- Optional: Assign for class or homework the online Food Detective Google Forms Activity



Snackz & Factz

7 minutes

Today's snack suggestion:
Cheese and whole grain crackers

MATERIALS

- Cheese and whole grain crackers

DO

Have students prepare or have the snack prepared.

Present/Display the "Factz" about today's Snack to the class as they are tasting.

SAY

Why are we eating cheese and whole grain crackers for a snack today?

Refer to the Factz below.

FACTZ

Each item in today's snack represents the food products we eat as omnivores: animal products and plant-based products.

While cheese is an animal product (made from milk), bacteria cultures are used to start the cheese-making process. The various flavors and textures of cheese are a result of different ripening methods, which can include the use of harmless bacteria, mold, or yeast!

Most cereal grains (wheat, oatmeal, corn, etc.) are the dried fruit of different types of grass! These "fruits" are used to make foods like bread and crackers.

Test Your Noodle

(Optional: students complete this online)

1. Multiple Choice: Where does the energy and nutrients that our bodies need come from?
   a. The air we breathe
   b. **The food we eat**
   c. The sun
   d. Tree bark

2. List a food chain with a producer and at least two consumers. **(Various correct responses)**

3. Fill in the blank: Humans are referred to as _____, because they eat both plants AND animals. **(Omnivores)**

4. Organisms that break down plants or animals after they die, and return the nutrients to the soil, are called _____. **(Decomposers)**

5. What are the three types of organisms present in a food web? **(Producers, Consumers, Decomposers)**

Exit Card

5 minutes

Look at the Food Web. What might happen if the red fox becomes endangered? Explain using specific examples from the food web.

Have students refer to the Food Web handout while they answer this question, so that you can assess them individually. You can have them write their answer to the question on their own copies of the Food Web Diagram, on an index card, or in their Food Detective Notebooks

NAME DATE

Breakfast Challenge

Breakfast is the most important meal of the day. When you eat a healthy breakfast, it gives your mind and body a long-lasting boost of energy. A good breakfast fuels you to concentrate longer in class, perform better on the field, and stay in a better mood.

We know there are times when you are hungry, but you don't have time to sit down for breakfast. We all have those days when we want to grab a donut and a soda for breakfast. The downside is that we don't really feel great afterwards. We might have a burst of energy from the sugar, but that sugar is used up quickly. You may not even notice that just minutes after you eat something really sugary you might feel tired and grumpy. You'll probably even want to fall asleep in class. That is not a good way to start off your day!

So what does it mean to eat a healthy breakfast? Your breakfast should include foods from each of the following food groups:

- **Milk and milk product** (whole milk, yogurt, cheese, or soy/almond milk)
- **Fruit or vegetable group** (bananas, apples, potatos, berries)
- **Bread and grain** (whole grain toast, oatmeal, or a tortilla)
- **Proteins** (hardboiled egg, peanut butter, nuts, or lean meats)

Some healthy breakfast ideas include an egg sandwich on whole grain bread with a piece of fruit, a bowl of oatmeal with raisins and nuts mixed in, or yogurt layered with granola and berries.

BREAKFAST CHALLENGE PLEDGE

I_____ pledge to take the Green Beetz Breakfast challenge!! I will do my best to eat a healthy breakfast every morning and drink a glass of water instead of a sugary drink. I promise to write in my Food Diary about what I eat every morning and how it makes me feel throughout the day.

_____ Signature

_____ Date

BREAKFAST CHALLENGE PLEDGE

I_____ pledge to take the Green Beetz Breakfast challenge!! I will do my best to eat a healthy breakfast every morning and drink a glass of water instead of a sugary drink. I promise to write in my Food Diary about what I eat every morning and how it makes me feel throughout the day.

_____ Signature

_____ Date

BREAKFAST CHALLENGE PLEDGE

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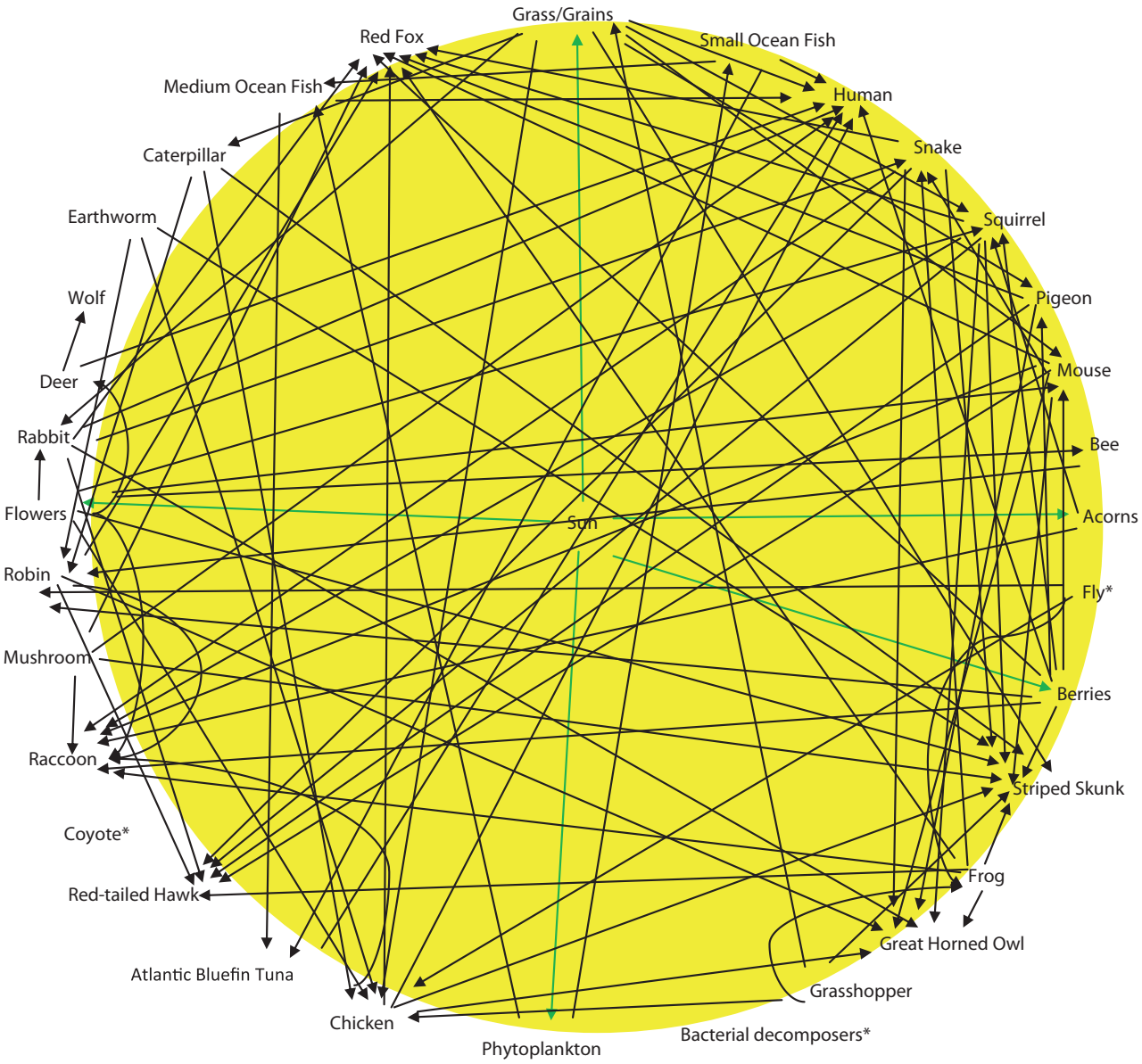
_____ Signature

_____ Date

Food Web



*Flies, earthworms, bacterial decomposers, mushrooms—all could have an arrow from any other organism in the web, as they are either decomposers or indiscriminant scavengers. Coyotes are also scavengers and will eat just about any animal or plant in the web, except for phytoplankton.

NAME DATE

Food Chain Activity

Choose from the list below and show what eats what – fill in the blanks with producers, consumers, and decomposers (hint: each chain should start with a producer and end with a decomposer)

PRODUCER	CONSUMER		DECOMPOSER
Sun	Grasshopper	Vulture	Bacteria
Grass	Frog	Squirrel	Fungi
Phytoplankton	Hawk	Red Fox	Mold
Acorns	Cow	Coyote	
Grass	Human	Deer	
Fruit	Salmon	Mountain Lion	
	Brown Bear	Mouse	
	Giraffe	Skunk	
	Lion	Great Horned Owl	

Example → Sun → Grass → Grasshopper → Frog → Hawk → Fungi

1 → _____ → _____ → _____ → _____ → _____

2 → _____ → _____ → _____ → _____ → _____ → _____

3 → _____ → _____ → _____ → _____ → _____ → _____

ANSWER KEY

Food Chain Activity Answer Key

1. Sun –> Grass –> Grasshopper –> Frog –> Snake –> Hawk –> Decomposers
2. Sun –> Grain –> Cow –> Human –> Decomposers
3. Sun –> Phytoplankton –> Salmon –> Brown Bear –> Decomposers
4. Sun –> Leaves –> Giraffe –> Lion –> Vulture –> Decomposers
5. Sun –> Acorns –> Squirrel –> Red Fox –> Coyote –> Decomposers
6. Sun –> Grass –> Deer –> Mountain Lion –> Decomposers
7. Sun –> Fruit –> Mouse –> Skunk –> Great Horned Owl –> Decomposers

Acceptable answers could also include decomposers completing the chain at any stage, or somewhere else in the chain, if students can explain what kind of decomposer they want it to be (mushroom, earthworm, insect, etc.) and it correctly would be eaten by the next consumer in the chain. For example, a mouse or skunk might eat a mushroom.

Food Chain Activity Cards

EXAMPLE 1

Sun

PRODUCER

Grass

PRODUCER

Grasshoper

CONSUMER

Frog

CONSUMER

Snake

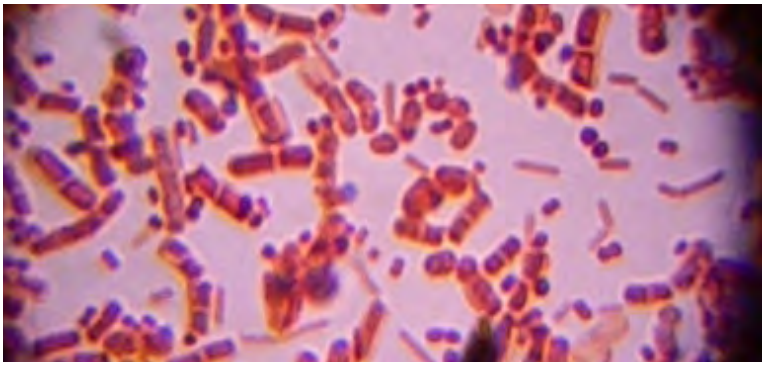
CONSUMER

Hawk

CONSUMER

Bacteria

DECOMPOSER



Food Chain Activity Cards

EXAMPLE 2

Sun

PRODUCER

Grain

PRODUCER

Cow

CONSUMER

Human

CONSUMER

Worms

DECOMPOSER

Food Chain Activity Cards

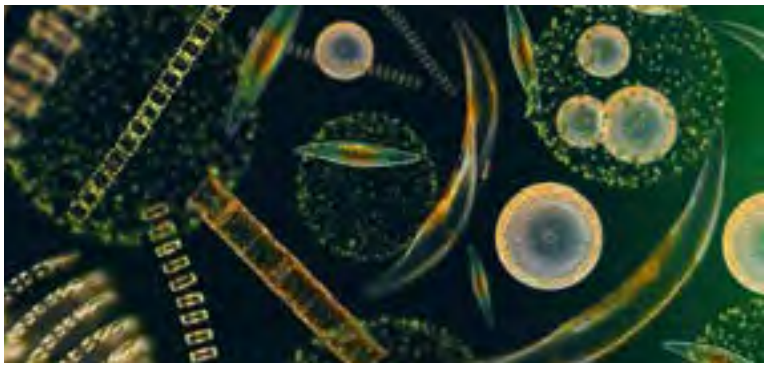
EXAMPLE 3

Sun

PRODUCER

Phytoplankton

PRODUCER



Salmon

CONSUMER

Bear

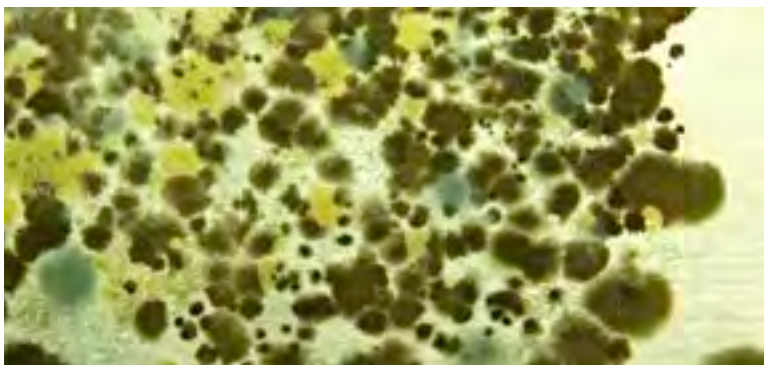
CONSUMER

Snake

CONSUMER

Mold

DECOMPOSER



Food Chain Activity Cards

EXAMPLE 4

Sun

PRODUCER

Leaves

PRODUCER

Giraffe

CONSUMER

Lion

CONSUMER

Vulture

CONSUMER

Fungi

DECOMPOSER

Food Chain Activity Cards

EXAMPLE 5

Sun

PRODUCER

Acorn

PRODUCER

Squirel

CONSUMER

Red Fox

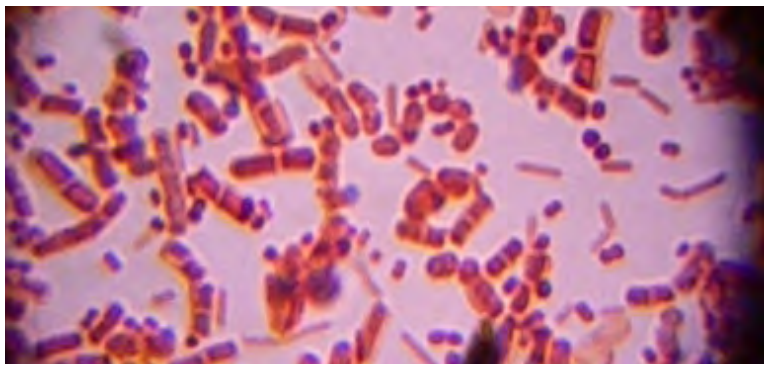
CONSUMER

Coyote

CONSUMER

Bacteria

DECOMPOSER



Food Chain Activity Cards

EXAMPLE 6

Sun

PRODUCER

Grass

PRODUCER

Deer

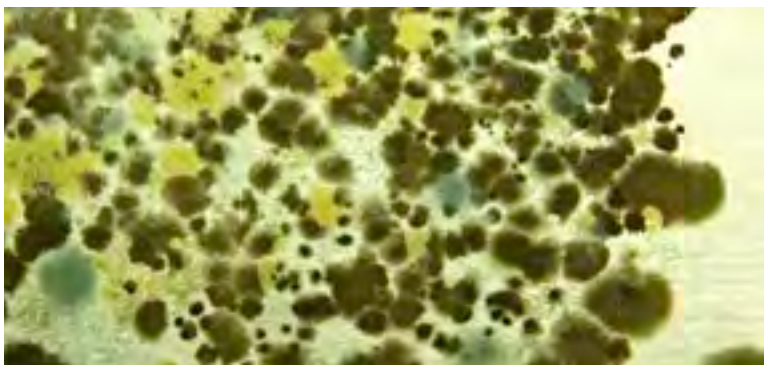
CONSUMER

Jaguar

CONSUMER

Mold

DECOMPOSER



Food Chain Activity Cards

EXAMPLE 7

Sun

PRODUCER

Fruit

PRODUCER

Mouse

CONSUMER

Skunk

CONSUMER

Great Horned Owl

CONSUMER

Fungi

DECOMPOSER

The Natural Food Cycle: Part 1 - Exit Card

Name: _____ Date: _____

1. Compare and contrast producers, consumers, and decomposers?
2. What role do **we** play as humans in the food web?
3. What is the difference between a food chain and food web?

_____

_____

_____

_____

_____

_____

_____

_____

The Natural Food Cycle: Part 1 - Exit Card

Name: _____ Date: _____

1. Compare and contrast producers, consumers, and decomposers?
2. What role do **we** play as humans in the food web?
3. What is the difference between a food chain and food web?

_____

_____

_____

_____

_____

_____

_____

_____

Name: _____ Date: _____

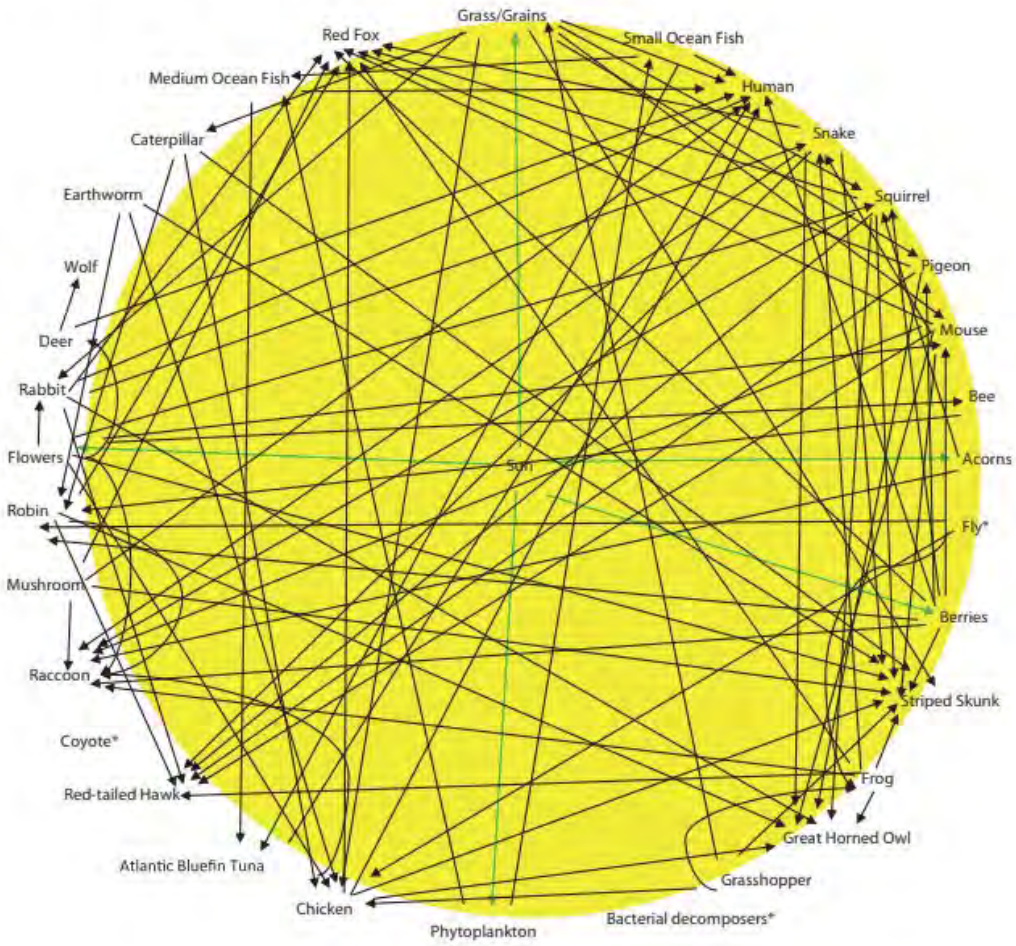
The Natural Food Cycle VIDEO Worksheet - Option A

Read the questions before you watch the video. You can jot down your ideas as you watch or wait until the end.

1. What does the phrase “you are what you eat" mean? (This may be easier to answer after you watch the video)	
2. What two things do we need to survive?	
3. What is the key source of all energy?	
4. What do we call the process where plants produce energy from water and sunlight?	
5. Give an example of a producer.	
6. Where do producers get their nutrients from?	
7. What are different types of consumers?	
8. What do we call the bacteria and fungi who breakdown dead matter and send nutrients back to the ground?	
9. Why do we call it a food **cycle**? What makes it a **cycle**?	
10. Do you have any questions?	

Answers

1. What does the phrase “you are what you eat mean? (This may be easier to answer after you watch the video)	*We are literally made up of what we consume so the quality matters.*
2. What two things do we need survive?	*Energy and nutrients.*
3. What is the key source of all energy?	*The sun.*
4. What do we call the process where plants produce energy from water and sunlight?	*Photosynthesis.*
5. Give an example of a producer.	*Plants (or a specific plant).*
6. Where do producers get their nutrients from?	*Soil.*
7. What are different types of consumers?	*Herbivores, omnivores, and carnivores (or specific animals, including us)*.
8. What do we call the bacteria and fungi which break down dead matter and send nutrients back to the ground?	*Decomposers.*
9. Why do we call it a food **cycle**? What makes it a **cycle**?	*The process repeats over and over again. After producers are consumed, the consumer eventually dies and decomposers then return that energy to the soil, where producers use it.*
10. Do you have any questions?	



Natural Food Cycle: Part 2 - Exit Card

What might happen if the red fox became extinct or endangered (meaning there aren't any or many left)? Explain using specific examples from the food web above.

_____

_____

_____

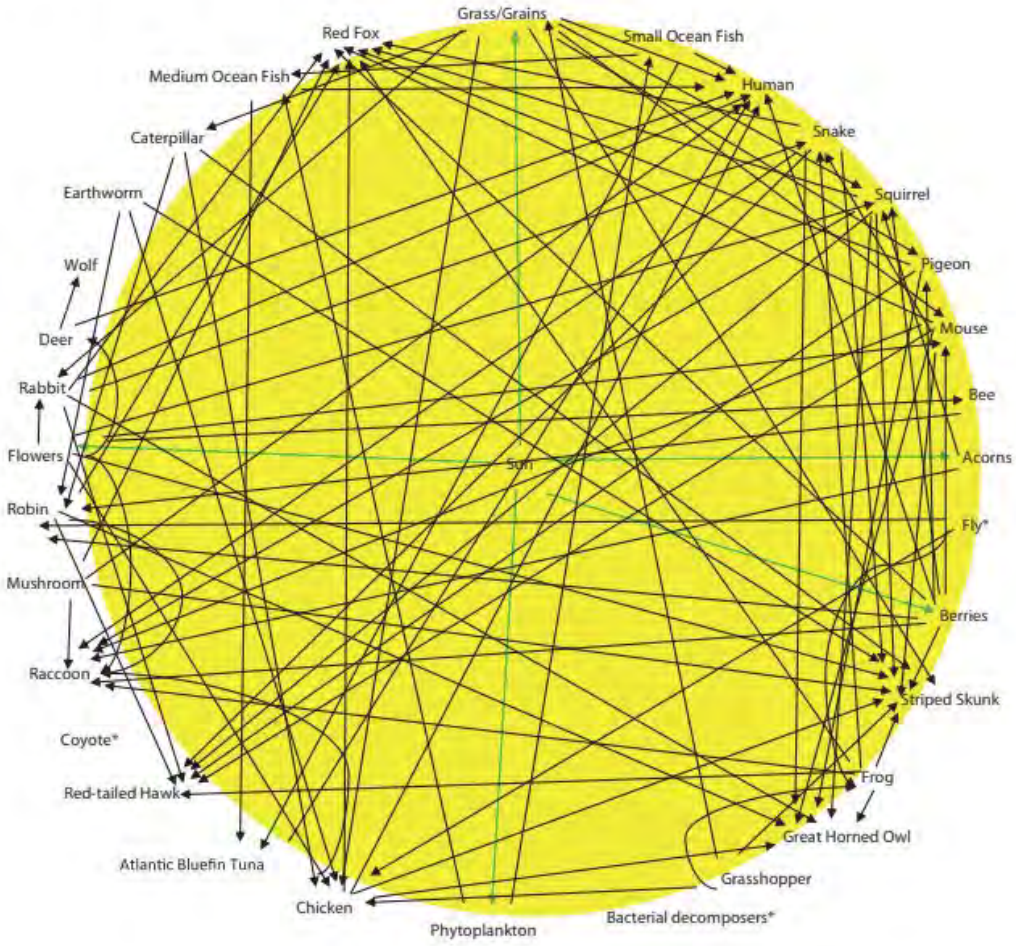
_____

_____

_____

_____

_____



The Food Web Additional Questions

1. What do the arrows tell us?

2. Why are some lines light green?

3. Why do some words have multiple lines coming from or going to it?

4. What ideas or questions do you have about the food web?