Organizing Organisms

In this activity, you will organize the list below into six different categories: individuals, populations, communities, ecosystems, biomes, and biospheres.
(If you need help recalling the definition of some of these words, check out the **vocabulary review** box.)

All living things on Earth
The apple trees in an orchard
A single bacteria cell
A stream with stones, clay, fish, bugs, and algae
A house cat
A caterpillar
A hive of bees
The squirrels, bugs, and birds that live in an oak tree
A desert
One piece of mold growing on old bread
A beach with seagulls, crabs, shells, and sand
The different kinds of fish in an aquarium tank
The African Savanna
A temperate forest

Biosphere	Biome	Ecosystem	Community	Population	Organism

Vocabulary Review
Biosphere: The part of the earth where living things exist. It encompasses all living things living in the lithosphere, atmosphere, and hydrosphere.
Biome: A major ecological community of organisms adapted to a particular climatic or environmental condition on a large geographic area in which they occur.
Ecosystem: A system consisting of biotic and abiotic components that function together as a unit. The biotic components include all the living things whereas the abiotic components are the non-living things.
Community: the assembly of interacting organisms coexisting in a particular area and time.
Population: A group of organisms of one species that interbreed and live in the same place at the same time.
Individual: A single, separate organism (animal or plant) distinguished from others of a same kind.
Definitions courtesy of biologyonline.com.

Organizing Organisms

In this activity, you will organize the list below into six different categories: individuals, populations, communities, ecosystems, biomes, and biospheres.
(If you need help recalling the definition of some of these words, check out the **vocabulary review** box.)

~~All living things on Earth~~
~~The apple trees in an orchard~~
~~A single bacteria cell~~
~~A stream with stones, clay, fish, bugs, and algae~~
~~A house cat~~
~~A caterpillar~~
~~A hive of bees~~
~~The squirrels, bugs, and birds that live in an oak tree~~
~~A desert~~
~~One piece of mold growing on old bread~~
~~A beach with seagulls, crabs, shells, and sand~~
~~The different kinds of fish in an aquarium tank~~
~~The African Savanna~~
~~A temperate forest~~

Biosphere	Biome	Ecosystem	Community	Population	Organism
- All living things on Earth	- A desert - The African Savanna - A temperate forest	- A stream with stones, clay, fish, bugs, and algae - A beach with seagulls, crabs, shells, and sand	- The squirrels, bugs, and birds that live in an oak tree - The different kinds of fish in an aquarium tank	- The apple trees in an orchard - A hive of bees	- A single bacteria cell - A house cat - A caterpillar - One piece of mold growing on old bread

Vocabulary Review
Biosphere: The part of the earth where living things exist. It encompasses all living things living in the lithosphere, atmosphere, and hydrosphere.
Biome: A major ecological community of organisms adapted to a particular climatic or environmental condition on a large geographic area in which they occur.
Ecosystem: A system consisting of biotic and abiotic components that function together as a unit. The biotic components include all the living things whereas the abiotic components are the non-living things.
Community: the assembly of interacting organisms coexisting in a particular area and time.
Population: A group of organisms of one species that interbreed and live in the same place at the same time.
Individual: A single, separate organism (animal or plant) distinguished from others of a same kind.
Definitions courtesy of biologyonline.com.

Building an Ecological Pyramid

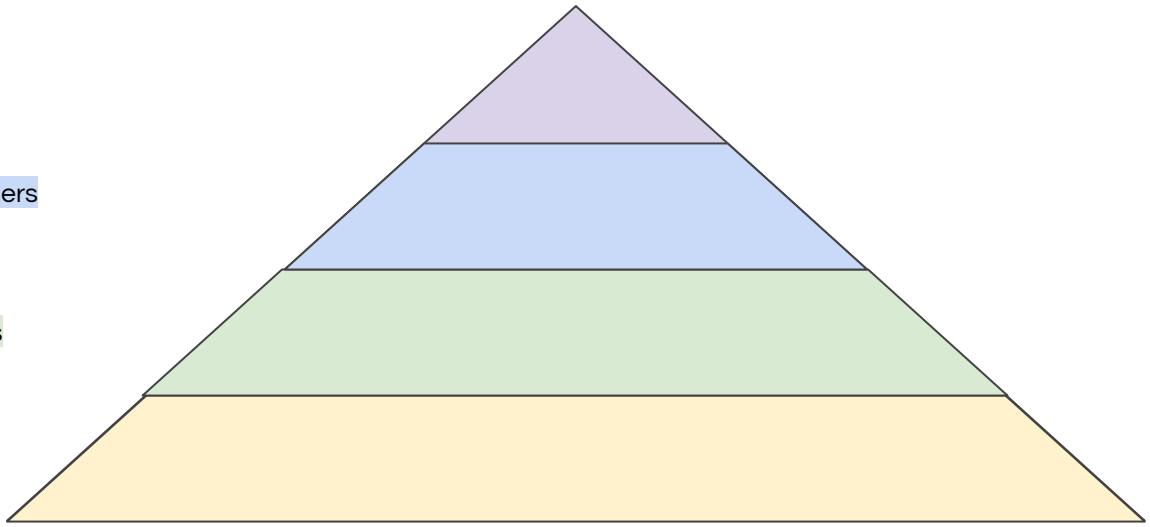
In this activity, you will create an ecological pyramid based off of an ecosystem that you find near you. You can find ecosystems near ponds and lakes, in forests, or in your own backyard. A good place to start is by looking for plants. Then consider what primary consumers eat the plants? What secondary consumers eat the primary consumers?
Fill in the trophic levels of the ecological pyramid with producers and primary, secondary, and tertiary consumers. Then answer the questions provided.
(If you need help recalling the definition of some important vocabulary words, check out the **vocabulary review** box.)

Level 4: Tertiary Consumers

Level 3: Secondary Consumers

Level 2: Primary Consumers

Level 1: Producers



1. What ecosystem did you choose to represent in your pyramid?

   _____

   _____

   _____

2. Are the organisms at the top of your pyramid apex predators? Why or why not?

   _____

   _____

   _____

3. Circle any decomposers that you included on your pyramid. If you didn't include any, can you think of and decomposers that are present in your ecosystem that you can add?

   _____

   _____

   _____

Vocabulary Review

Ecological Pyramid: A graphical representation in the shape of a pyramid to show the feeding relationship of groups of organisms, and the flow of energy or biomass through the different trophic levels in a given ecosystem.
Trophic Level: a position in a food chain or ecological pyramid occupied by a group of organisms with similar feeding mode.
Ecosystem: a system consisting of biotic and abiotic components that function together as a unit. The biotic components include all the living things whereas the abiotic components are the non-living things.
Producer: An organism capable of producing its own food through the process of photosynthesis (using light energy) or through chemosynthesis (using chemical energy).
Consumer: An organism that generally obtains food by feeding on other organisms or organic matter due to lack of the ability to manufacture own food.

- Primary consumers are herbivores that feed on producers. Secondary consumers are consumers that feed on primary consumers and/or producers. Tertiary consumers are consumers that feed on secondary and primary consumers, as well as on producers.
- Apex predators are predators in which no animal preys on them.

Decomposer: the organisms that are involved in the process of decomposition of the dead, both animal as well as plant matter, in the ecosystem.

Definitions courtesy of biologyonline.com.

Building an Ecological Pyramid

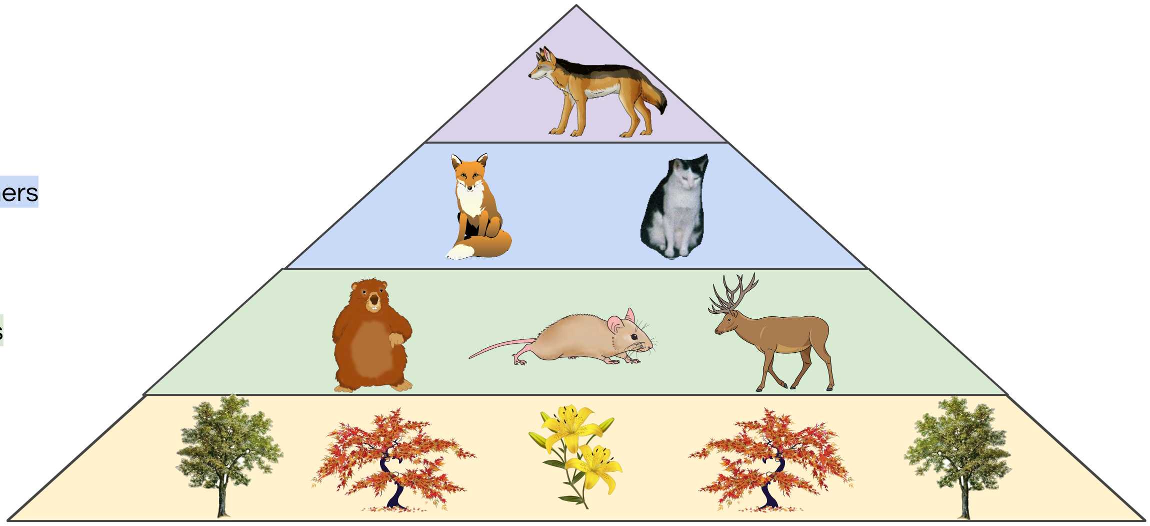
In this activity, you will create an ecological pyramid based off of an ecosystem that you find near you. You can find ecosystems near ponds and lakes, in forests, or in your own backyard. A good place to start is by looking for plants. Then consider what primary consumers eat the plants? What secondary consumers eat the primary consumers?
Fill in the trophic levels of the ecological pyramid with producers and primary, secondary, and tertiary consumers. Then answer the questions provided.
(If you need help recalling the definition of some important vocabulary words, check out the **vocabulary review** box.)

Level 4: Tertiary Consumers

Level 3: Secondary Consumers

Level 2: Primary Consumers

Level 1: Producers



1. What ecosystem did you choose to represent in your pyramid?
   I chose to represent the ecosystem around my house in New Hope, Pennsylvania. We live in a forested area.

2. Are the organisms at the top of your pyramid apex predators? Why or why not?
   The coyotes at the top of my pyramid are not apex predators, because they have natural predators, such as bears and mountain lions.

3. Circle any decomposers that you included in your pyramid. If you didn't include any, can you think of decomposers that are present in your ecosystem that you can add?
   I did not include any decomposers in my pyramid, but there are worms in this ecosystem that break down the dead tissues of plants and animals.

<u>**Vocabulary Review**</u>
Ecological Pyramid: A graphical representation in the shape of a pyramid to show the feeding relationship of groups of organisms, and the flow of energy or biomass through the different trophic levels in a given ecosystem.
Trophic Level: a position in a food chain or ecological pyramid occupied by a group of organisms with similar feeding mode.
Ecosystem: a system consisting of biotic and abiotic components that function together as a unit. The biotic components include all the living things whereas the abiotic components are the non-living things.
Producer: An organism capable of producing its own food through the process of photosynthesis (using light energy) or through chemosynthesis (using chemical energy).
Consumer: An organism that generally obtains food by feeding on other organisms or organic matter due to lack of the ability to manufacture own food.

- Primary consumers are herbivores that feed on producers. Secondary consumers are consumers that feed on primary consumers and/or producers. Tertiary consumers are consumers that feed on secondary and primary consumers, as well as on producers.
- Apex predators are predators in which no animal preys on them.

Decomposer: the organisms that are involved in the process of decomposition of the dead, both animal as well as plant matter, in the ecosystem.

Definitions courtesy of biologyonline.com.

Biosphere In A Jar

In this activity, you can create your own self-sustaining ecosystem using materials that you find outside and in your home. Just follow the instructions below to get started!

Materials:

From Home

- A jar with an airtight lid
- A piece of plastic slightly bigger than your jar
  EG. from a plastic bag or ziplock bag
- Sharp object for poking holes in the plastic
- Water
- A sunny spot EG. a windowsill
- Marker
- Pencil/Pen
- Scissors
- Cardboard

From Outside

- Small rocks
- Soil from a garden or forest floor
- Moss and/or clover with the roots intact
- Any acorns, seeds, twigs, rocks etc. you want as decorations

Instructions:

1. Go outdoors and collect all necessary biotic and abiotic factors you need for you biosphere (listed to the left).
2. Wash the small rocks with water to remove any debris.
3. Place at least 1 inch of the washed rocks at the bottom of your jar.
4. Using a marker, trace around the outside of the jar on a piece of plastic. Cut out the tracing. The plastic tracing should be a little bit wider than your jar.
5. Place the plastic tracing on a piece of cardboard and poke many holes in the plastic with a sharp object. This will act as a membrane, keeping the soil from seeping down into the rocks.
6. Place the plastic tracing in the jar, making sure it is covering all of the rock layer.
7. Evenly distribute your collected soil into the jar. Do not pack it down too tightly.
8. Place the moss/clover you collected into the jar. You can use a pencil or pen to move around the dirt and lightly pack down the plants.
9. Arrange your decorative items in the jar.
10. Add enough water to the jar so that a small pool forms at the bottom layer of rocks. Make sure that the water level does not surpass the plastic tracing.
11. Seal the jar with the lid and place it in a sunny spot.

NOTE: If your jar has a lot of condensation forming on the glass, it may be overwatered. If this is the case, open the lid for a day and allow some water to evaporate off. Overwatering the jar may rot the plants inside.

This worksheet was adapted from the "Make It At Home- Biosphere Terrariums" worksheet created by Mimi Wertheimer of The Leonard Gelfand Center.

Case Study: The Yellowstone Ecosystem

In this activity, you will learn about the rebalancing of the ecosystem in Yellowstone National Park in Wyoming. **To start off, watch a clip from the video below to learn more about the reintroduction of wolves into the Yellowstone ecosystem.**
https://www.learner.org/series/the-habitable-planet-a-systems-approach-to-environmental-science/ecosystems/ecosystems-video/ [watch from 13:37-22:38]

Next, answer the following questions to check your understanding.

1. Summarize why it was important to bring wolves back into the Yellowstone Ecosystem.

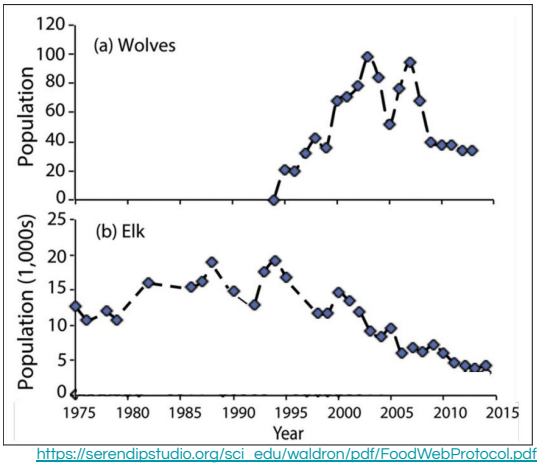
_____
_____
_____
_____

2. To the right is a graph showing the populations of elk and wolves in Yellowstone National Park.
   a. What describes the decrease in the elk population starting in 1995?

_____
_____
_____

   b. Look at the y-axes of each population graph. Why is the wolf population so much smaller than the elk population?

_____
_____
_____



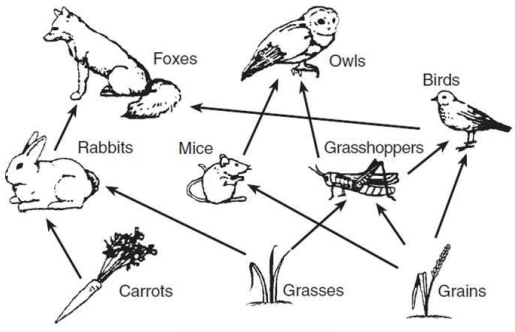
https://serendipstudio.org/sci_edu/waldron/pdf/FoodWebProtocol.pdf

   c. What do you think a graph of the willow population would look like from 1995-now? Would the population be increasing or decreasing? Explain your reasoning.

_____
_____
_____
_____

3. A food web is another way of representing the energy flow in an ecosystem. An example of a food web is shown on the right. As you can see, arrows are drawn from an organism to another organism that eats them. There may be multiple arrows coming from an organism if it has multiple predators.

   Based on what you learned from the video and some additional online research, try to construct a food web based on The Yellowstone Ecosystem. Draw your web on the back of this worksheet and be sure to include the following organisms: elk, wolf, gray willow, beaver, bison, aspen, coyote, grass, grizzly bear.



(Not drawn to scale)
https://www.thinglink.com/scene/964891423604211715

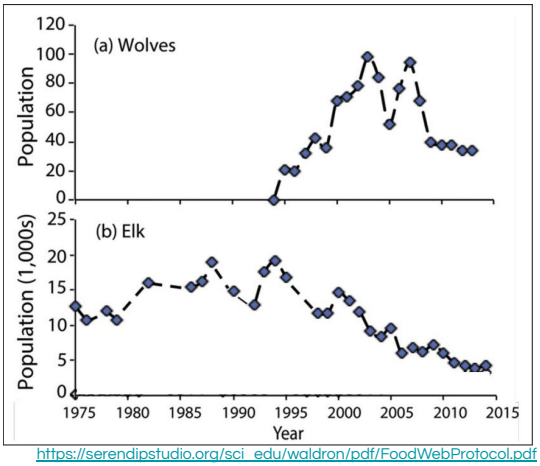
Case Study: The Yellowstone Ecosystem

In this activity, you will learn about the rebalancing of the ecosystem in Yellowstone National Park in Wyoming. **To start off, watch a clip from the video below to learn more about the reintroduction of wolves into the Yellowstone ecosystem.**
https://www.learner.org/series/the-habitable-planet-a-systems-approach-to-environmental-science/ecosystems/ecosystems-video/ [watch from 13:37-22:38]

Next, answer the following questions to check your understanding.

1. Summarize why it was important to bring wolves back into the Yellowstone Ecosystem.
   It was important to bring wolves back into the Yellowstone Ecosystem in order to re-balance it. Without wolves, the elk population was growing exponentially and eating much of the vegetation that other herbivores relied on to survive. As a result, the populations of other herbivores decreased.

2. To the right is a graph showing the populations of elk and wolves in Yellowstone National Park.



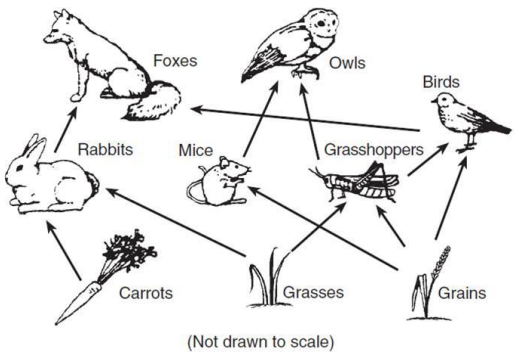
https://serendipstudio.org/sci_edu/waldron/pdf/FoodWebProtocol.pdf

   a. What describes the decrease in the elk population starting in 1995?
      1995 was the years that wolves were brought back to Yellowstone. The elk population decreased as wolves hunted them.

   b. Look at the y-axes of each population graph. Why is the wolf population so much smaller than the elk population?
      The wolf population is smaller because the further you get from the bottom of the food chain, the less energy is available to support large populations.

   c. What do you think a graph of the willow population would look like from 1995-now? Would the population be increasing or decreasing? Explain your reasoning.
      A graph of the willow population would show an increase starting in 1995. This is because as the elk population decreased, there were less willows being consumed. The willow populations would be larger than the elk population at any given point, since they are at the bottom of the food chain with the most energy.

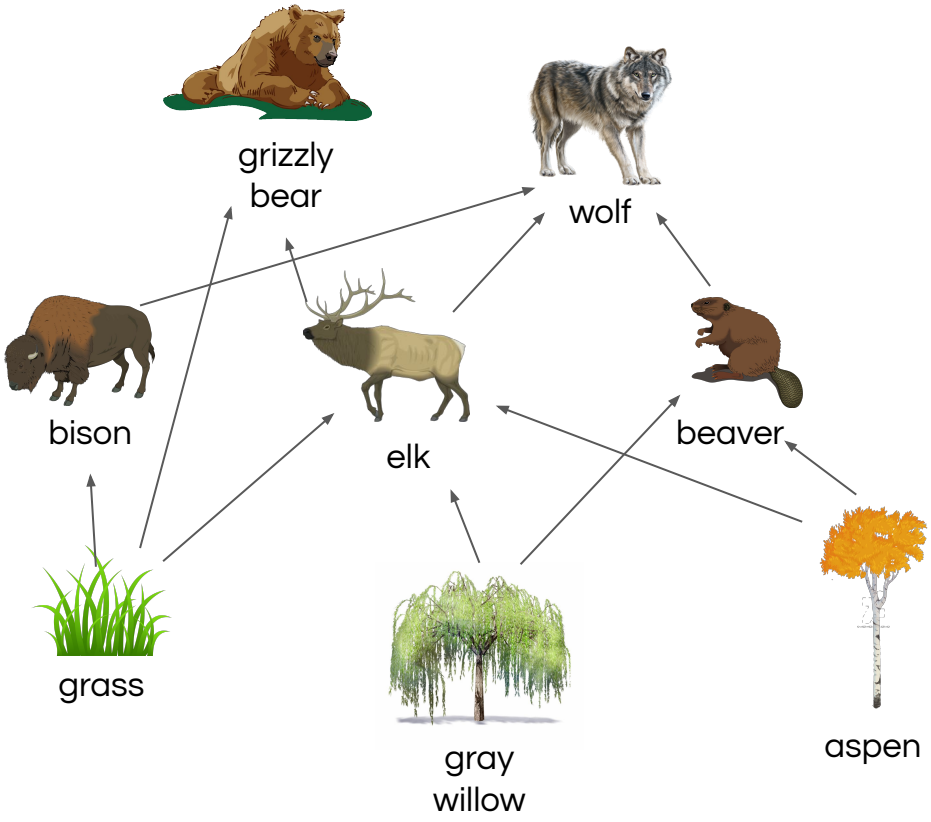
3. A food web is another way of representing the energy flow in an ecosystem. An example of a food web is shown on the right. As you can see, arrows are drawn from an organism to another organism that eats them. There may be multiple arrows coming from an organism if it has multiple predators.



https://www.thinglink.com/scene/964891423604211715

   Based on what you learned from the video and some additional online research, try to construct a food web based on The Yellowstone Ecosystem. Draw your web on the back of this worksheet and be sure to include the following organisms: elk, wolf, gray willow, beaver, bison, aspen, grass, grizzly bear.

Answer to Question 3 on Case Study: The Yellowstone Ecosystem Worksheet



This food web was made using information from the National Park Service: https://www.nps.gov/yell/learn/education/classrooms/upload/EatOrBeEatenSupplementLifeCards.pdf