# Activity 2: Wetland Wonders

## Summary

*Students explore the components of a wetland and design a wetland energy pyramid.*

## Objectives

*Students will be able to:*

- Describe a wetland
- Identify biotic and abiotic components of a wetland
- Understand the different levels of an energy pyramid for a wetland
- Design an energy pyramid for a wetland
- Explore where Whooping Cranes fit into a wetland energy pyramid
- Understand what an "umbrella species" is

## Standards

Environmental Education B.8.6
English Language Arts CCSS.ELA-LITERACY.W.8.1

## Materials Needed:

- Copies of "What's in a Wetland?" worksheet
- Copies of "Energy Pyramid" worksheet
- Whooping Crane food box (in crane trunk)
- Pencils
- Clipboards

## Background:

Ecosystems are made up of both **biotic** (living or once-living) and **abiotic** (non-living) factors. For example, biotic factors in a forest would be raccoons, trees, birds, and squirrels. Examples of abiotic factors are soil, sunshine, wind, and rocks.

All organisms require energy to grow and reproduce. An energy pyramid is one way of describing how organisms relate to each other based on their energy consumption. Organisms are placed at different **trophic** (energy) levels in an energy pyramid depending on what they eat and where they get their energy. Trophic levels indicate an organism's position in the food chain. The different trophic levels are made up of producers, consumers, and decomposers. The organisms on each trophic level get their energy by consuming organisms on lower levels.

**Producers** are organisms that get their energy from the sun. These organisms produce their own food through photosynthesis. Photosynthesis combines water and carbon dioxide to produce glucose. The energy from the sun is a catalyst for this process. Carrots, roses, algae, and grass are examples of producers.

**Consumers** are organisms that get their energy from consuming other organisms. There are three different levels of consumers in an ecosystem: primary, secondary, and tertiary.

1. **Primary consumers** are organisms that eat producers. Primary consumers are **herbivores**, animals that eat only plants and vegetation. Rabbits are an example of primary consumers.

2. **Secondary consumers** are organisms that eat primary consumers. Secondary consumers can be **carnivores** (animals that eat only meat) or **omnivores** (animals that eat both meat and plants). Whooping Cranes and snakes are examples of secondary consumers.

3. **Tertiary consumers** are organisms that eat primary and secondary consumers. They can either be carnivores or omnivores. Bobcats are tertiary consumers because they eat Whooping Cranes. Owls are tertiary consumers because they eat snakes.

**Decomposers** are organisms that eat dead material in an ecosystem and help break it down into smaller pieces. Have you ever wondered why a log begins to disintegrate into smaller pieces over time? It is because



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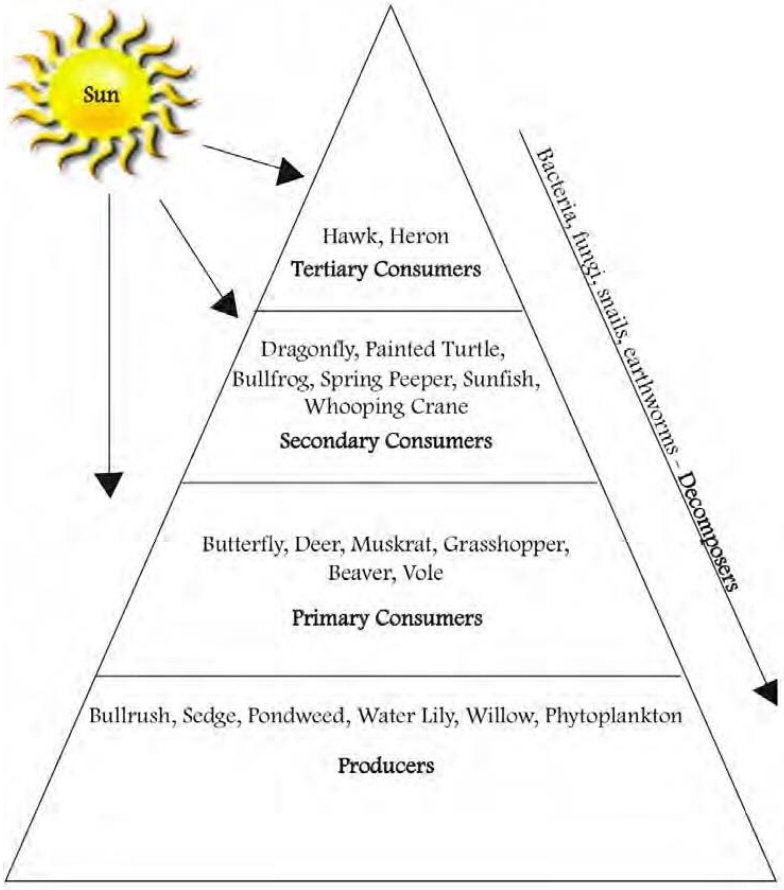
decomposers are hard at work breaking down the log. Often, decomposers are too small to see without the magnification of a microscope. Fungi, bacteria, and earthworms are examples of decomposers.

As we move up the trophic levels, there is less and less energy available for animals to use. This decrease in available energy occurs because there is not a 100% transfer of energy when an organism on one level eats an organism on a lower level. In other words, not all of the energy is transferred to the consumer. For example, when a rabbit eats a patch of grass, not all of the energy in the grass gets incorporated into the rabbit. Some of it goes to helping the rabbit perform everyday functions like moving and breathing. Some of it is simply lost. Then, when a fox eats a rabbit, some of the energy is lost again, so the pyramid becomes even narrower.

As we move from one trophic level to another, the amount of energy available for organisms to consume decreases by a factor of 10. If the producers (grass) have 10,000 kilocalories of available energy per square meter per year (kcal/$m^2$/yr), the primary consumers (rabbits) only have 1,000 kcal/$m^2$/yr, the secondary consumers (fox) have 100 kcal/$m^2$/yr, and the tertiary consumers only have 10 kcal/$m^2$/yr. Because available energy decreases, there are fewer and fewer consumers as we move up the energy pyramid. A lot of producers are required to support a smaller number of herbivores and even fewer carnivores and omnivores.

Below is an example of an energy pyramid that might be found in a wetland:



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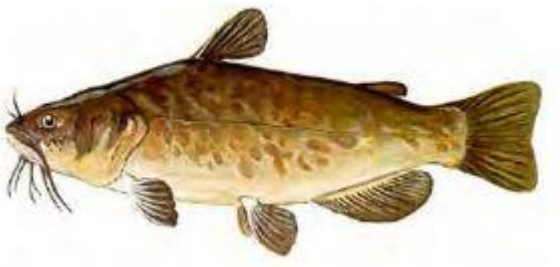
Whooping Cranes are **omnivores**. They have a broad diet that consists of both plants and animals. Some examples of producers consumed by Whooping Cranes are grains, tubers, rhizomes, and berries. Primary and secondary consumers include terrestrial insects (especially grasshoppers), fish, frogs, and aquatic invertebrates. Whooping Cranes are often found in mudflats or shallow wetland areas where water levels have dropped so they can feed on animals that have been trapped in the remaining water. It appears that Whooping Cranes are especially fond of bullheads, crayfish, tadpoles, and blueberries in their breeding grounds.

In their wintering grounds along the Gulf Coast, Whooping Cranes rely heavily on blue crabs for sustenance. Blue crabs are an abundant resource that is rich in protein. Blue crabs need fresh water from streams mixing with the salty water in the coastal bays in order to survive. In years that are stricken with drought, not enough fresh water reaches the coast so the blue crabs are forced to move upstream. When this happens, Whooping Cranes have a hard time finding enough food to eat and some perish. Alternate food sources include wolfberries and acorns.



**Bullheads are a major component of the Whooping Crane's diet when they spend the summers in Wisconsin.** *Photo: MI DNR*

**Whooping Cranes eat a lot of crayfish when they are available.** *Photo: WI DNR*

**Blue crabs are an important source of protein for Whooping Cranes along the Gulf Coast.** *Photo: National Oceanic and Atmospheric Administration/Department of Commerce*


**In Texas, wolfberries are an important part of a Whooping Crane's diet, especially during drought years.** *Photo: Sten Porse, license CC-BY 3.0*



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Wetlands are important to many species. Whooping Cranes depend on both plant and animal life found in wetlands. Whooping Cranes are considered an **umbrella species**. When wetlands are conserved for an endangered species, such as Whooping Cranes, other species benefit from that protection.

**This is an illustration of a coastal wetland in Texas. By setting aside land for Whooping Cranes, whole ecosystems are preserved.** *Image used with permission from the Texas Parks and Wildlife Department.*

## Procedure

1) Have students write a paragraph or two describing what they think a wetland is (including a list of the types of organisms that they think they would find in a wetland) and explaining the importance of wetlands.

2) Visit a wetland and have students record what they see using the "What's in a Wetland?" worksheet list the biotic and abiotic factors in a wetland.

3) Using the list of organisms that they observed and would expect to observe in a wetland, have students create an energy pyramid of a wetland ecosystem on the "Energy Pyramid" worksheet. Where do Whooping Cranes fit in this energy pyramid?

4) Students should examine the food items in the food box. How is the sample of crane chow (which is fed to cranes in captivity) different from what cranes would eat in the wild?



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## Extensions:

1) Students can make an energy pyramid based on what they consume. Have the students keep track of everything that they eat in one day and make an energy pyramid. Where do they fit in? Is there anything that can eat them?



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Name:

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## What's in a Wetland?

| Biotic Factors | | Abiotic Factors |
|---|---|---|
| Plants | Animals | |
| | | |

Are there other organisms that live in a wetland that you didn't see while you were visiting it? List those organisms below. Why do you think you didn't see them?



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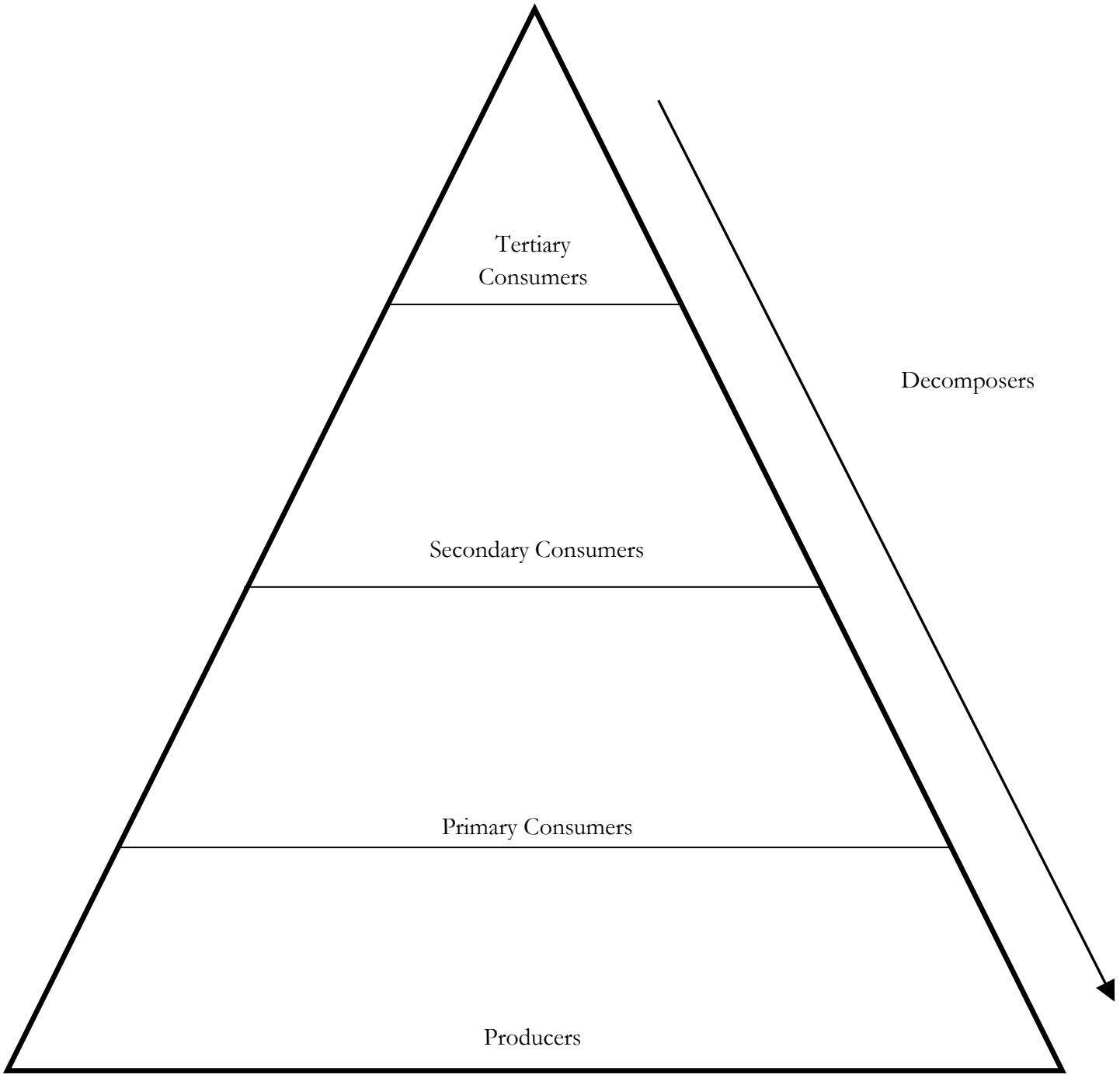
## Wetlands Energy Pyramid



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