Vocabulary:

* Trophic -
* Producers -
* Consumers -
* Primary Consumers -
* Secondary Consumers -
* Tertiary Consumers –
* Detritus Feeders –
* Decomposers –
* Biomass –
* Trophic Levels –
* Trophic Pyramid –
* Food Web -

**Trophic Webs**

1. There are a wide variety of organisms in the world that have a wide variety of survival strategies. Since there are many ways for an organism for organisms to survive, scientists try to categorize them. Use the space below to try to categorize every type of organism in the world into three categories based on their feeding strategies. Give an example for each type of category that you come up with

Share your categories with the a group that is near you. Listen to their categories. Do you want to change your categories at all? If so, use the space below to change categories.

The three main types of **trophic** (relating to feeding) categories that are utilized by scientists are listed below.

1. **Producers** – Organisms that produce their own food. Common examples are plants that do photosynthesis.
2. **Consumers** – Organisms that cannot make their own food. They must go out and acquire energy. Most consumers will eat food to acquire nutrients.
3. **Decomposers/Detritus Feeders** – Organisms that consume dead material or waste products. Detritus feeders consume detritus while decomposers rot dead material.

Using your knowledge of the three different types of organisms, break the following list of organisms into their proper category.

|  |  |  |  |
| --- | --- | --- | --- |
| Rabbit | Palm Tree | Vulture | Orchid |
| Wolf Spider | Fox | Tulip | Giant Panda |
| Dung Beetle | Chicken | House Cat | Tumbleweed |
| Sheep | Wolf | Apple Tree | Earthworm |

|  |  |  |
| --- | --- | --- |
| Producers | Consumers | Decomposers/Detritus Feeders |
|  |  |  |

1. What did you have for dinner last night? Use the space below to write down everything that you ate!

Now try to breakdown the organisms behind the dinner that you ate. Start with the food that you ate and figure out what organisms were made up your food.

*Example: Ham and cheese sandwich 🡪 Wheat (Bread), Pig (Ham) and Cow (Cheese)*

You may notice that there were a wide variety of foods eaten by you and your classmates. However, not every organism is as adventurous as you. Organisms, such as the Koala, maintain a diet that consists of mainly one variety of food.

Since there are such a wide variety of consumers, scientists break consumers down into three major categories.

1. **Primary Consumers** – These are consumers that will only consume producers. Most primary consumers are herbivores that will eat only plant material. A good example of a primary consumer is cow. Very rare exceptions to the plant eating rule include tube worms that eat bacteria (the local producers) near hydrothermal vents.

1. **Secondary Consumers** – These are consumers that will consumer consumers. Secondary consumers can be carnivores or omnivores. Good examples of secondary consumers are pythons (carnivore) and black bears (omnivores).
2. **Tertiary Consumers** – These are top level consumers that eat only other consumers. Tertiary consumers are the top of the food chain and will not eat producers. Since teriary consumers are the top of the food chain they will have no natural predators. they have no natural predators. Good examples of tertiary consumers are lions and eagles.

Use the space below to break down your consumers from problem #1 into primary consumers, secondary consumers and tertiary consumers.

|  |  |  |
| --- | --- | --- |
| Primary Consumers | Secondary Consumers | Tertiary Consumers |
|  |  |  |

1. The prefix “Bio-“ refers to living things. The term “mass” refers to the quantity of matter that an object or system contains.

Therefore **biomass** is the quanity of matter inside of a particular living system. This number is actually quite relevant to Ecologists. It allows Ecologists to understand the basic amounts of energy available in living systems.

Understanding how much biomass is in a **trophic level**, position on the food chain, will let us know how many organisms can be supported in an ecosystem.

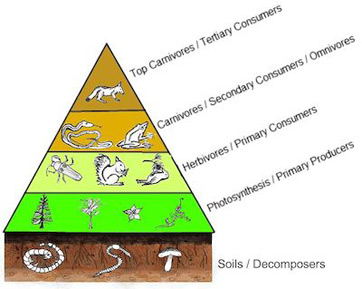
In order to understand the principal of biomass, utilize the population of your lab group ad identify the amount of biomass that is available in your population

**Work Space**

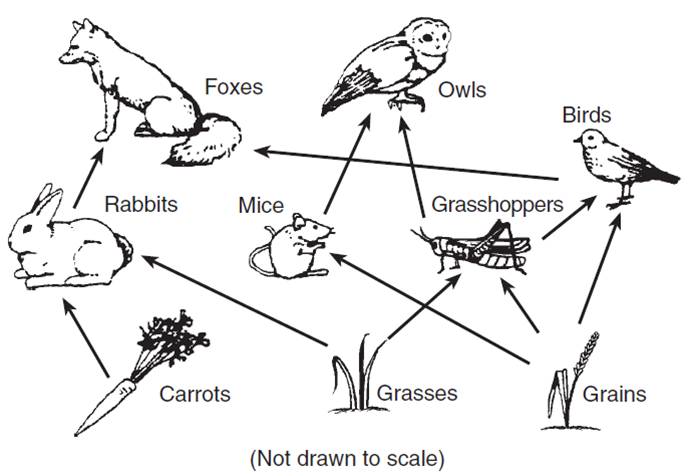
While there is no true conversion for biomass, it is generally agreed that roughly 10% of biomass is conserved when passing from one trophic level to the next in a healthy ecosystem.

Given this guideline, try to solve the two problems below.

1. There are 205000kg of producers in a particular ecosystem. Would it be able to support 2500kg of secondary consumers?
2. There are 500 Koi Fish in a large tank. Each Koi Fish averages 500g and is a secondary consumer. If you wanted to maintain a healthy ecosystem, what amount of producer biomass would you have to maintain?
3. Below is a basic trophic pyramid. This is a visual representation of how much biomass is in an ecosystem. Answer the questions below.



1. According to the trophic pyramid, would you expect to find more producers or primary consumers in an ecosystem? Why?
2. According to the trophic pyramid, what trophic level would have the least biomass? Why?
3. There is an old Chinese proverb, “There is only one tiger to a hill”. Explain that saying using the trophic pyramid.
4. The complexities of feeding relationships between trophic levels are often hard to understand. Basic feeding relationships can be mapped out using a simple **food web** to represent the flow of energy within an ecosystem. Look at the basic food web below and circle three feeding relationships that exist.



However, this food web does not represent each ecosystem that exists. Each ecosystem will have a different food web that explains the trophic relationships in the ecosystem.

Creating a food web of a particular ecosystem will allow for a greater understanding of the basic relationships between organisms. When making a food web, follow the basic guidelines below to the best of your ability.

1. Generally producers will be towards the bottom of the food web, primary consumers will be towards the middle of the food web and secondary consumers/tertiary consumers will be towards the top of the food web. If this is not possible, try to group the trophic levels.
2. Arrows always point on the direction of the flow of energy. In the above example, energy is flowing from the mice to the owl.
3. Decomposers and detritus feeders can be placed in convenient locations.

Use the general guidelines for food webs and create a food web on a separate piece of paper. Use the story listed below as your guide. Only use the relationships that are listed in the story.

**Delaware Water Gap Food Web**

On a bright and sunny morning there was a slight wind in the air. The wind stirred the buttercups and the trout lilies. Grasshoppers hop from place to place eating the grass and flowers, while trying to avoid the robins and leopard frogs. A colony of termites eat a rotting log while a pair of pileated woodpeckers enjoy their morning meal of termites.

The decaying leaves that litter the forest floor play host to a large number of ants and mushrooms that use the leaves as food. It also gives a rich bed of soil for the oak trees and spruce trees that populate the forest

On and over the treetops there is just as much life as on the ground floor. Squirrels jump from tree to tree trying to find acorns from the oaks. Tiger beetles hunt insect larvae by running quickly from place to place. Garden spiders trap passing gnats and mosquitos in their nets that are strung between branches. Above the trees red tailed hawks and bald eagles soar lazily looking for trout, mice and rabbits,

After the sun had reached its zenith, a strange quiet came over the forest. The squirrels went back to their nests, a herd of deer paused from their grass grazing to look up nervously and the robins stopped chirping. Suddenly a loud shot fired out and sent all the animals running. An orange clad hunter stepped out from behind a bush and approached the large buck that he had just shot.