

Science 7

UNIT 1

Interactions within Ecosystems

Topic #1: Living and Non-living



Intermediate Science 7

Topic 1: Living and Non-Living



Using Your Imagination

Close your eyes and imagine that you are standing in a forest.

- 1) List at least 5 things that you “see”.
- 2) Next, describe the local conditions (eg. land features, temperature, etc.) of your forest setting.



CLASSIFYING THINGS

- How to classifying things in your surrounding:

=>Living

=>Non Living

=>Dead

Scientists use a classification system to study, compare & identify living things.



LIVING THINGS

- **Living things:** Something that is alive or having characteristics of life.

Organism refers to a living thing

There are three things that all living things can be classified as:



plant



animal



micro-organism



What is a Characteristic?

- **Characteristic** refers to a feature.

What are the characteristics of a moose?



CHARACTERISTICS OF LIVING THINGS

BRAINSTORM ACTIVITY

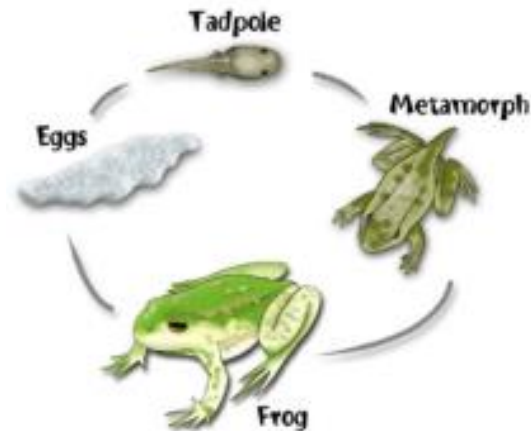
- What are some characteristics of living things?



1. GROWTH

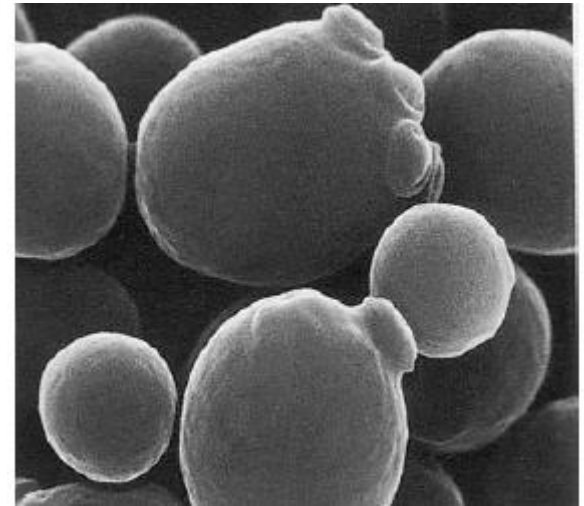
- **GROWTH:** the characteristic of life that allows organisms to get bigger, change and repair themselves. It means more than just getting bigger.

Growth is a part of a life cycle



2. REPRODUCTION

- **Reproduction:** The replacement of an old generation by a new generation.



3. MOVEMENT

- **Movement** - any motion or activity that changes the shape, position or location of an organism.
- **Locomotion** - movement from one place to another. For example, humans use legs for locomotion



4. RESPONDS TO THE ENVIRONMENT

- **Stimulus:** Anything which causes activity or change in an organism and can be either internal or external.

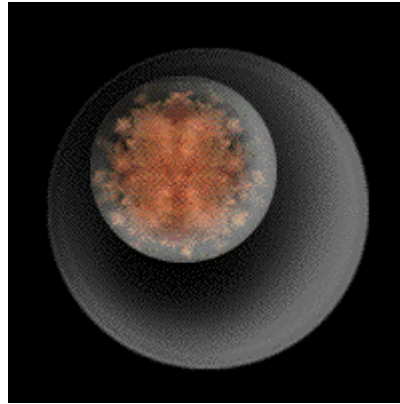
- *Some Stimuli are :*

- Odours
- temperature
- lights
- taste
- touch
- gravity
- electric shock



5. MADE OF CELLS

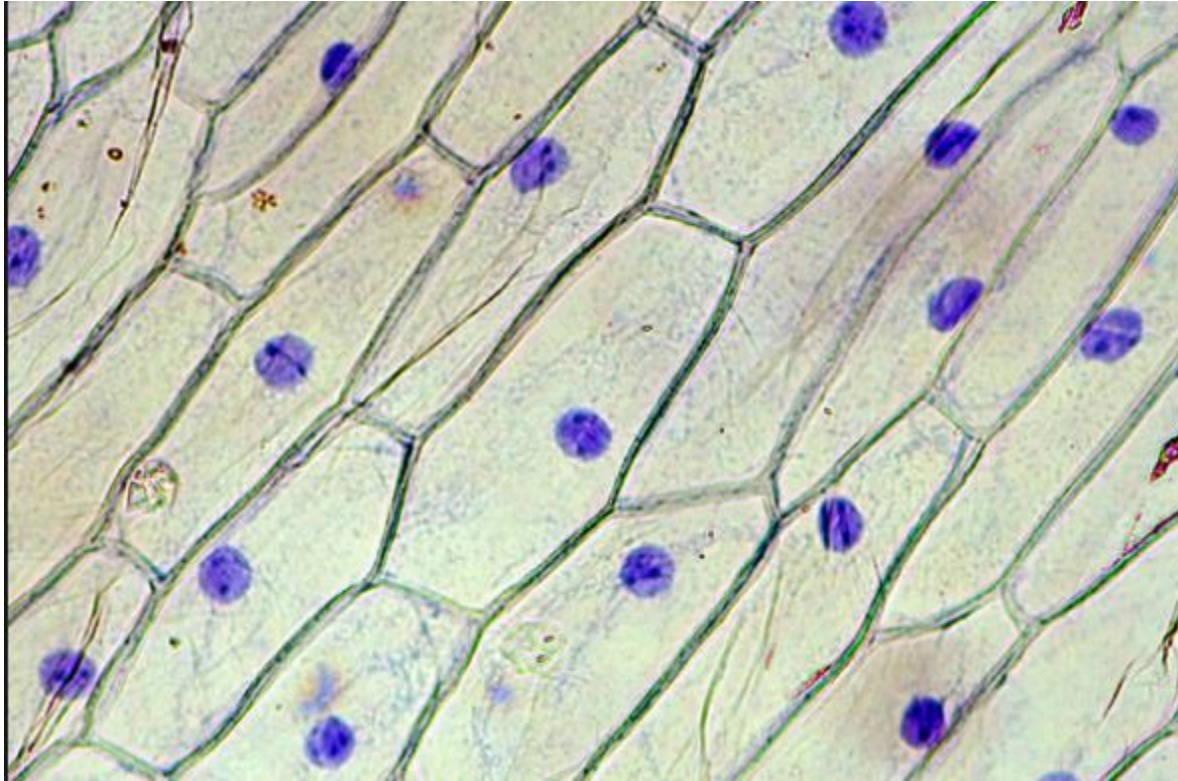
Cell refers to the tiny, living building block which makes up all living things



Organelles refer to structures of a cell that perform a specific function. Each organelle has a role to play in the activities that are necessary for the life of the cell.



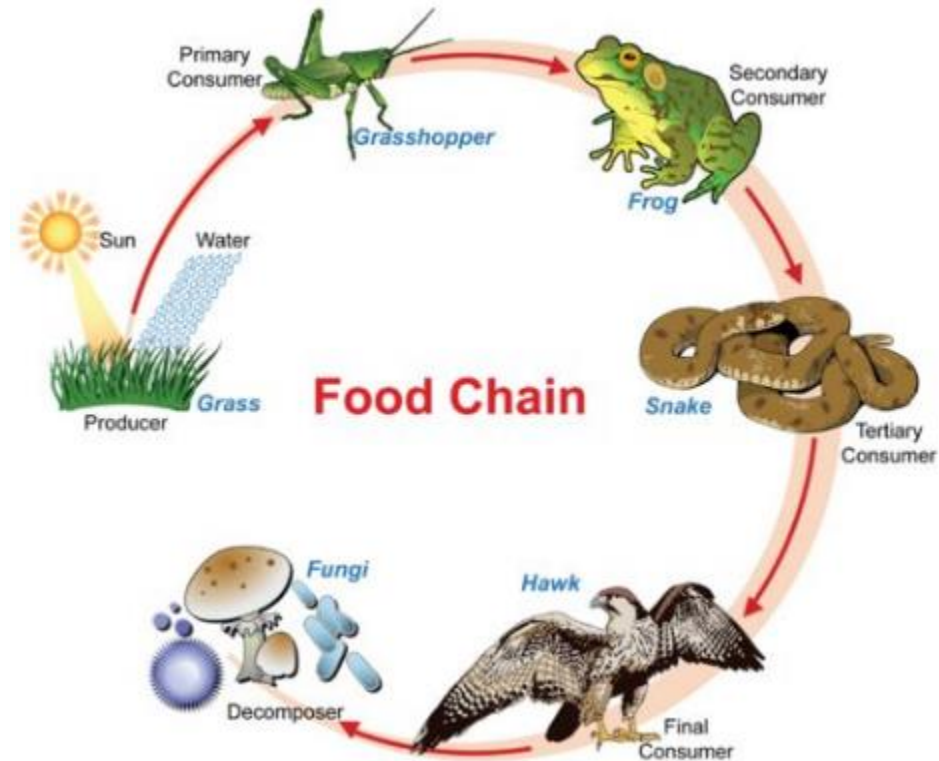
OBSERVING AN ONION CELL WITH A MICROSCOPE



6. Obtain and Use Energy

Cells cannot survive on their own. They need power to stay alive. They need energy to perform functions such as growth, maintaining balance, repair, reproduction, movement and defense. This means all living organisms

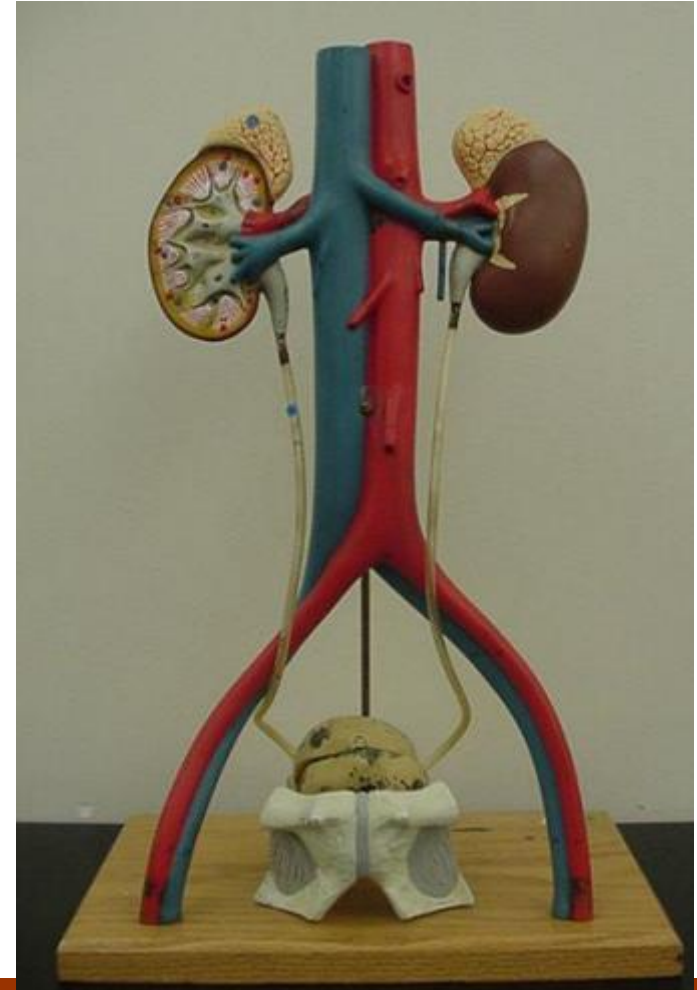
must obtain and use energy to live



7. Gets rid of wastes that build up in its body:

What kind of waste does your body produce?

The breakdown of substances in the body are eliminated through the excretory system





Species

Species: a group of organisms that can naturally breed to produce fertile offspring. (Example. Human)



Population

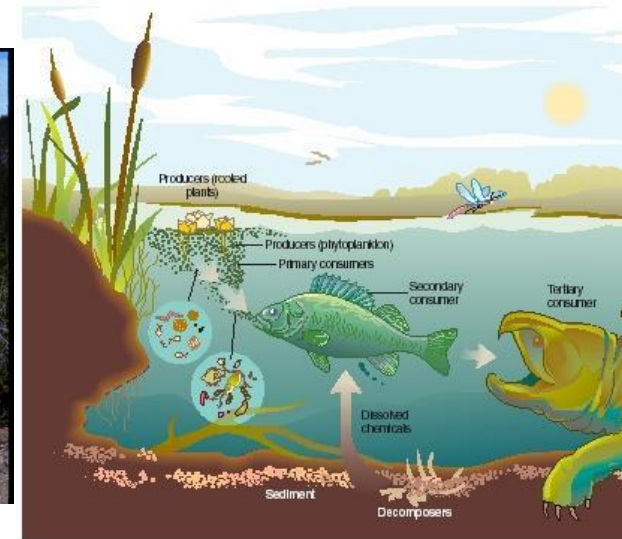
- **Population** are members of the same species, living in the same area
- Ex: moose on the Avalon Pen.

northern cod stock



Community

- **Community** population of species that occupy the same habitat (place where a species lives)
 - Ex: forest:
 - > all birds, all rodents, moose, rabbits, foxes





Dead

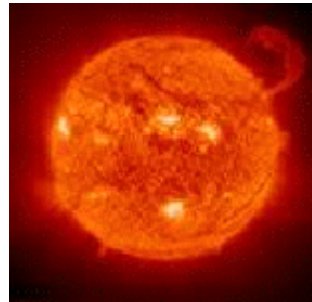
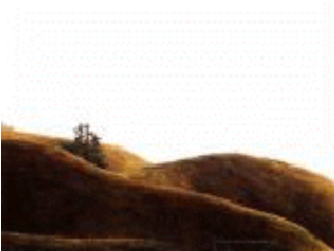
- **Dead**: refers to something that was once alive, but no longer has any signs of life.



NON -LIVING

- **Non-living:** never having all the signs of life.

Examples air, water, soil, sunlight, temperature and landscape.





Which objects in this scene are living? Which ones are non-living?



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Interactions within Ecosystems

Topic #2: Introduction To Ecosystems



What is a habitat?

Habitat is a place where plants and animals lives.

Some organisms can survive only in certain habitats.

For Example: a pond is the home of a beaver



HABITATS

- .



- eg *Arctic Canada* is the habitat of the polar bear.

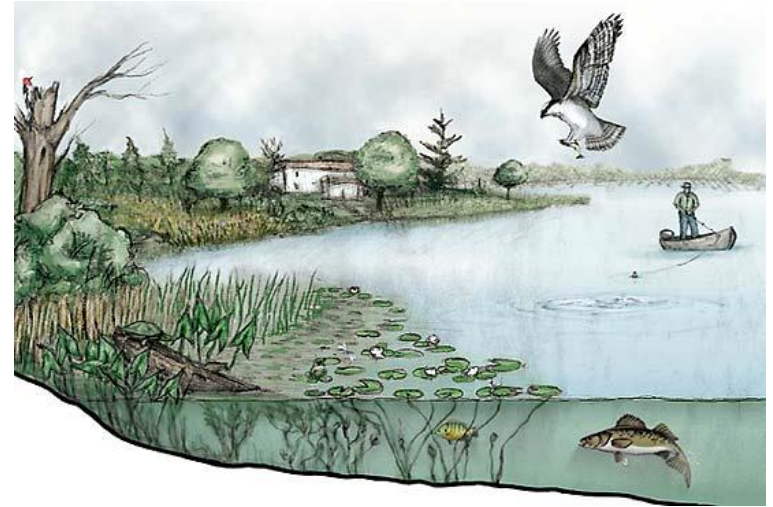


Ecosystem

- **Ecosystem** refers to the network of interactions that links the living and the non-living things in an environment.

Ecosystem includes

- the many species living in an environment
- the relationships among those species
- the relationships between the species and the non-living environment.



Note: An Ecosystem can be studied by breaking it into two parts:



1. BIOTIC FACTORS

- **Biotic factors** refers to living or dead parts of the environment.
- Examples: plants, animals, and micro-organisms.

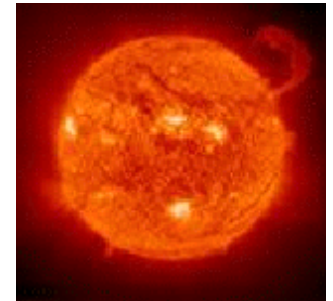


2. ABIOTIC FACTORS

- **Abiotic Factors** refers to the non-living parts of the environment.

The abiotic factors include:

1. Intensity of sunlight
2. Temperature
3. Soil
4. Air and wind
5. Water



Biotic vs Abiotic Factors

Ecosystem

Biotic Factors

**Animals, plants, people,
birds**

Abiotic Factors

**Water, sunlight, soil, rocks,
wind, temperature**



Educational Film

- The role of abiotic factors.

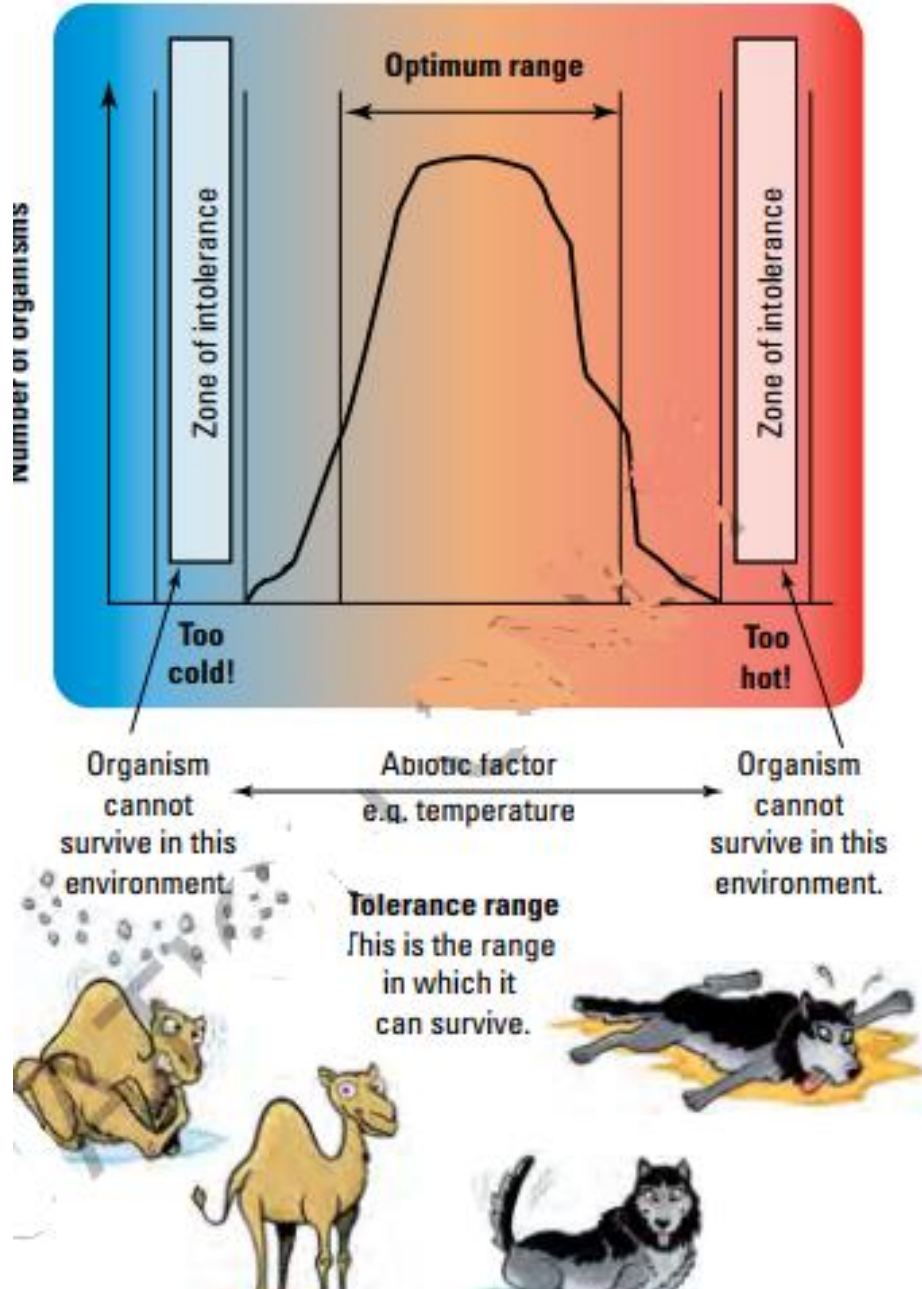


Range of Tolerance

Range of Tolerance refers to the abiotic factors that affect where an organism can survive. An organism will survive best at the middle of their range of Tolerance.

- For example a plant may die if the temperature drops below 0 °C or reaches 50 °C.





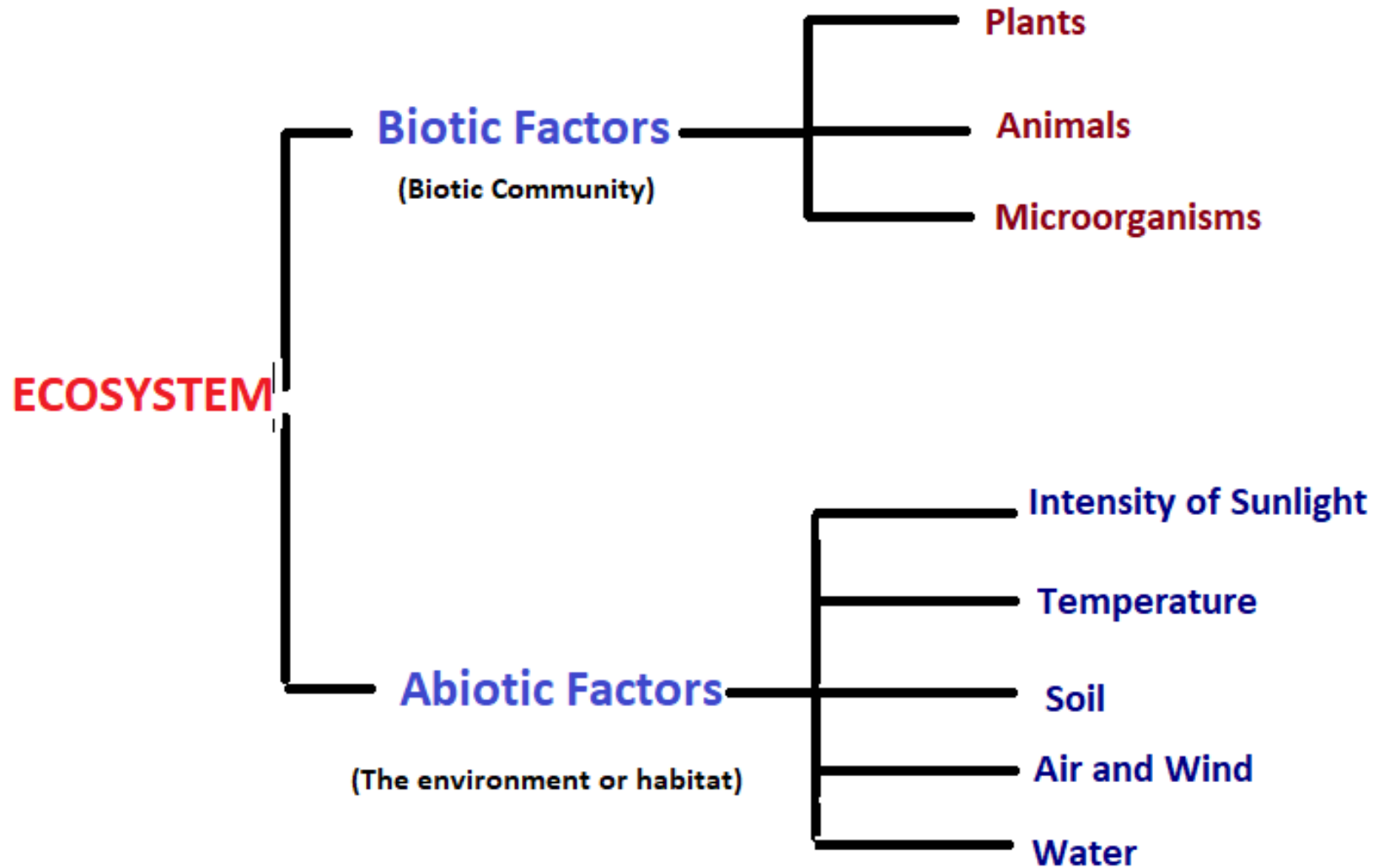
Biotic & Abiotic Factors

Place each item in the correct location in the chart:

Rotting Tree
Dead Bird
Fish
Sunlight
Bone
Air
Temperature
Rocks
Maple Tree

Biotic	Abiotic





There are a variety of ecosystems on planet Earth!

Large ones – Atlantic ocean

Small ones – rotting log

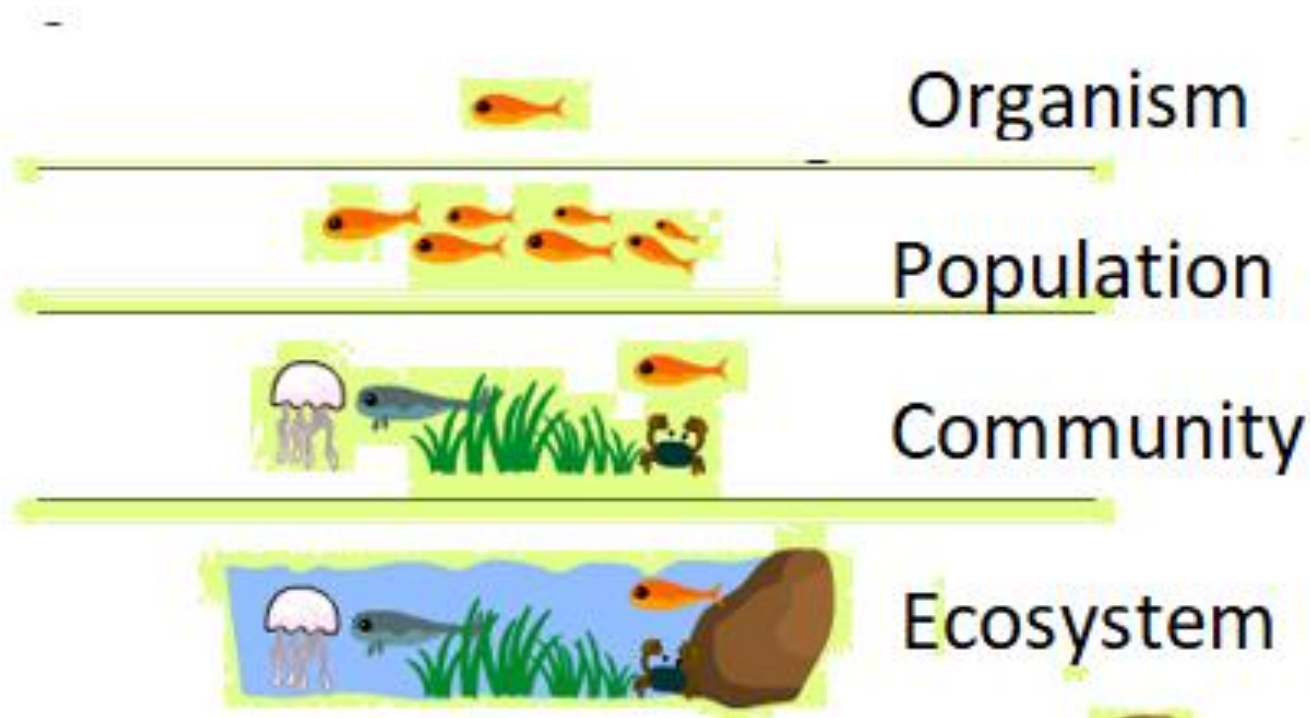
Dry ones – Sahara desert

Wet ones – bogs

ETC.

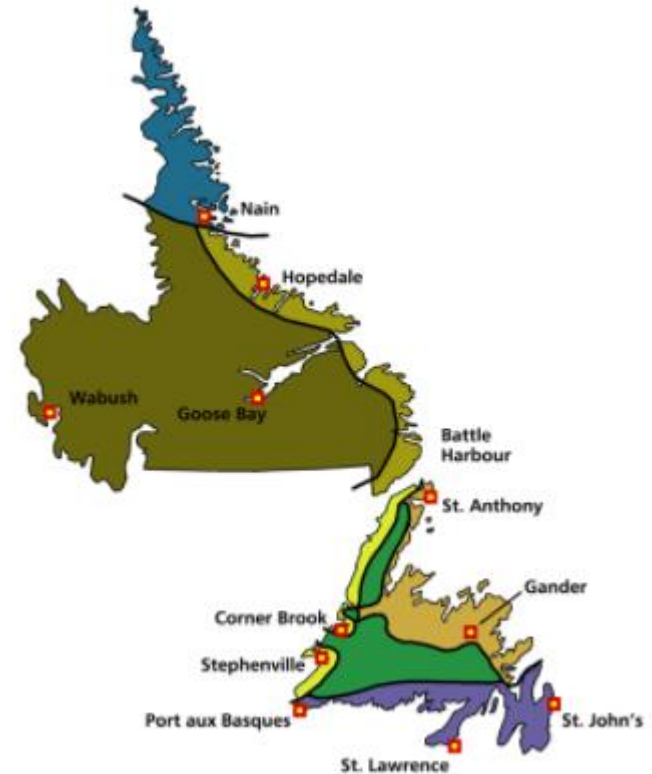


Levels of organization in an ecosystem



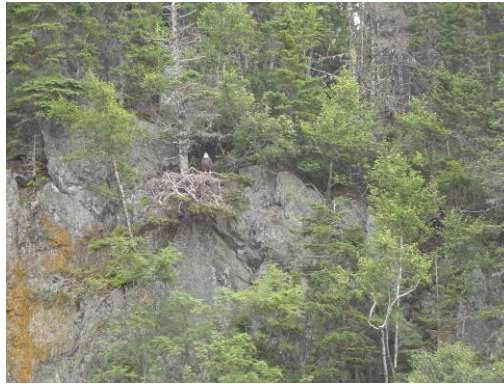
Types of Ecosystems In Newfoundland and Labrador

1. Coastline
2. Ocean
2. Freshwater
3. Arctic
4. Forest



1. Coastlines

- The coastlines of NL are very rocky and sometimes become covered with water as the tides wash in and out.
- Organisms that call the coastlines their home can attach themselves to the rocks to avoid being washed away.
 - Examples: Seaweed, barnacles, mussels, starfish, and rock crabs.



2. Oceans

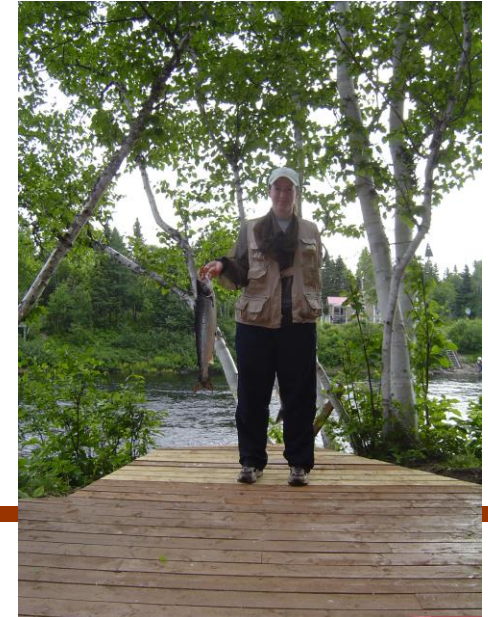
- The Labrador Current flows southward along the east coast of Canada. This current is responsible for our NON-tropical climate!
- Our Atlantic ocean is COLD and so the marine life here must be adapted to live in its frigid temperatures.
 - Examples: Caplin, cod, seals, whales, jellyfish, etc.
 - Also, don't forget the gulls! It wouldn't be fishing in NL if you didn't have a flock of gulls surrounding your boat!



3. Freshwater: Rivers, Lakes, and Ponds

- Can you name some popular rivers and lakes in NL?

- NL's freshwater provides a habitat for many different types of animals. Most common to us are salmon, trout, beavers, ducks, and frogs.



4. Artic

- The northernmost tip of Labrador has an artic ecosystem
 - it's COLD!
- Since it also has very little precipitation, it has been called a “cold desert”.
- A meter below the surface of the ground, the soil is permanently frozen (**permafrost**).
- Plant life: low shrubs, mosses, lichens, small flowering plants.
- Animal life: caribou, musk, ox, wolves, artic foxes and hares, and lemmings.
- Some birds rear their young here in the spring but must return south in winter due to the cold.

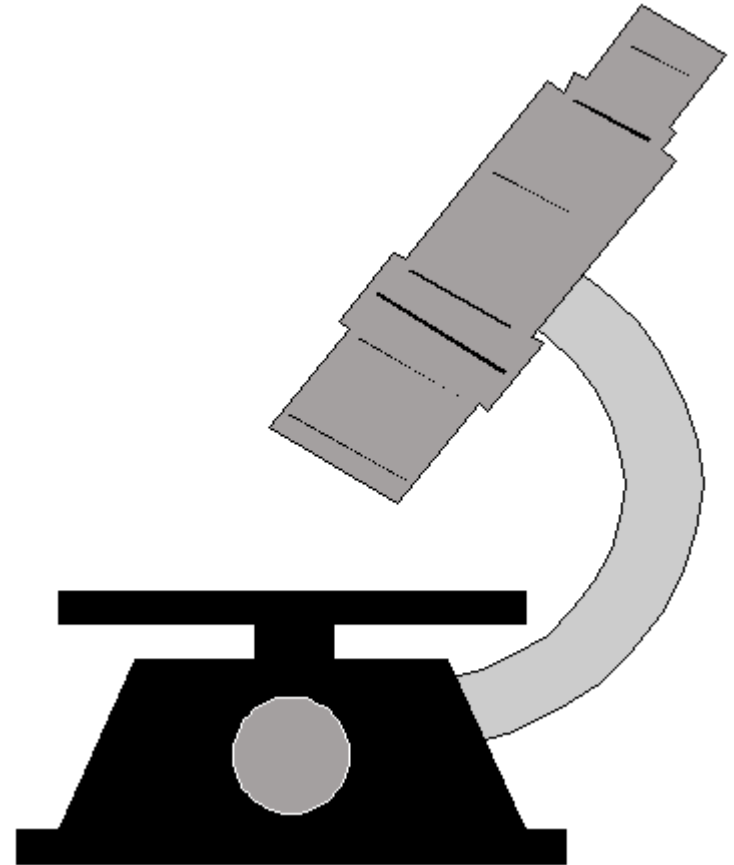


5. Forests

- Forest ecosystems cover the majority of NL.
- Climate: Summers are cool while winters are wet.
- Common trees: Black spruce, balsam fur, white birch, and mountain ash.
- Animal Life: moose, caribou, black bear, lynx, red fox, pine marten, and mink.
- Where drainage is poor, bogs and marshes often develop. The build-up of decaying material forms peat – a type of soil rich in nutrients.



Go Over Laboratory Safety



Core Lab 1: Salty Seeds?



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Interactions within Ecosystems

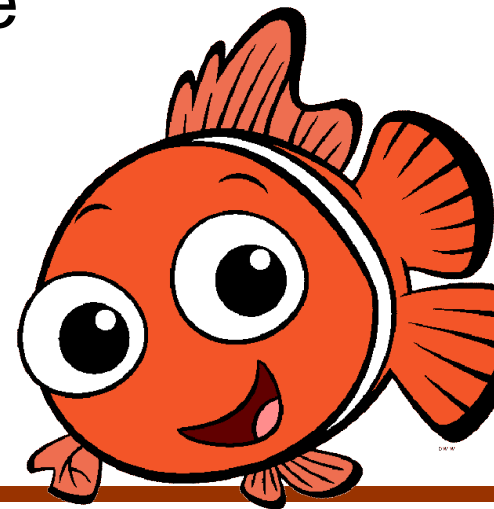
Topic #3: Interactions in an Ecosystem



Interactions -Discussion

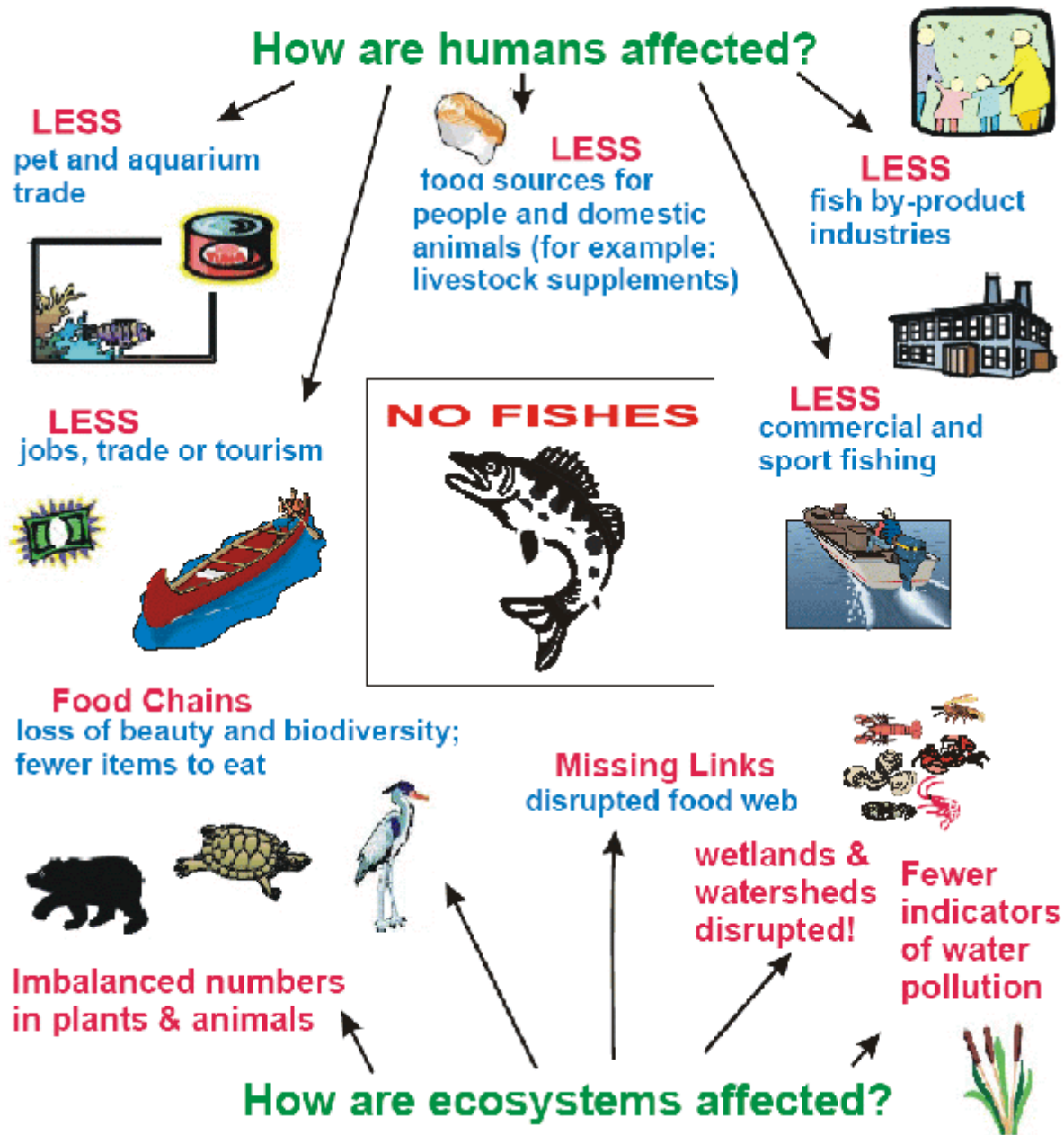
Imagine a world with no fish!!

- Imagine a world without fishes. Suppose a developer built a housing community within a natural forested area with a stream — disruption to the area would destroy habitats and kill many species including fish. Think of all the ways you interact with fish. Who and what would be affected?



Imagine a World Without Fishes:

A Loss of Biodiversity



Environmental
reactions

What is An Interaction?

Interaction refers to how the actions of an organism affect its environment. There must be interactions within our environment in order for organisms to survive.

Example: A bear eating berries and drinking from a stream.



Types of Ecosystem Interactions

Interactions in an ecosystem can be classified as:

1) Abiotic – Abiotic

2) Biotic–Abiotic

3) Biotic - Biotic



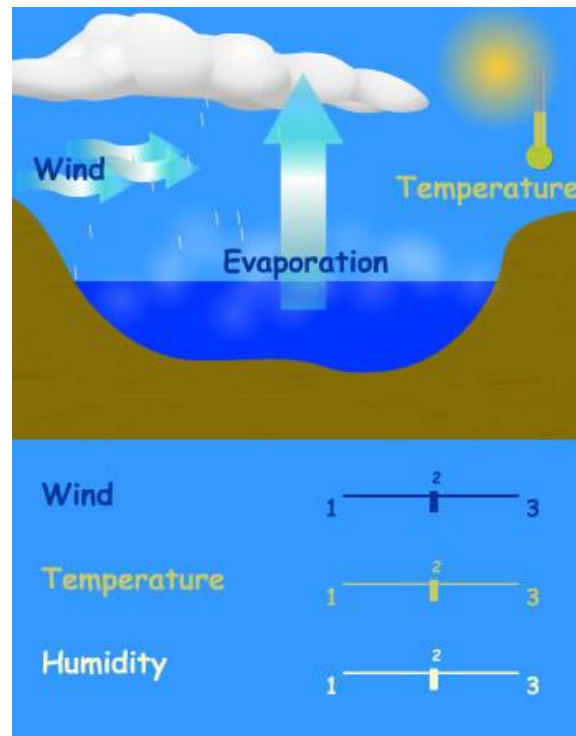
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1) Abiotic – Abiotic Interaction

Example:

Sunlight causes water to evaporate

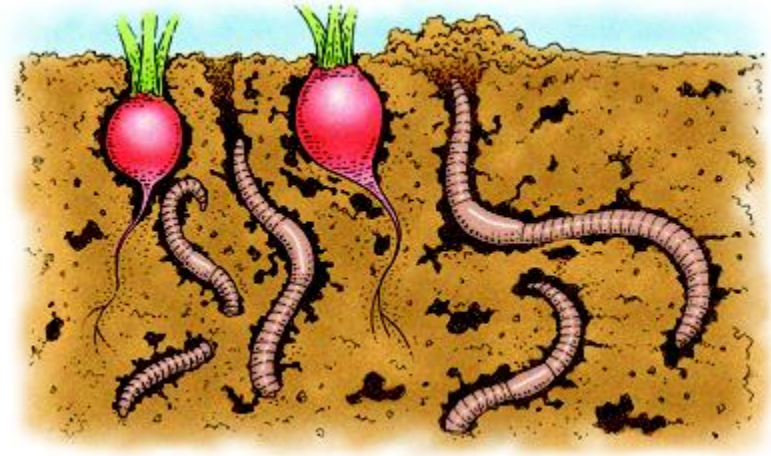


• Biotic – Abiotic Interaction

For Example:

Polar uses water to move from one location to another

A worm aerates the soil



• Biotic – Biotic Interaction

For example

A bird nesting in a tree

A bear eating a moose

A mosquito biting a person

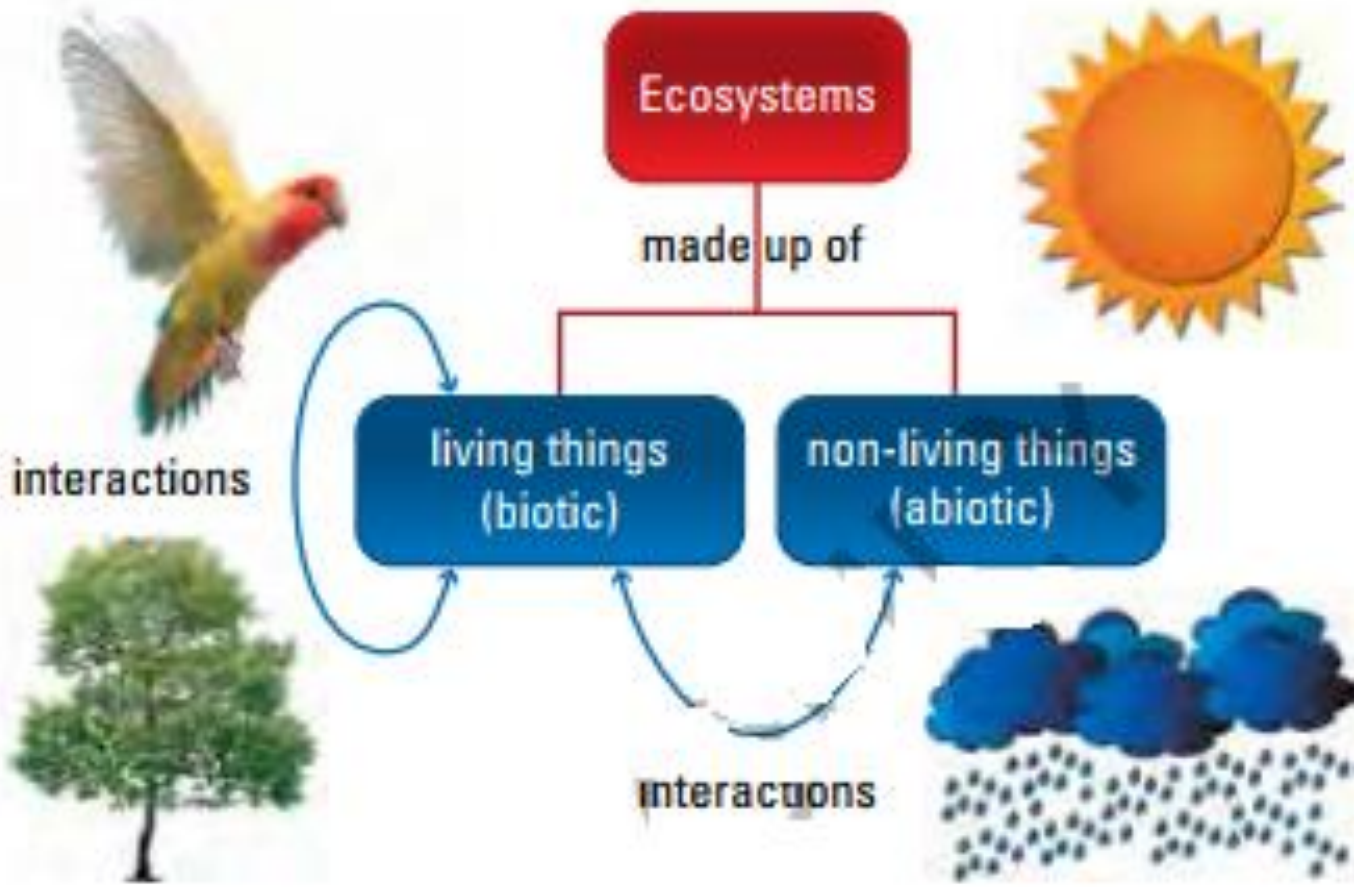


Why Do Living Things Interact In An Ecosystem?

Living things interact within their ecosystem to obtain:

- 1) Food
- 2) Oxygen
- 3) Water
- 4) Shelter
- 5) Protection
- 6) Transportation





Core Lab 2: What is in your school yard?

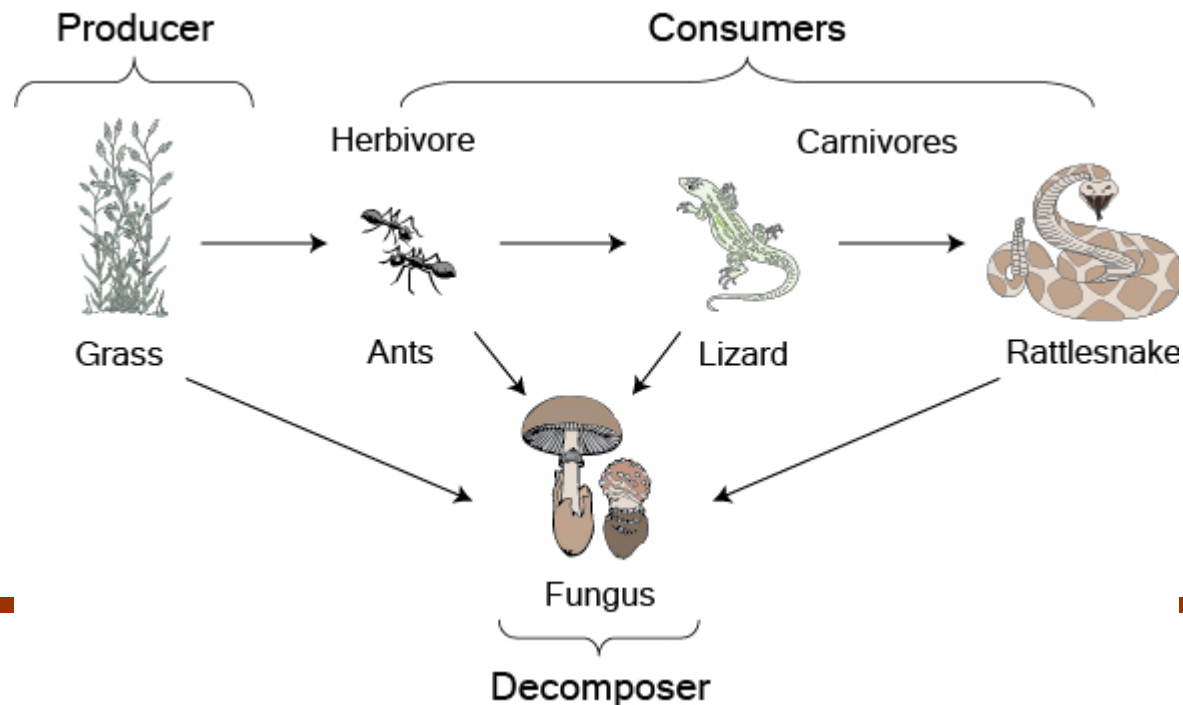


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Interactions within Ecosystems

Topic #3: Roles Of Organisms In Ecosystems



Classifying Living Things In An Ecosystem

How an living thing gets energy can be used to classify it. An organism can be classified as:

- 1) Producer
- 2) Consumer
- 3) Decomposer

Producers



Consumers



Decomposers



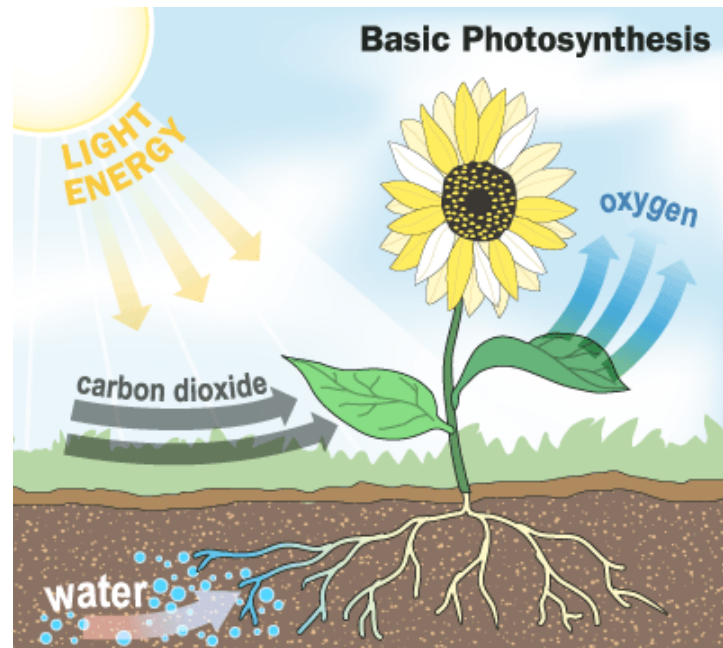
1. Producer

Producer refers to organisms that are able to make their own food.



PHOTOSYNTHESIS

- **Photosynthesis:** process occurring in green plants that uses the sun's energy to convert water and carbon dioxide into food and oxygen.



2. Consumers

Consumer : an organism that obtains its food by eating other animals.



Three Types Of Consumers:

Herbivores which eat producers.



Carnivores that eat herbivores.

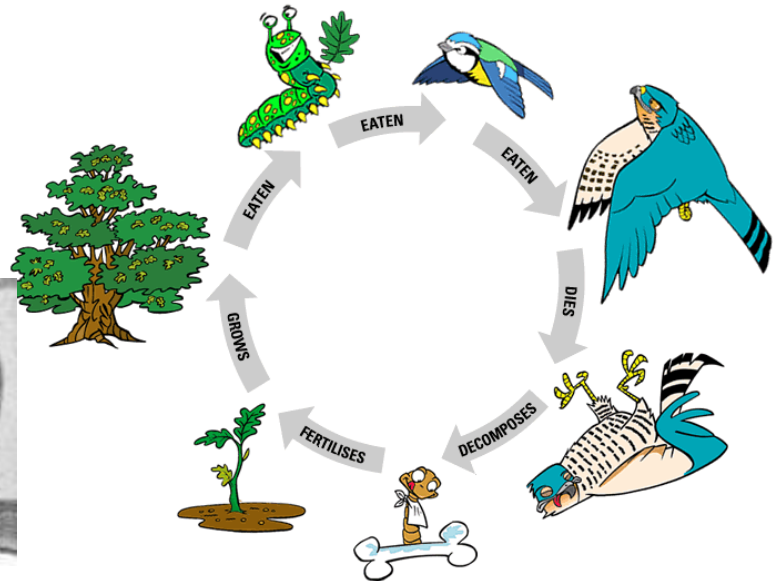
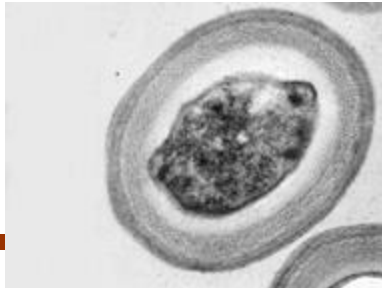


Omnivore: which eat both plant and animal material.



3. Decomposers

Decomposers feed by producing weak acids that break down dead tissue into smaller part chemical particles. This process releases nutrient materials gases into the soil, water, and air, where they can be used by producers. In this way, every organism that dies is recycled. The nutrient materials are never used up.



NICHE

Niche refers to the jobs, or roles of an organism make up.

In nature, each species plays a particular part in the ecosystem it shares with other organisms. Some are producers, some are consumers, some are decomposers, and so on.



A complete description of an organism's ecological niche includes:

Where and when it mates

When it feeds / where it feeds

What it eats

What eats it

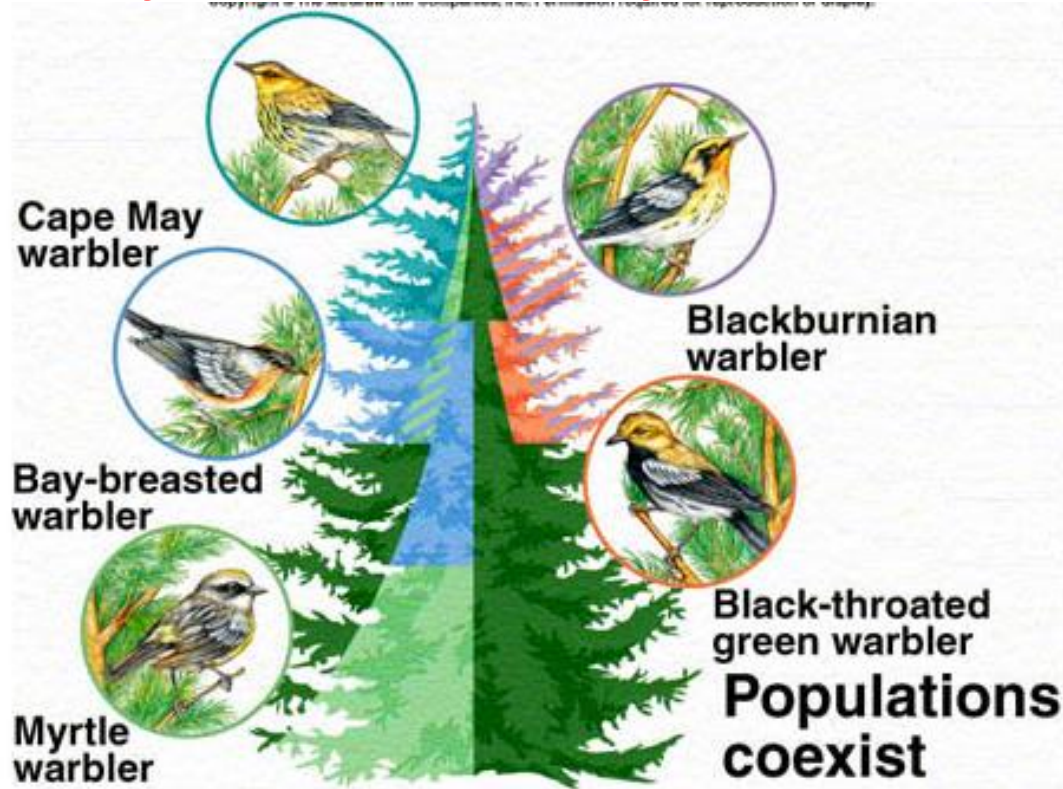
How it competes etc

To provide a description of a ecological niche, consider what would happen if the organism was removed from its habitat

For Example: What would happen if all the squirrels were removed from Newfoundland?



Every type of organism has its own niche and no two niches in the same ecosystem are exactly the same.



The American Warblers split up their niches within spruce trees. In other words, each species of bird hunts insects in a different part of the tree and nests at a separate time from other warblers. These data indicate that by reducing niche overlap, species are able to coexist within a community. Such a scenario results in a decrease in competition between species within a community.





Introduction of New Species

If two species do share similar niches in an ecosystem, competition for survival may occur.

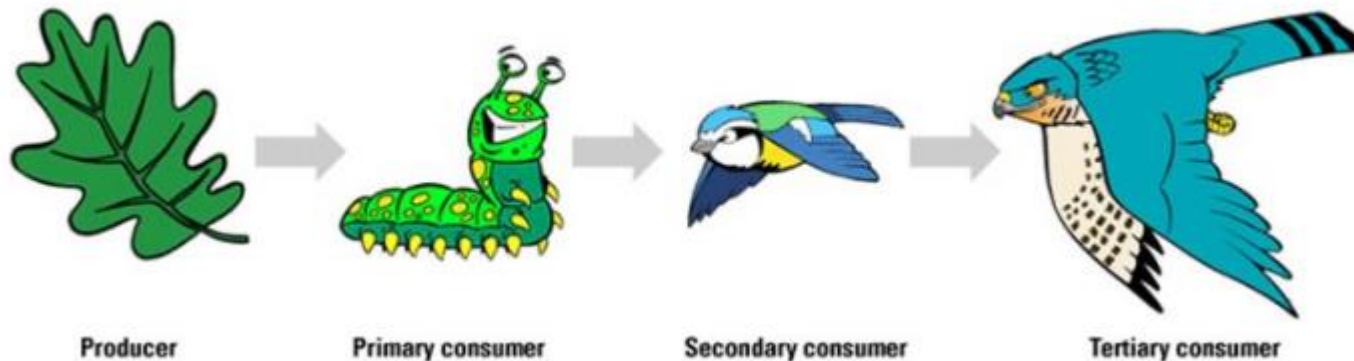


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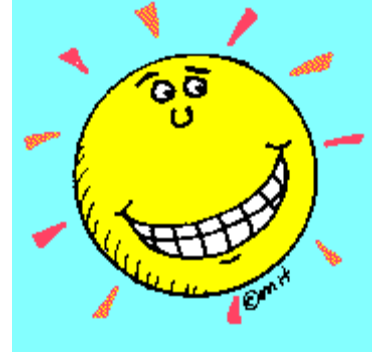
UNIT 1

Interactions within Ecosystems

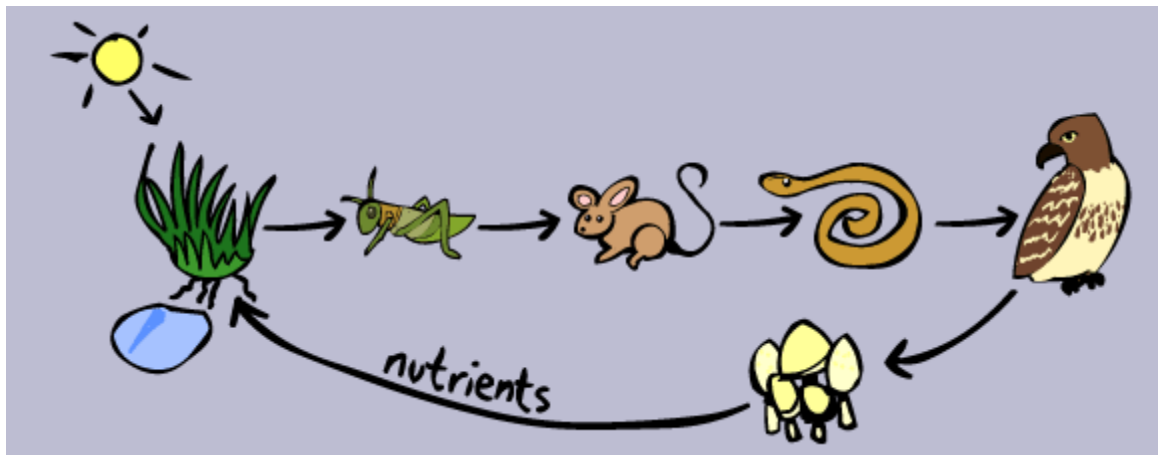
Topic #4: Food Chain and Food Webs



Energy flow



- The source of energy for Earth is the sun
- It is a one-way flow. Energy enters an ecosystem through the process of **photosynthesis** carried out by **primary producers**.

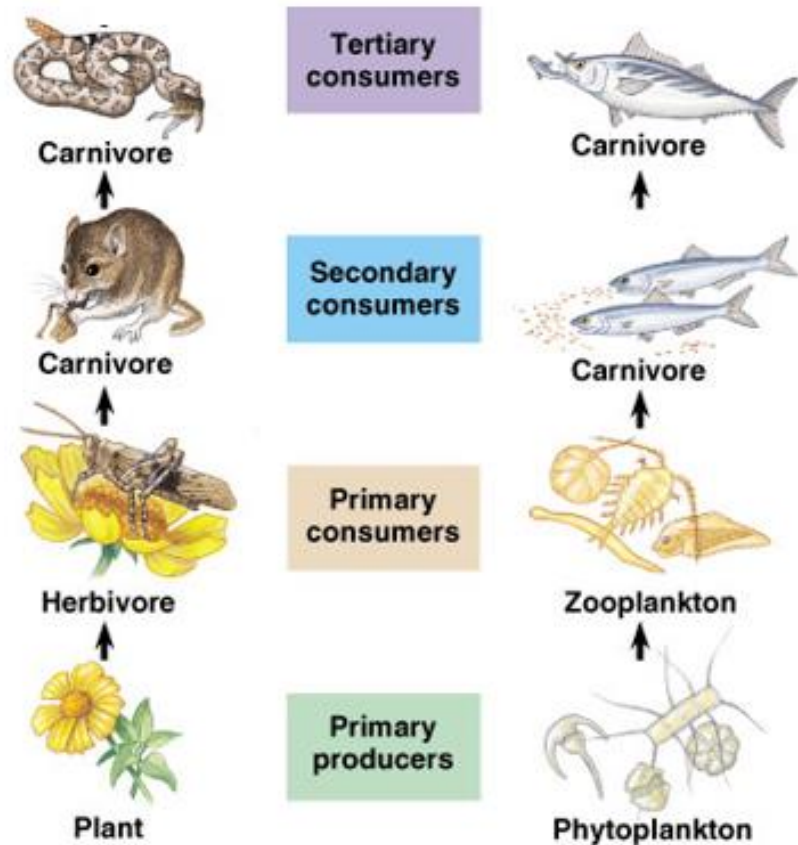


Every organism needs to obtain energy in order to live. For example, plants get energy from the sun, some animals eat plants, and some animals eat other animals.



FOOD CHAIN

Food Chain: the movement of food energy and nutrients through an ecosystem from producers to different level of consumers. It begins with the producer that obtains/captures the energy from the sun

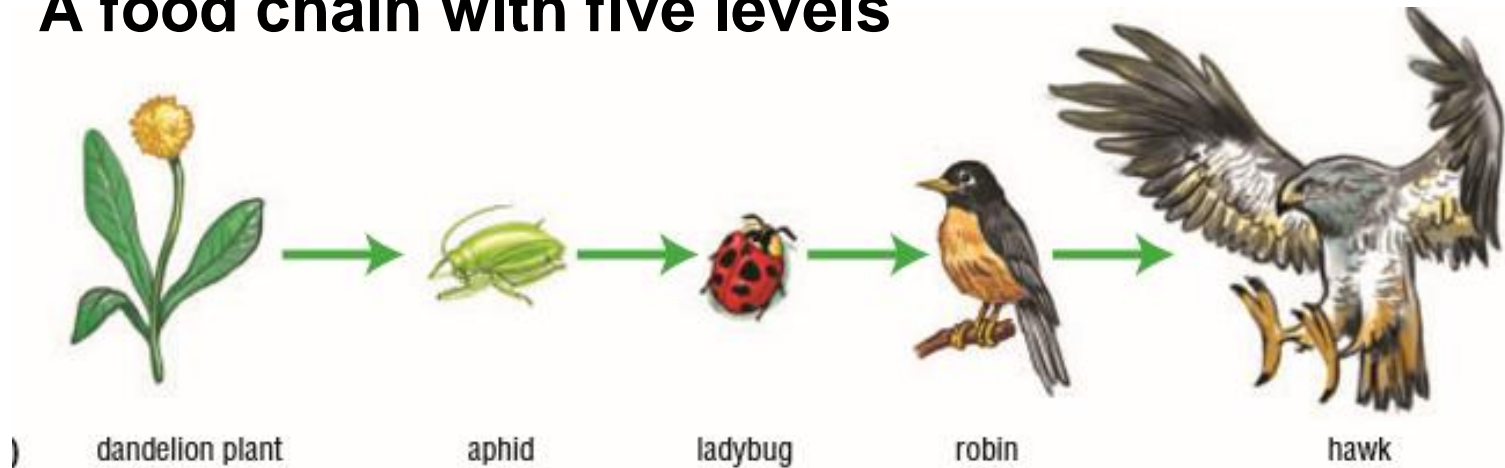


Food Chains In Newfoundland

A food chain with only two levels



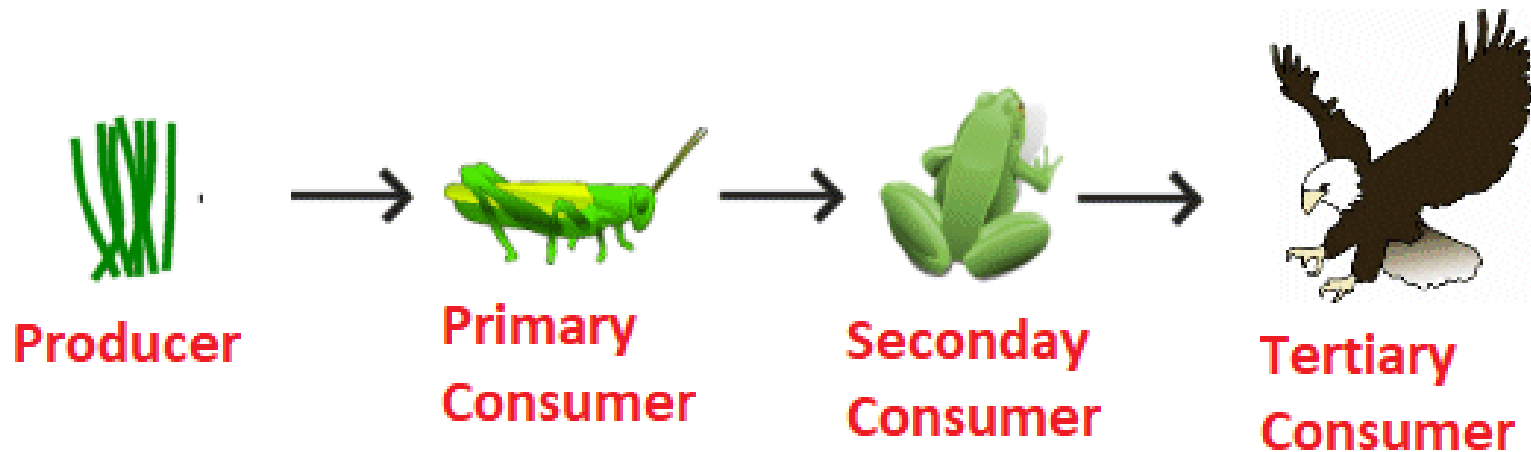
A food chain with five levels



The Movement of Energy In A Food Chain

Note:

Arrows are used to indicate the direction the energy flows in the food chain



Levels In A Food Chain

1. Producers: an organism that can produce its own food from materials in the abiotic environment. They use photosynthesis to produce their own food. Always Starts a food chain

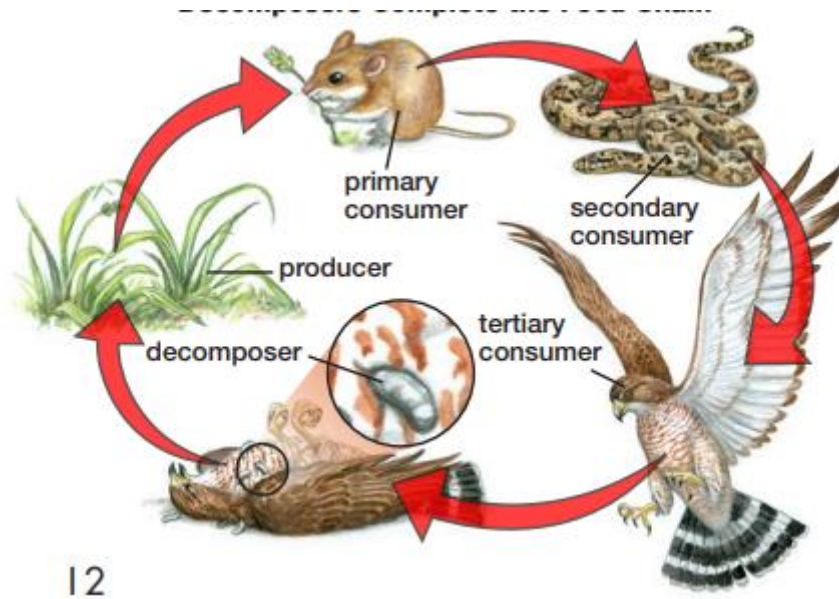
2. Primary Consumer : an organism that eats only producers. It is a Herbivore

3. Secondary Consumer : An organism that eats primary consumers or other animals to obtain energy. It is a carnivore

4. Tertiary Consumers: An organism that eats the secondary consumers. It is a carnivore



Decomposers Complete The Food Chain



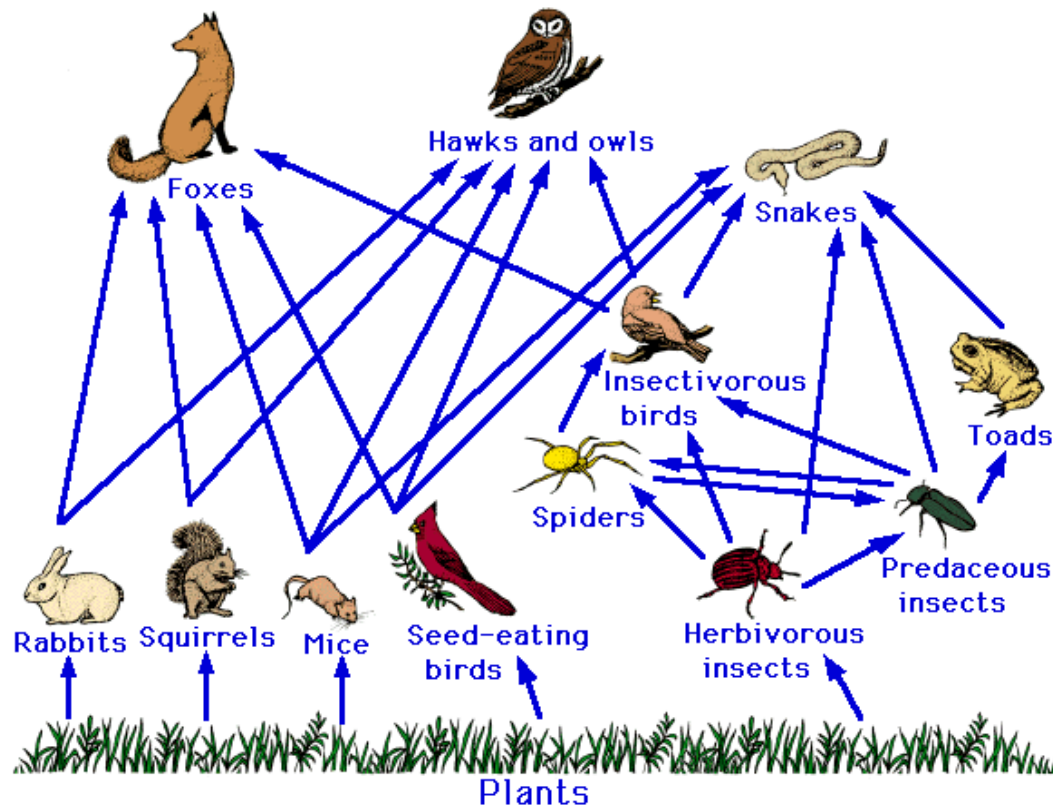
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Decomposers are the last link in any food chain. They are nature's recyclers: They ensure that nutrients are returned to the soil so producers can use them for the purpose of photosynthesis. Without decomposers such as bacteria and mushrooms, the earth would be covered in waste and the flow of energy would be a one way street instead of a cycle.

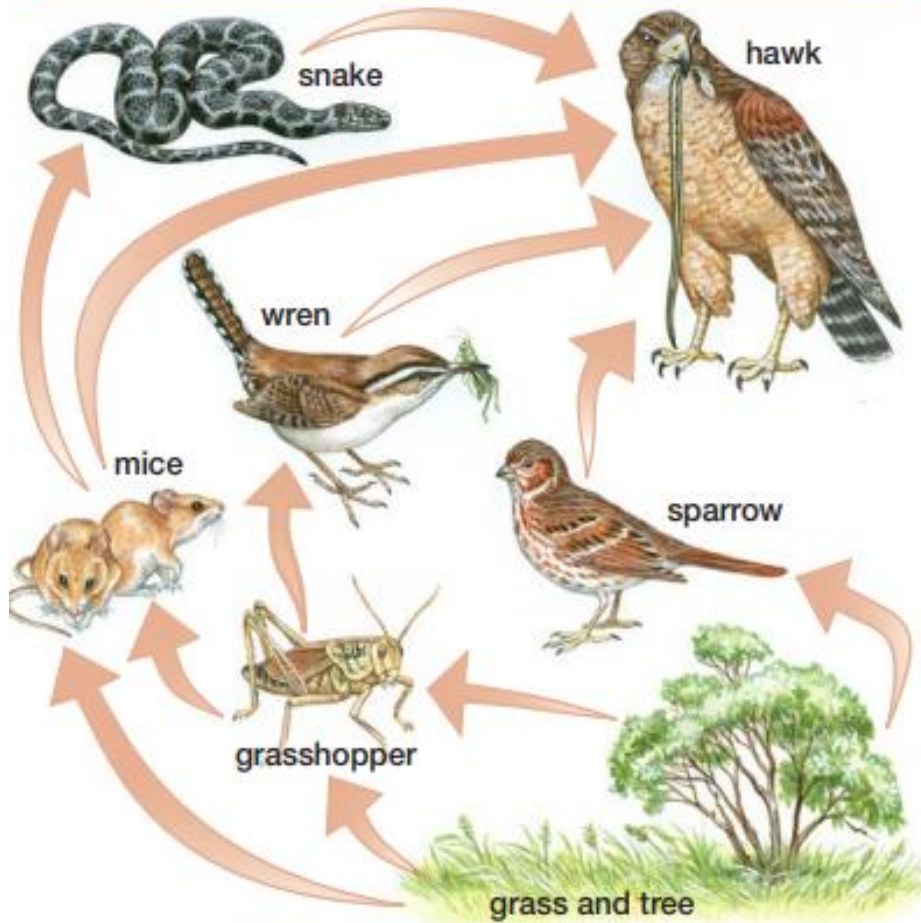


Food Web

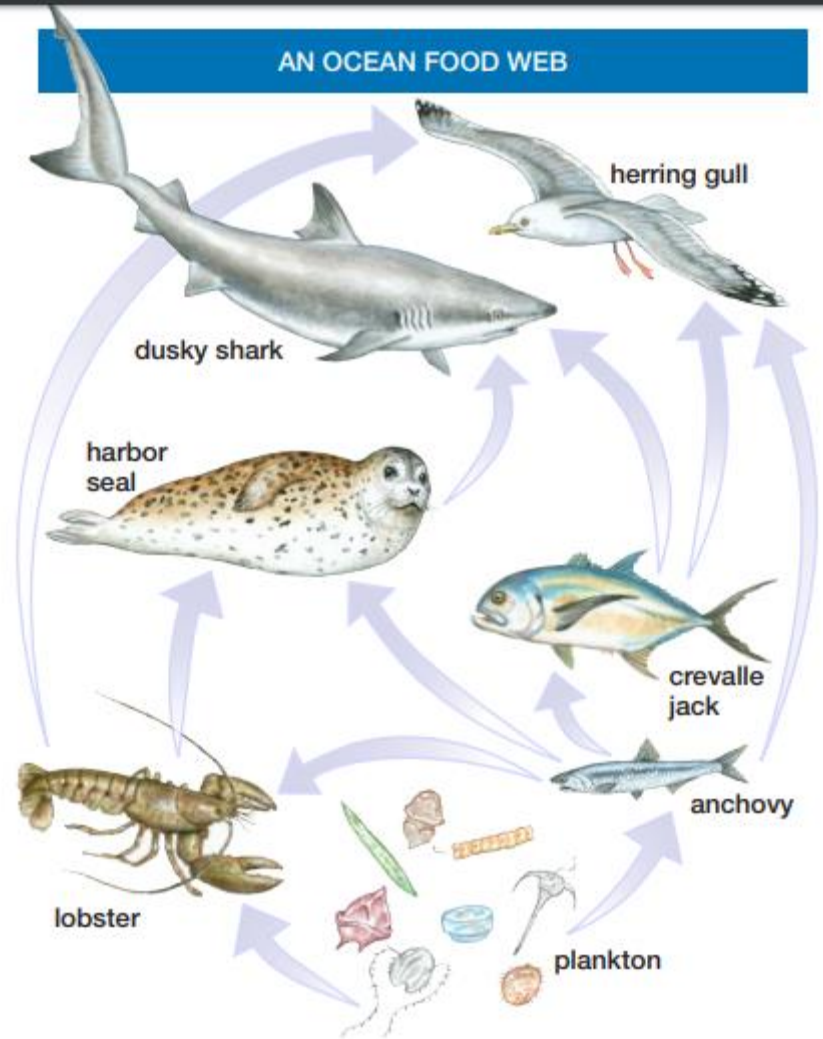
- **Food Web:** a series of interconnected food chains, showing many feeding relationships among organisms.



A FOREST FOOD WEB

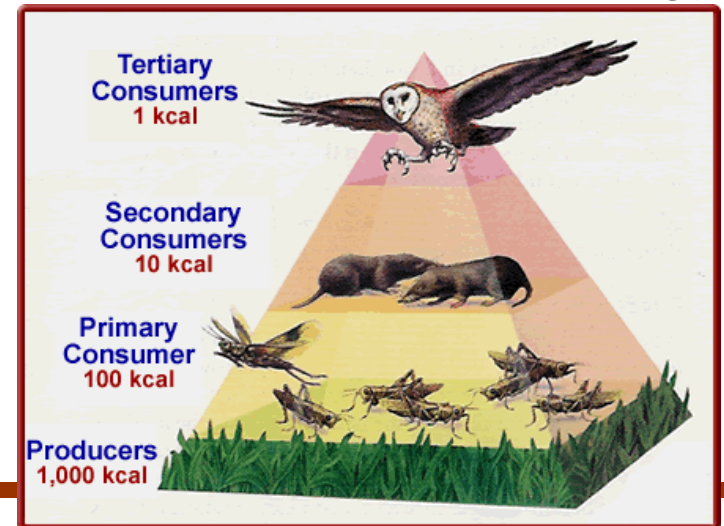


AN OCEAN FOOD WEB



Energy Pyramids

- **Energy pyramid** shows the amount of energy that moves from one level to another in a food chain.
- The most energy is available at the producer level of the pyramid.
- The availability of energy decreases as it moves up the energy pyramid.



Tertiary consumers

Secondary consumers

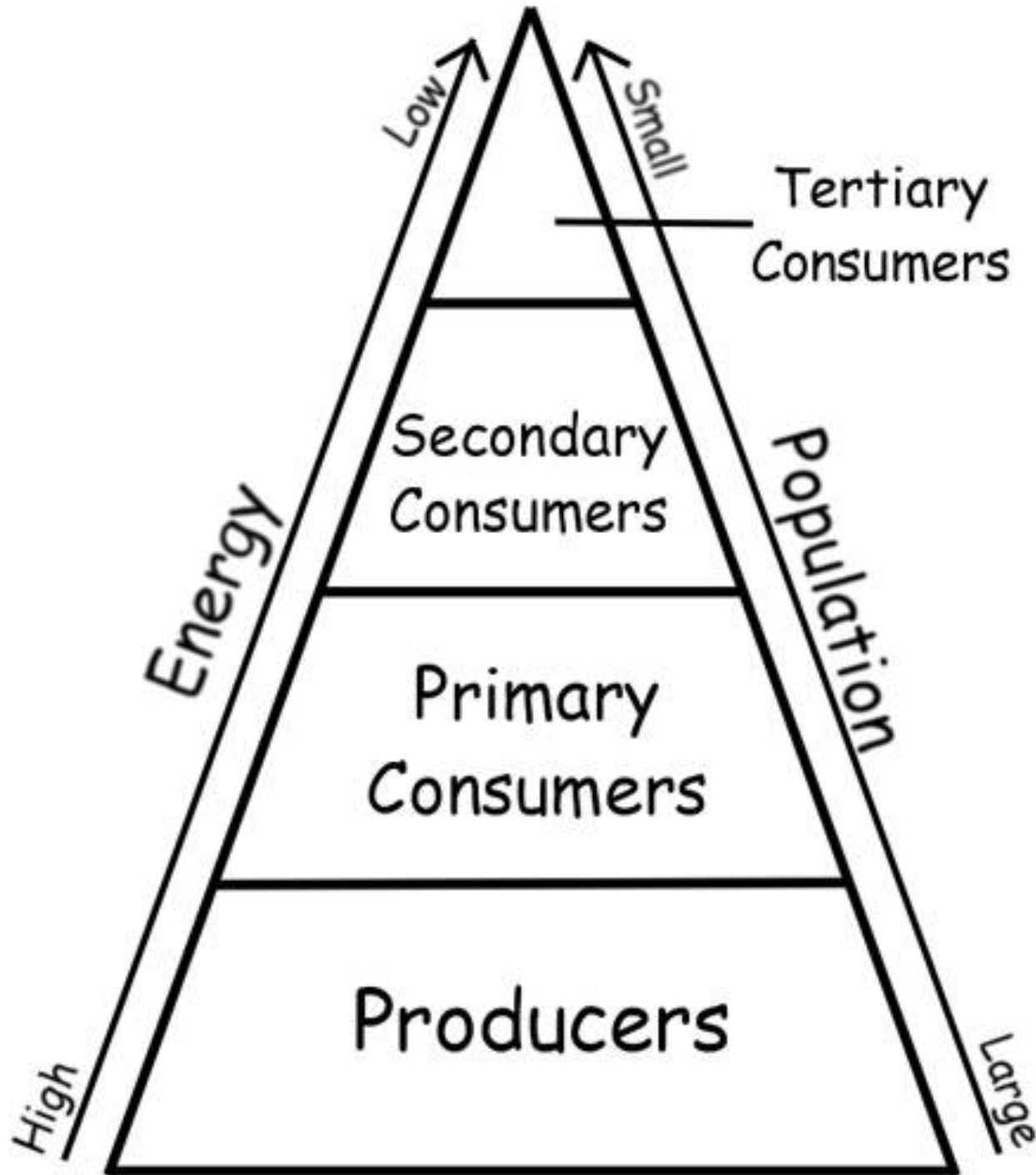
Primary consumers

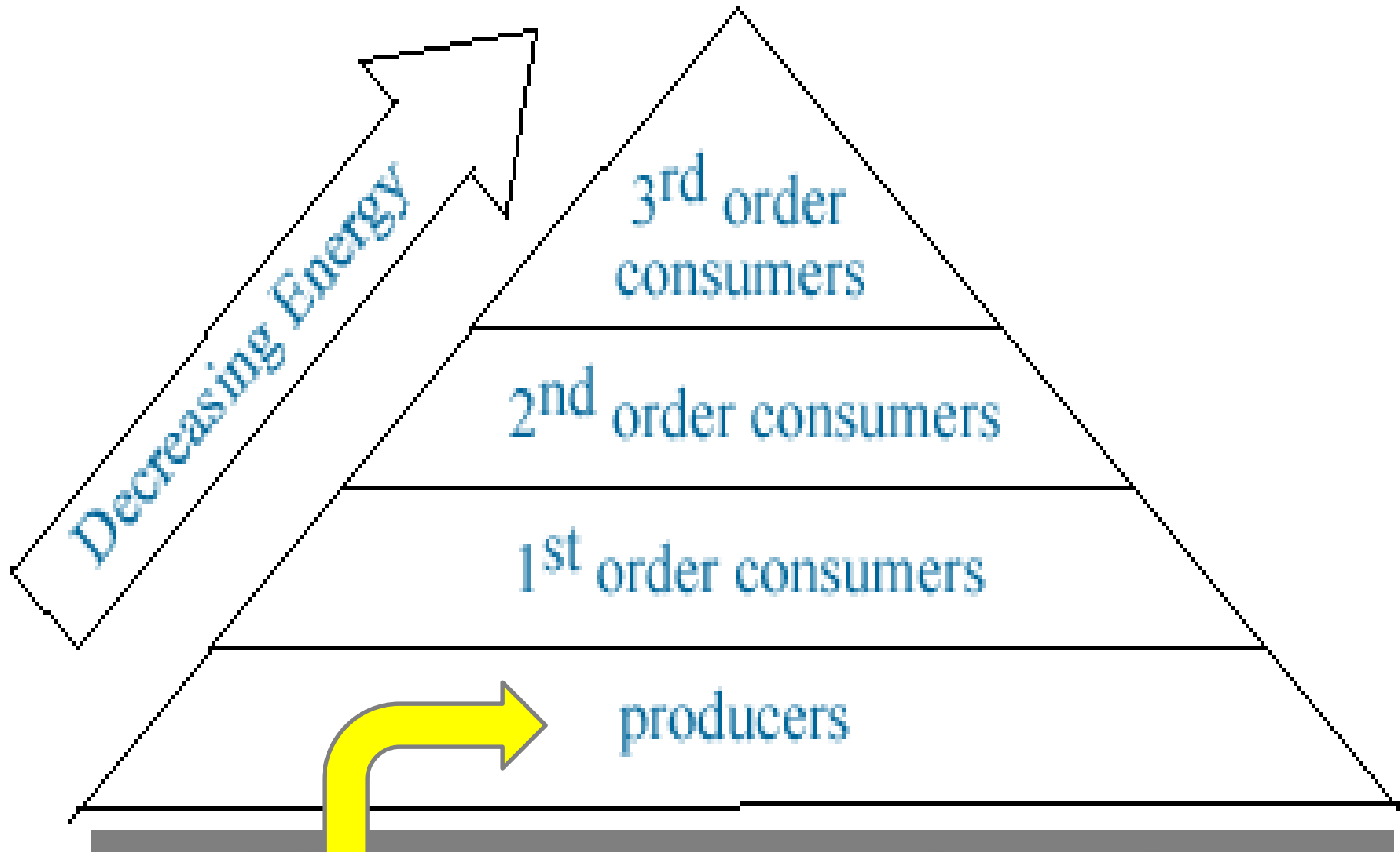
Primary producers





Who
needs the
most
energy to
survive?

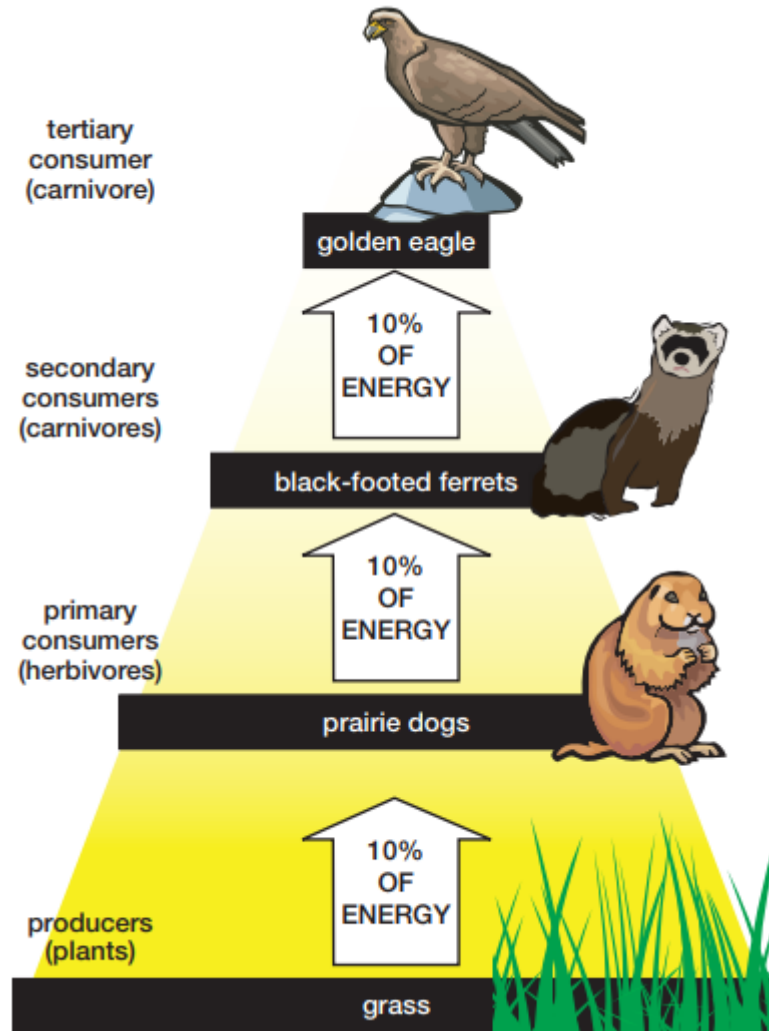




The most energy is at the producer level – the base of the pyramid



Only about 10 percent of energy is passed on to the next level in the food chain. As a result, food chains have only 5 different levels



Student Lab Activity

Page 9 in Text book

