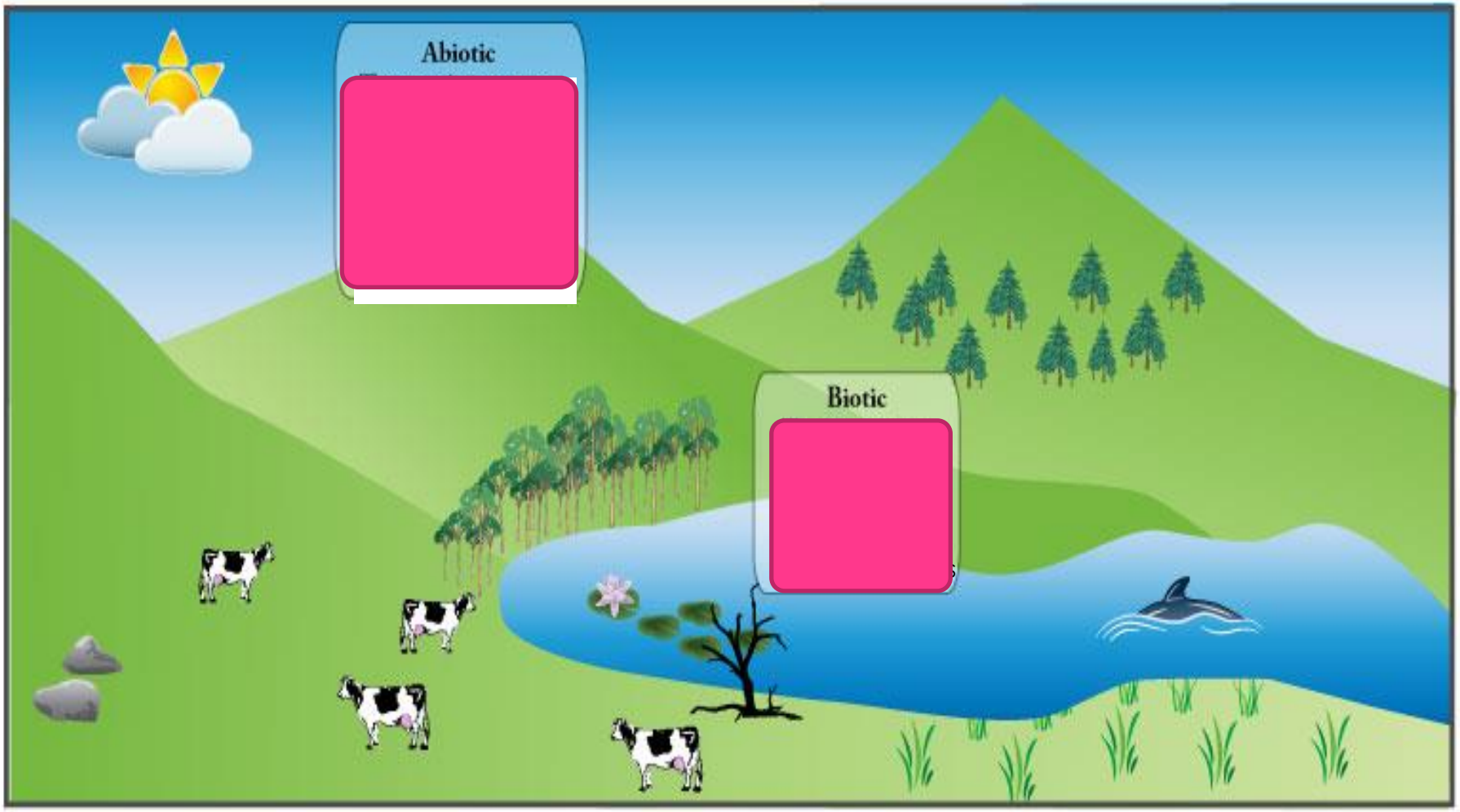
Unit 1 Topic 4

How Organisms Interact

Organisms In Ecosystems

- A rabbit is chased by a lynx
  - These animals are interacting!
- What two types of organisms are there?
- Abiotic…?
- Biotic …?

Example…



Organisms In Ecosystems

- A rabbit is chased by a lynx
  - These animals are interacting!
- What two types of organisms are there?
- Abiotic (Water, air, soil)
  - Non-living organisms in an environment
- Biotic (Plants, animals, people)
  - Living organisms in an environment

Example…

List 4 abiotic factors found in an ecosystem.

-
-
-
-

List 4 Biotic factors found in an ecosystem.

-
-
-
-

Roles In Ecosystems

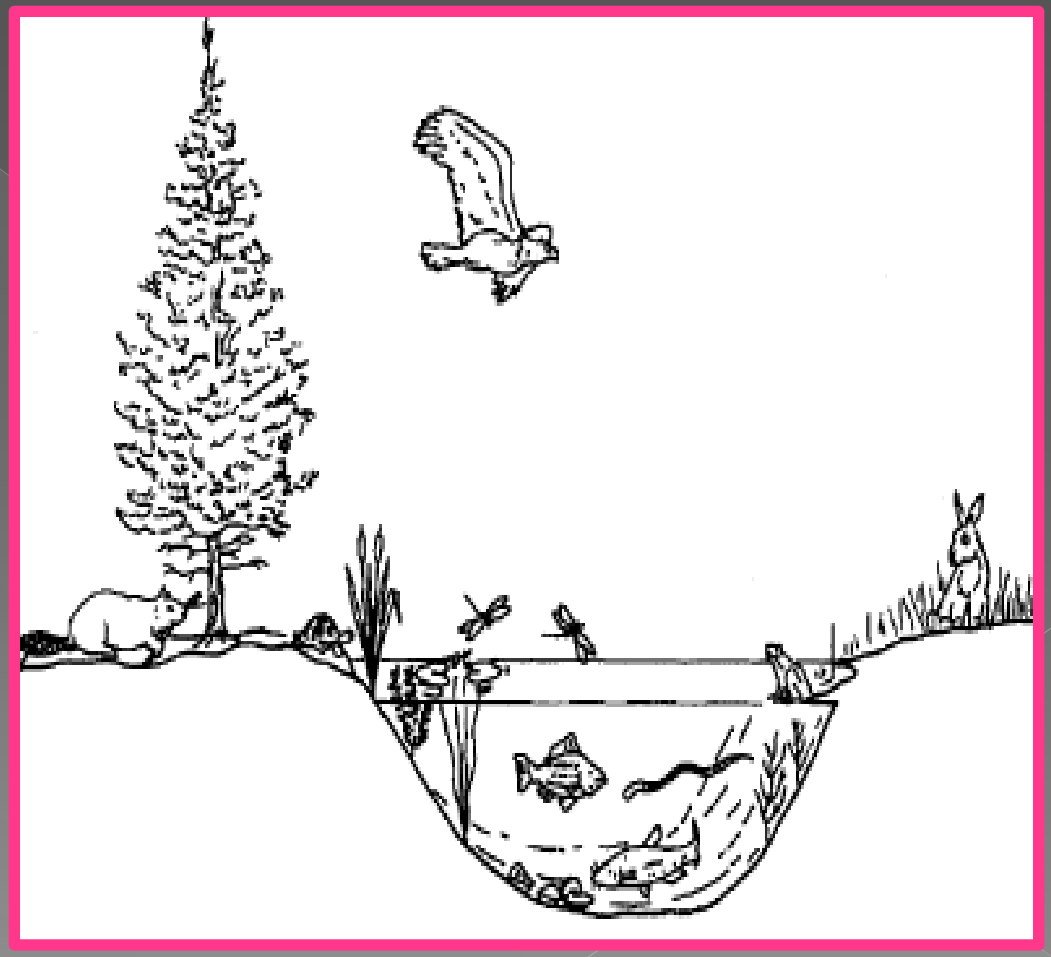
- We all have different roles in our lives …?

Roles In Ecosystems

- We all have different roles in our lives …?
  - Athlete
  - Student
  - Brother
  - Father
- Just like us … organisms play different roles as well
- The roles they fill are called **niches**

Determining A Niche

- In order to determine niche you must examine …
  - Where "it" lives
  - What "it" eats
  - How "it" interacts



What Happens if 2 organisms occupy the exact same Niche?

- That would mean those 2 organisms would
  - Live in the exact same area.
  - Eat the exact same thing.
  - Interact In the Exact Same manner.

That is asking for trouble!!!!

What Happens if 2 organisms occupy the exact same Niche?

- Imagine what would happen if coyotes lived in the same habitat as wolves, ate the same food as wolves, shared the same water, and shared the same pack-like behavior as wolves.

- What do you think the wolves would do to the coyotes?

- It's no wonder coyotes live beside the highways eating garbage and road kill. The Wolves would never let the coyotes share the same niche.

Different Niches

Niche Categories relating to food:

- Producers (grass, plants…)
  - Make life possible for all other organisms because they use the sun to produce food energy. If all of the plants died, all other living things would starve.
- Consumers (fox, rabbit…)
  - Consume foods. They go out and find food to consume. This may even include eating other consumers!

Be A Detective

Below is a sample of Feces (poop) from an Owl. Can you determine the niche of the owl by analyzing what's in the poop?

Consumers Extended

- Consumers are split into <u>3 different categories…</u>

- Herbivores
  - They eat plants and vegetation
- Carnivores
  - They eat meat and other consumers

- Omnivores
  - They eat both plants and animals

Consumers Extended

- We can even break them down further!
- Predators
  - Animals that hunt other animals.
- Prey
  - The animal being hunted/eaten

Predator Or Prey?

- Can Herbivores be considered as Predators?
- Can Herbivores be considered as Prey?
- Can Carnivores ever be considered as Predators?
- Can Carnivores ever be considered as Prey?
- Can Omnivores ever be considered as Predators?
- Can Omnivores ever be considered as Prey?
- Can Producers ever be considered as Predators?
- Can Producers ever be considered as Prey?

Predator- Prey Relationship

Rules of Battle

Rule #1: Predators show up only AFTER the prey. Otherwise the predators will have nothing to eat.

Rule #2: There needs to be more prey than predators so that the predators have enough food supply.

Rule #3: When there is a lot of prey present, predators have more food to eat and so they have food supply to produce more babies to feed. Yeah…let the good tiiimes roll!

Rule #4: When there is a lot of prey present, predators have more food supply and so they can produce more babies to feed.

Predator- Prey Relationship

Rules of Battle

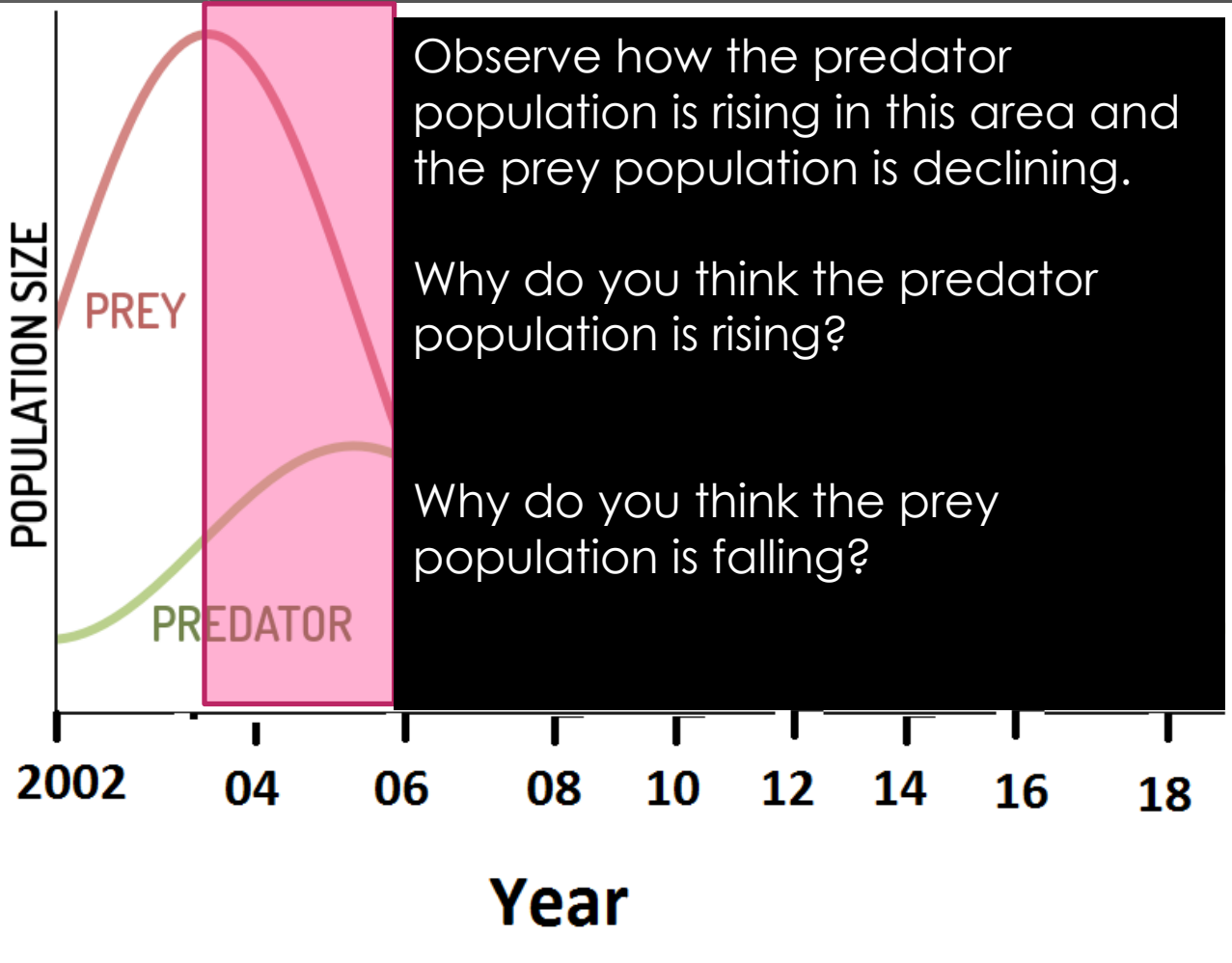
Rule #4: When there is a lot of prey present, the predators have more food supply and so they can produce more babies to feed. As a result predator populations rise.

Rule #5: If the Predator population grows beyond the number of prey present, many predators will go hungry and starve to death very quickly. They WON'T all die out because the strongest will be able to withstand hunger long enough for the prey population to recover.

Rule #6: Animal predators are mostly able to catch weak and diseased Prey. They aren't able to hunt down the strong and healthy prey. Over time, this improves the overall health of prey population because the sick and unhealthy prey are removed from the group.

Predator- Prey Relationship

Here is what predator-prey battles look like.



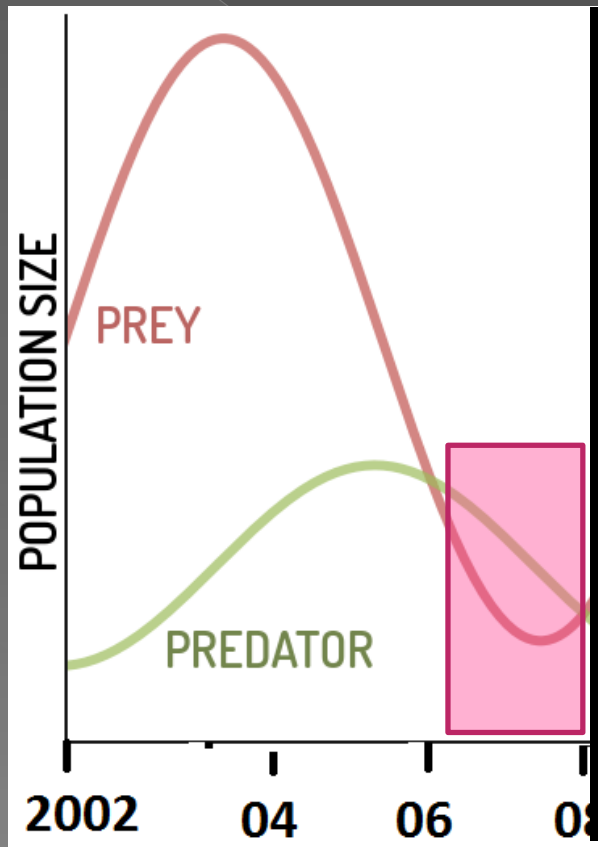
Observe how the predator population is rising in this area and the prey population is declining.

Why do you think the predator population is rising?

Why do you think the prey population is falling?

Predator- Prey Relationship

Here is what predator-prey battles look like.



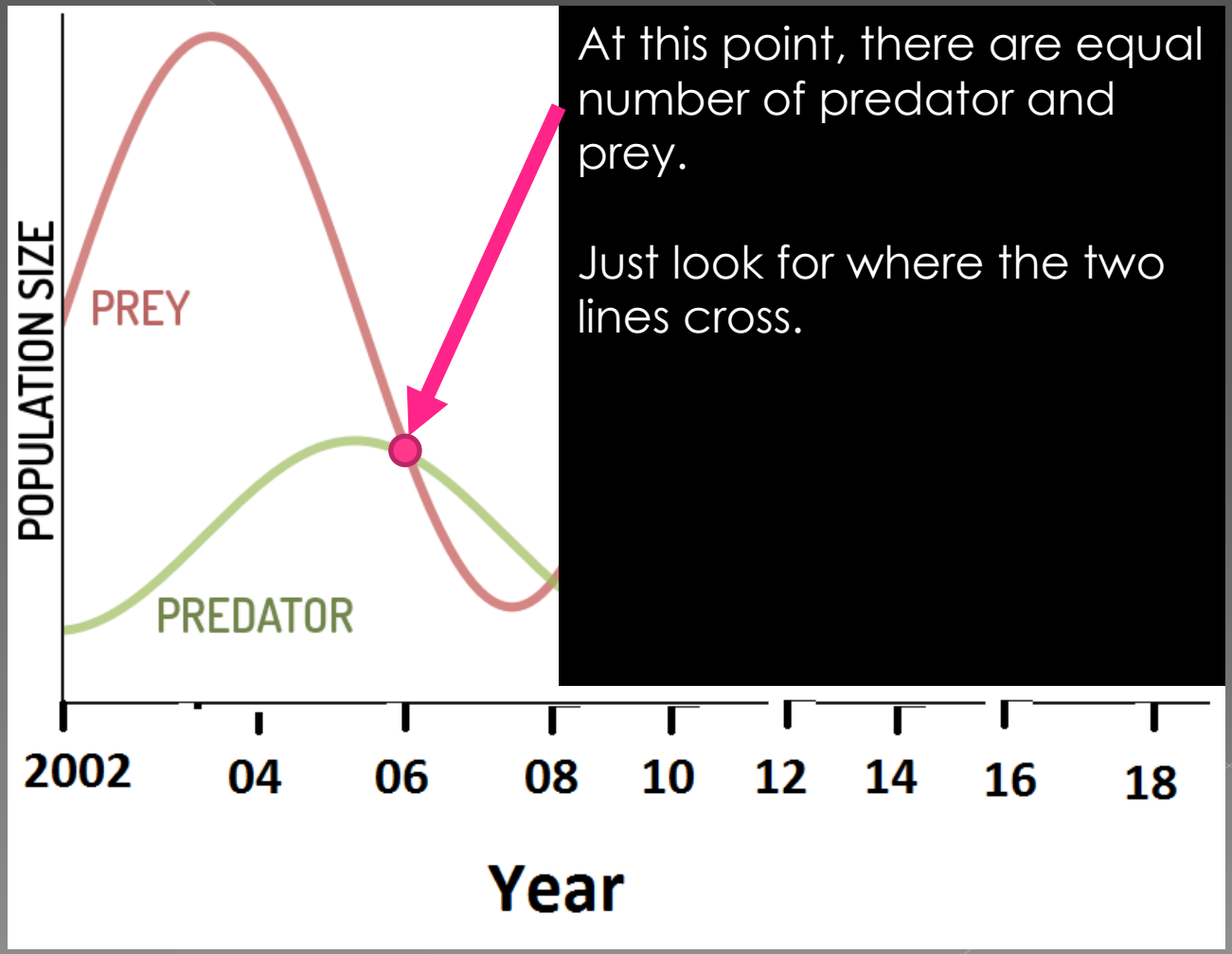
Observe how there are more Predators than Prey in this part of the graph.

Who eventually pays the price for this imbalance?

Why don't the PREY population fall
To ZERO? It looks like they start to recover just before 2008

Predator- Prey Relationship

Here is what predator-prey battles look like.



At this point, there are equal number of predator and prey.

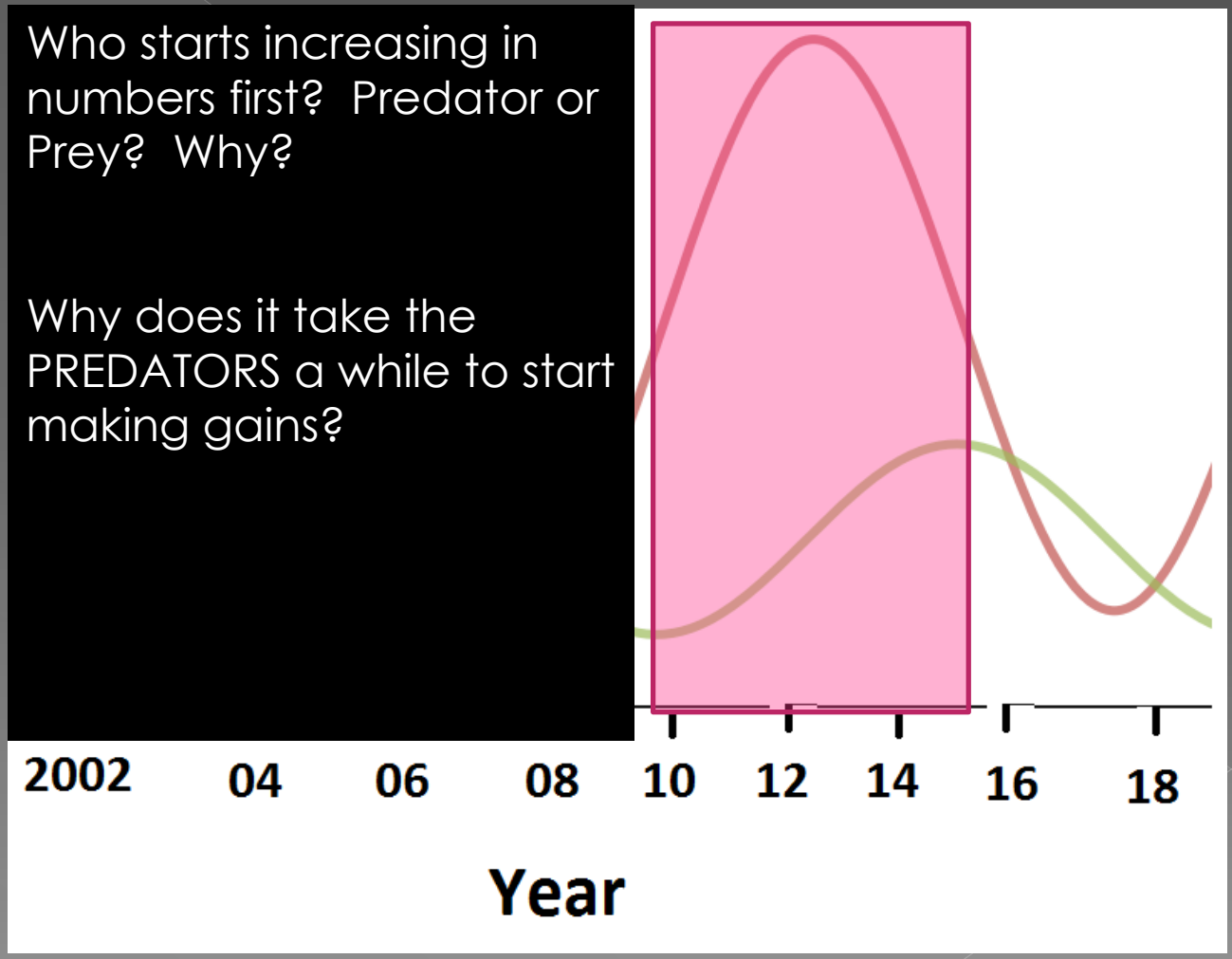
Just look for where the two lines cross.

Predator- Prey Relationship

Here is what predator-prey battles look like.

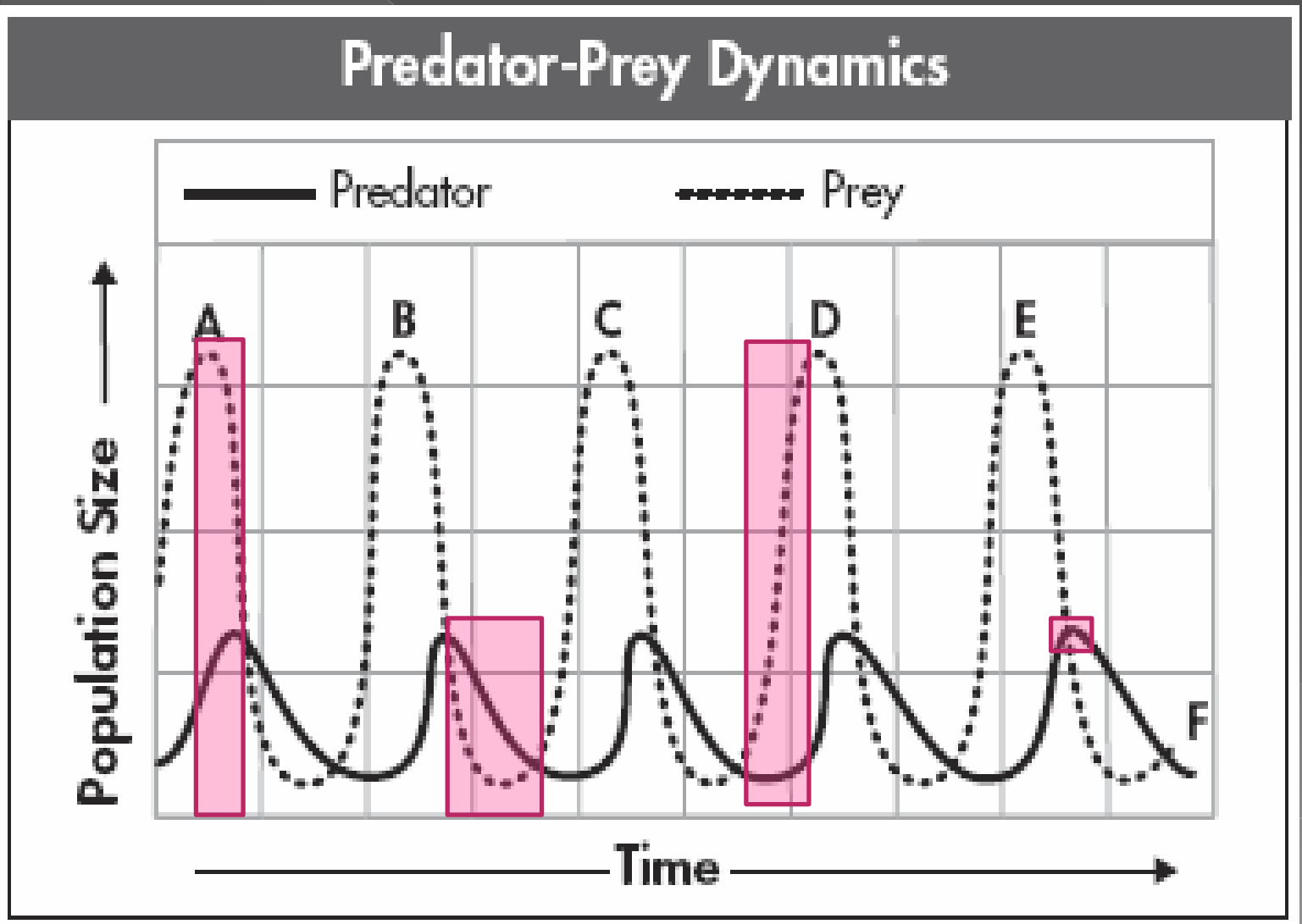
Who starts increasing in numbers first? Predator or Prey? Why?

Why does it take the PREDATORS a while to start making gains?



Predator- Prey Relationship

Explain what is happening to each population at each location. Explain why.



Food Chains

- When you eat something … you eat the energy it contained!
  - Example: I eat a steak (cow), that ate plants (grass) that used the sun (energy).

Most of the energy that you consume is wasted. Very little is stored in your body.

That's right folks! Your body wastes most of the energy that is in the food that we eat.

- Where does the wasted energy go?
  - Let me explain with this …

Sir, this is a fast - fastfood restaurant. That means you don't have to waste your time with eating and digesting your meal. That'll be 8 € for the burger and the drink.

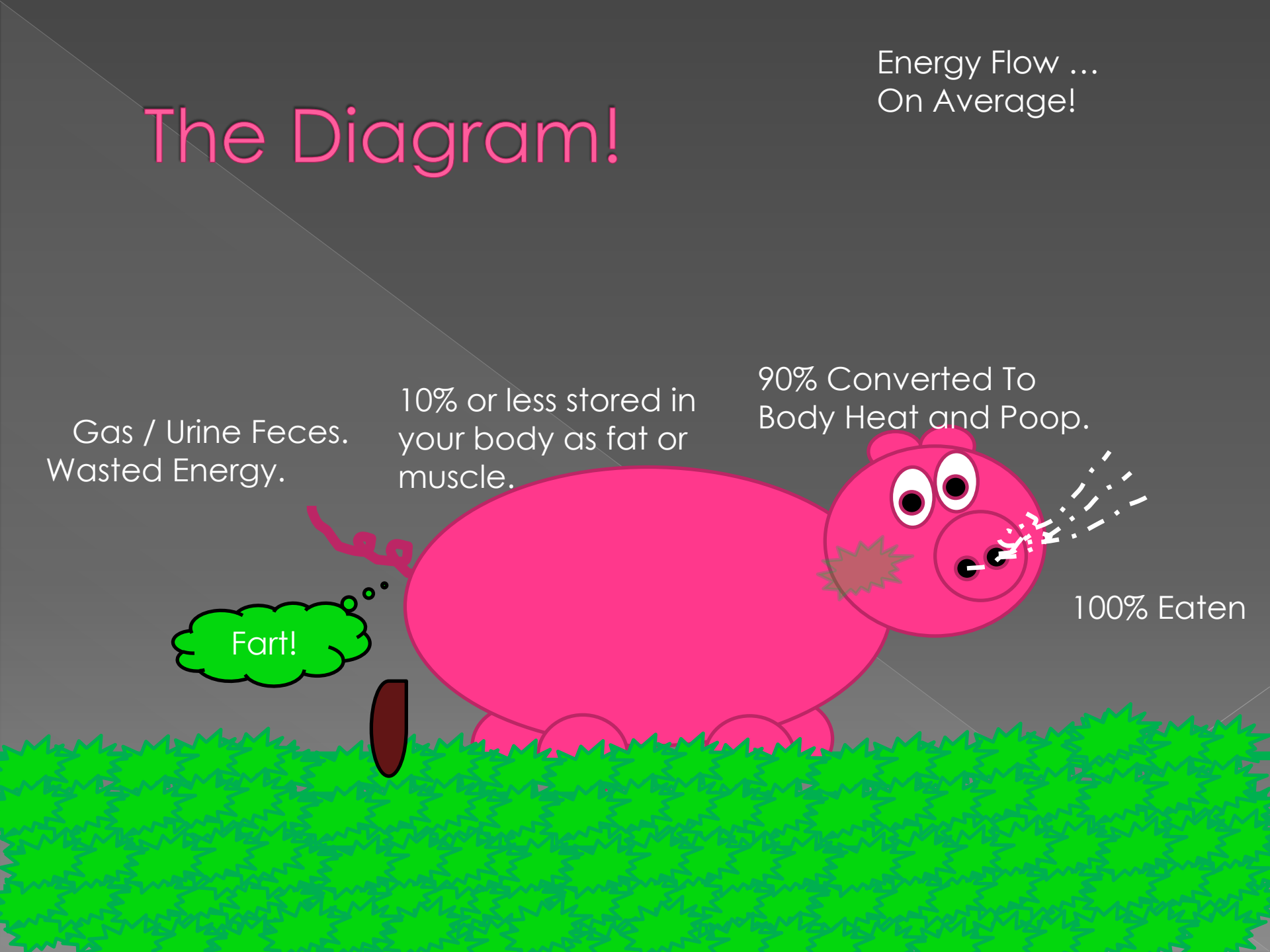
Question

- Jimmy ate 5 pounds worth of food hoping to gain 5 pounds of body weight. A day later, he weighed himself and noticed that the scale read almost the exact same thing.

- If Jimmy ate 5 pounds of food, why didn't he gain 5 pounds?

The Diagram!

Energy Flow …
On Average!



Energy Flow

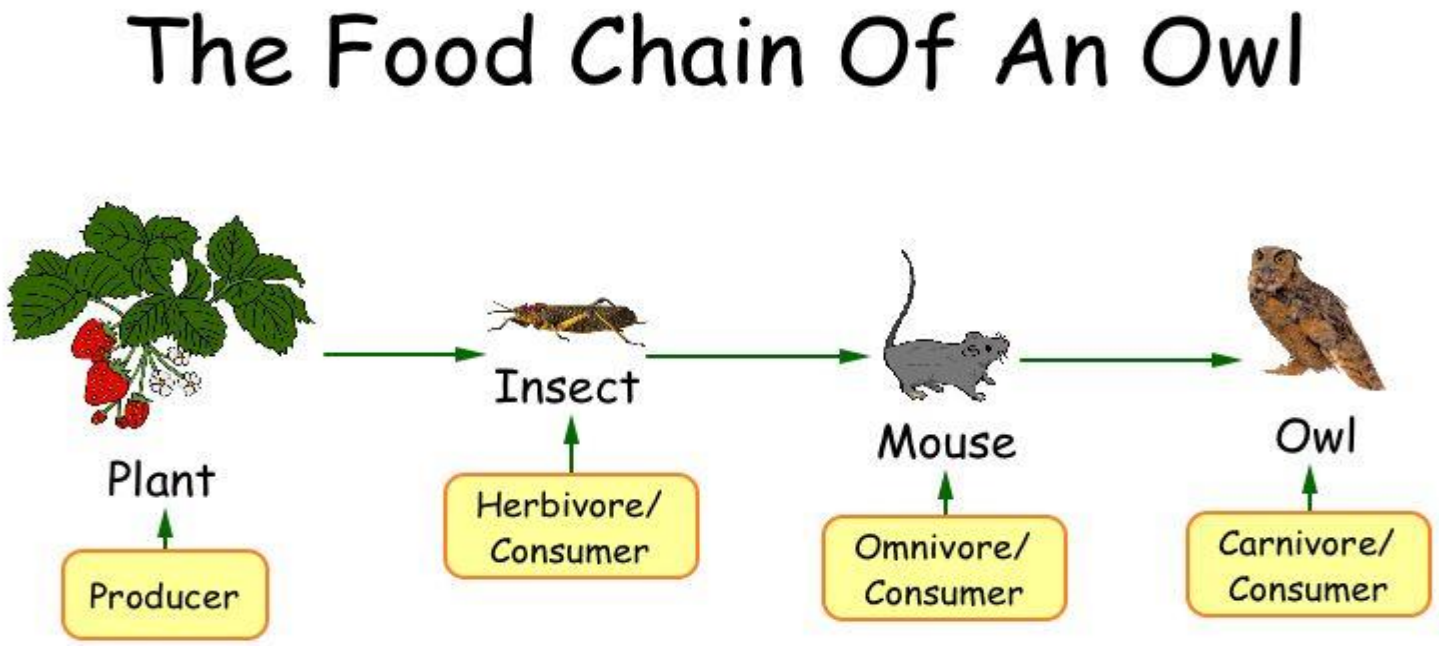
- How are they different?
- Food Chain = energy flow
- Food Web = all organisms involved and who effects who.

Food Webs vs. Chains

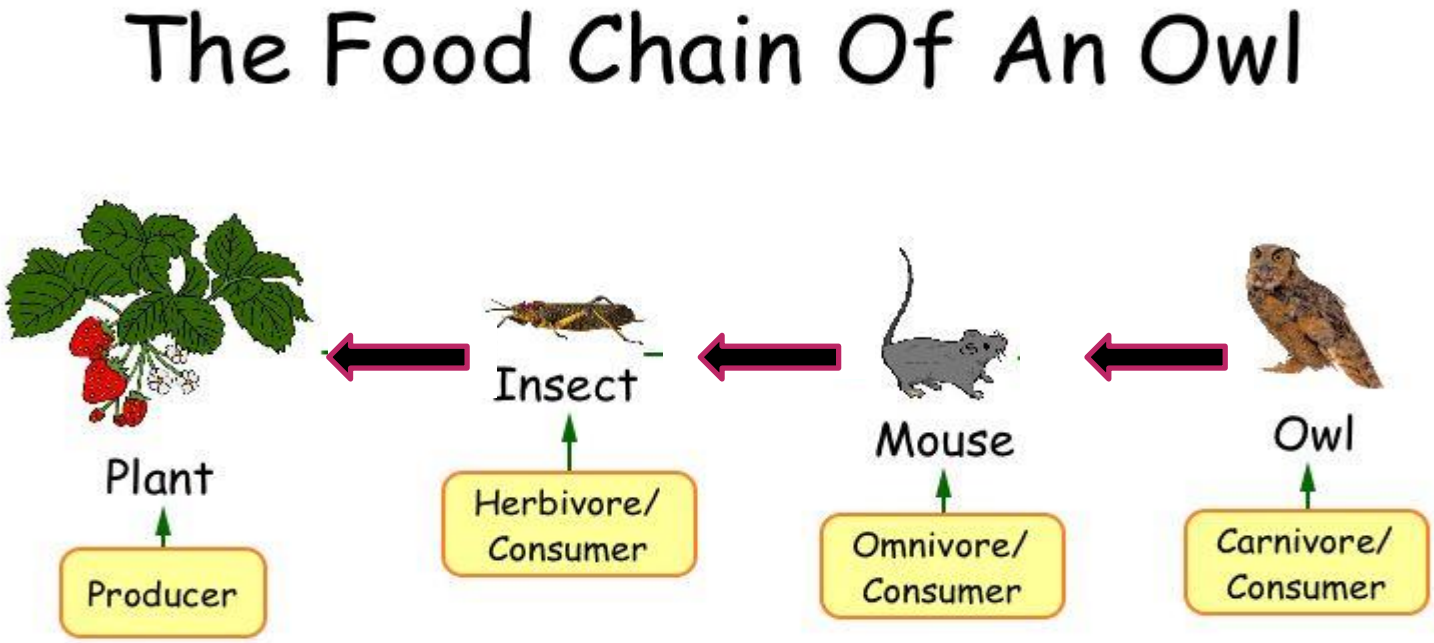
- How are they different?
- Chain = shows energy flow
- Web = all organisms involves and who effects who

Food Webs vs. Chains

The Direction of the Arrows Matter! The arrows show which way the energy travels. In other words, which stomach, the organism flows into.

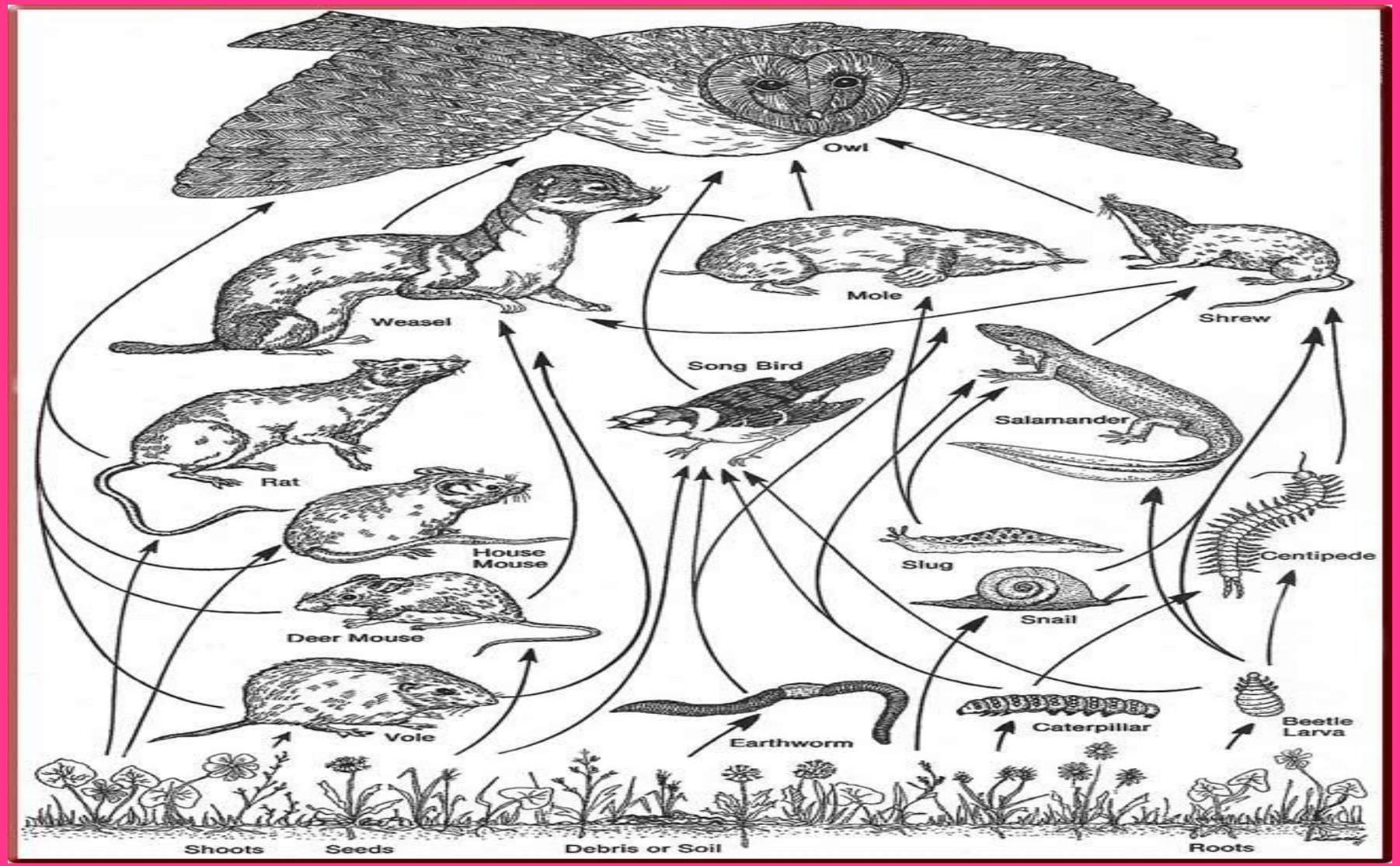


Food Webs vs. Chains

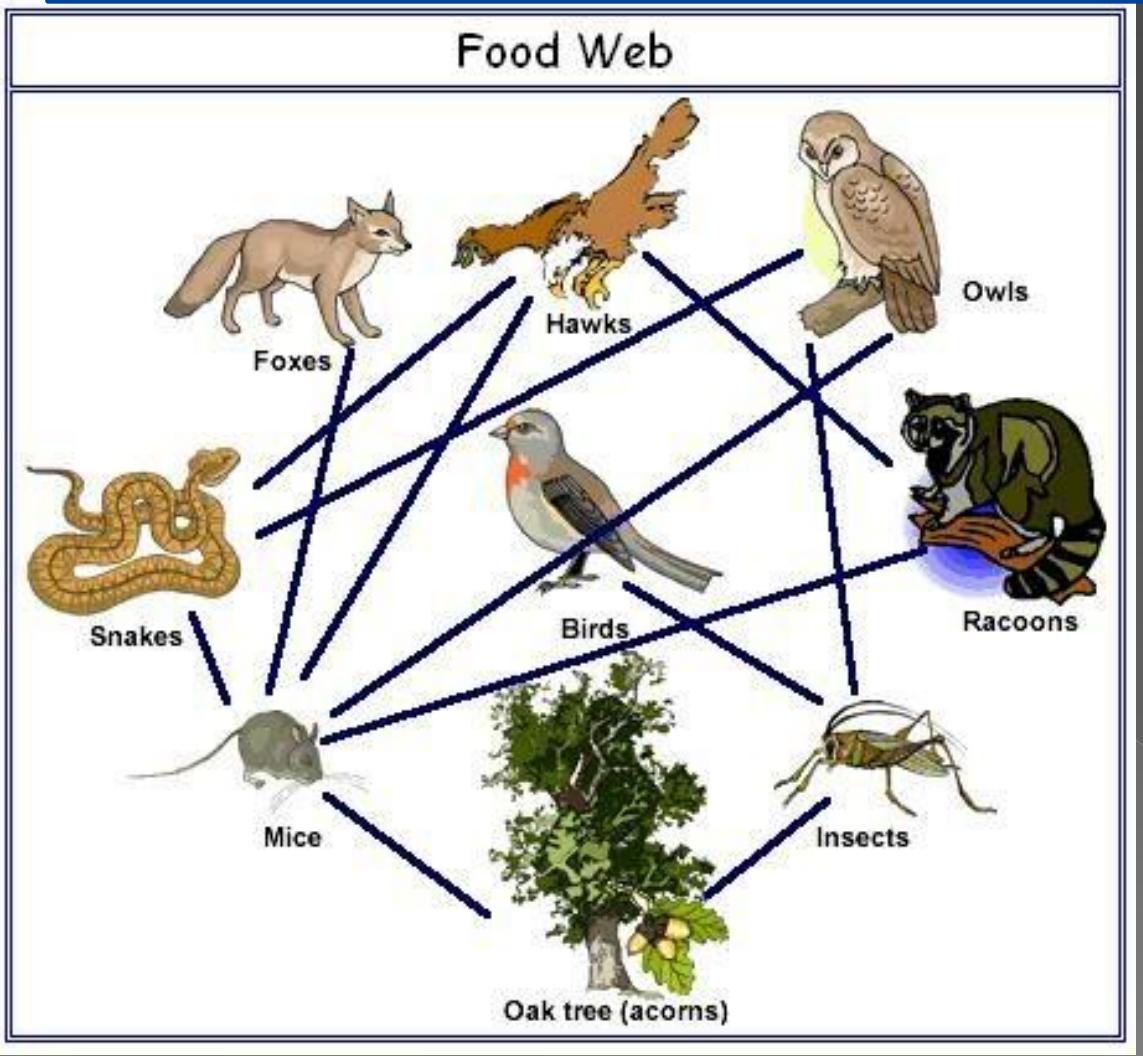


A food chain shows the path of energy from one living thing to another. Decomposers like bacteria, are necessary for all food chains.

Food Webs vs. Chains



Draw the arrow heads in the Food Web Below.



What would the effect be if all of the snakes and raccoons went extinct?

What would the effect be if the producers were removed?

What would the effect be if all of the owls went extinct?

What would the effect be if all of the mice went extinct?

Comparing The Mass of Living (bio) things…BIOMASS!

- Let's pretend that you counted all of the plants in the world and then counted all of the cows in the world. Which one would there be more of? Why?

VS

What if you counted all the cats vs all of the mice in the world? Which group would have more? Why?

Pyramid of **Numbers**

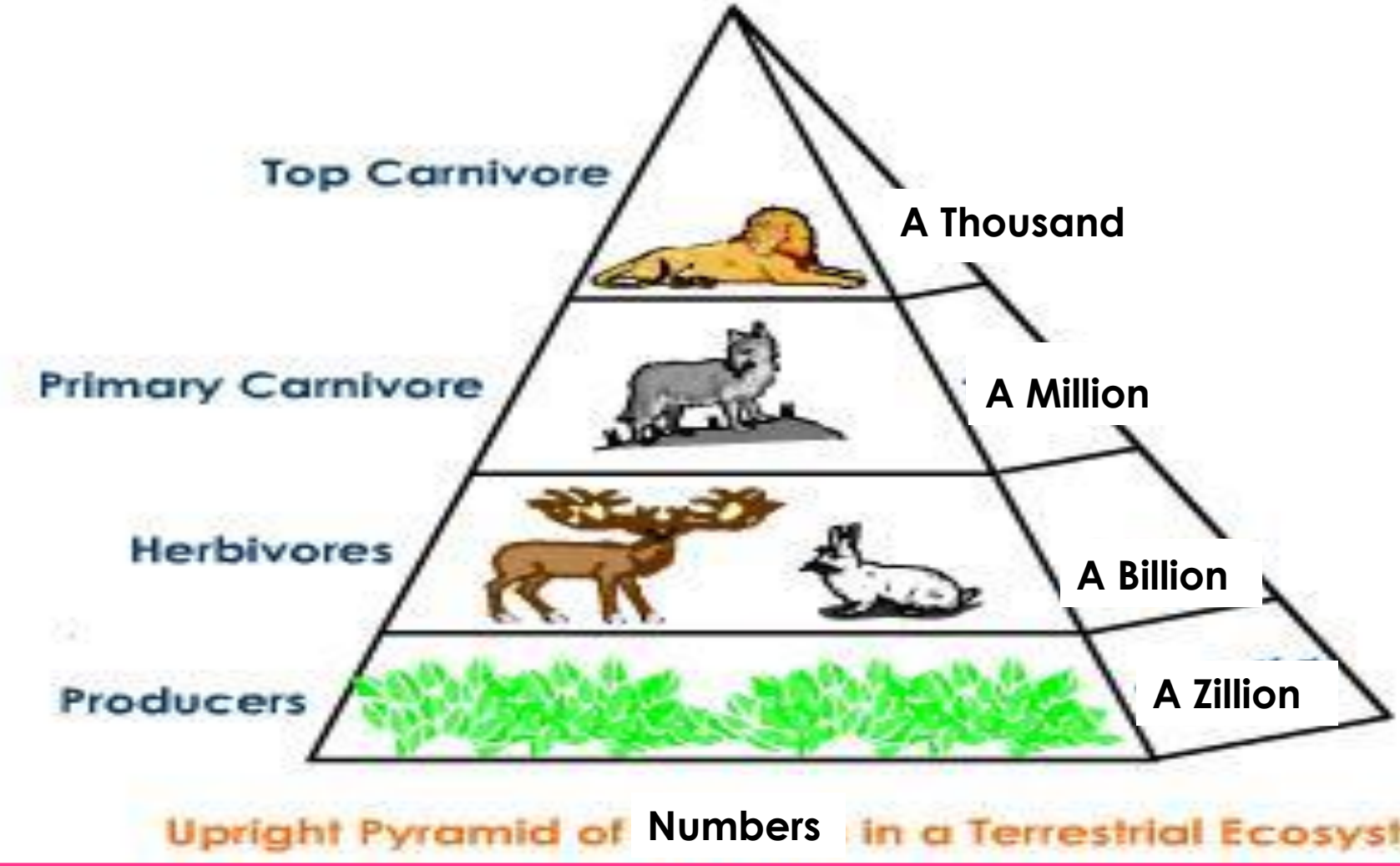
- Webs and Chains show energy transfer but NOT how many organisms are involved!

- Enter "The Pyramid of Numbers"!

Total NUMBER of all organisms in an ecosystem!

Pyramid of NUMBERS!

Which trophic level of the pyramid has the greatest NUMBER of organisms? Why?



Comparing The Mass of Living (bio) things…BIOMASS!

- Ok, so now Let's pretend you weighed all of the plants in the world and then all of the cows in the world. Which one would be heavier? Why?

VS

What if you compared the **mass** of all the cats vs all of the mice in the world? Which group would weigh more? Why?

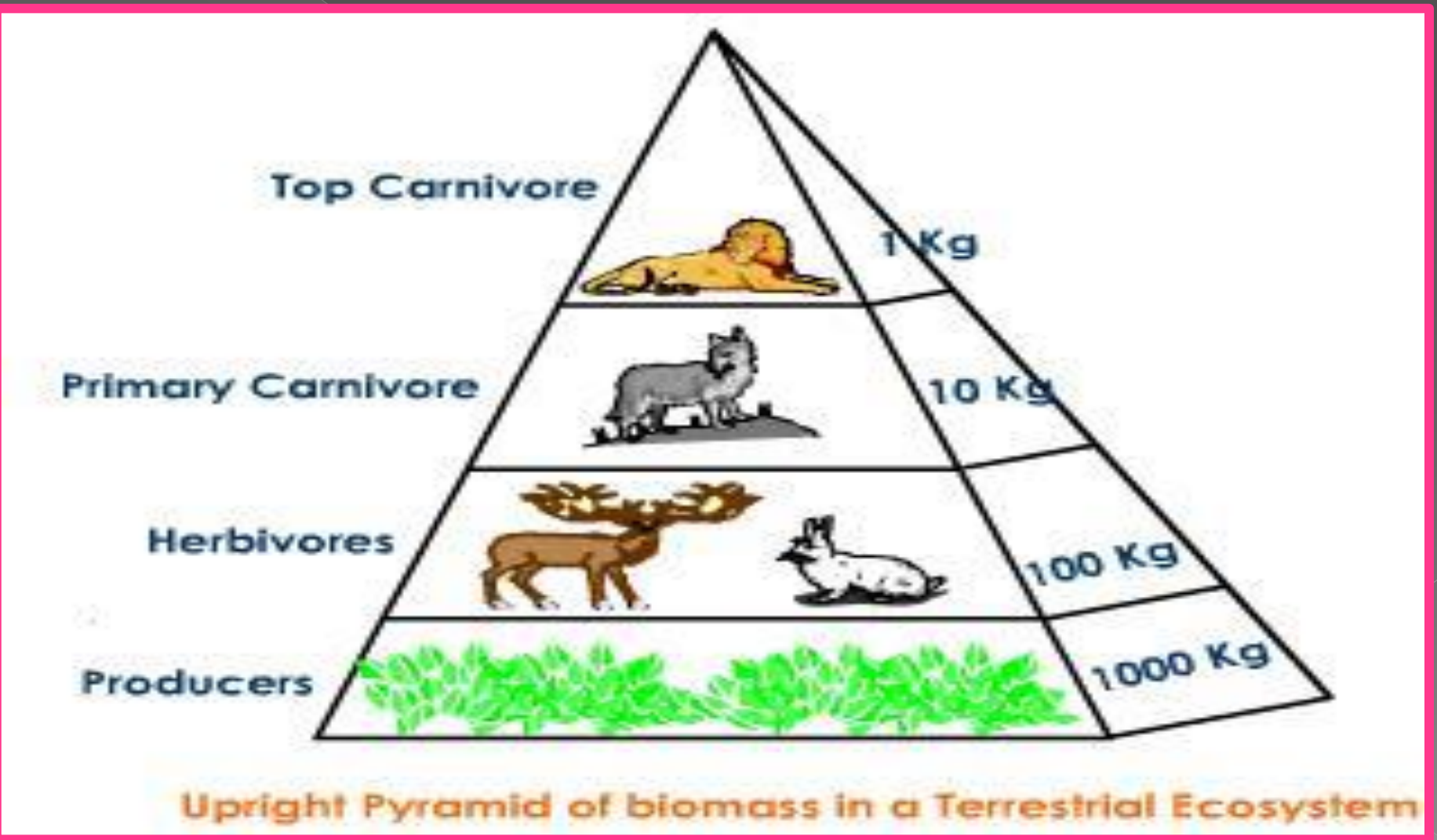
Enter The Pyramid of **BIOMASS**

Biomass!

Total <u>MASS</u> of all organisms in an ecosystem!

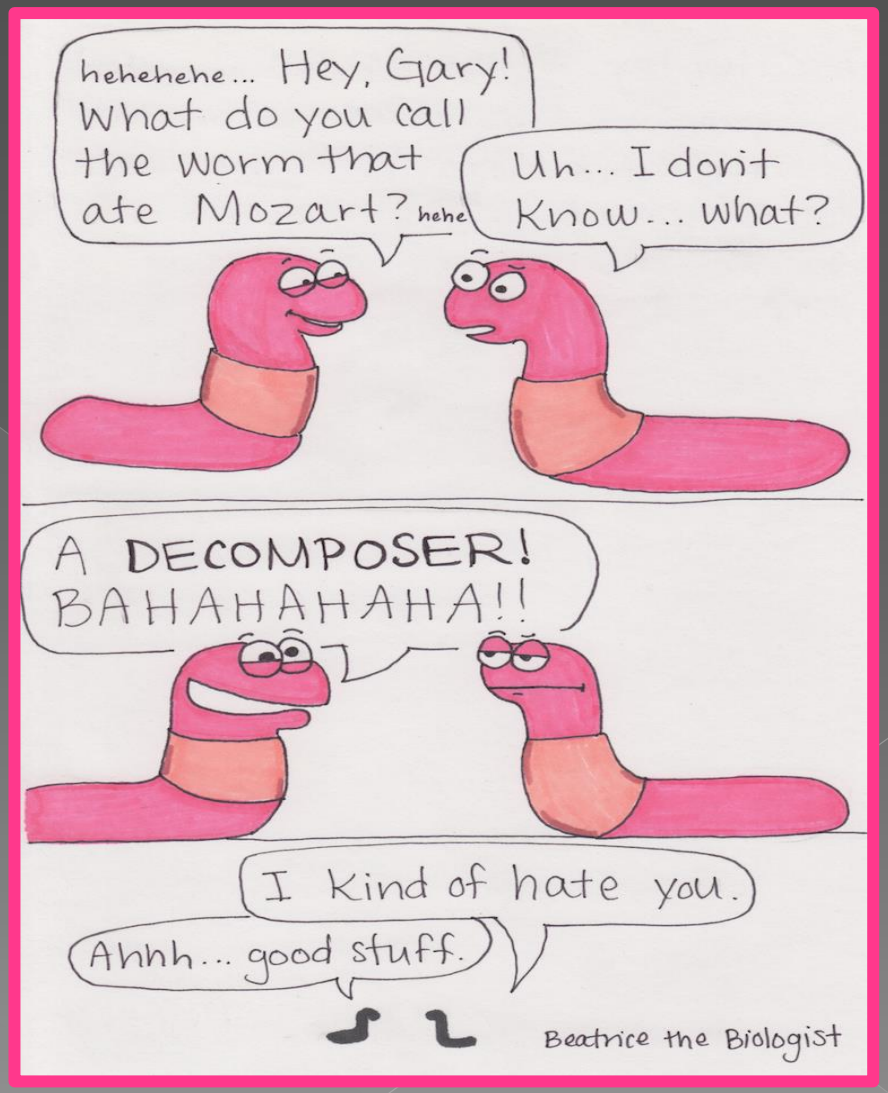
Pyramid of BIOMASS!

Which trophic level of the pyramid has the greatest MASS of organisms? Why?



The Clean-Up Crew

- Why are there few dead bodies laying around the natural environment?
- "Clean-Up Crews"!



Decomposers

- As materials break down, the stored nutrients are released back into the ecosystem
- Other organisms eat them!

- So who does this?
  - Scavengers
  - Decomposers

Scavengers

- Organisms that feed on dead or decaying plant and/or animal matter. If a predator like a lion killed the animal, scavengers, like the vulture below, wait on the sidelines until the lions are done, and then they scavenge the leftovers.

Decomposers

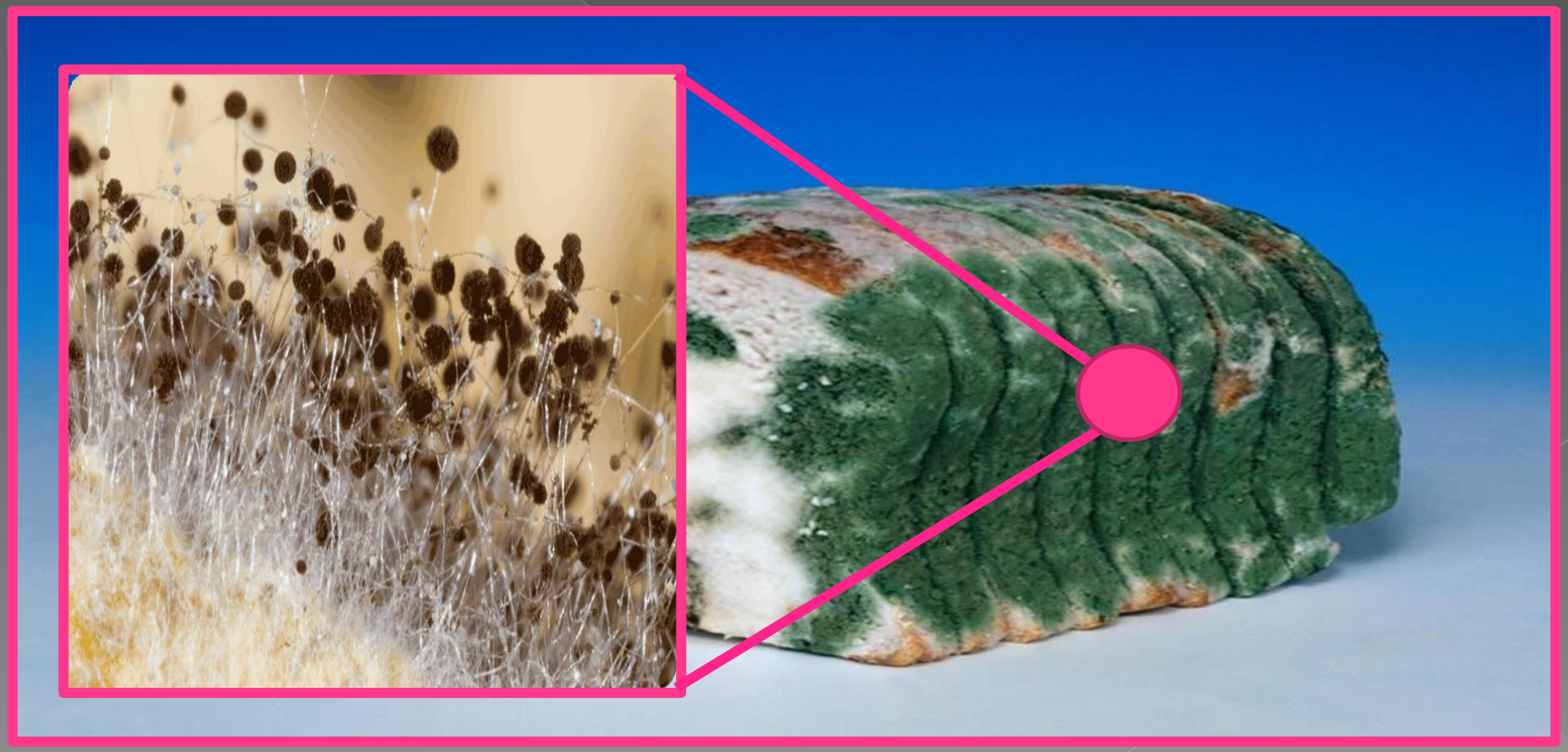
- They ***do not eat*** dead material!
- They grow ***on*** or ***in it*** ABSORBING nutrients into their own cells.
- What they do not eat just cycles back into the ecosystem

Examples …

- Decomposers
  - Ever find moldy bread at your house?

Examples …

- Decomposers
  - Ever find moldy bread at your house?



Fungus!

- Another example of a decomposer is a fungus!
- Mushrooms are a type of Fungus!

Question

- What would happen if decomposers did not exist?

Topic 4 – Complete!