Ecology in a Nutshell

Ecology

- The study of the interactions of living organisms with one another and with their environment

Square #2

Everything is Connected: Biotic Factors

Definition: describes living parts of the environment

Square #2 (cont)

Everything is Connected

Biotic Examples *(any organism from any of the 6 Kingdoms)*

- Plants
- Animals
- Protists
- Fungi
- Eubacteria
- Archaeabacteria

Square #3

Everything is Connected: Abiotic Factors

Definition: describes nonliving parts of the environment

Square #3 (cont)

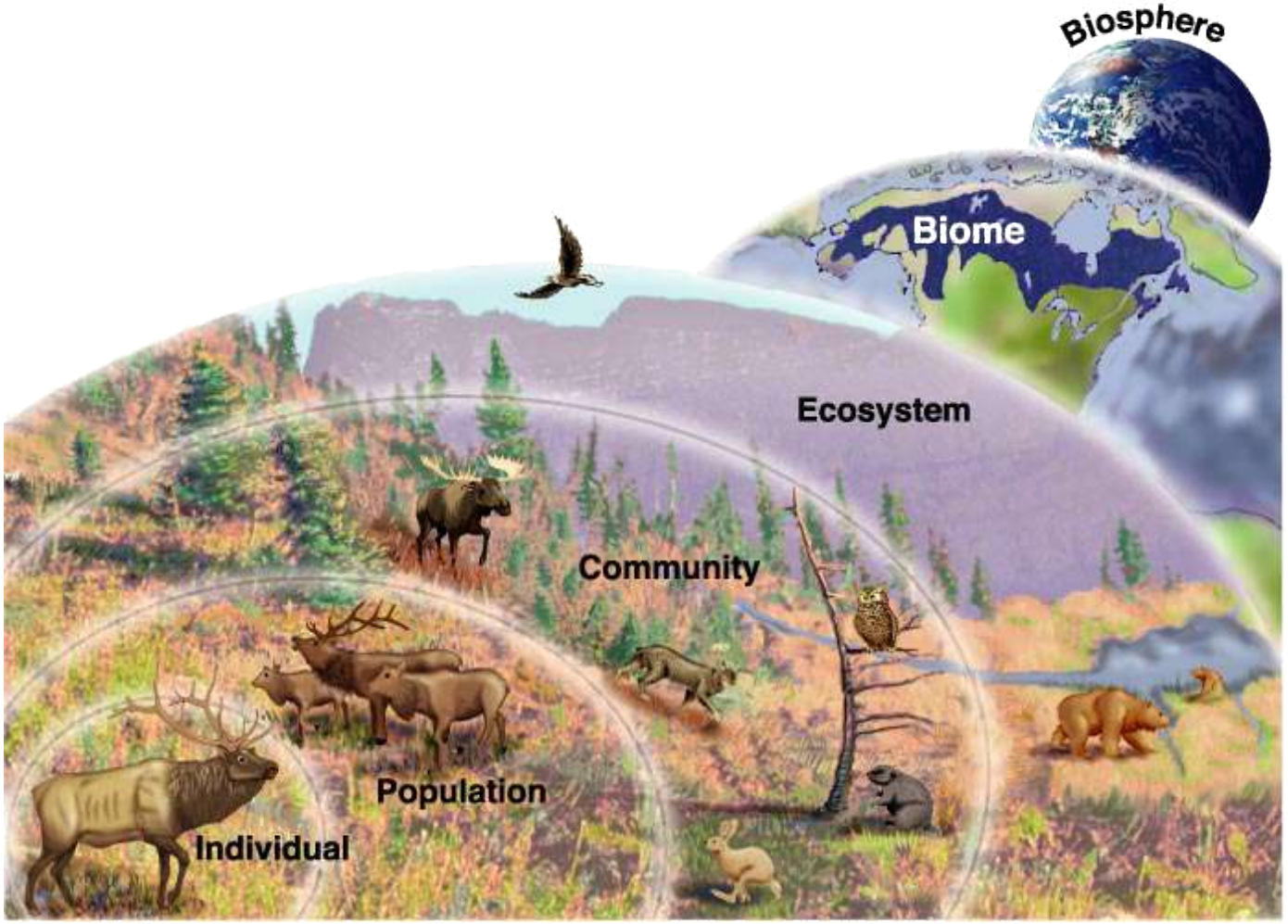
Everything is Connected

Abiotic Examples

- Water
- Soil
- Light
- Temperature
- Air
- Elements in the Earth (gold, silver, copper, etc.)

The Five Levels of Environmental Organization

Individual Organism → Population → Community → Ecosystem → Biosphere



Square #4

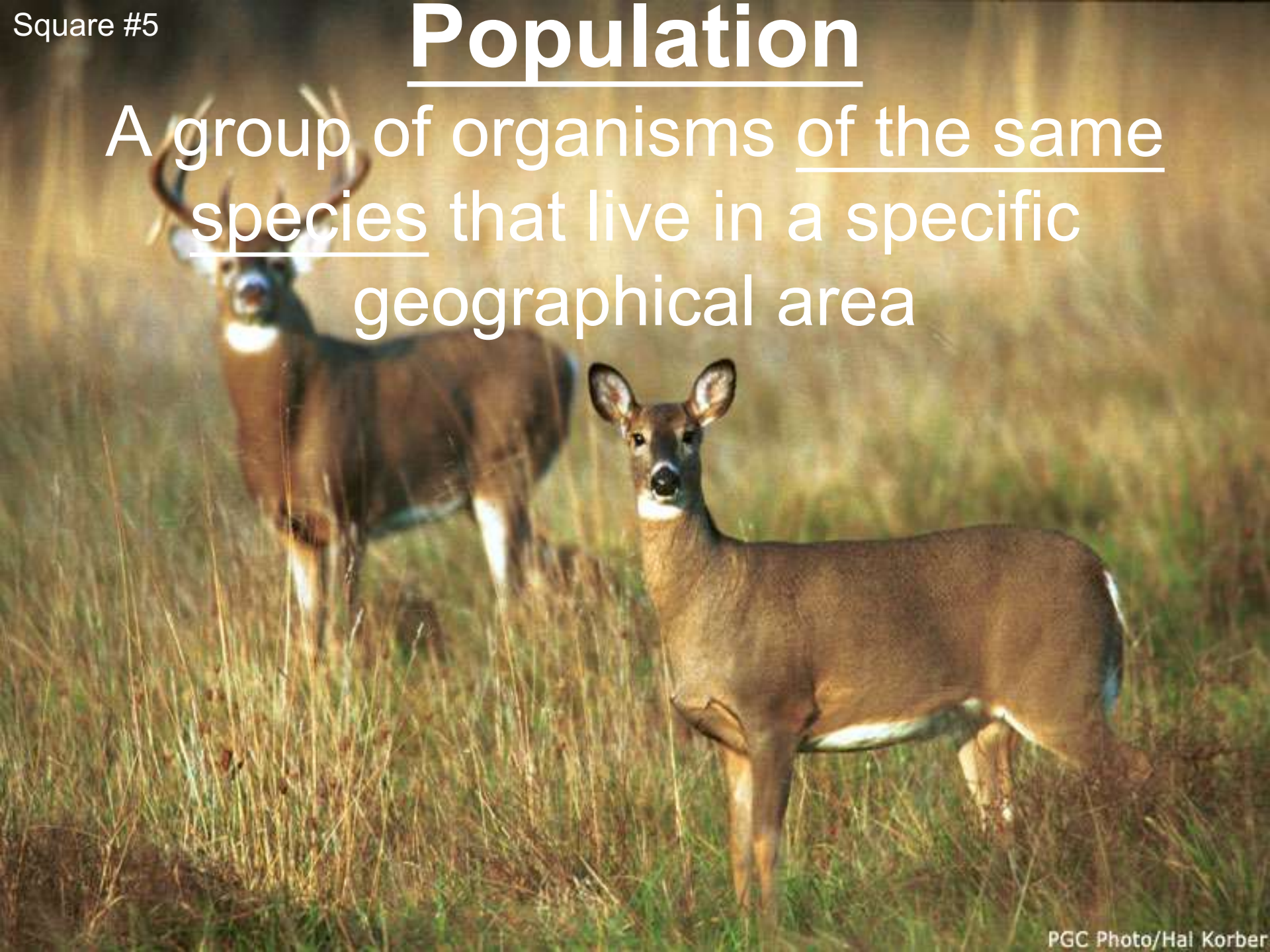
Organism

Any living thing that can carry out life processes independently

Square #5

Population

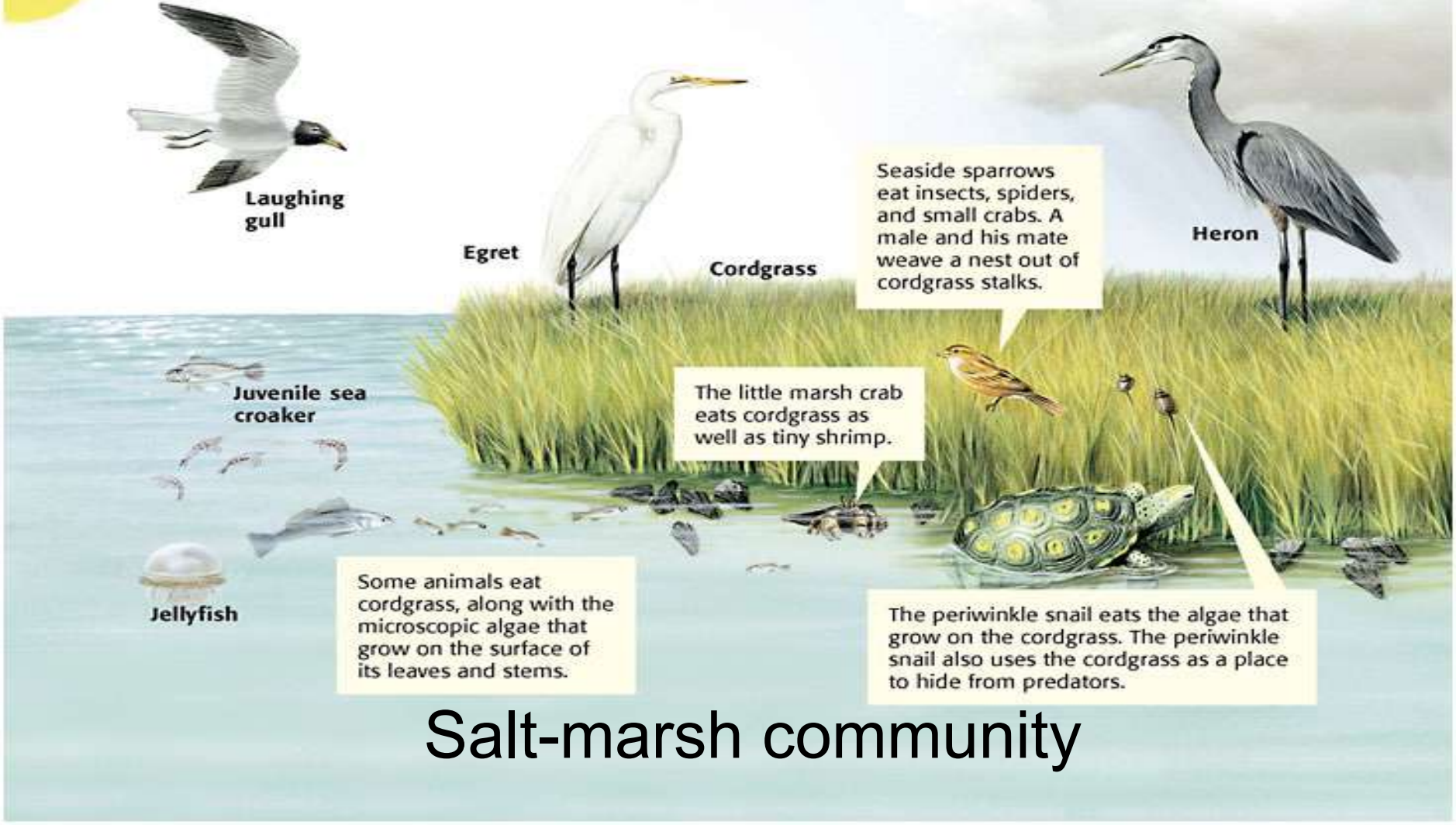
A group of organisms of the same species that live in a specific geographical area



Square #6

Community

All the populations of species that live in the same habitat and interact with each other.

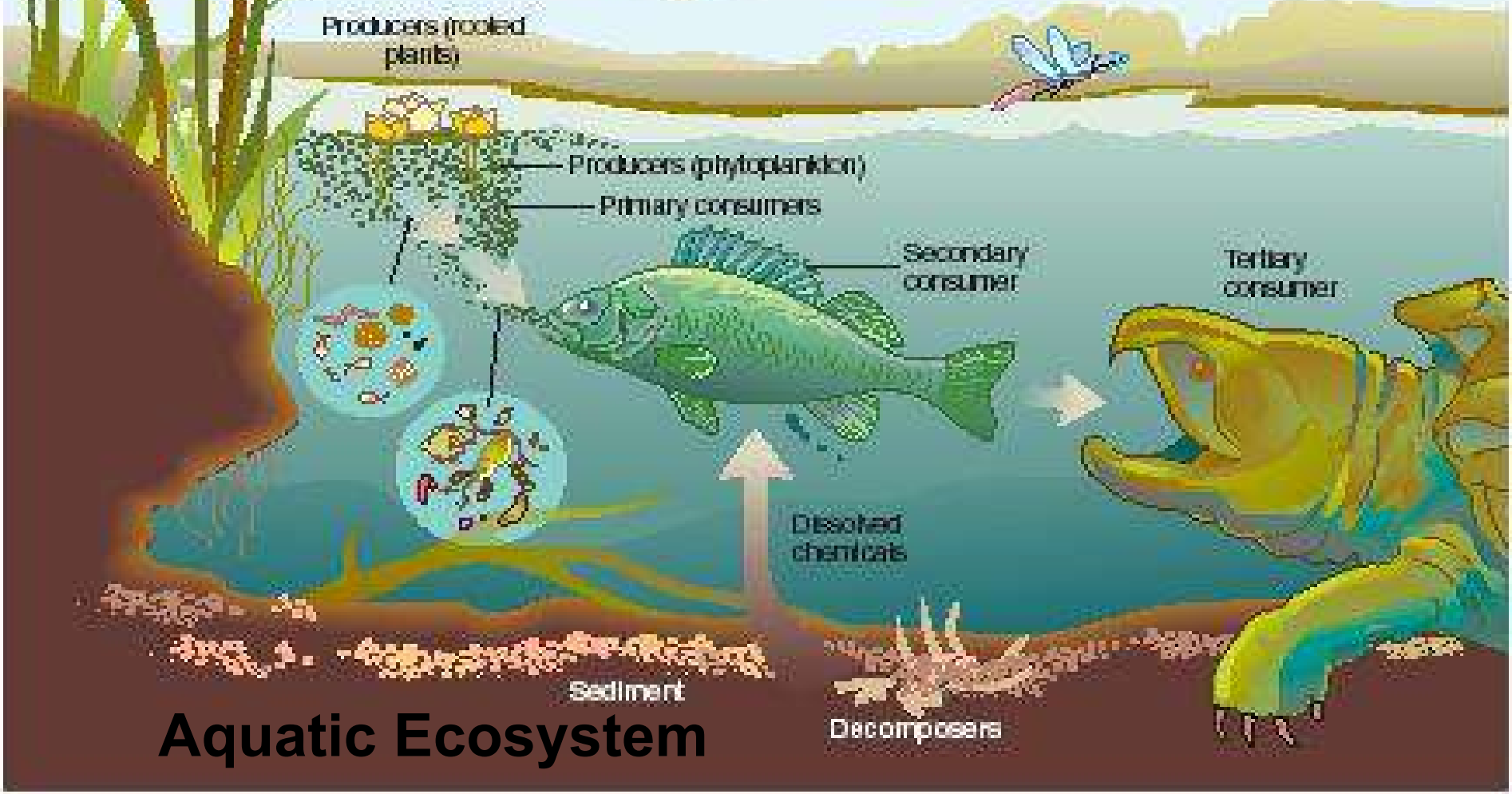


Salt-marsh community

Square #7

Ecosystem

A community of organisms and their abiotic environment.

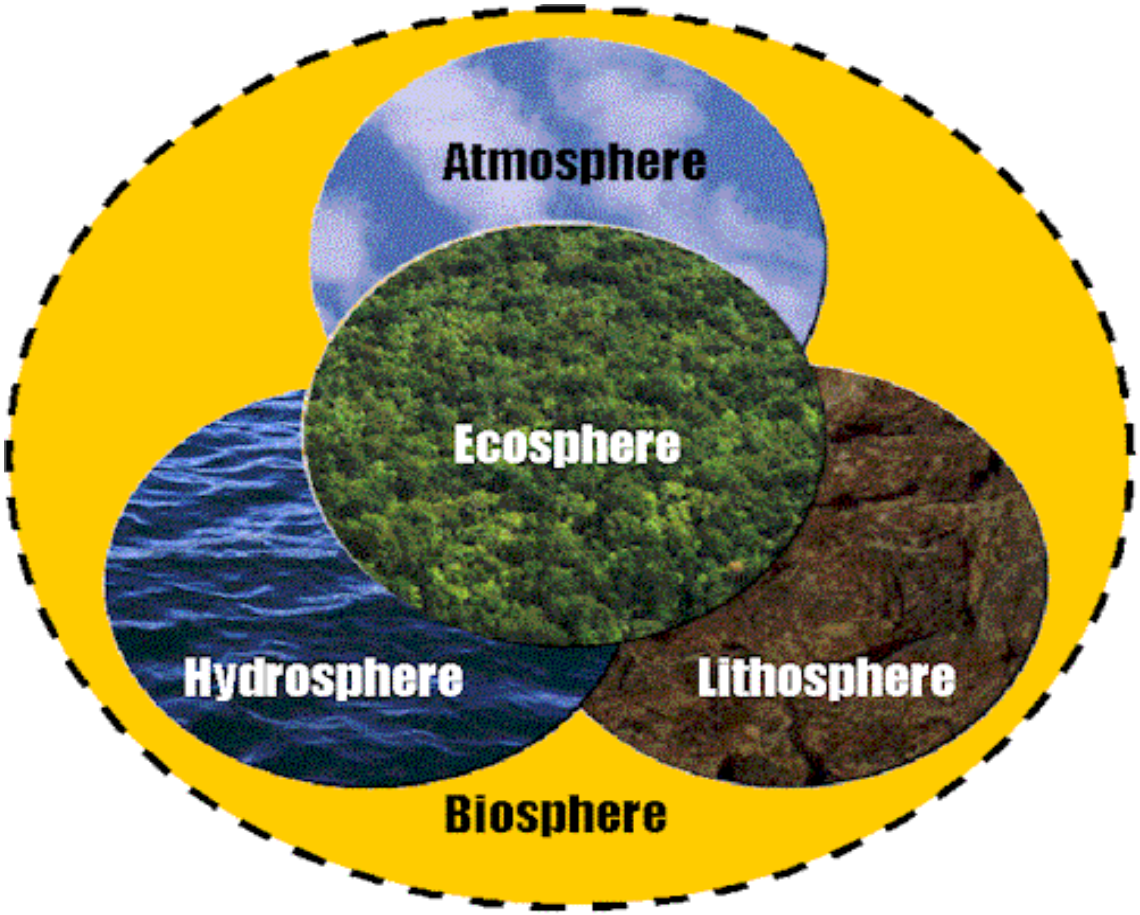


Aquatic Ecosystem

Square #8

Biosphere

The ecosystem comprising the entire earth and the living organisms that inhabit it.



Square #9

Living Things Need Energy: Food Chains

A food chain is a diagram that shows how energy in food flows from one organism to the other.

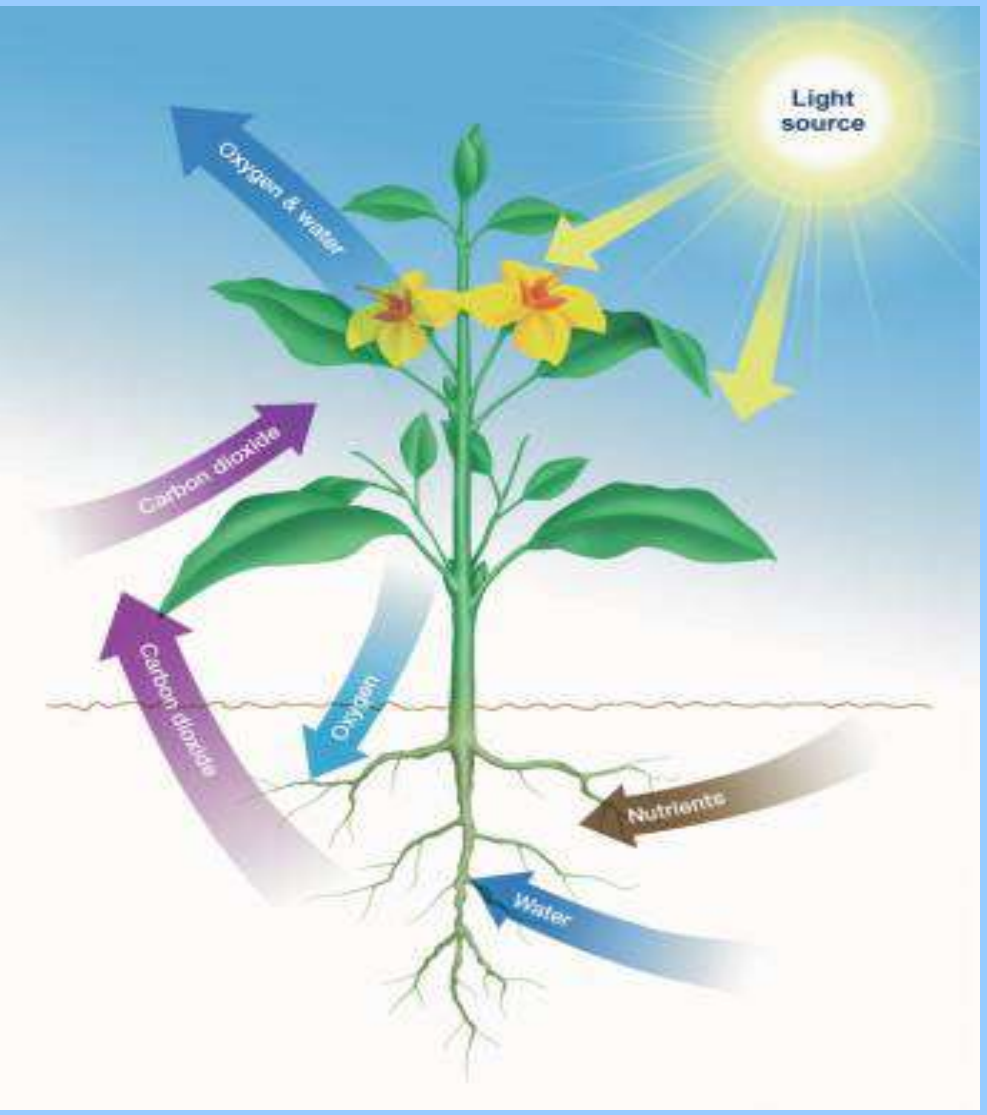
Square #9

Living Things Need Energy: Food Chains

Sunlight is the source of energy for almost all living things.

Square #10

Producer



Organisms that use sunlight directly to make food

Square #11

Consumer – Herbivore

A consumer that eats only plants.

Ex: The black-tailed prairie dog is an herbivore that eats seeds and grass in the grasslands of western North America.

Square #12

Consumer – Carnivore

A consumer that eats only animals.

Ex: Coyotes, hawks and badgers are carnivores which will kill and eat other animals (like a prairie dog).

Square #13

Consumer – Omnivore

A consumer that eats both plants and animals.

Ex: The grasshopper mouse eats insects, lizards, and grass seeds.

Square #14

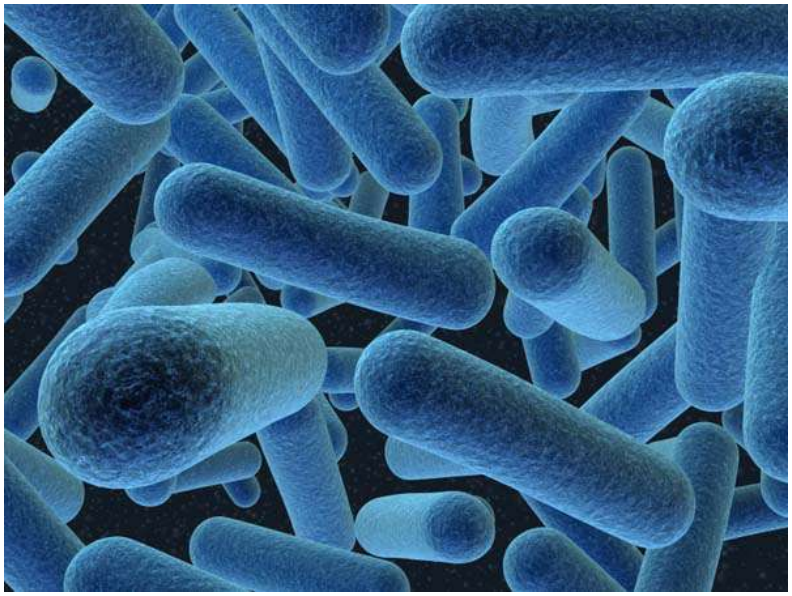
Consumer (Scavenger)

A consumer (omnivore) that eats dead plants & dead animals.

Ex: A turkey vulture may eat some of another animal's leftovers. A scavenger can pick bones completely clean.

Square #15

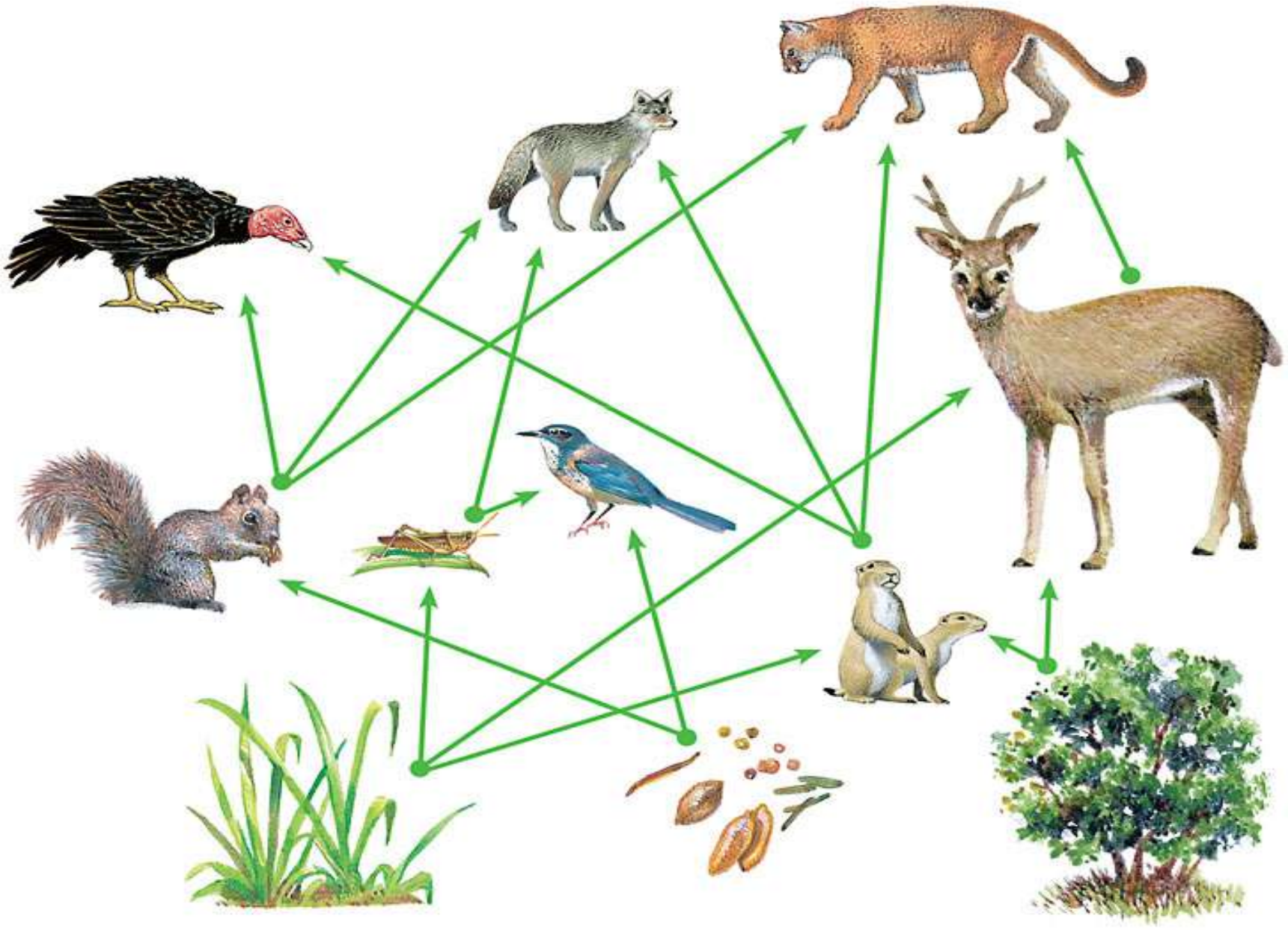
Decomposer



Organisms that get energy by breaking down dead organisms. They break down materials and return nutrients to the soil. (Ex: fungi and bacteria)

Square #16

Food Web



Square #16

Food Web

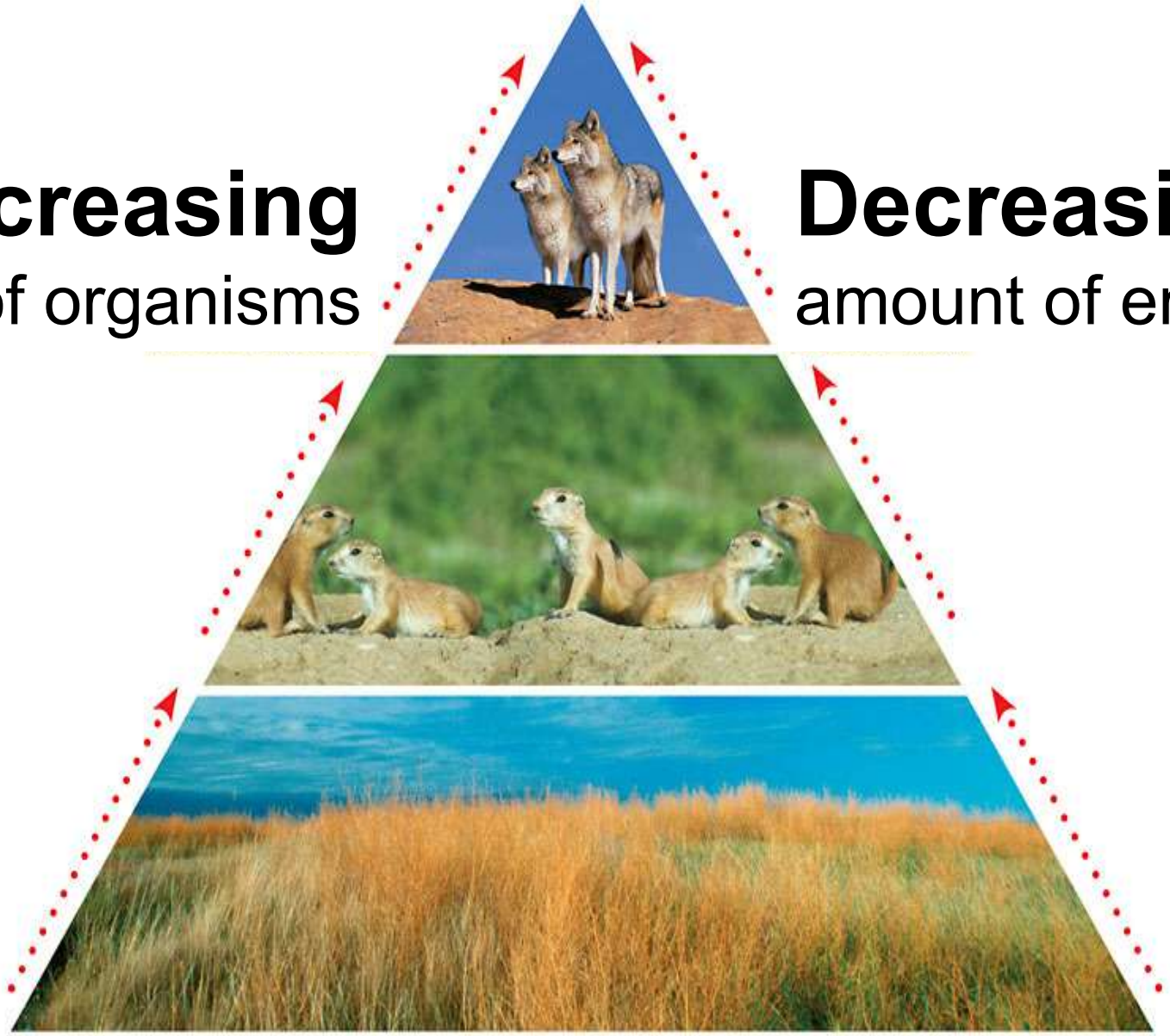
The green arrows show how energy moves when one organism eats another. Most consumers eat a variety of foods and can be eaten by a variety of other consumers.

Square #17

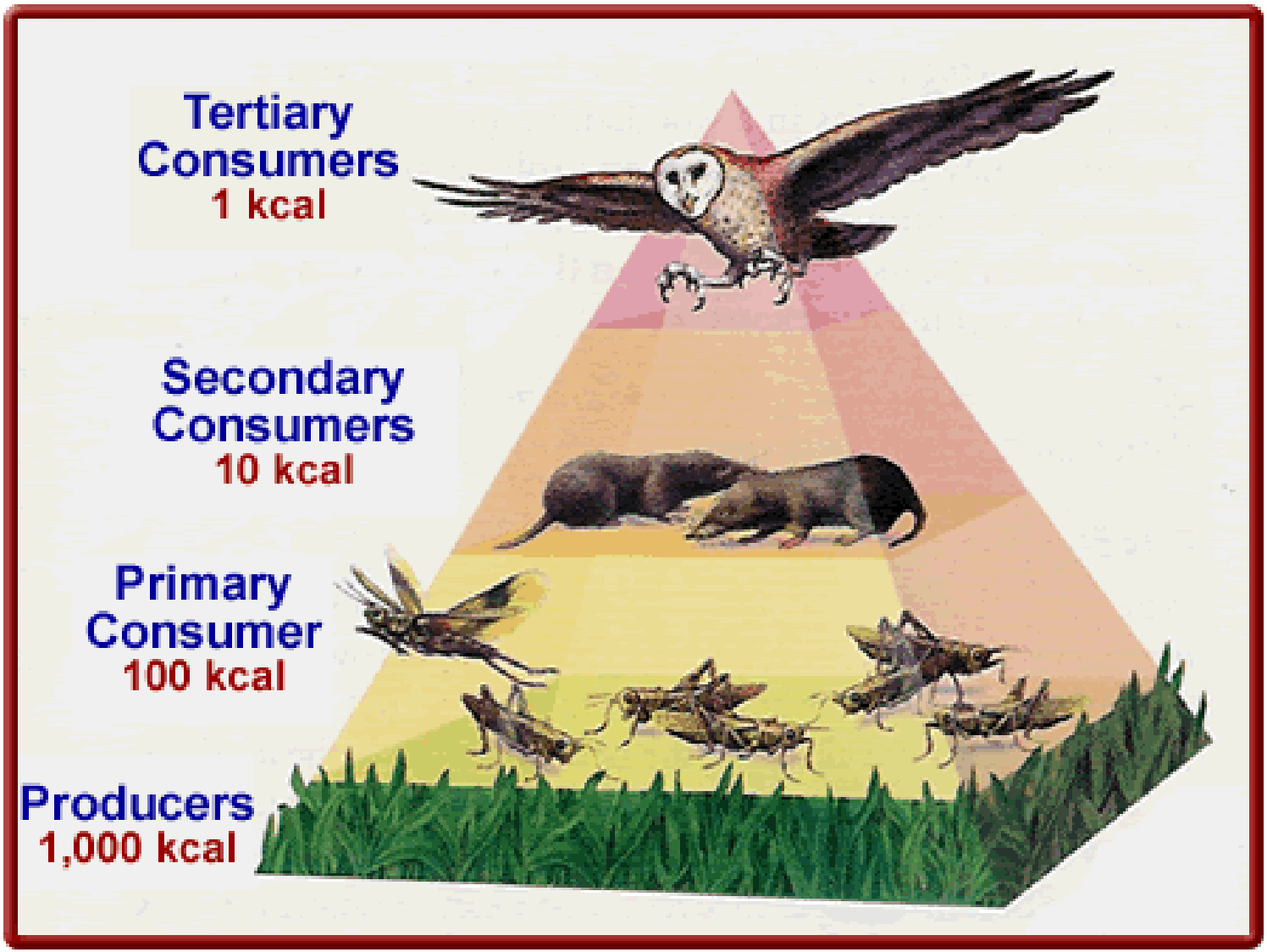
Energy Pyramid

Decreasing
# of organisms

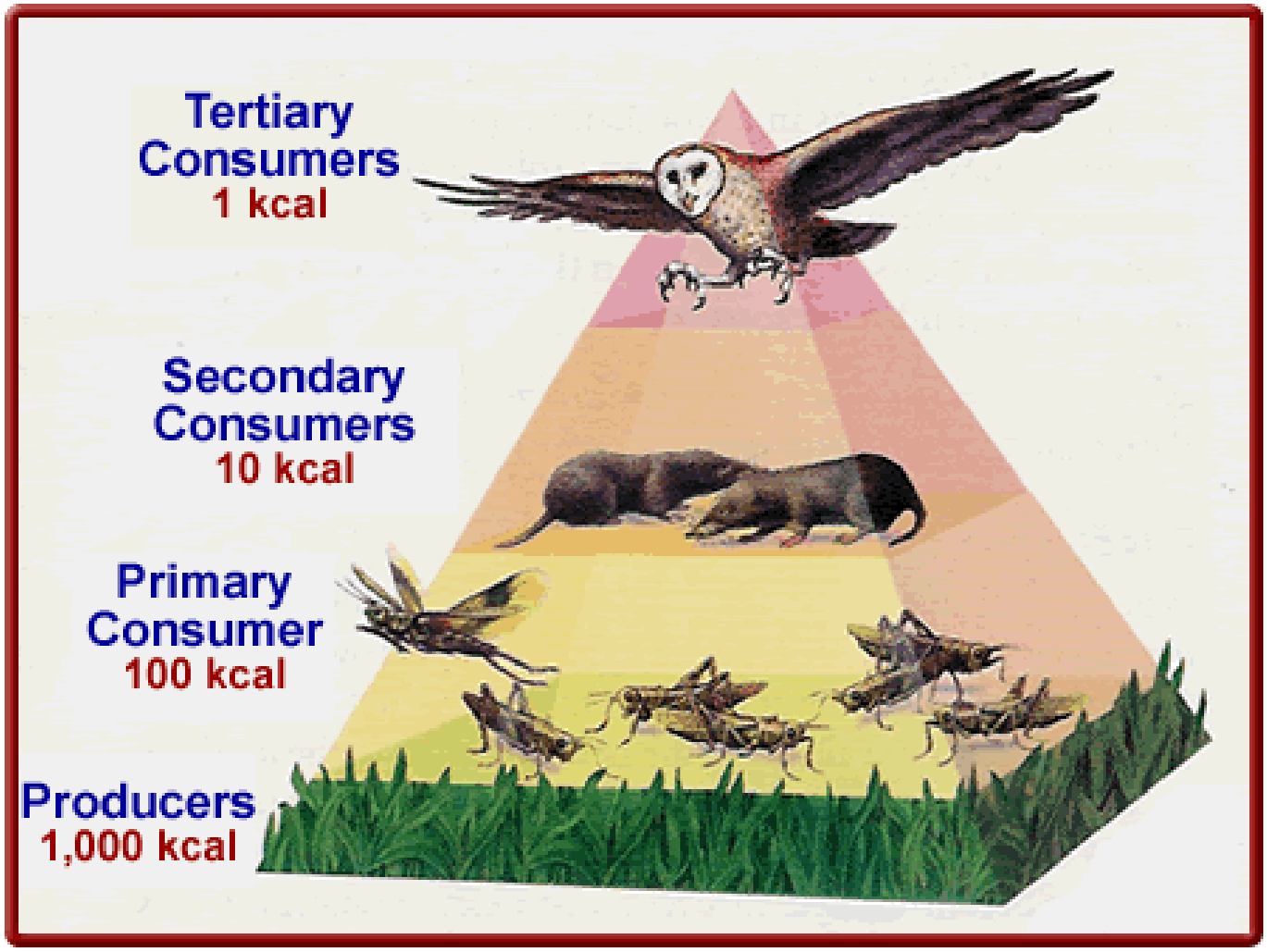
Decreasing
amount of energy



What happens to the remaining 90%?

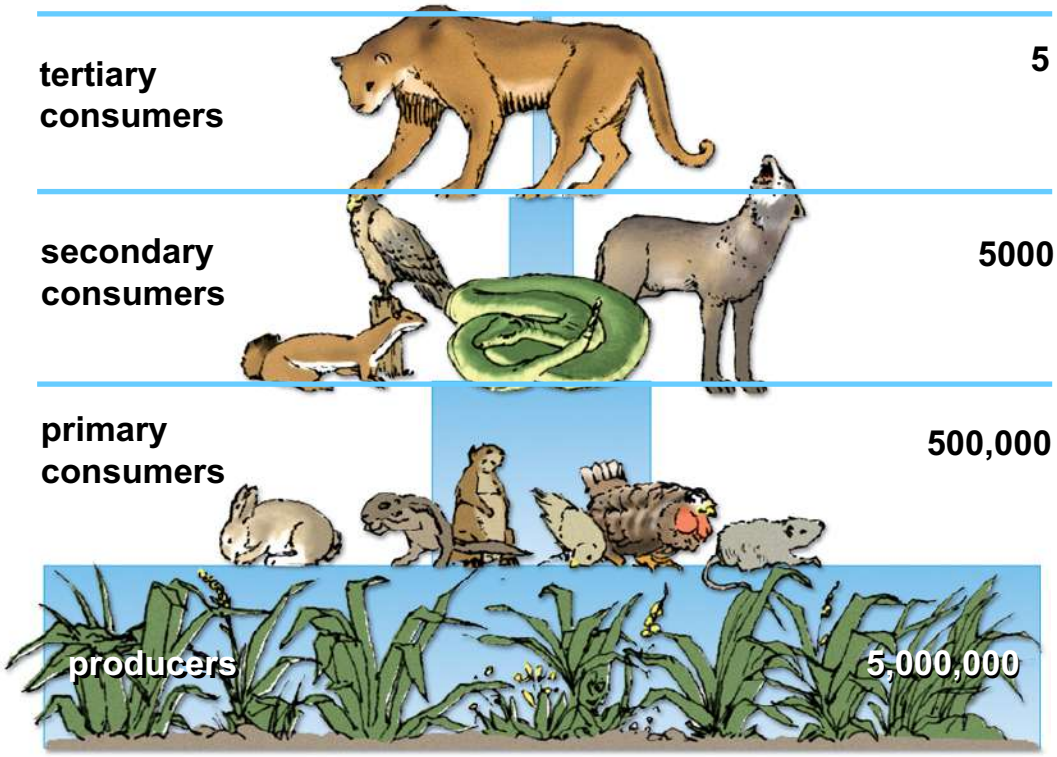


It is used by the organisms or converted to heat



Pyramid of Numbers

- Shows the numbers of individual organisms at each trophic level in an ecosystem.



- A vast number of producers are required to support even a few top level consumers.

Square #17

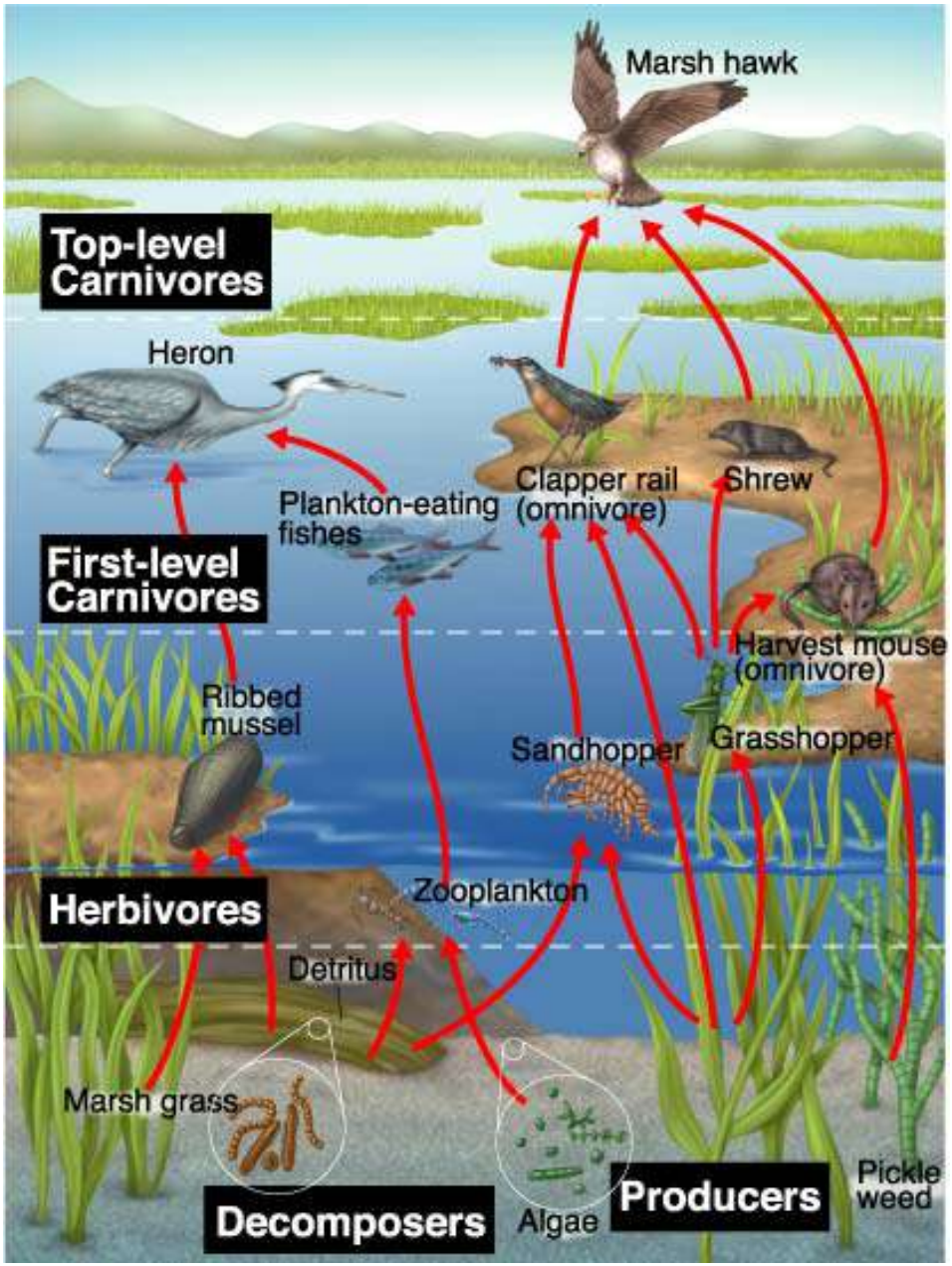
Energy Pyramid

A diagram that shows an ecosystem's loss of energy.

- More energy is available at the base than at the top.
- There are fewer organisms at the top than at the base.

Levels of the Energy Pyramid

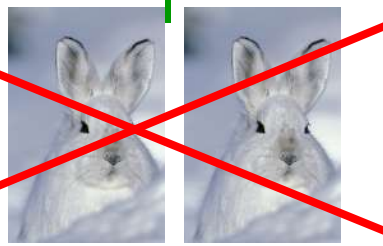
- Producer: makes food
- Primary consumer: eats producer (herbivore)
- Secondary consumer: eats the herbivores or both plants and herbivores (carnivore or omnivore)
- Tertiary consumer: Top of the food web – has no predators



#18 # Yellowstone: What happened???

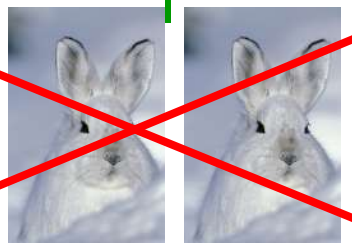
Without the gray wolf, the elk population was no longer controlled.

Yellowstone: What happened???



Elk overgrazed, so there was too little grass to support the elk and other populations that depend on grass, such as the snowshoe hare

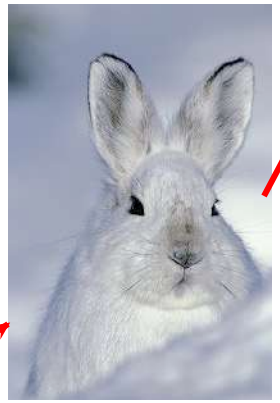
Yellowstone: What happened???



As the populations of snowshoe hares declined, the fox lost its food source. Without a predator at the top of the food chain, the other populations were out of control.

Square #18

Balance in Ecosystems



Square #19

Ecosystems out of Balance

1.What happened when the wolf population was wiped out?

A: The populations of some species (such as elk) were no longer controlled. Elk overgrazed, so there was not enough grass to support the elk and other populations. As a result, populations of elk and others who depended on the grass were in decline.

Square #19

Ecosystems out of Balance

2. What did the U.S. Fish and Wildlife service hope to accomplish by reintroducing wolves into Yellowstone?

A: They hope to restore the natural energy flow in the area and bring populations back into balance.

Square #20

Ecosystems out of Balance

Are you going to reintroduce wolves into Yellowstone?

Yes? – explain

No? – explain

Square #21

Ecological Succession

1. **Succession** – a gradual development of a community over time
2. **Pioneer Species** – the first organisms to live in an area
3. **Secondary Succession** – the original community regrowing through a series of stages

Square #22

Ecological Succession in Yellowstone

1. Early Stages – only a few species grow in the area (small, green plants grew in large numbers)

2. Community Maturing – dominated by well-adapted, slow growing species (within 10 years, many trees were growing and the forest community was coming back)

3. A mature community – over time, a variety of organisms who are well-adapted reinhabit the area

Square #23

Interactions with the Environment

Limiting Factors

A resource that is so scarce that it limits the size of a population.

Carrying Capacity

The largest population that an environment can support at any given time

Square #23 (cont)

Interactions with the Environment

Caption: When a deer population becomes too large for the amount of food available, food is the limiting factor on the carrying capacity of the deer's community.

Square #24

Interactions Among Organisms

Competition

- When two or more individuals or populations try to use the same resources (such as food)
- Occurs between individuals within a population AND between populations

Square #24 (cont)

Interactions Among Organisms

Caption: Hyenas and vultures compete for the meat of the dead elephant

Square #25

Interactions Among Organisms

Predator/Prey

- Predator: an organism that kills and eats all or part of another organism
- Prey: an organism that is killed and eaten by another organism

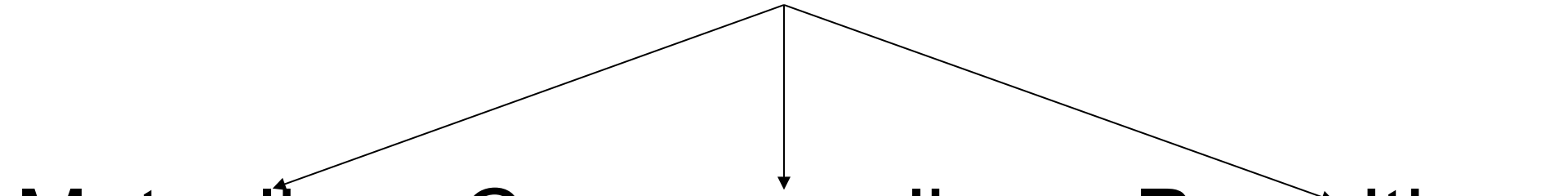
Square #25 (cont)

Interactions Among Organisms

Caption: The lion is the predator and the zebra is the prey.

Symbiosis: a relationship in which two different organisms live in close association with each other, regardless of the effect

Symbiotic Relationships



Square #27

Symbiosis: Mutualism

Mutualism: a relationship between two species in which both species benefit

Symbiosis: Mutualism

Caption: The tick bird eats parasites off of the rhino. Both species benefit because the bird gets food, and the rhino gets rid of parasites.

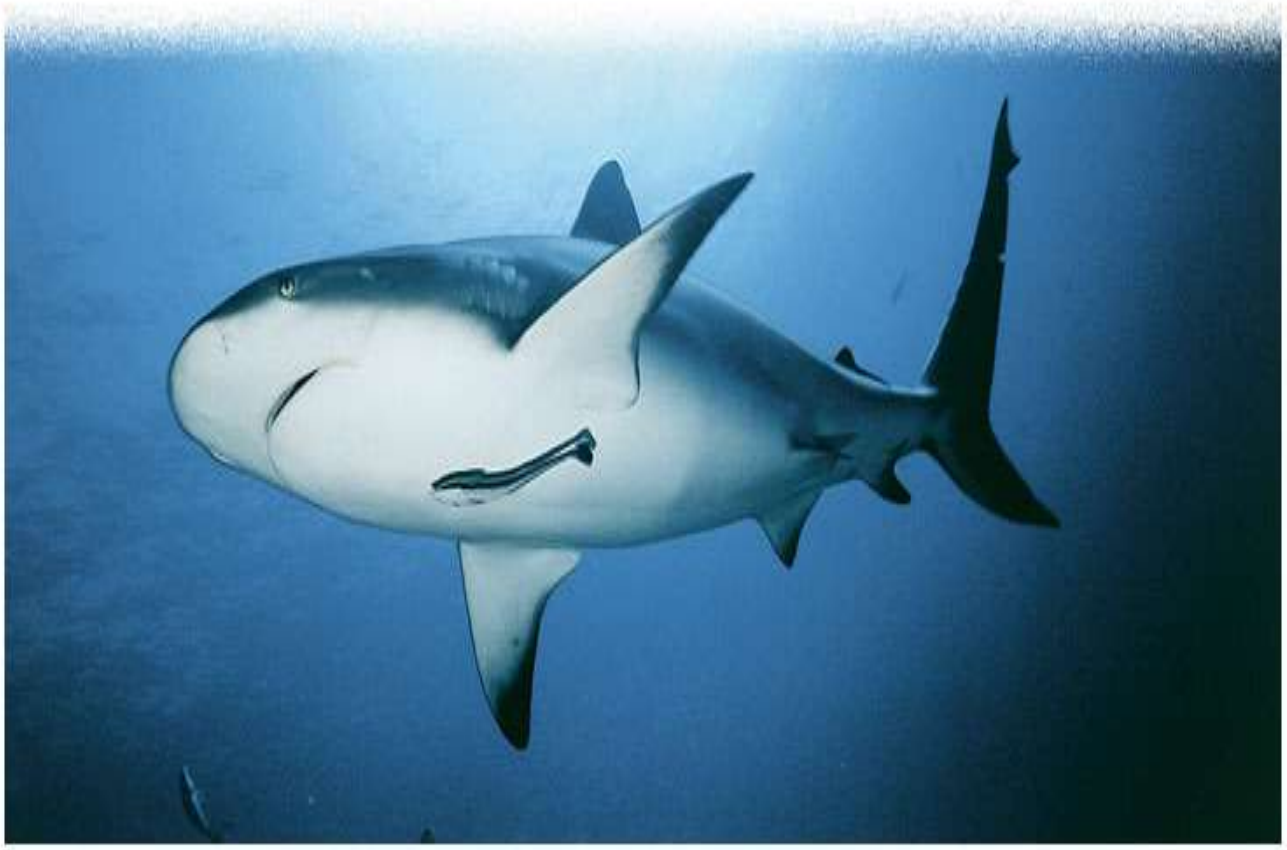
Symbiosis: Commensalism

Commensalism: a relationship between two organisms in which one organism benefits and the other is unaffected

Square #28

Symbiosis: Commensalism

Caption: The remora attached to the shark benefits from the relationship. The shark neither benefits from nor is harmed by the relationship .



Square #29

Symbiosis: Parasitism

Parasitism: a relationship between two species in which one species, the parasite, benefits from the other species, the host, which is harmed

Square #29 (cont)

Symbiosis: Parasitism

Picture Caption: The tomato hornworm is being parasitized by young wasps who are burrowing into its body and eating it alive!

Square #29

Symbiosis: Parasitism

Caption: Mosquitoes inject poison to their victims while they benefit by getting a meal of blood.

-Malaria and West Nile Virus can be spread through mosquito bites.

Symbiosis: Coevolution

Coevolution: The change over time of two species that is due to mutual influence, often in a way that makes the relationship more beneficial to both species.

Square #30

Symbiosis: Coevolution

Caption: If the flower and the bee did not change together, the bee would be unable to pick up the nectar, so he would not be able to pick up the pollen, and the flower would not get pollinated.