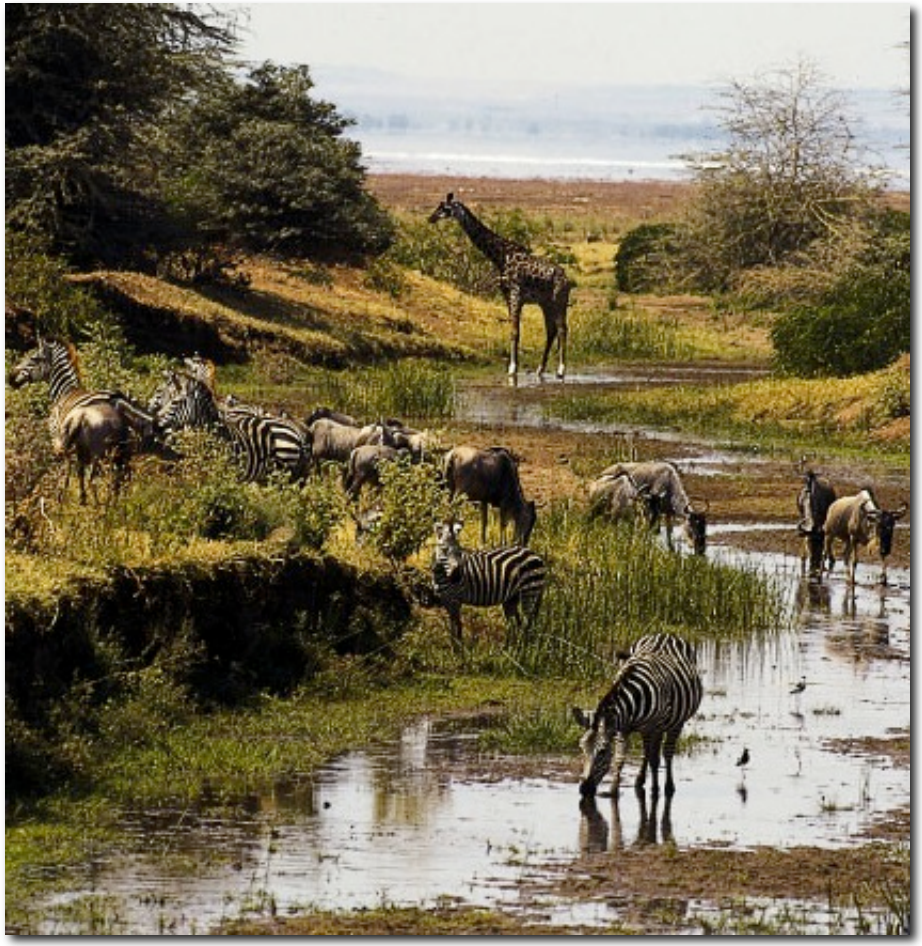
3.1 - What is Ecology?



Objectives

- Identify the **levels of organization** that ecologists study.
- Describe the **methods** used to study ecology.

Ecology

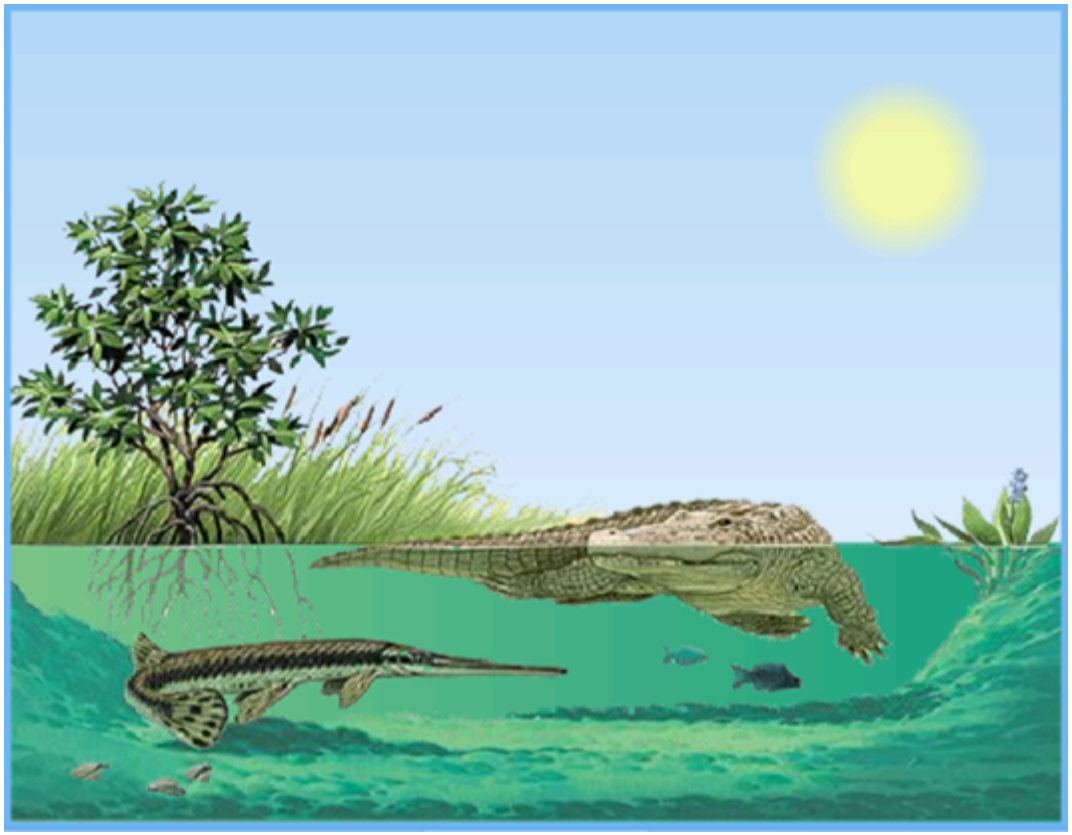
- **Ecology** – the study of the **interactions** of living organisms with one another and with their physical environment (soil, water, climate, etc.)

Important Terminologies

- **Ecosystem** – a **community** and all the physical aspects of its **habitat**
- A **community** – The many **different** species that live together in a habitat
- A **population** – all members of **ONE** species that inhabit a particular area
- **Species** – a group of organisms so similar to one another that they can breed and produce fertile offspring

Abiotic and Biotic Factors

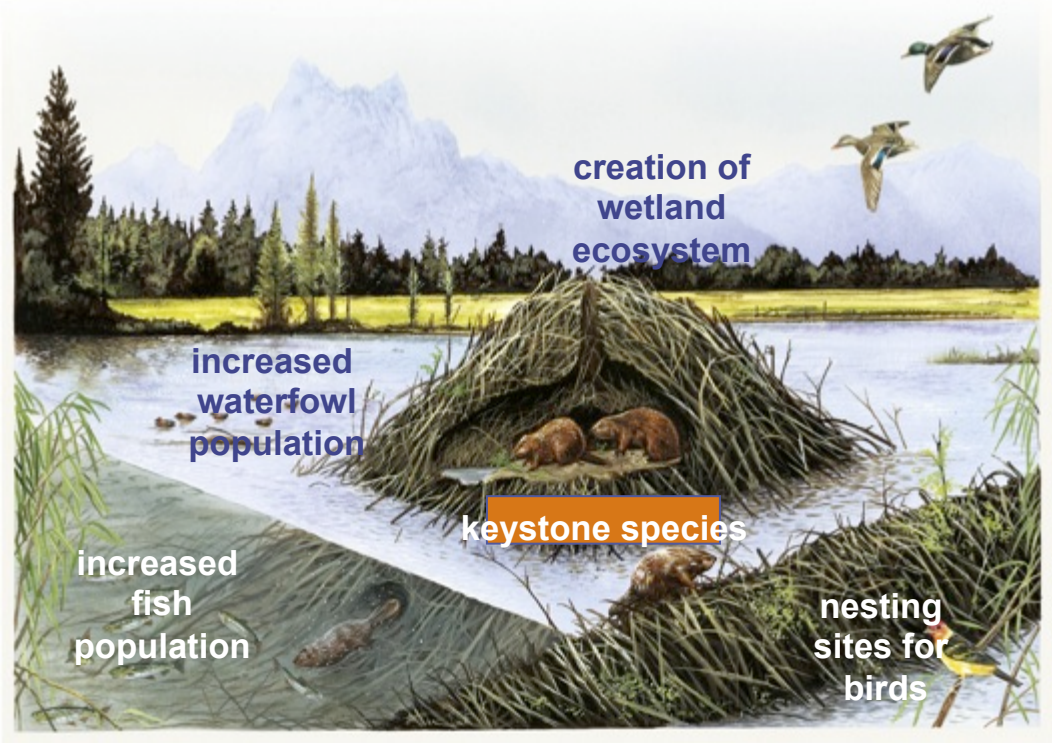
- **biotic factors** – organisms (living) in a habitat
- **abiotic factors** – physical (non-living) aspects of a habitat



Keystone Species

- **Keystone species** hold their ecosystem together.

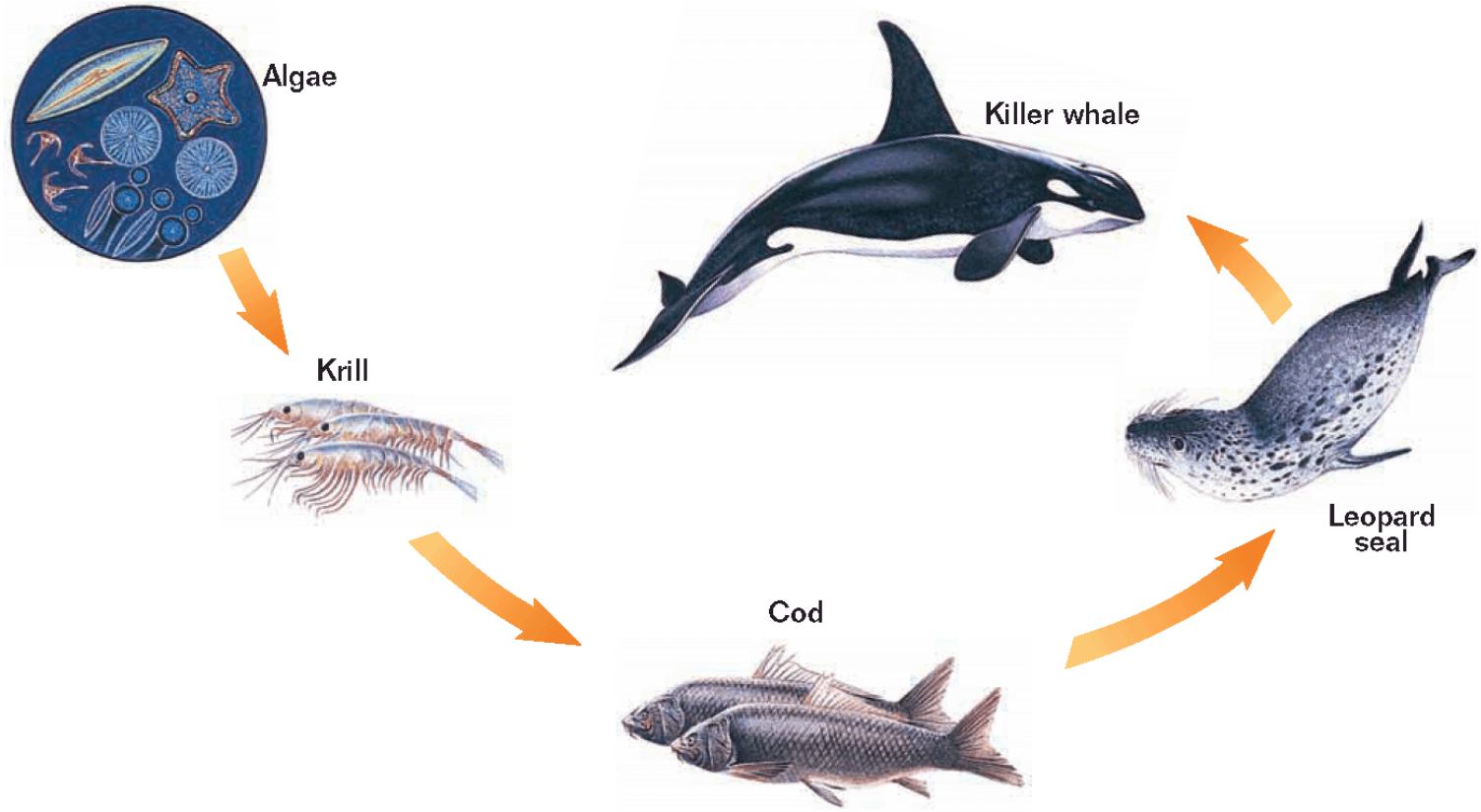
  Ex: Beavers



Queen of Trees

In what ways can the **sycamore fig tree** be a **keystone species**?

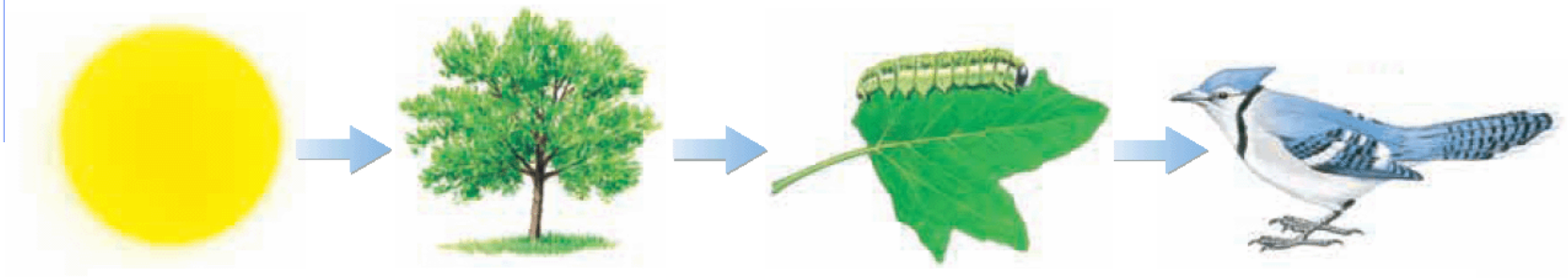
3.2 - Energy Flow



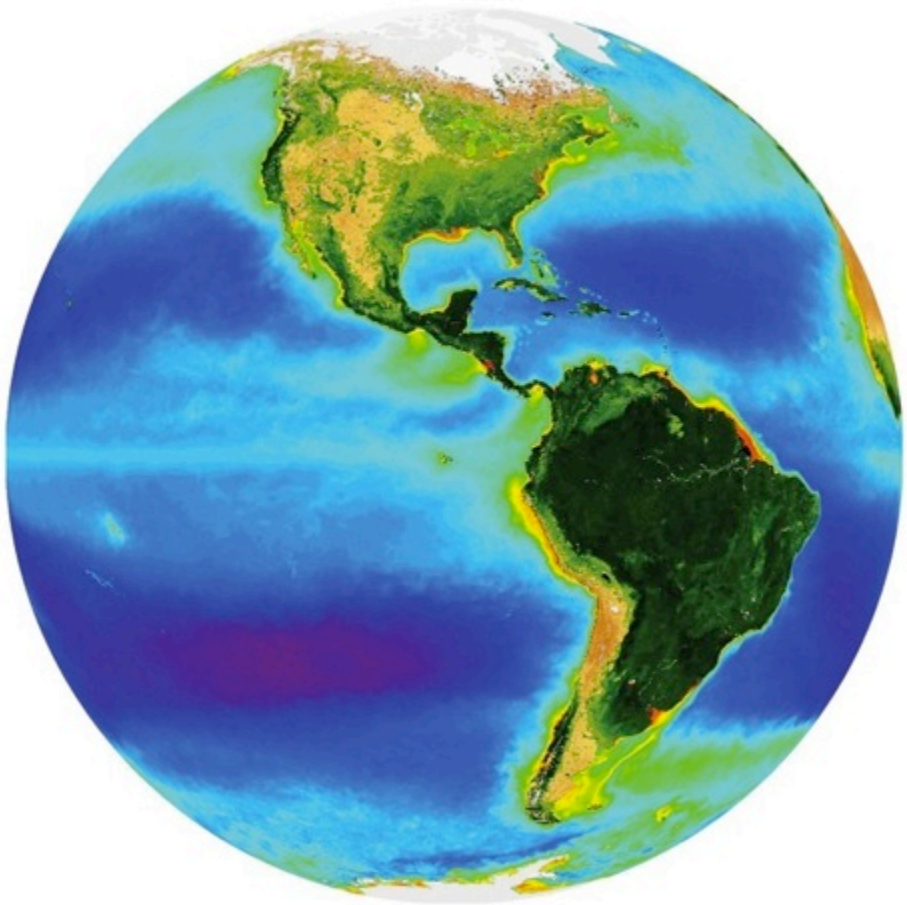
Objectives

- Distinguish between **producers** and **consumers**.
- Compare **food webs** to **food chains**.

A simple food chain



Producers



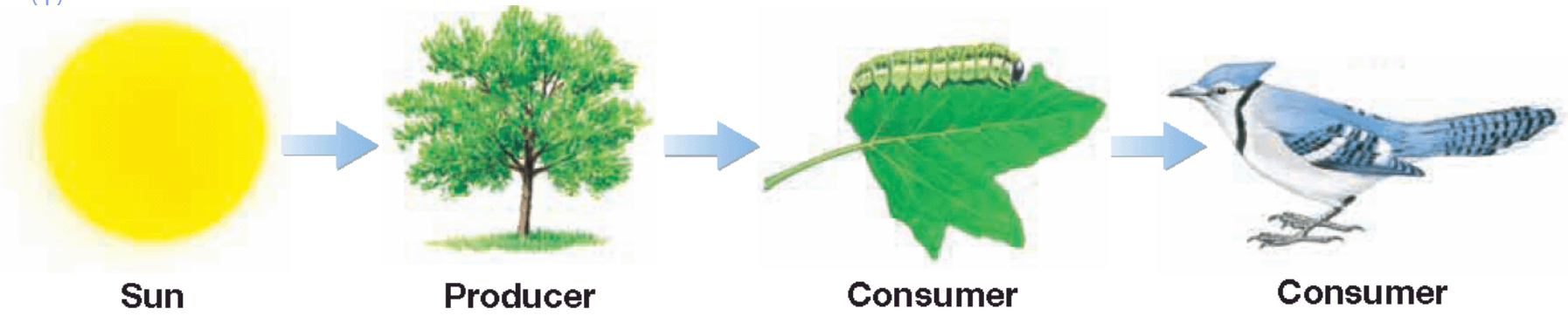
- **PRODUCERS** – Organisms that **produce** their own energy by converting solar energy into chemical energy

  Ex: plants, algae, etc.

Consumers

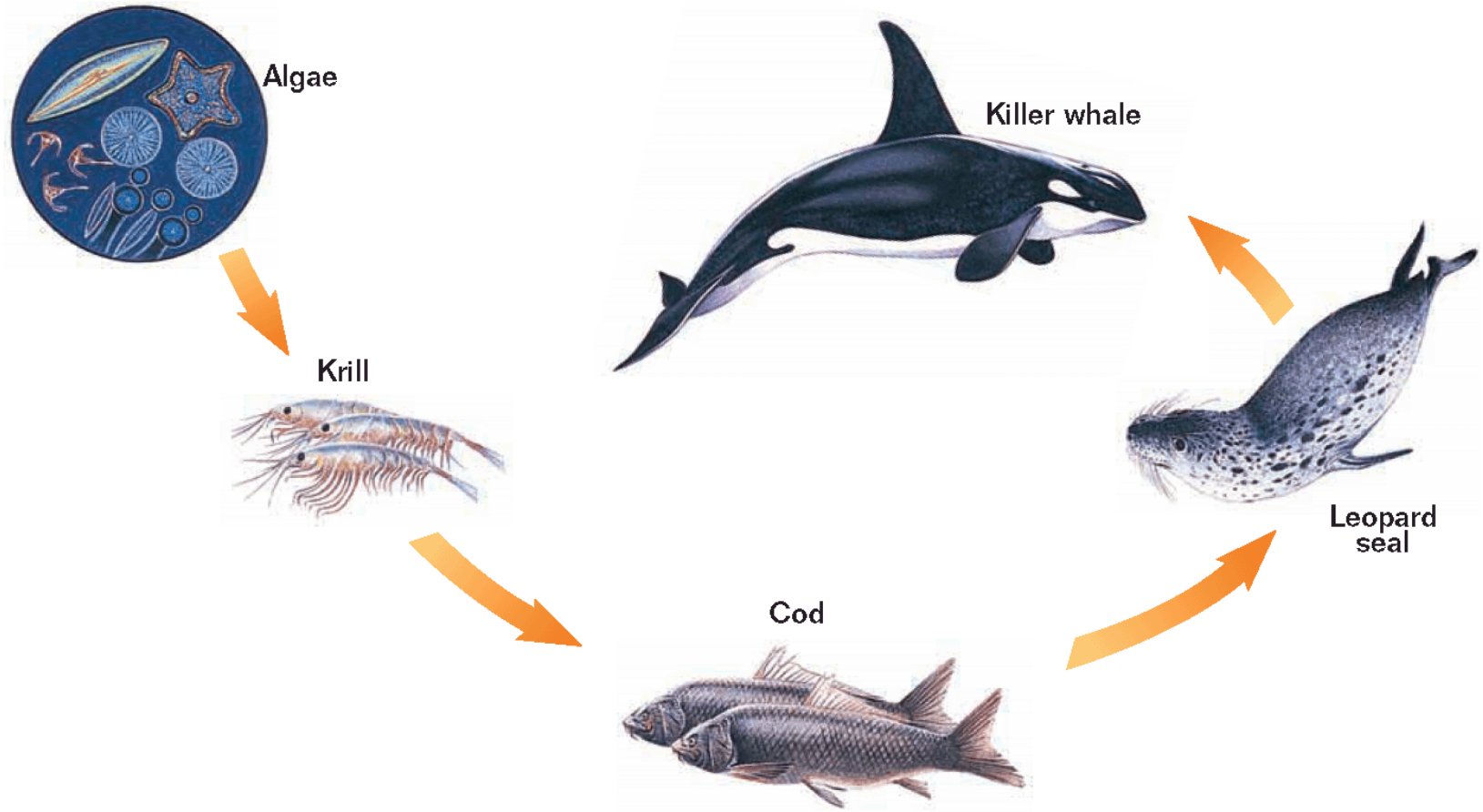
- **CONSUMERS** – Organisms that **consume** plants or other organisms to obtain the energy.

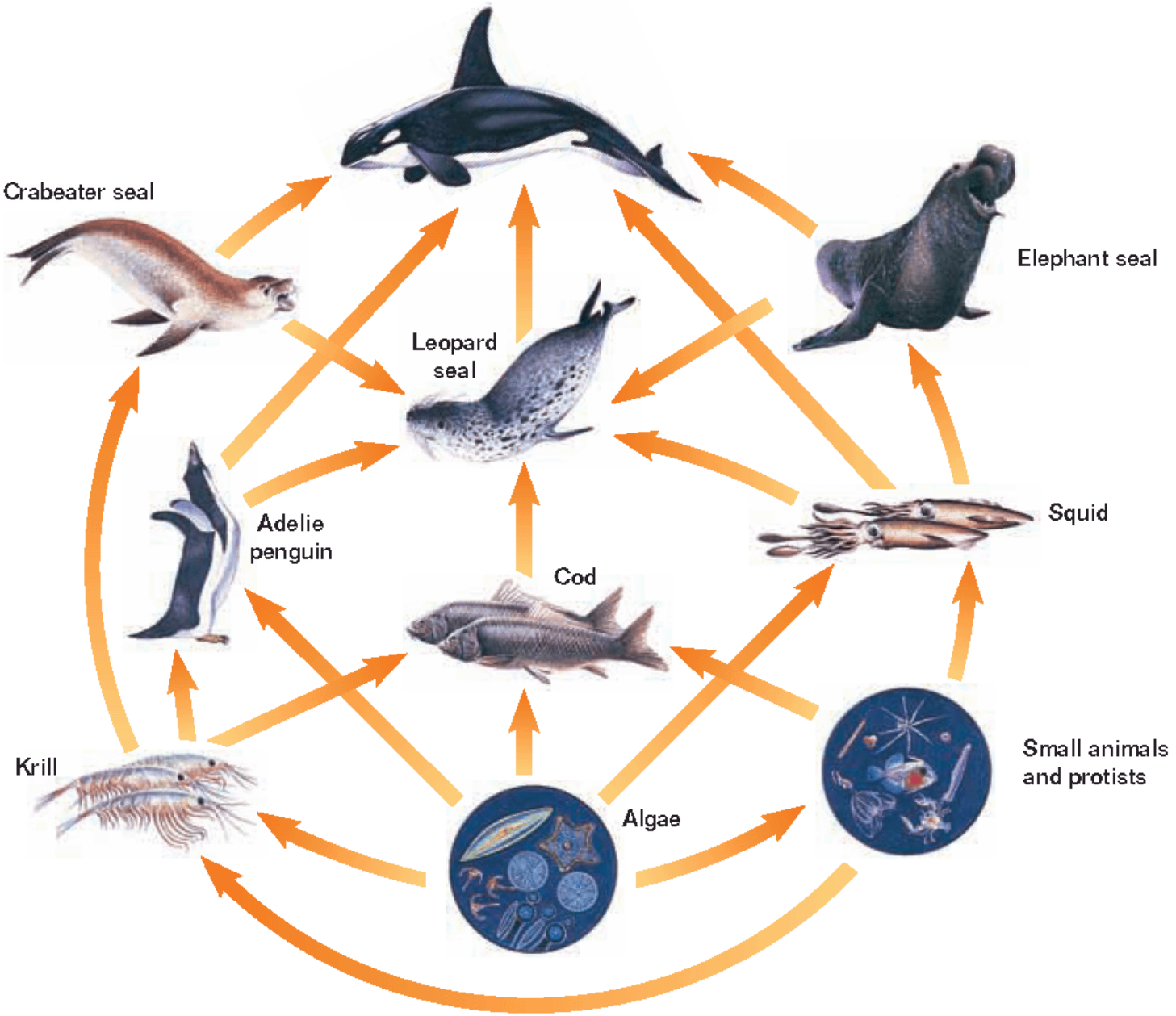
Trophic (Feeding) Levels

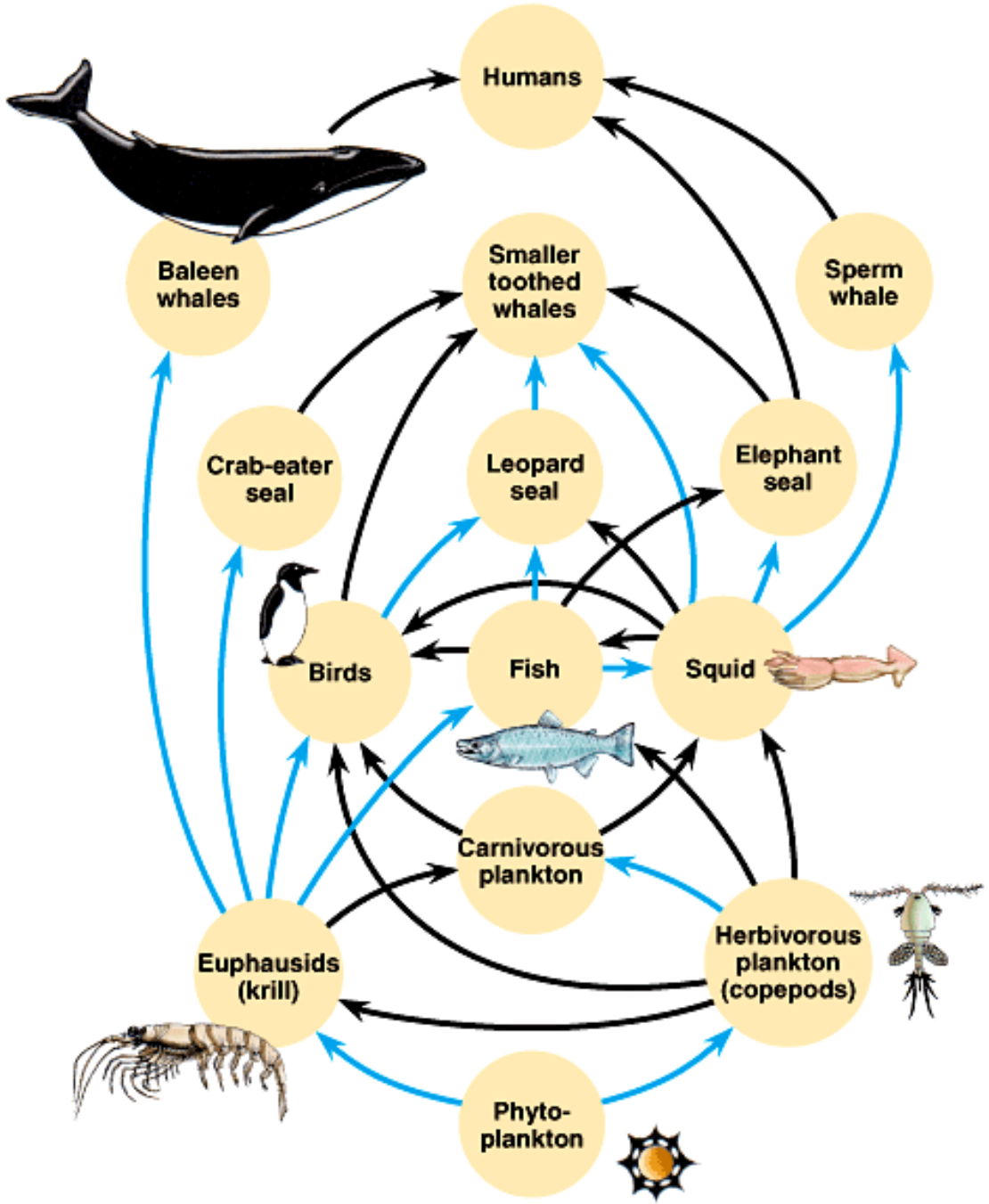


- **First** trophic level – the **producers** (plants, algae, and bacteria)
- **Second** trophic level – **herbivores (primary consumers)**
- **Third** trophic level – **carnivores (secondary consumers)**
- **Fourth** trophic level – Carnivores that eat other carnivores **(tertiary consumers)**

Food Chain in an Antarctic Ecosystem

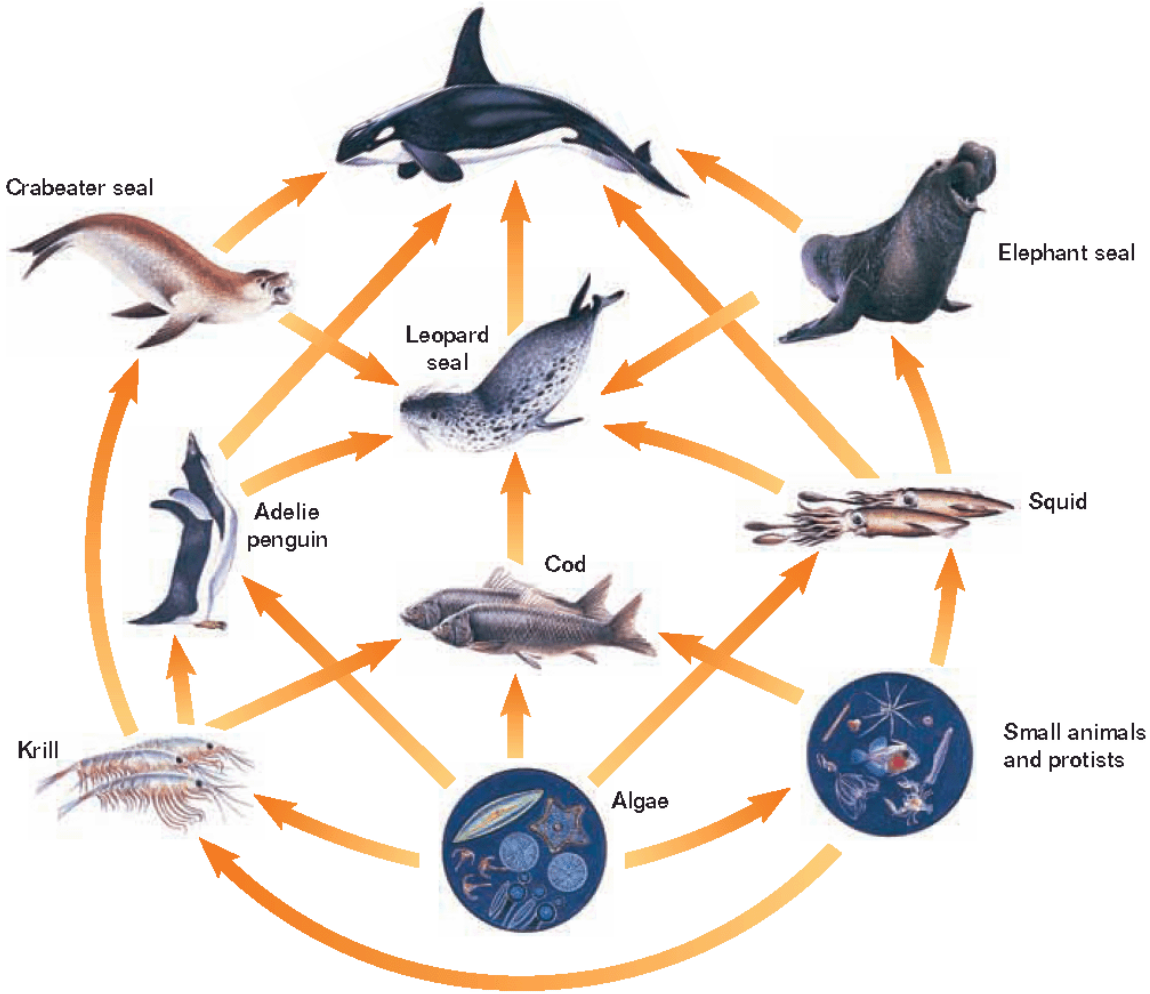



Crabeater seal
Elephant seal
Leopard seal
Adelie penguin
Squid
Cod
Krill
Algae
Small animals and protists

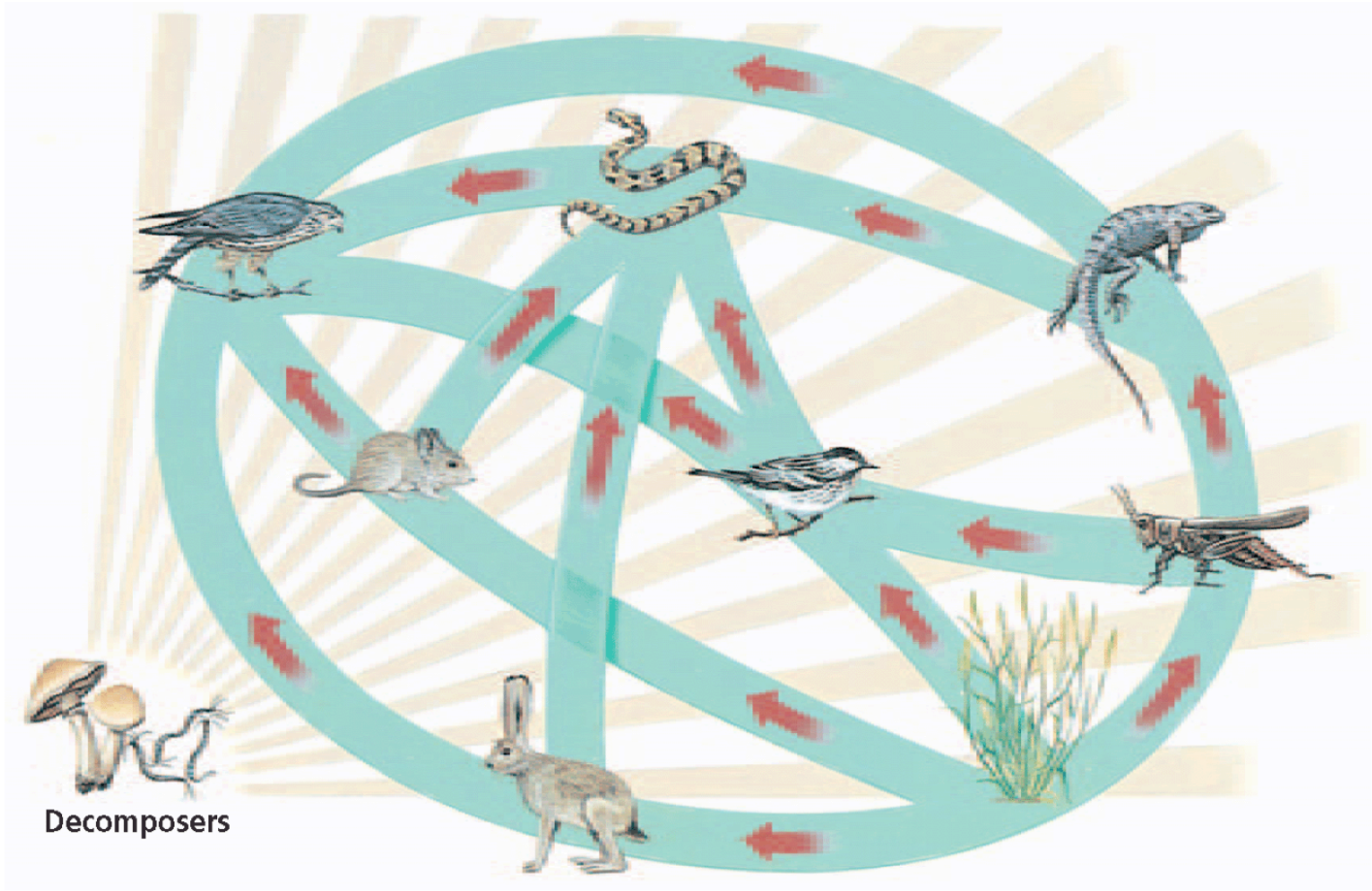

Humans
Baleen whales
Smaller toothed whales
Sperm whale
Crab-eater seal
Leopard seal
Elephant seal
Birds
Fish
Squid
Carnivorous plankton
Herbivorous plankton (copepods)
Euphausids (krill)
Phyto-plankton

Food Web

- Animals often feed at several trophic levels.
- This creates an interconnected group of food chains called a **food web**.



Grassland Food Web

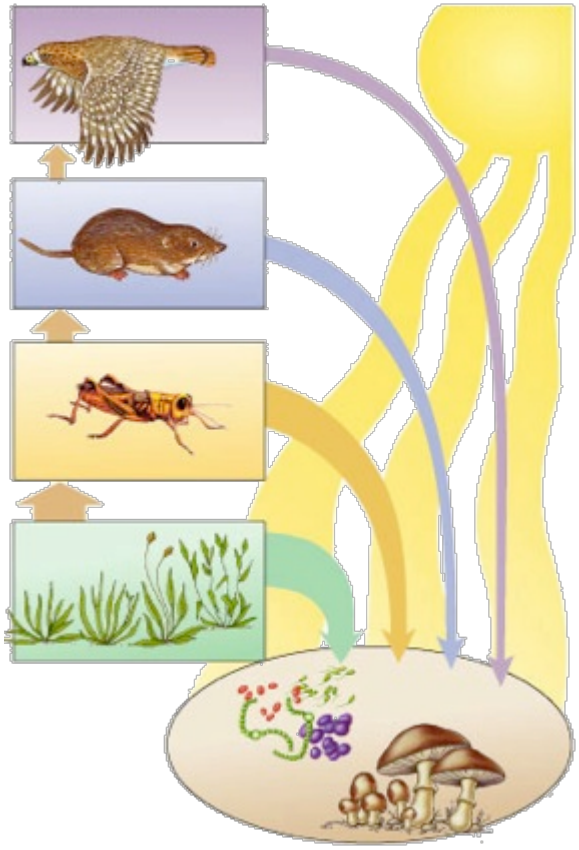


Yum, yum…

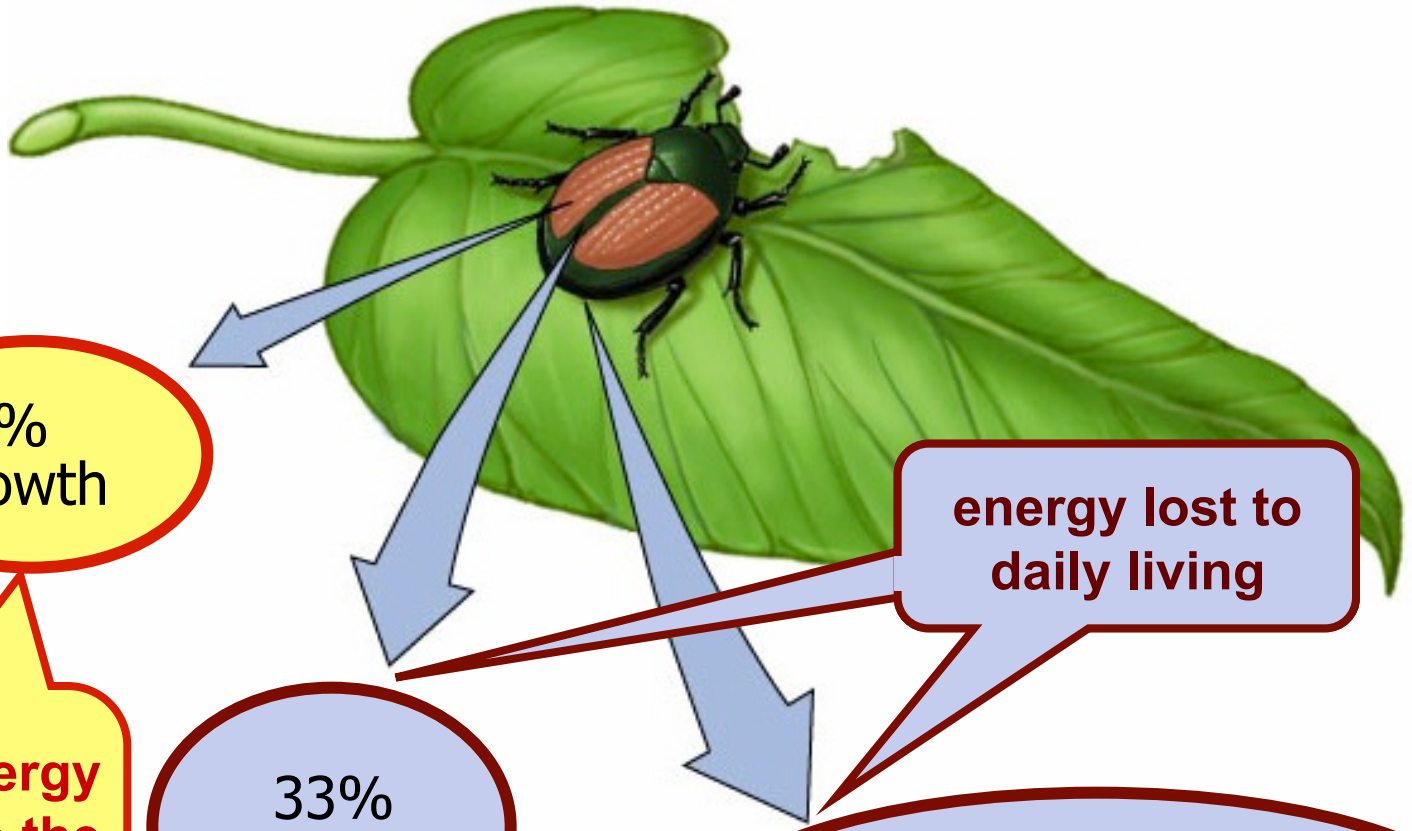
Loss of Energy in a Food Chain

LESS energy is available in each succeeding trophic levels. Why?

1. Of the food available, only a certain amount is captured and eaten by the next trophic level.
2. Some of the food eaten cannot be digested and exits as **WASTE**.
3. Only a portion of the food digested becomes part of the organism's body. The rest is used for **ENERGY**.
4. Also… much energy is lost as **HEAT** that escapes into the surroundings.



Energy Loss in a Food Chain

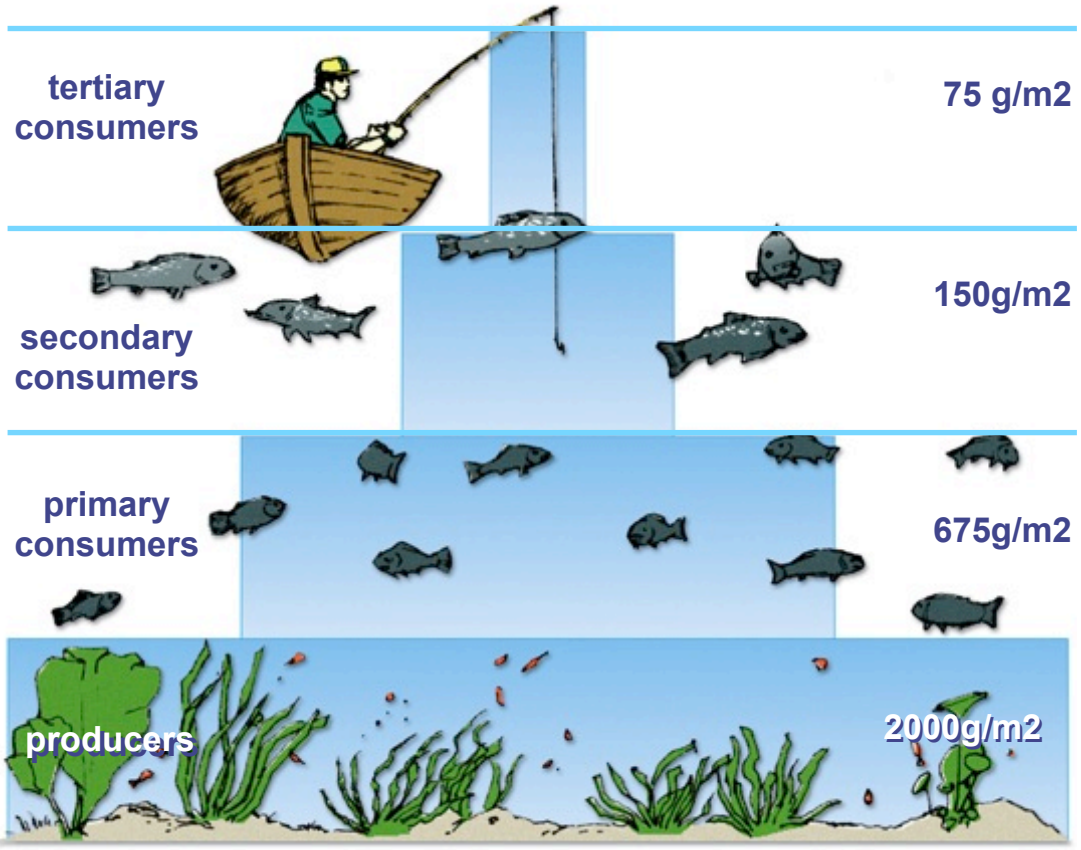


Ecological Pyramids

- The trophic structure of an ecosystem can be summarized in the form of an **ecological pyramid**.
- There are 3 possible types of pyramids.

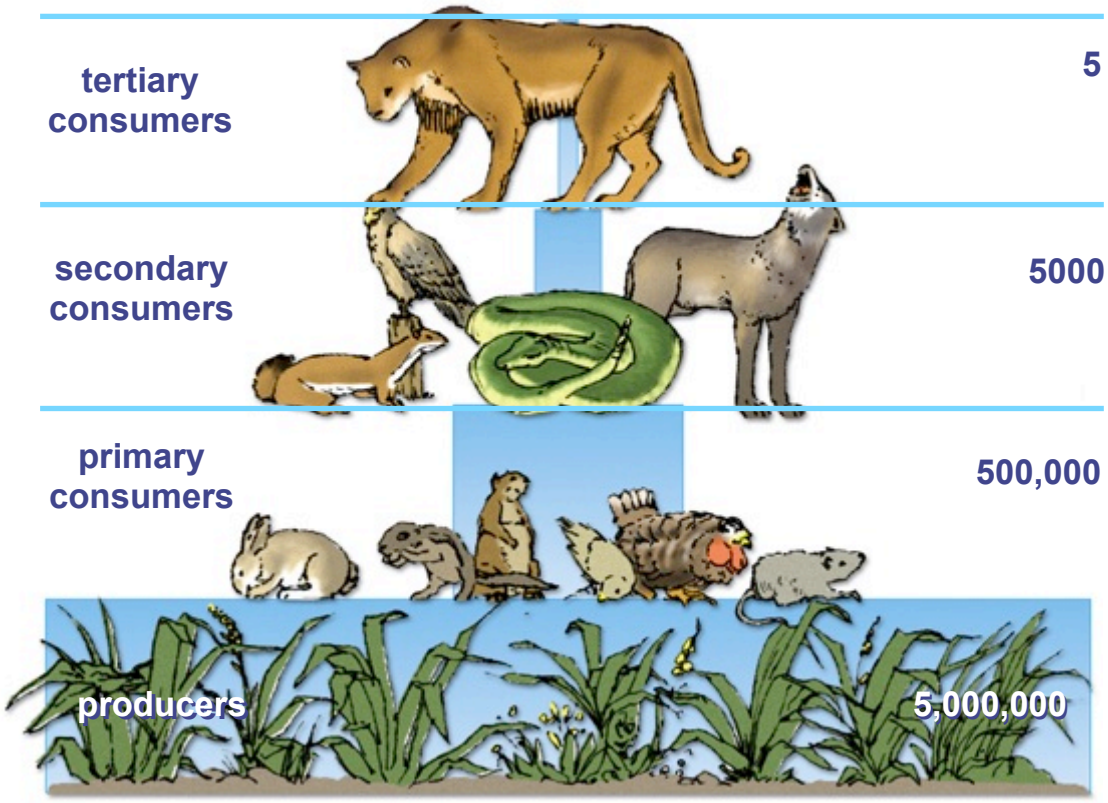
Pyramid of Biomass

1. **Pyramid of Biomass** (based on the dry weight of living material at some particular time).



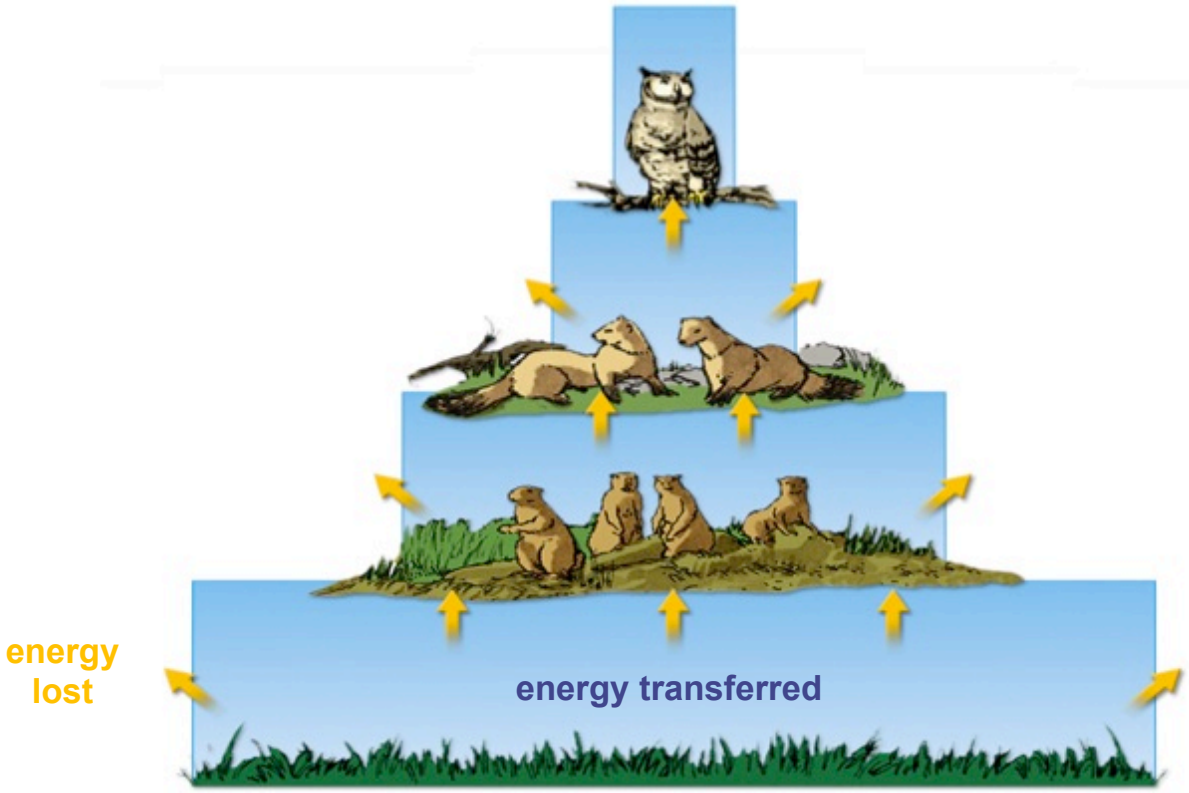
Pyramid of Numbers

2. **Pyramid of Number** (based on the number of organisms at each trophic level).

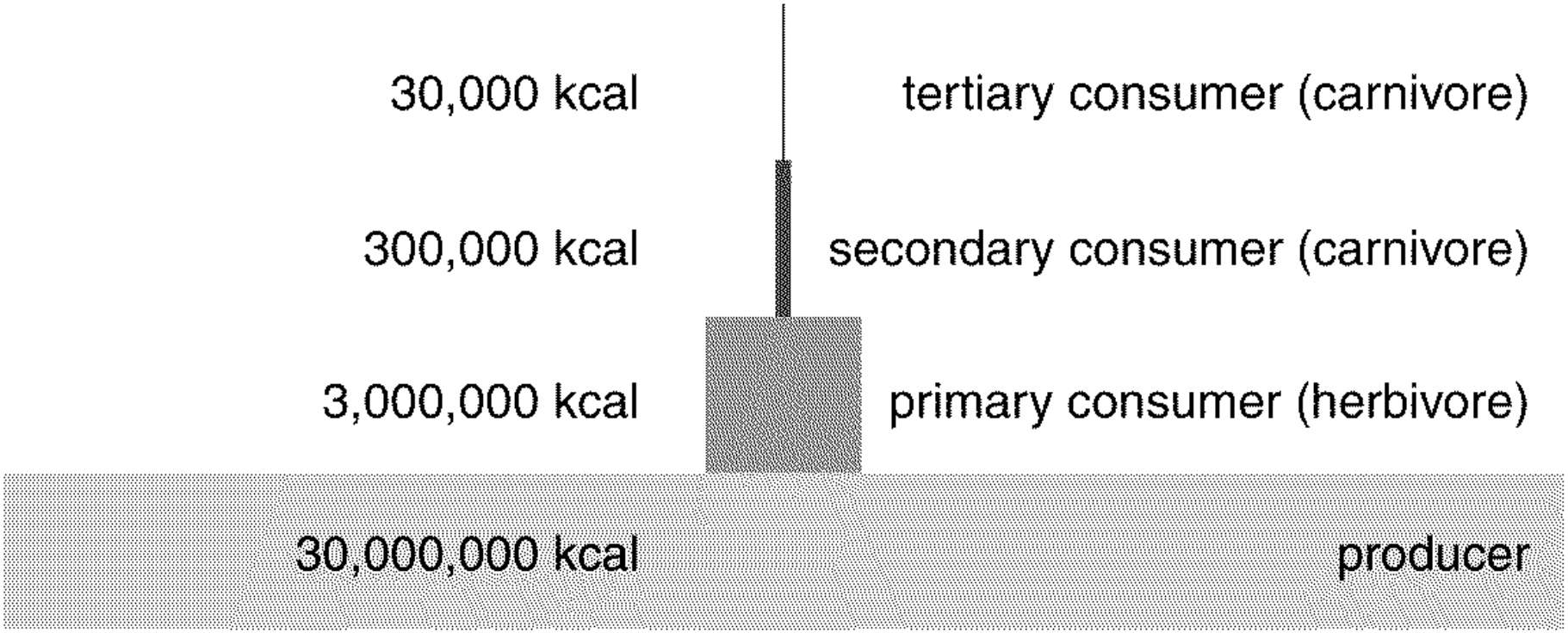


Pyramid of Energy

3. **Pyramid of Energy** (based on the amount of energy available at each trophic level).

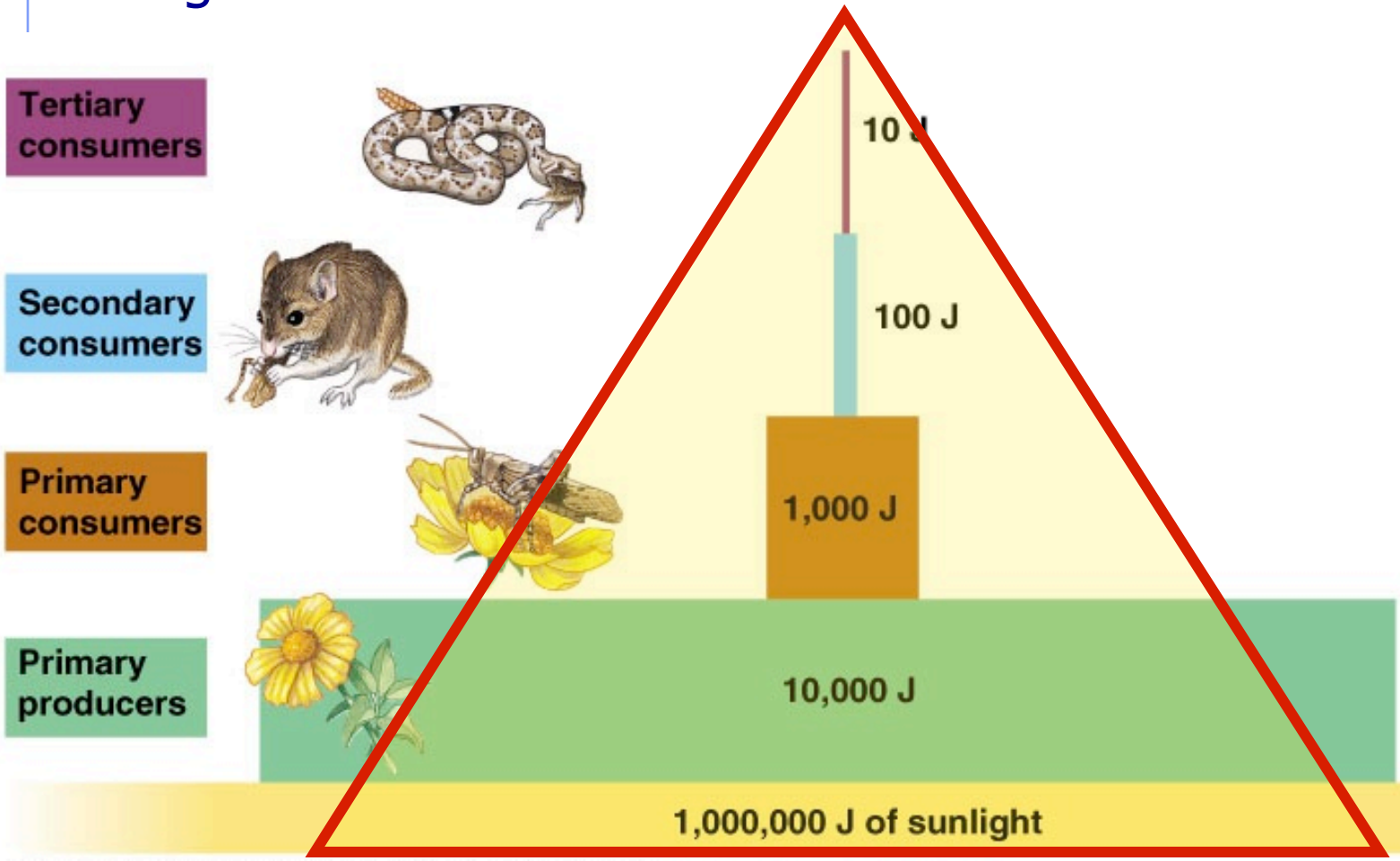


Pyramid of Energy



The 10% Rule

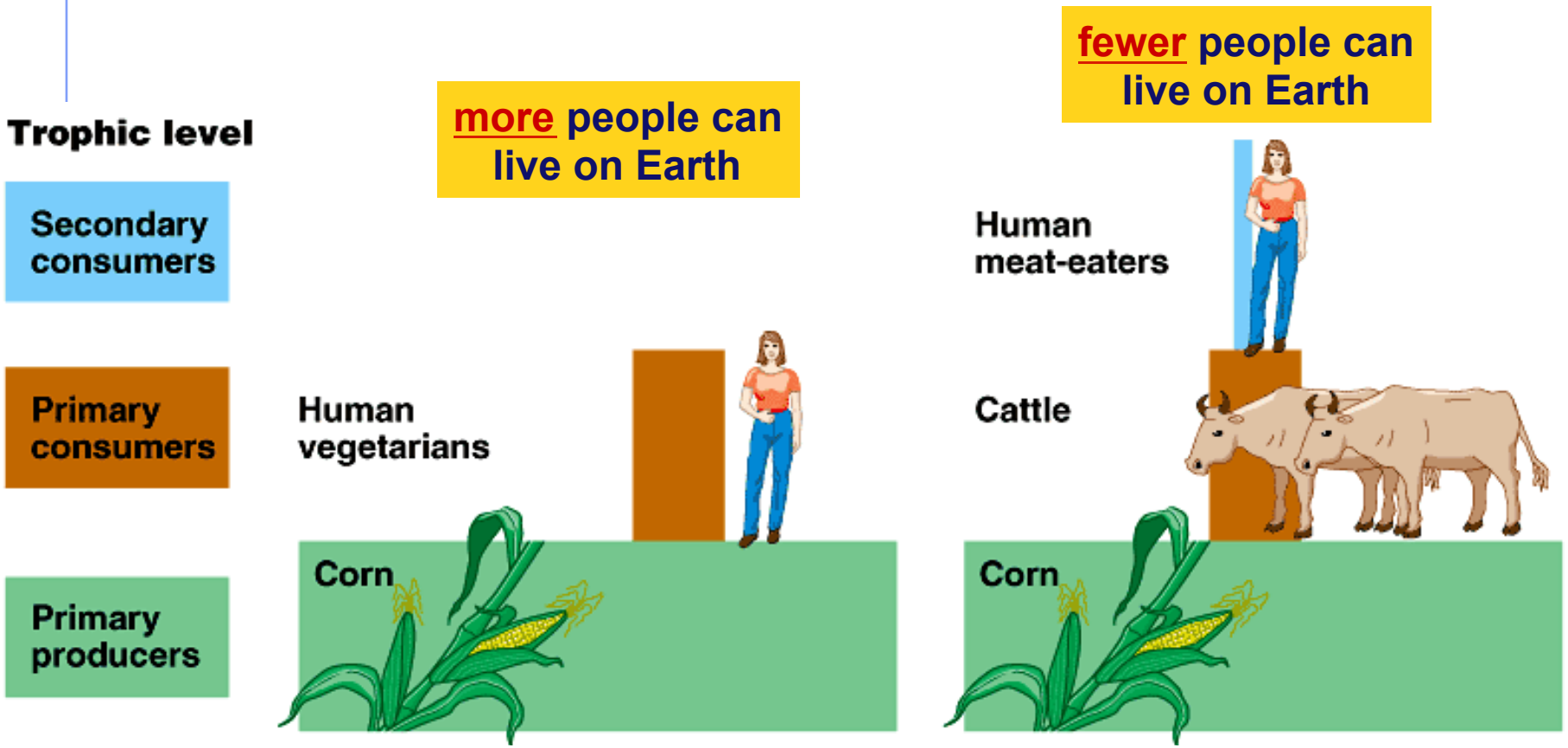
- The energy stored by the organisms at each trophic level is about **one-tenth** the energy stored by the organisms in the level below.



Vegetarians or Meat-eaters?

How many people can Earth support?

- If we are meat eaters?
- If we are vegetarian?




THOM'S BUTCHERS