

## Chapter 6 in an Urchin shell

---

---

---

---

---

---

---

## The Acorn Connection

- Points
  - All parts of the community are dependent on non-living parts
  - Living members effect non-living aspects
  - Life is connected in complex ways - everything effects everything

---

---

---

---

---

---

---

## The Acorn Connection

- Points
  - Relationships in ecosystems are dynamic
  - Human management of ecosystems involve trade-offs

---

---

---

---

---

---

---

## Ecosystem

- Ecosystem = community + non-living environment
  - community = all the living things in an area

---

---

---

---

---

---

---

## Three Characteristics of Ecosystems

- 1: structure of living and non-living things
- 2: processes (including energy and chemical cycling)
- 3: Change (including succession)

---

---

---

---

---

---

---

## Yellowstone hot springs

- Simplest ecosystem
  - First trophic level - producers - photosynthesis [bacteria and algae]
  - Second trophic level - herbivores - primary consumers [flies and larvae]
  - Third trophic level - carnivores - secondary consumers [insects, bird]

---

---

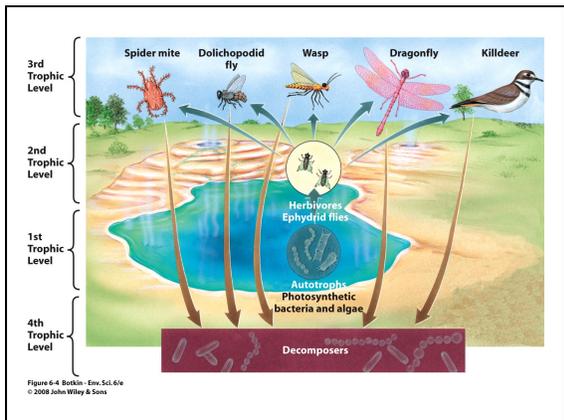
---

---

---

---

---




---

---

---

---

---

---

---

---

**Yellowstone hot springs**

- Fourth trophic level - in this case, decomposers - [bacteria]
- Decomposers work at all levels
- RULE: when an organism is at multiple levels we assign it the highest one it operates at

---

---

---

---

---

---

---

---

**Yellowstone hot springs**

- Maintained by two factors
  - 1: sunlight
  - 2: inflow of water with chemical elements
- Includes a total of about 20 species!! (even though it is very simple)

---

---

---

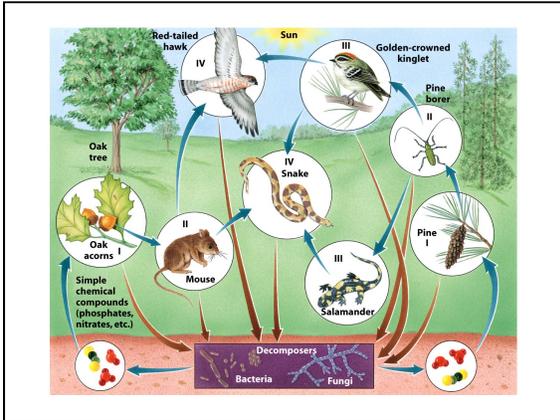
---

---

---

---

---



---

---

---

---

---

---

---

---

### Terminology reminder

- Phytoplankton - tiny photosynthetic organisms in aquatic ecosystems - first trophic level
- Zooplankton - tiny animals in aquatic ecosystems, such as krill - second trophic level

---

---

---

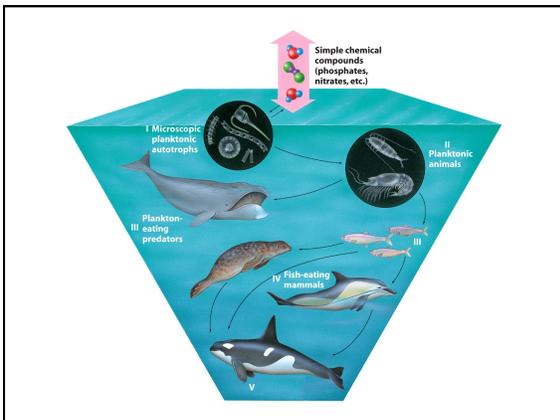
---

---

---

---

---



---

---

---

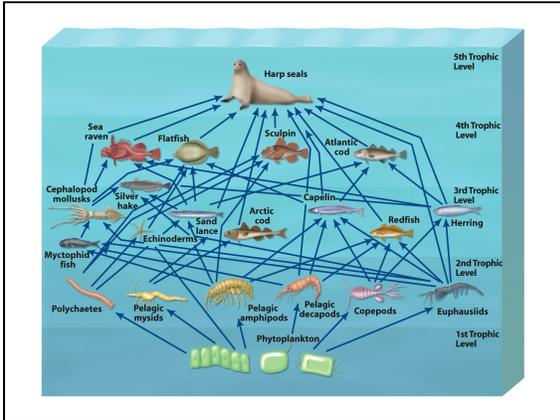
---

---

---

---

---




---



---



---



---



---



---

### The Community Effect

- Indirect effects of one species on another due to the law of environmental unity
  - Whales eating krill is not a community effect. Dolphins having less food because whales eat krill is a community effect.

---



---



---



---



---



---

### Sea Otters 1

- Study of otters has been available, because the history of hunting has meant they are more common in some areas than others
- Food chain
  - Kelp ---> Urchin ---> Otter

---



---



---



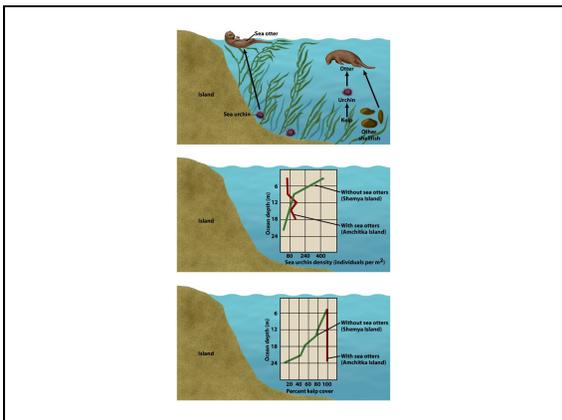
---



---



---




---

---

---

---

---

---

---

---

## Sea Otters 2

- Where there are few otters there are many urchins and the kelp get killed
- Where there are many otters there are few urchins and kelp thrives
- Kelp serves as habitat to many species, therefore otters indirectly effect diversity

---

---

---

---

---

---

---

---

## What is an ecosystem?

- If understanding ecosystems is important to management, then we have to define ecosystems.
  - Well defined - edge of lake
  - Gradual - from desert to forest
  - Vague - grassland to savannah in Africa
  - Common - watershed

---

---

---

---

---

---

---

---

### How Do You Know When You Have Found an Ecosystem?



- Vary greatly in structural complexity.
- The watershed is a common, practical delineation.
- Common to all ecosystems is energy flow and cycling of chemical elements.

---

---

---

---

---

---

---

### Ecosystem Management

- Ecosystem management is the key to conservation of life on Earth.
- If ecosystems cease to function we must supplement with our own actions.
- Must consider chemical cycling, energy flow, community-level interactions, and natural changes.

---

---

---

---

---

---

---

### Three kinds of Ecosystems

- Natural
- Artificial - a pond as part of a waste treatment plant
- Managed - agriculture and wildlife preserves
- Sometimes, such as in zoos, individuals are separated from their ecosystems

---

---

---

---

---

---

---