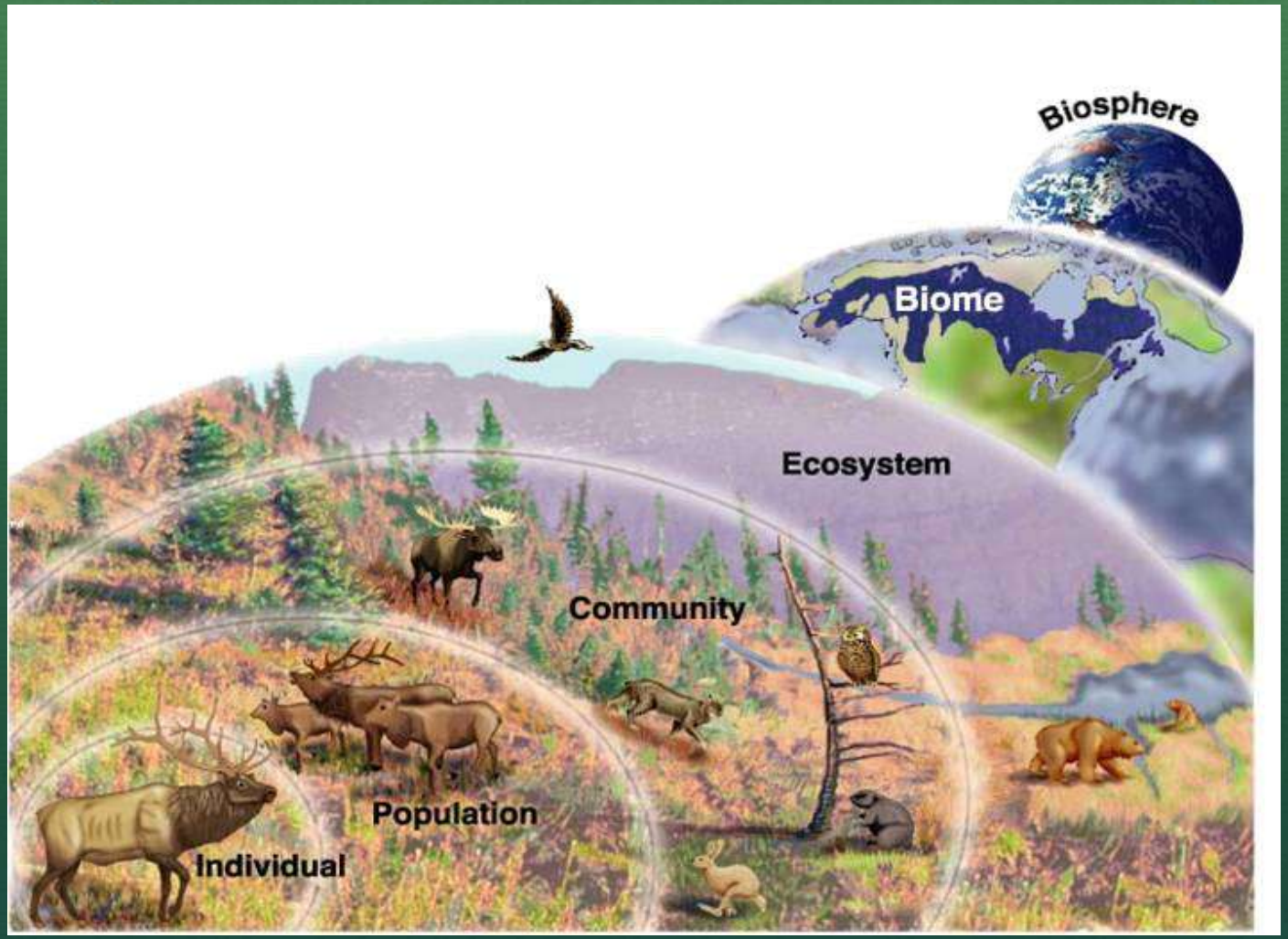
Warm-Up 2/20

- **PARASITISM ?**

- 1. Possible definition
- 2. An example or two (think of the characteristics a parasitic relationship should have)
- http://www.youtube.com/watch?v=4Mb0GOITRUU

Community Ecology

Levels in Nature

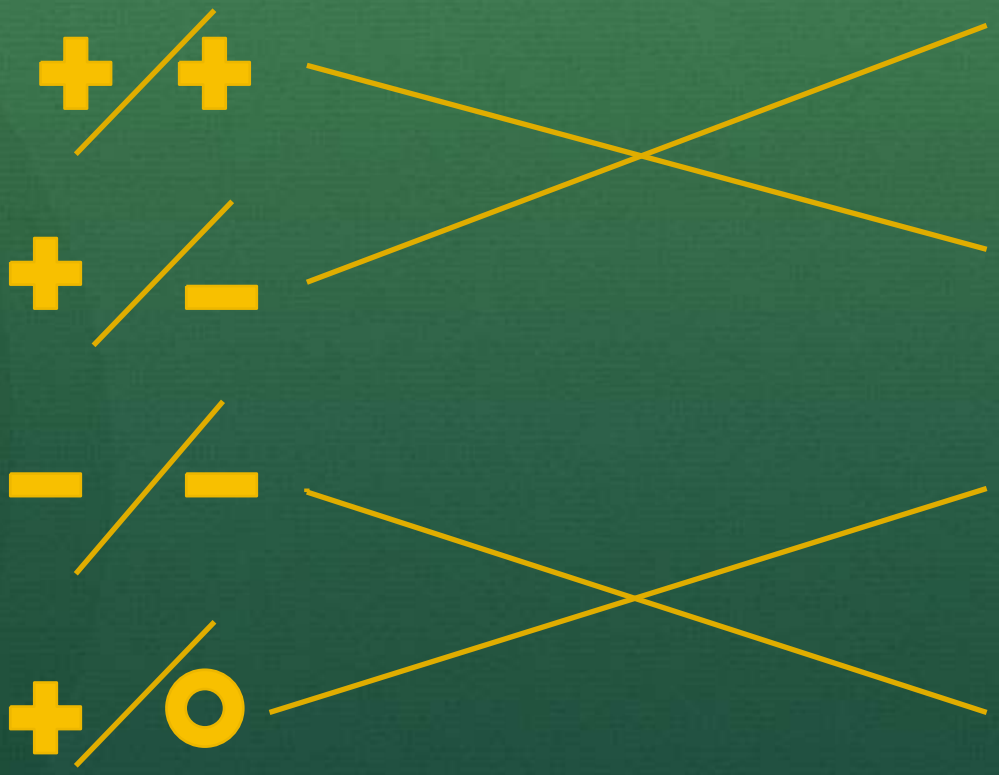


What is Community Ecology?

- Community= incorporates the populations of organisms within a given area.
- Community Ecology= the study of the interactions within species in a community
- Why does this matter?
  - Brainstorm?
    - Endangered species
    - Global warming effects
    - Effects of human development…etc.

Types of Species Interactions

Can you match them?



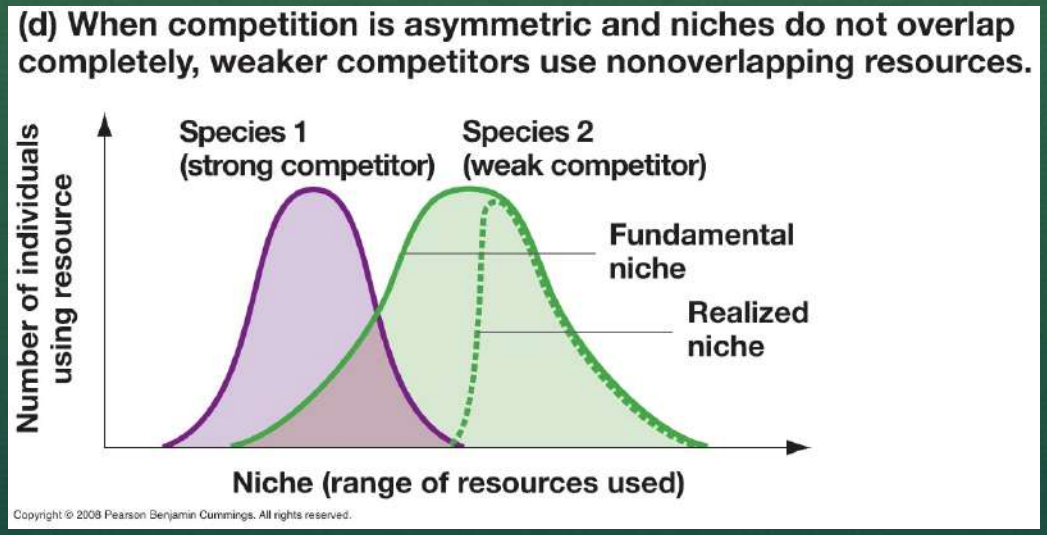
- Predation
- Mutualism
- Commensalism
- Competition

1. Competition -/-

- The struggle of individuals to obtain a limiting resource
- What does this tell you about these two species?
  - They must share a similar niche.

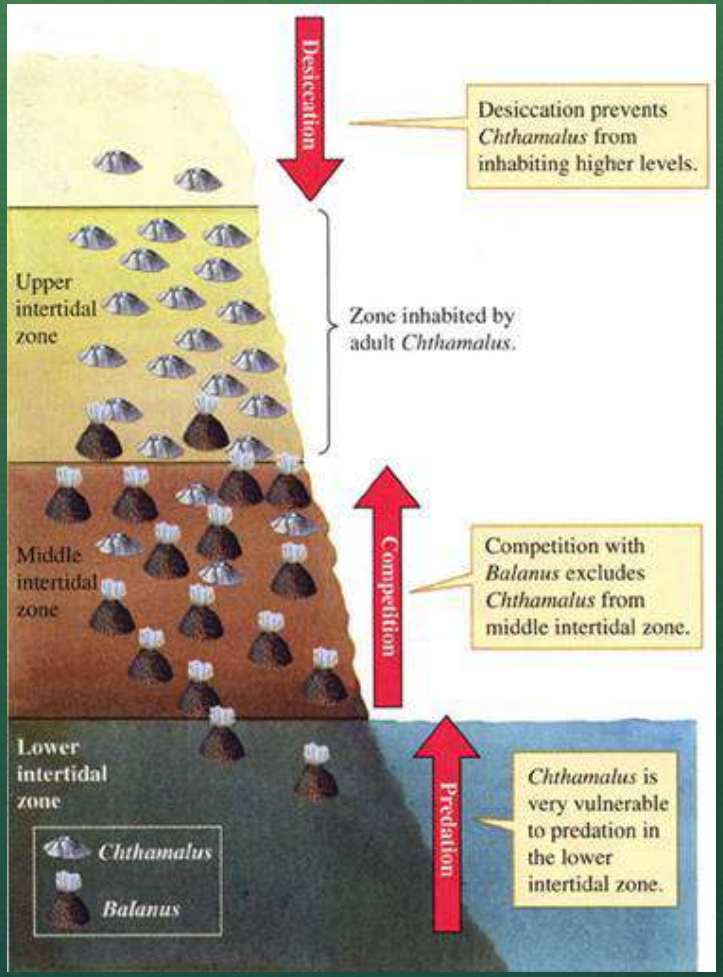
Competitive Exclusion Principal

- Two species competing for the same limiting resource cannot exist.
- Also described as two species cannot survive if they occupy the same niche.



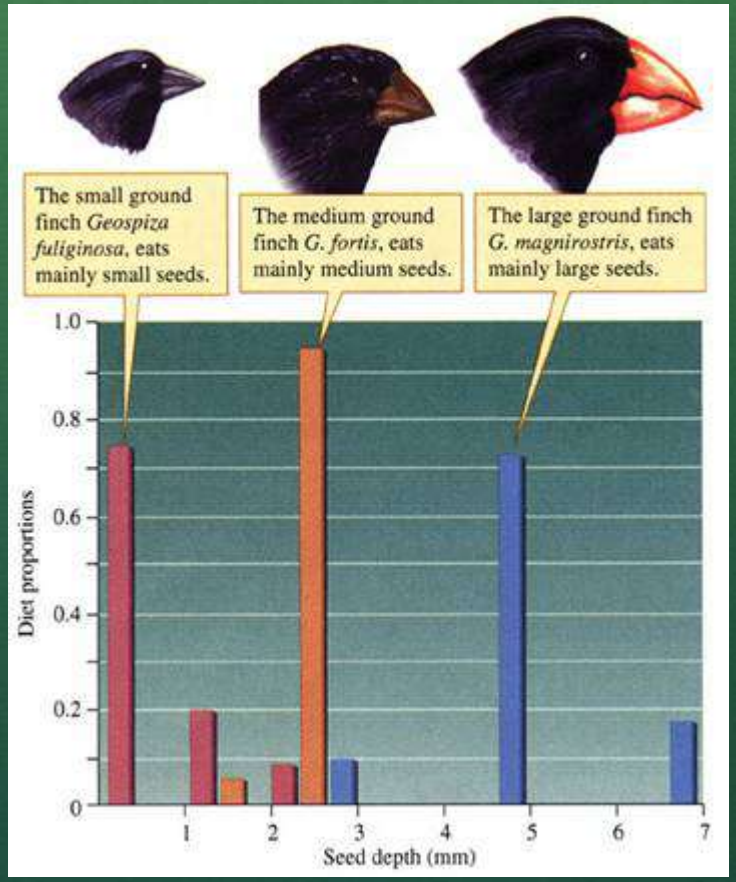
Resource Partitioning

- Resource partitioning often results in resource partitioning.
  - When two species divide a resource based on differences in the species' behavior or morphology.
  - This is evolutionarily favorable because it lessens the niche overlap.
  - Spatial, temporal, or morphological



Character Displacement

- The tendency for characteristics to be more divergent in sympatric populations of two species than allopatric populations of the same two species.



2. Predation

- The use of one species as a resource for another.
- True Predators: typical idea of a predator. Kill their prey and consume it.
- Herbivores: consume plants as their prey.
- Parasites: organisms that live on or in another organism at the cost of their host.

Predation Drives Evolution

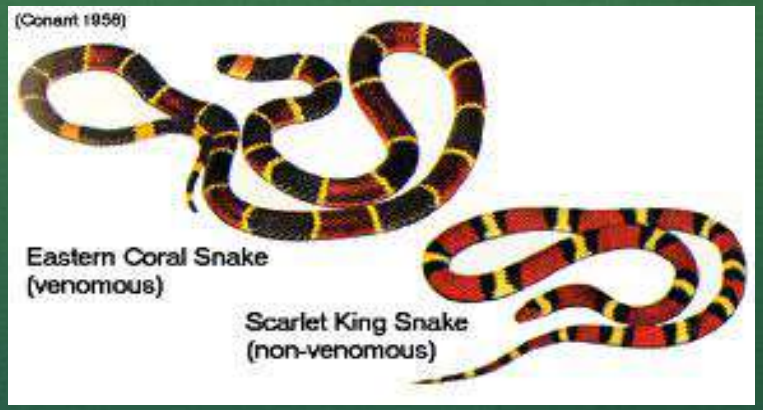
- Predators and prey are constantly adapting in an attempt to evade the other.
- What might be some predator adaptations?
  - Speed
  - Camouflage
- What about some prey adaptations?
  - Toxins
  - Camouflage

Anti-predator adaptations

- Batesian Mimicry

- Palatable/harmless species mimics a harmful one

- Mullerian Mimicry



- Two or more protected species evolve to look alike.

3. Mutualism

- An interaction benefitting both species by increasing their chances of survival or reproduction
- Plants and pollinators

Convergent Evolution

- How can we apply the idea of convergent evolution to parasitic, mutualistic, and predator/prey relationships?

4. Commensalism

- A relationship where one species benefits but the other is neither harmed nor helped.

Characterizing a Community

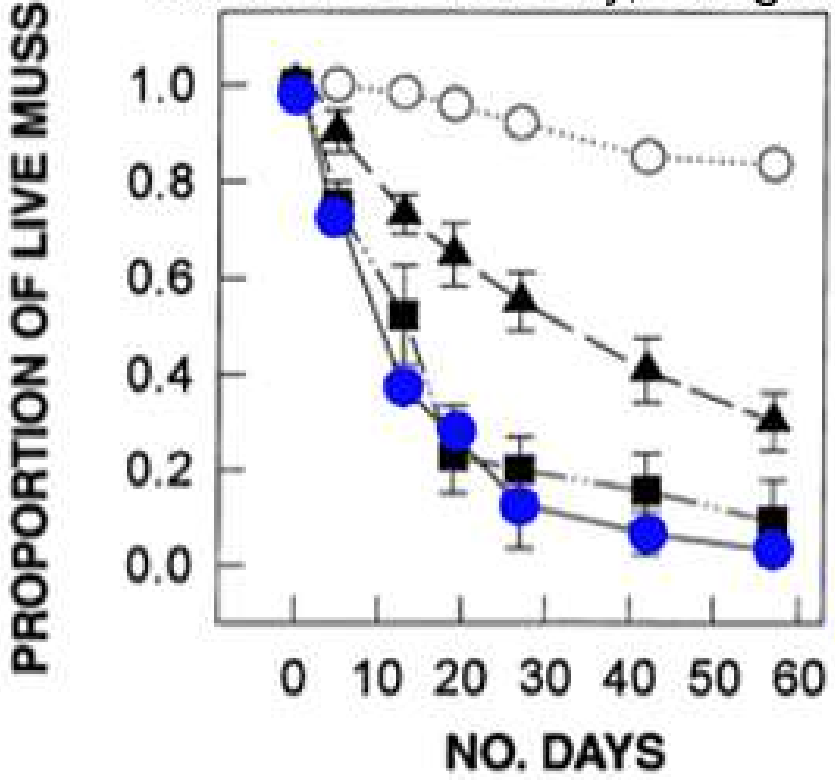
- To examine community structure we can look at:
  - Species diversity
  - Examine dominance of species
  - Keystone species
  - Food chains

Keystone Species

- A species that plays a role in its community that is far more important than its relative abundance might suggest.
- Presence of them greatly increases community diversity
- Also includes species that provide food for a community when scarce
- Ecosystem engineers



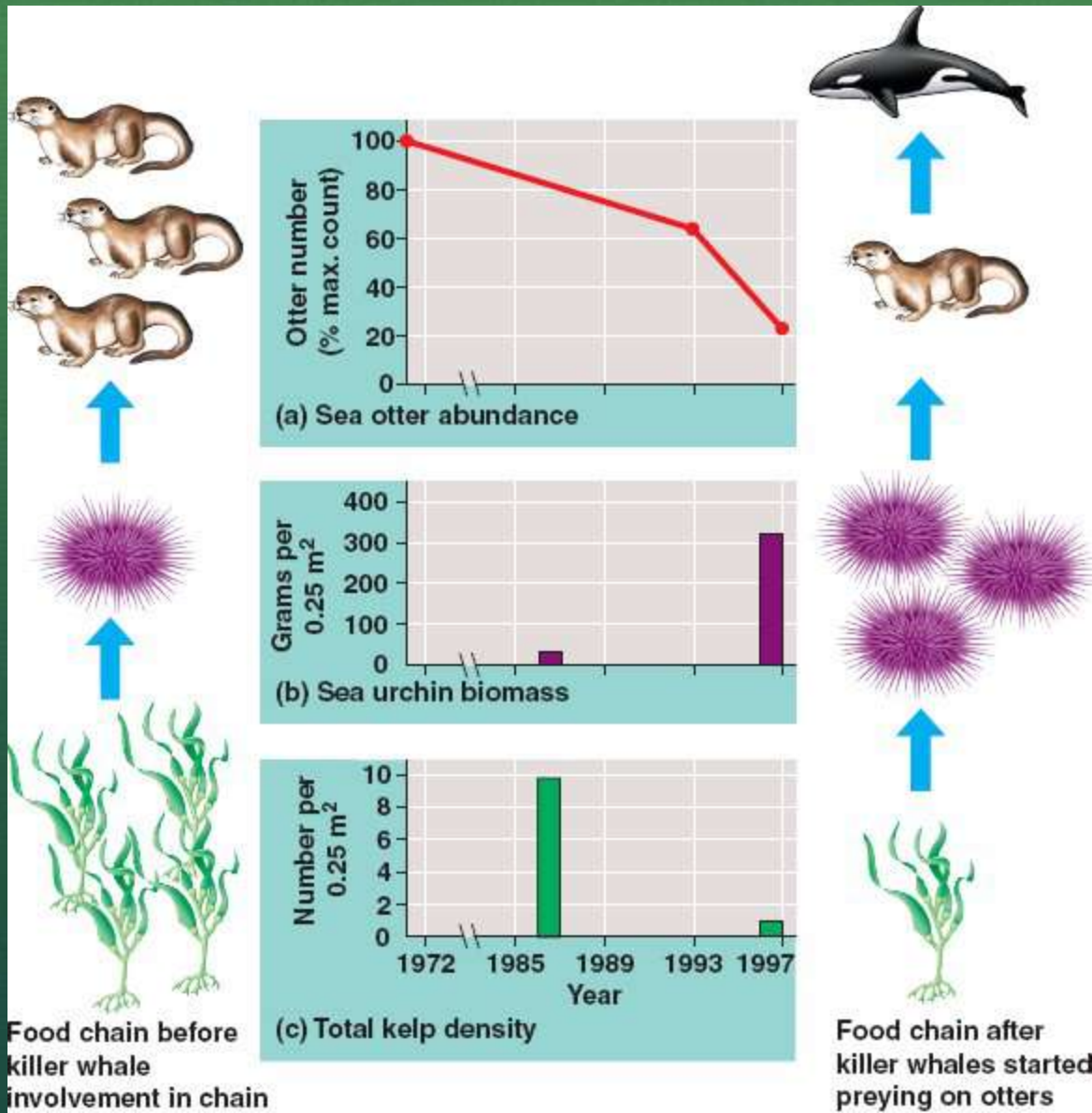
Sample data from wave-exposed shore at Boiler Bay, Oregon



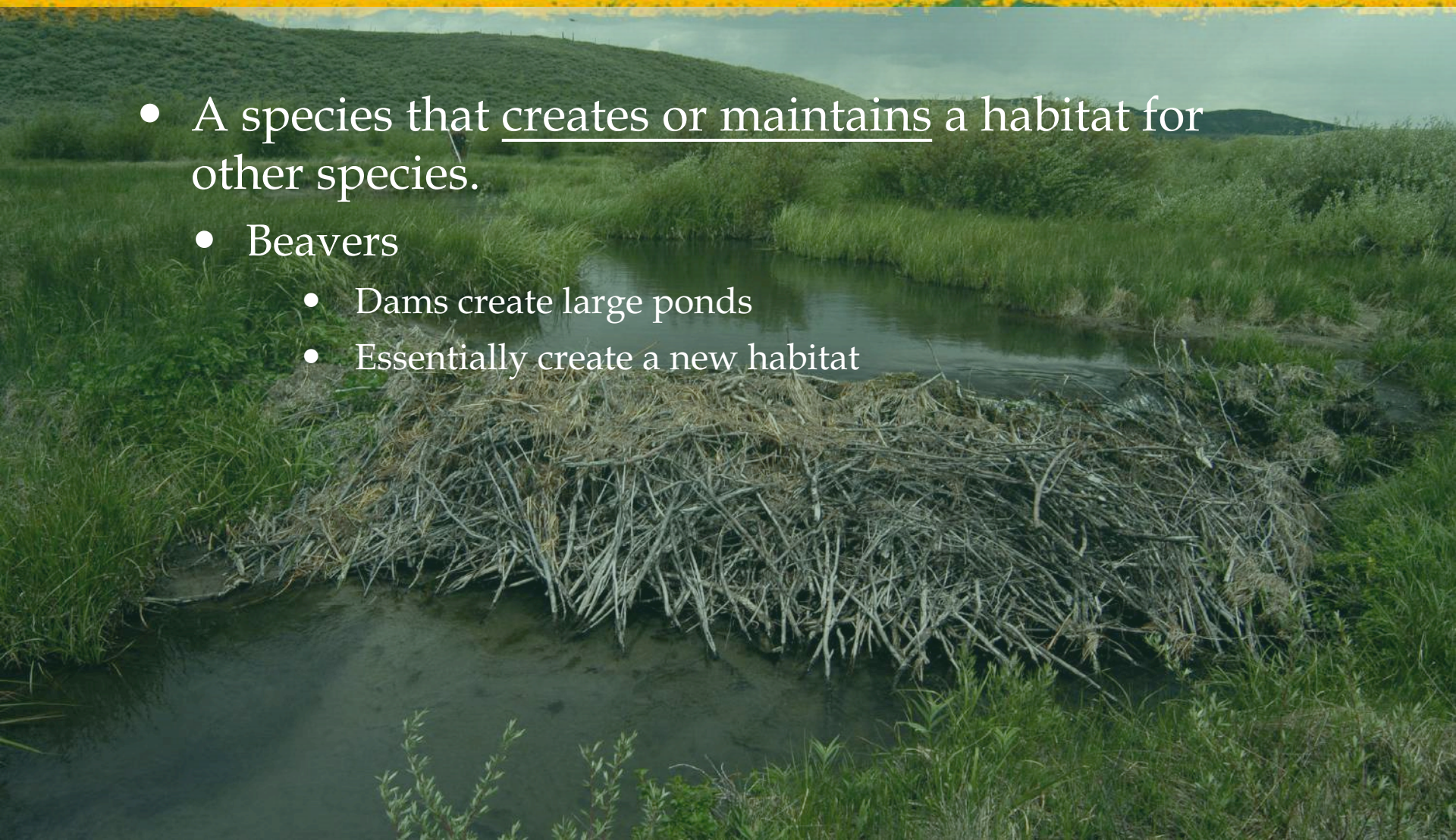
1. both predators removed: mussels survive well
2. only *Pisaster* removed: *Nucella* eats the mussels
3. only *Nucella* removed: *Pisaster* eats the mussels
4. neither predator removed (control): mussels are eaten, but not significantly more than in treatment 3, where *Nucella* is removed and *Pisaster* is present

The sea otter is a keystone predator in the Northern Pacific

What impact does the Orca Whale have on this food chain?



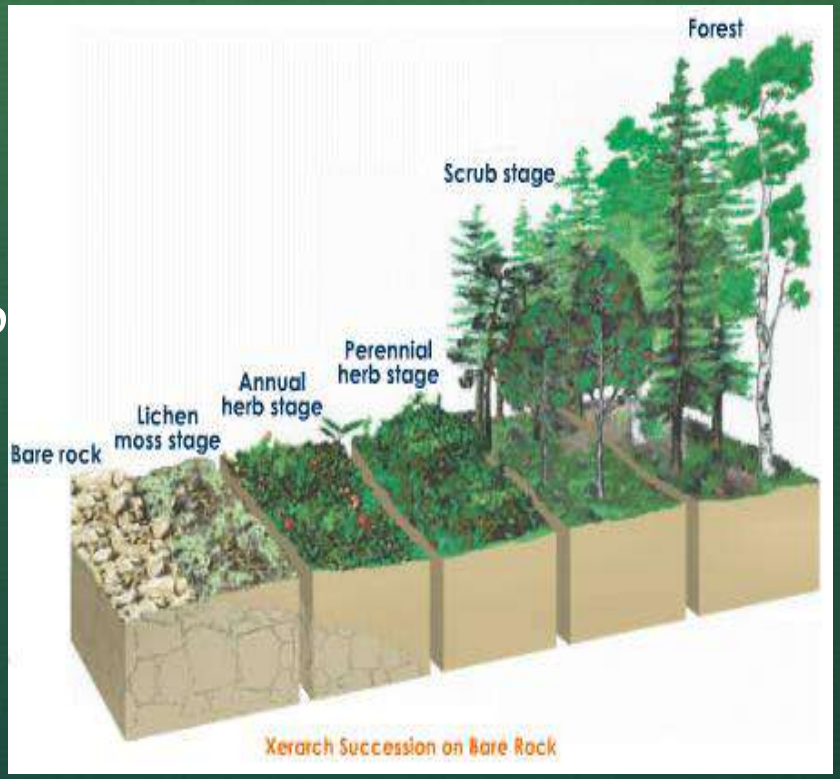
Ecosystem Engineer



- A species that creates or maintains a habitat for other species.
  - Beavers
    - Dams create large ponds
    - Essentially create a new habitat

Community Composition

- Communities naturally change over time, even without human impact.
- Ecological Succession- the predictable replacement of one group of species by another group of species over time.
  - Primary Succession
  - Secondary Succession
  - Most commonly after a natural disturbance



Primary Succession

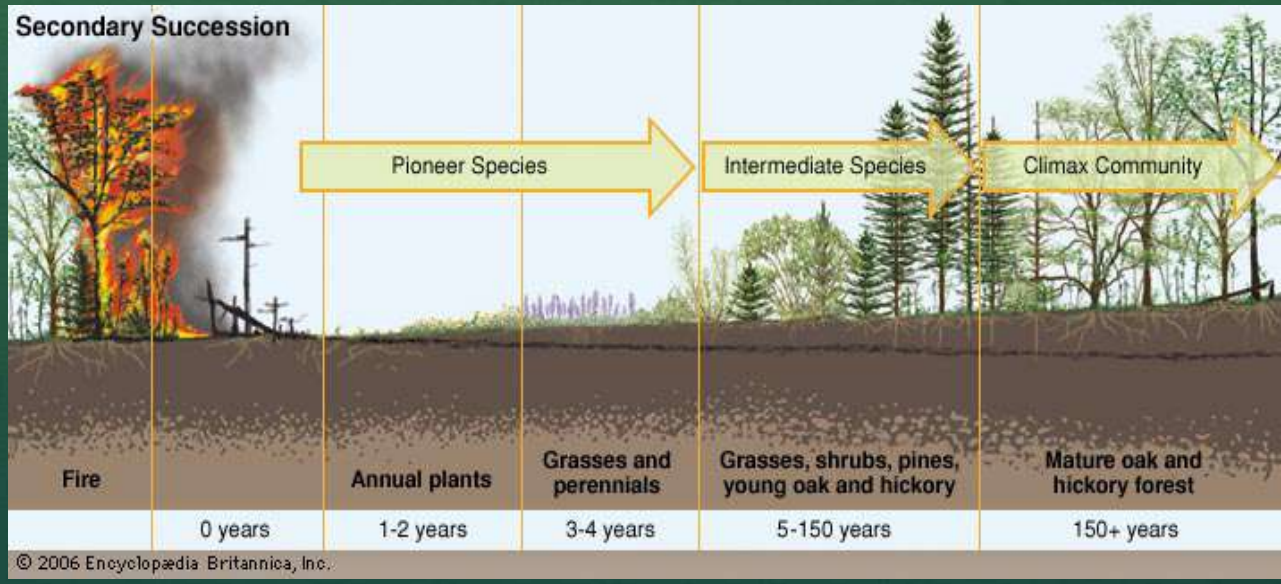
- Key requirements
  - On surfaces devoid of soil
  - Base is usually rock
  - Virtually lifeless

- Natural progression
  - Bacteria
  - Lichens and mosses
  - Soil
  - Grasses
  - Shrubs
  - Trees

What kind of trees might establish first?

Secondary Succession

- Key requirements
  - Disturbed areas that still have their soil
  - Often occurs after fire or hurricane
  - Little vegetation but intact soil
- Natural Progression
  - Annual Plants
  - Grasses
  - Shrubs
  - Trees

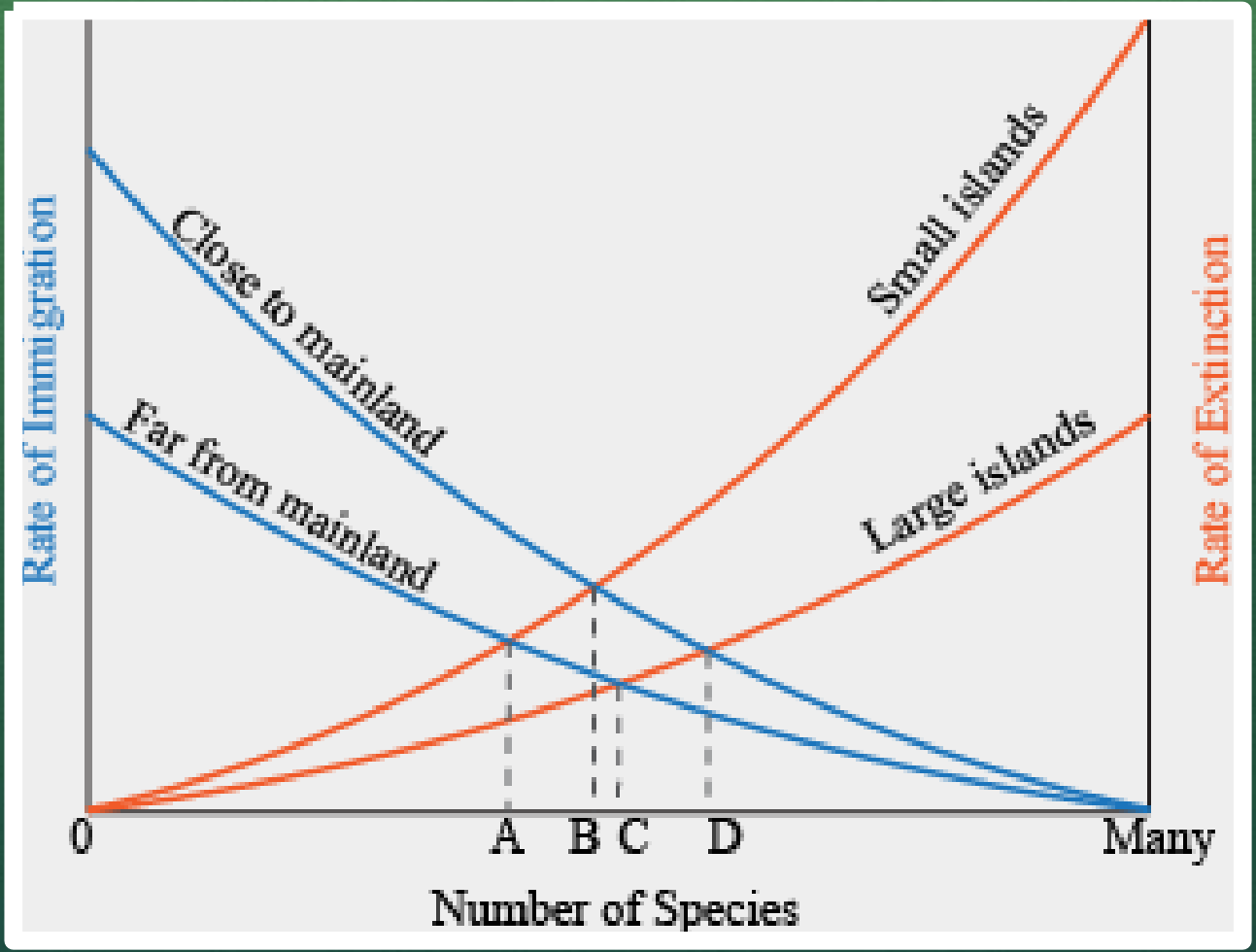


Successional Species

- Pioneer species- species that can colonize new areas rapidly and grow well in full sunlight
  - What qualities might a pioneer species have?
    - R-selected species
    - Facilitate other species

Why do they eventually get outcompeted? What traits might the next generation of species have?

Theory of Island Biogeography



What'd you learn in school today?

- Community Ecology= the study of the interactions within species in a community
- What are two examples of why it matters?
- What type of relationship is -/+?
- Two competing species share the same niche
- What is the difference between true predators, herbivores, and parasites?
- What example did we use for commensalism?

- Keystone Species= A species that plays a role in its community that is far more important than its relative abundance might suggest.
- What is the difference between primary and secondary succession? After what kind of disturbance might each occur?
- Summarize briefly the theory of island biogeography.

Activity

- In groups of two or three go online and research the following relationships. Identify the interaction between the animals paying particular attention to what each animal receives from the relationship.
- 1. Cuckoo bee and yellow jacket
- 2. Acacia tree and ants
- 3. Cattle egrets and water buffalo
- 4. Algae and fungus
- 5. Lynx and snowshoe hare