# Species Interactions and Community Structure Chapter 17





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Feeding Relationships – The Food Web

 One of the earliest approaches to the study of communities describes who eats whom!



Photograph by Bianca Lavies

#### Feeding Relationships – The Food Web

 Food web – a summary of the feeding interactions within a community

### Why is this better than a food chain???



PRODUCER (plant)

SUN



PRIMARY CONSUMER (herbivore)



SECONDARY CONSUMER (carnivore)

DECOMPOSER (fungi)



Diatom

### Food Webs – Very, VERY complex!!!

- Can be represented in many different ways to try and reduce the complexity
  - Only include common species.
  - Exclude weakest trophic links.

Isn't it much clearer this way???

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- Strong Interactions and Food Web Structure
  Paine suggested feeding activities of a few species may have a dominant influence on community structure.
- Called strong interactions!

Which has more influence on the intertidal community? Why?





# **Indirect Interactions**

- Indirect interactions are the effects of one species on another through a third species
  - Trophic cascades (Chapter 18)
  - Indirect commensalism
  - Apparent competition

•One species indirectly benefits another species (through a third species) while it is neither helped or harmed

This is commensalism. What would be indirect commensalism???



# Indirect Commensalism

- Example:
  - Beavers fell cottonwood trees which then produce stump sprouts
  - Beetles prefer consuming high nutrition sprout leaves
    - Beetles grow larger, faster and utilize defensive compounds found in leaves



Who gains? Who loses? Who's not affected? Indirect commensalism between beavers and Chemical changes in cottonwood leaves of spootis growing on stumps of beaver-felled trees provide better nutrition for *Chrysomela confluens* compared to leaves on intact trees.

Cottonwood stump sprouting after tree felled by beaver.

# **Indirect Interactions**

Indirect interactions are the effects of one species on another through a third species Trophic cascades (Chapter 18) Indirect commensalism Apparent competition

 Negative effects between two competitors who share a predator or herbivore

This is competition. What would be apparent competition???



# **Indirect Interactions**

Example:

One species may facilitate the presence or increase the abundance of the predator which suppresses the second species

Exotic plant Brassica nigra sheltered mammals which increased herbivory on native bunchgrass Nassella pulchra



# **Keystone Species**

- The feeding activities of a few keystone species may control the structure of communities.
- Keystone species reduce the probability of competitive exclusion = more diversity!!!

http:// www.youtube.com/we =Ng6CNn6XnBg



# **Keystone Species**

#### Urchin barrens

# http://www.youtube.com/watc h?v=-p6viD0h5nw





Before removal

After removal

# **Mutualistic Keystones**

 Keystone species exert strong effects on their community structure, despite low biomass.

