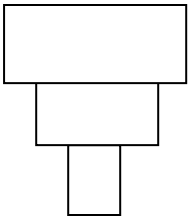
SPECIES INTERACTIONS

Trophic pyramid

One common way to visual trophic relationships is to draw stacked rectangles, each one representing a different trophic level. The size of the pyramid is made proportional to the **biomass** or **energy** at each trophic level.

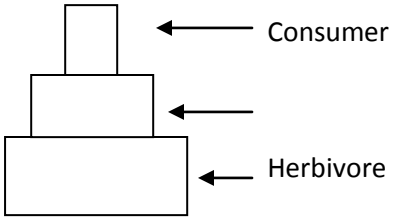
Biomass pyramid

Biomass at each trophic level



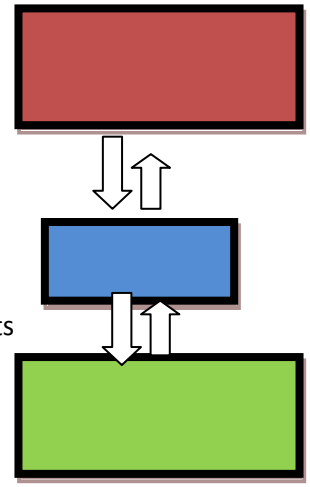
Energy pyramid

Production at each trophic level



How can you get inverted biomass pyramids?

Why do energy pyramids have a standard pyramid shape?



Bottom up—dynamics are controlled by energy flow and other abiotic limitations (light, nutrients, etc.). In other words, more nutrients means more plant production, this can lead to more grazers, and thus more predators.

Top down—consumptive processes control dynamics.

Trophic cascade—indirect effects of consumption. In other words, a predator reduces populations of grazer, increasing abundance of plant. The impacts of the top predator will propagate down through lower trophic levels. When there is more of the predator, there will be fewer of the prey.

Thus, when a system has odd-numbered trophic levels (1, 3, 5), then theoretically it should have lots of primary producers and "be green". In contrast, if there are an even number of trophic levels (2, 4), then there should be low biomass of the primary producers (trophic level 1).

There has been a bit of a historic argument about the relative importance of top-down and bottom-up processes in influencing streams. Of course, the answer lies in the middle—it is usually both.

Food web diagrams

- Helpful way of conceptualizing the role of species in ecosystems
- Important to be specific about diagrams
- What do arrows mean?
    - Energy flow—bottom up
    - Nutrient flow—bottom up (and recycling)
    - Consumption rates—top down
    - Interaction strength—bidirection
    - Impact—bidirectional

Food web complexity

It is difficult to predict how a consumer will impact a stream community and ecosystem. Due to:

- Time lags
- Omnivory
- Food web complexity
- Trophic ontogeny
- Detritivory
- Unplatable or armoured species
- Strong and weak links

For example, Moore et al. 2012.