Chapter 2 Animal Ecology

Ecology

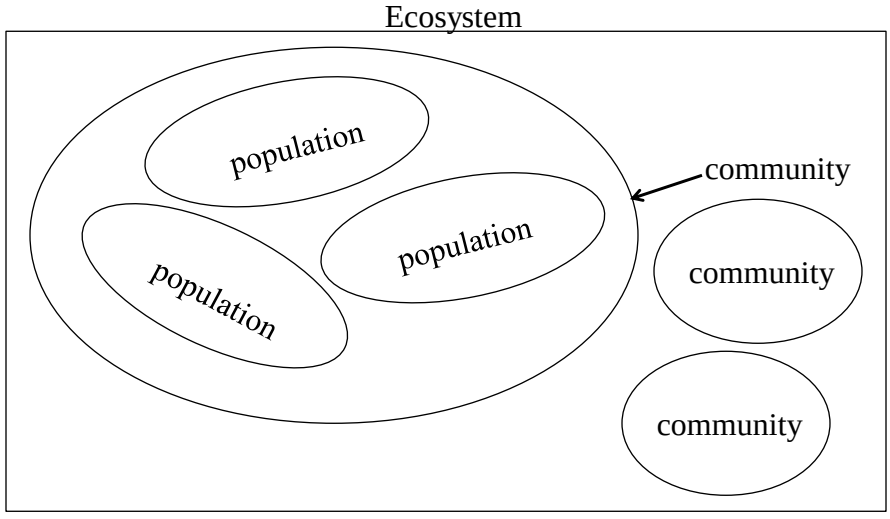
The study of distribution & abundance of an organism & its interactions with other organisms (biotic) & its interactions with its environment (abiotic).

Environment immediate surroundings of an organism

Macro environment

Micro environment

Population: a potentially reproductively interactive (**interbreeding**) group of animals of same species

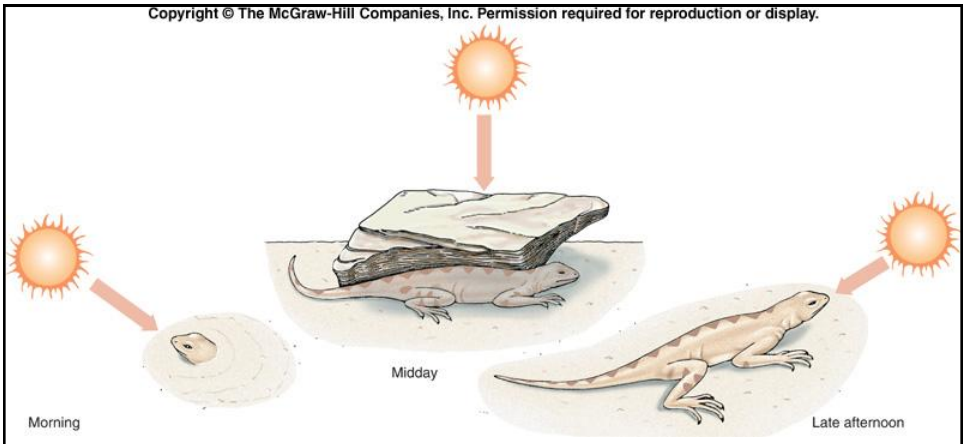


Symbiosis: intimate relationship between a host & symbiont

	host	symbiont
mutualism	+	+
commensalism	+	O
parasitism	-	+

remoras on shark--mutualism, commensalism, parasitism?

crab-sea anemone--mutualism, commensalism, parasitism?



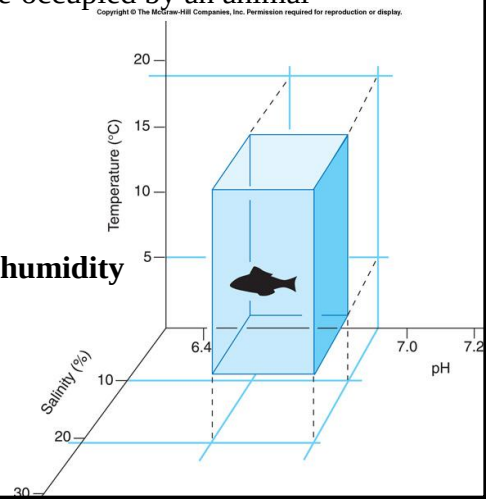
Habitat: physical space where an animal lives & defined by animal's normal activity

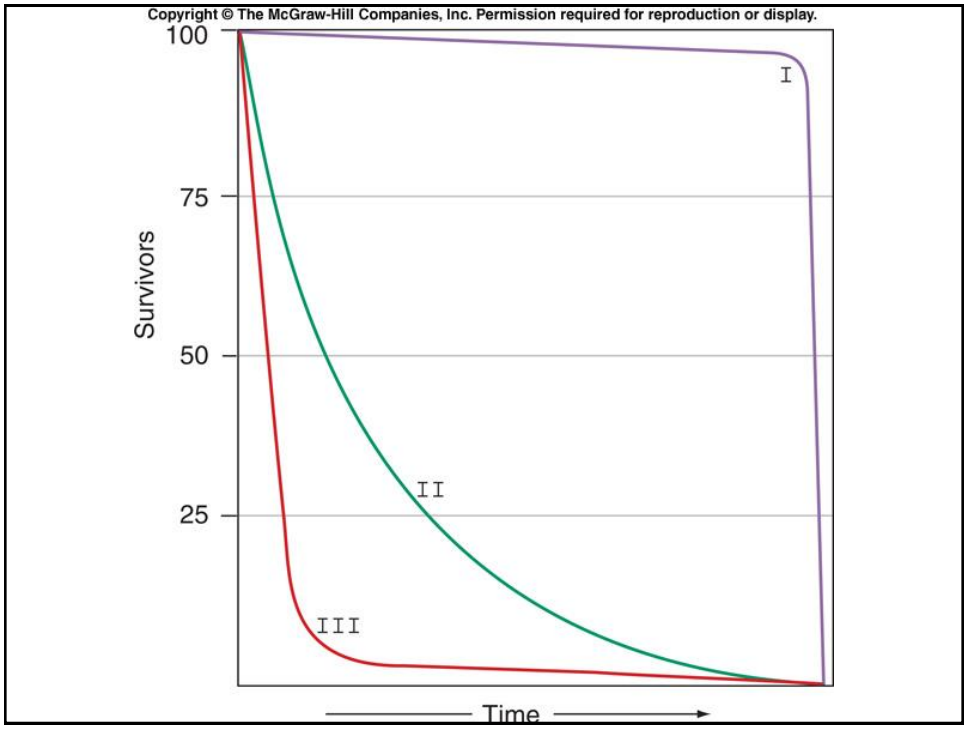
Niche: occupation & address of an animal

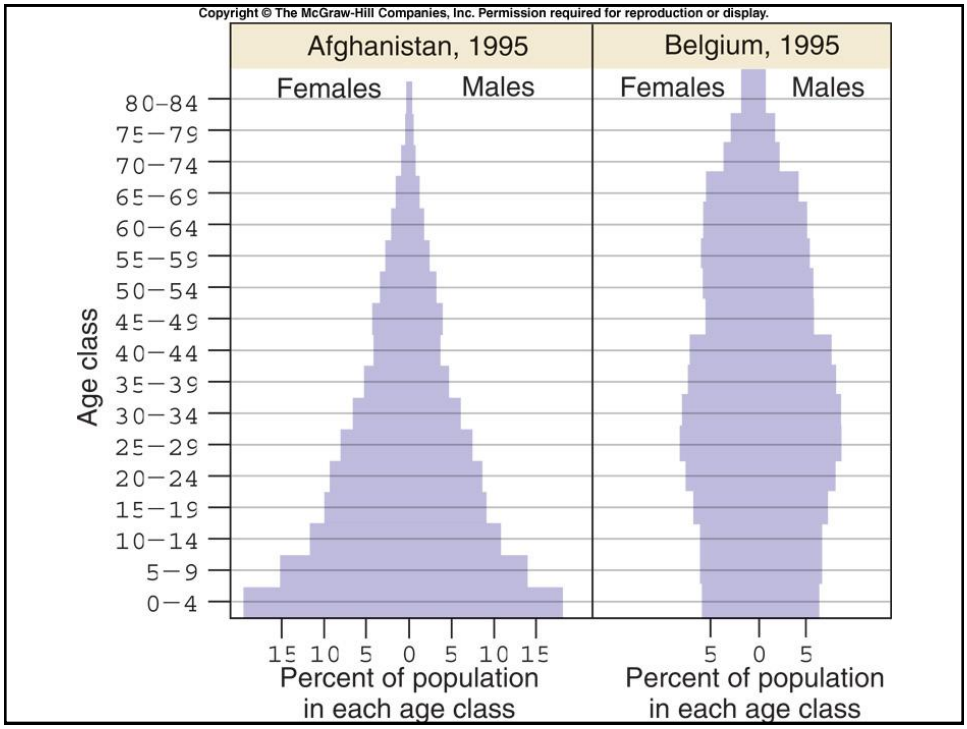
Realized niche: actual niche occupied by an animal

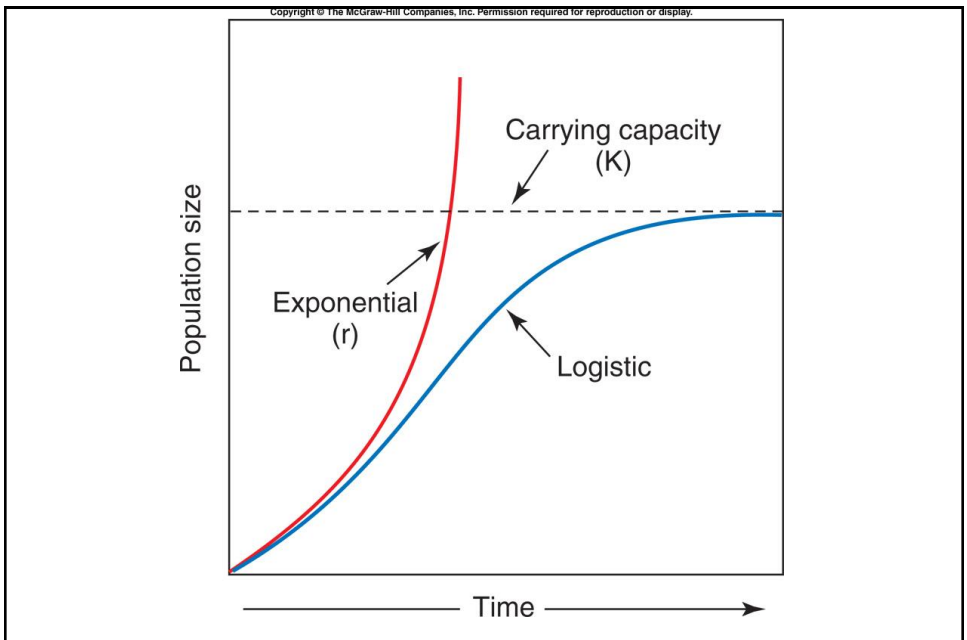
Fundamental niche: potential niche occupied by an animal

Abiotic factors: temperature, pH, humidity salinity, oxygen & carbon dioxide

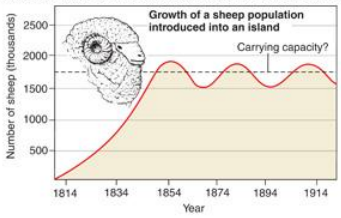


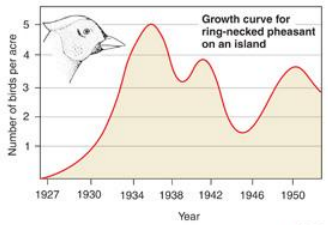


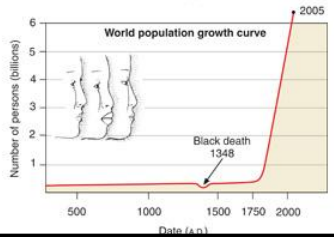




carrying capacity (K): largest population can be supported by limited resource







Factors controlling population growth:

Density-dependent factors:
e.g. parasitism, diseases, crowding, competition,

Density-independent factors:
e.g. natural disasters: earthquakes, flood, hurricanes & tornadoes

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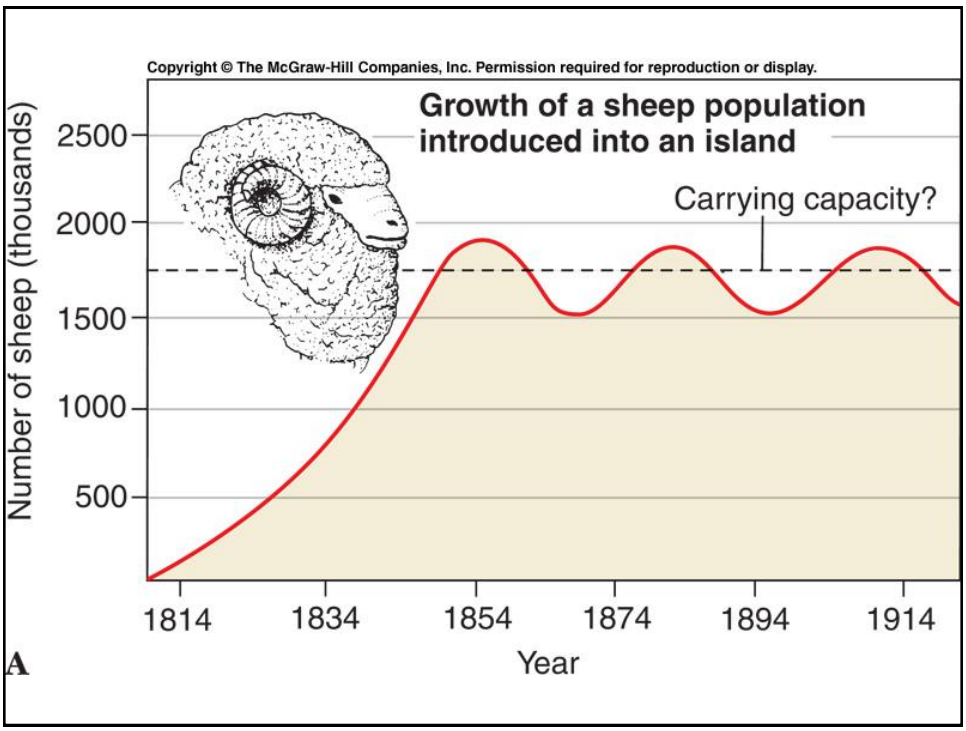

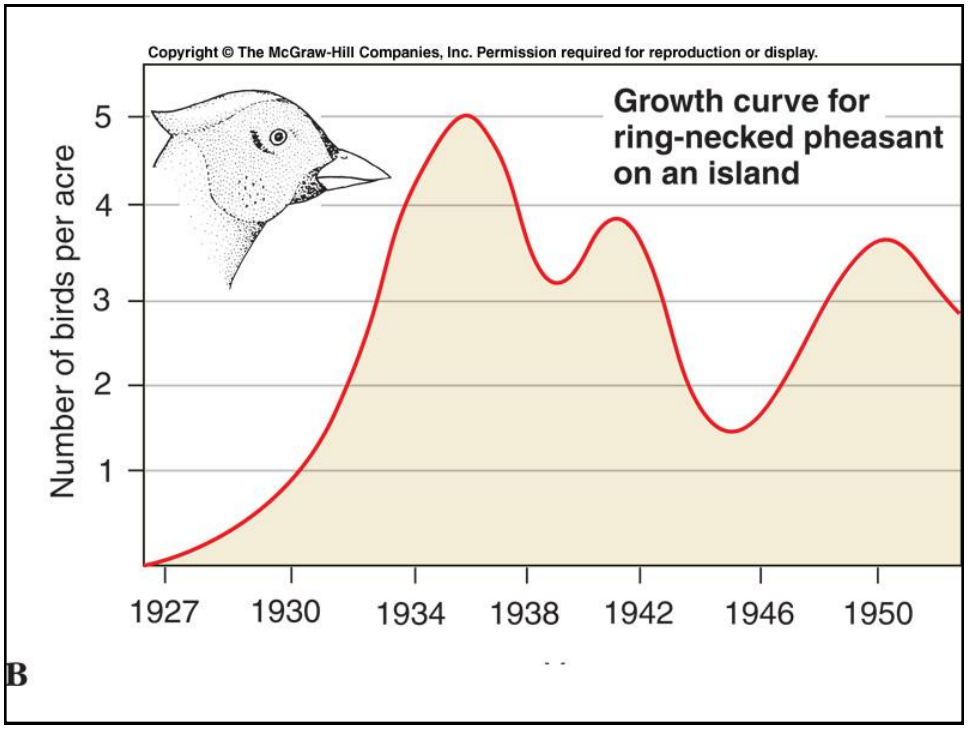
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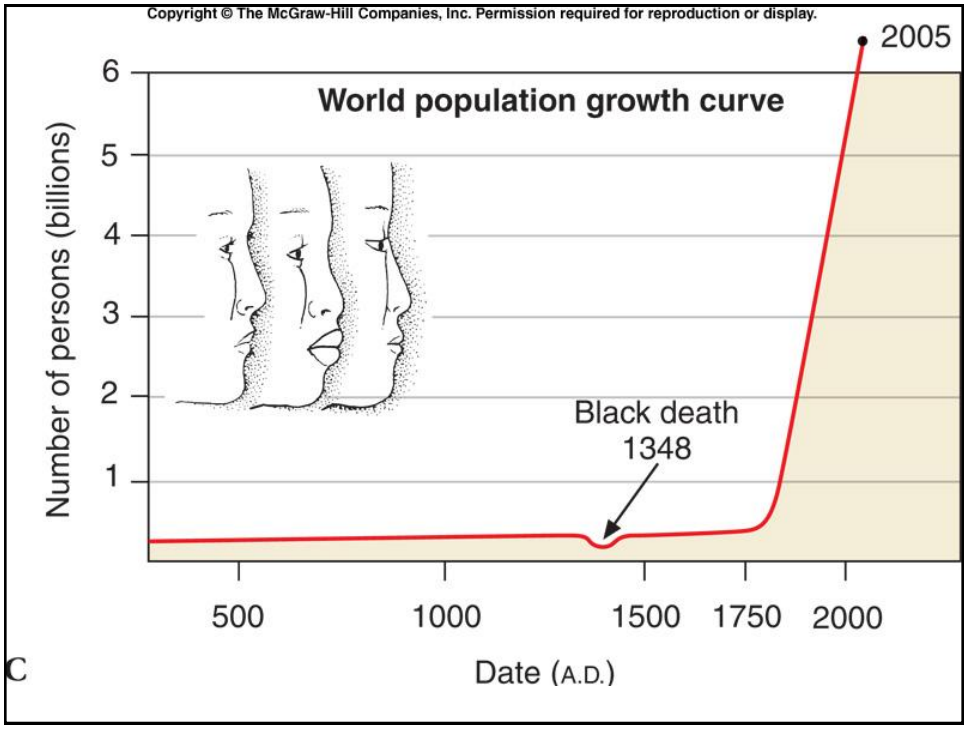
Growth curve for ring-necked pheasant on an island
Number of birds per acre
1
2
3
4
5
1927
1930
1934
1938
1942
1946
1950
B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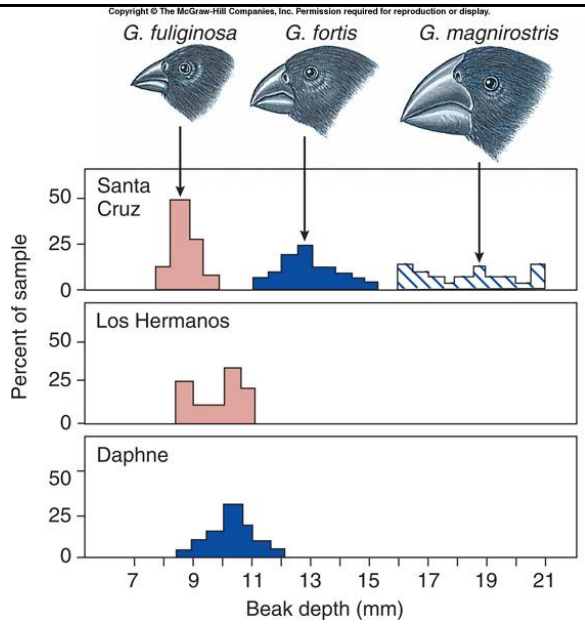
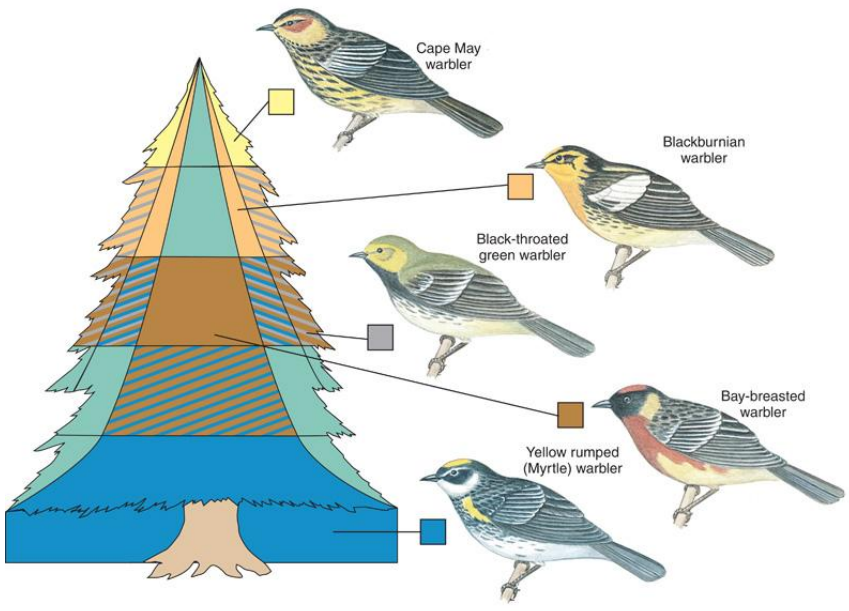
2005
World population growth curve
Number of persons (billions)
1
2
3
4
5
6
Black death
1348
500
1000
1500
1750
2000
Date (A.D.)
C

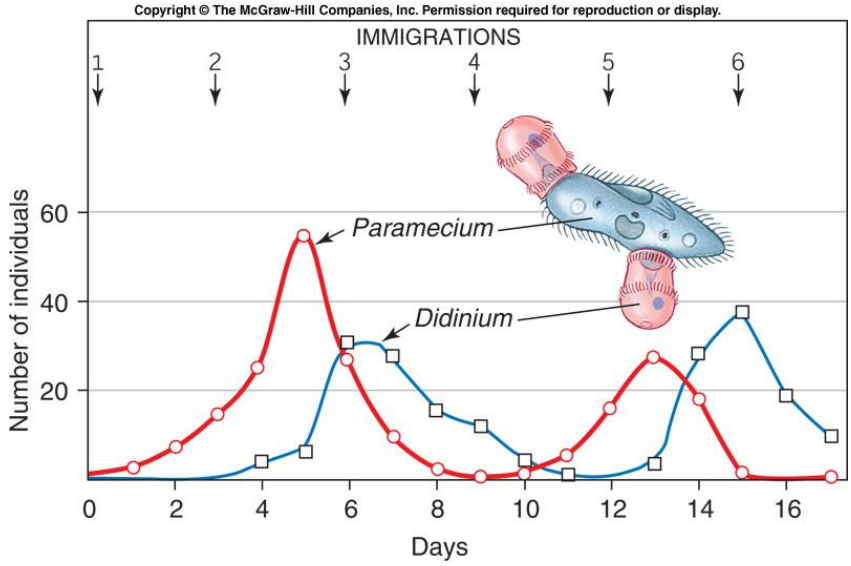


Character displacement extending resources to minimize competition

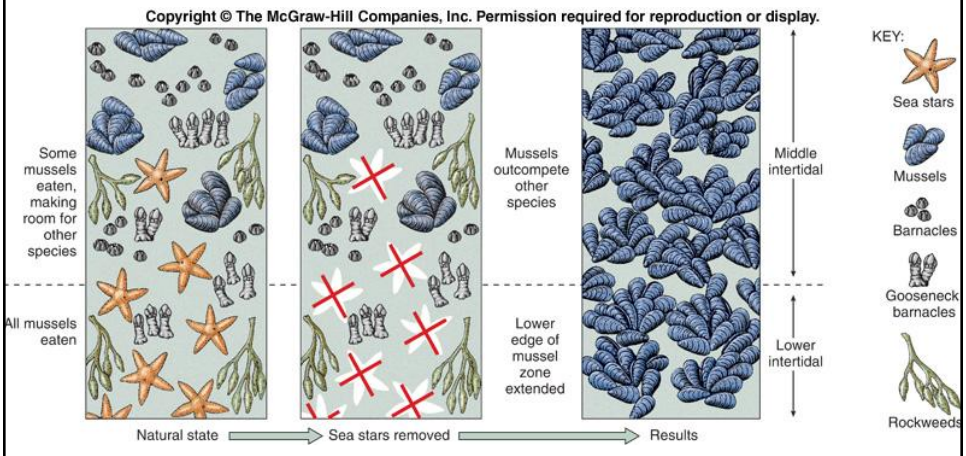
Guild: distribution of five warbler species in northeastern spruce forest



Predator-Prey Relationship: 1934 G.F. Gause



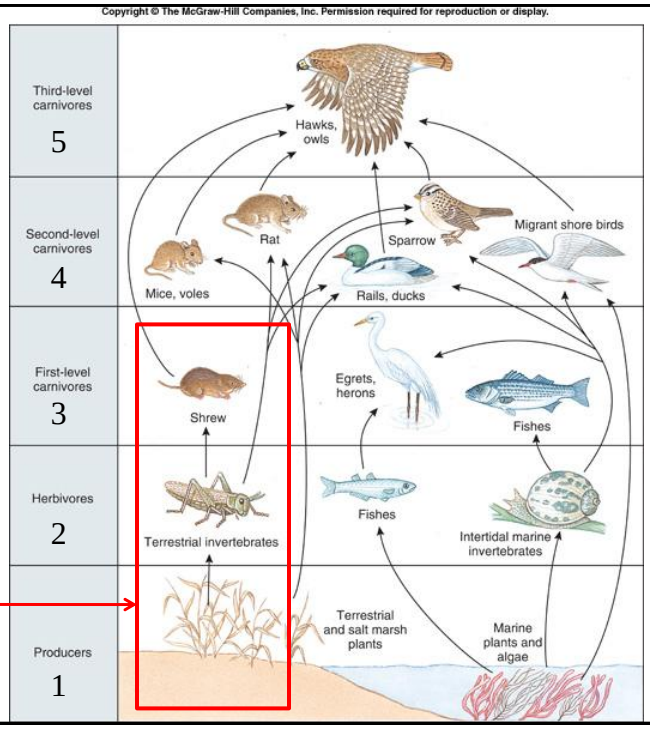
Keystone species: its presence & absence alters dramatically community diversity

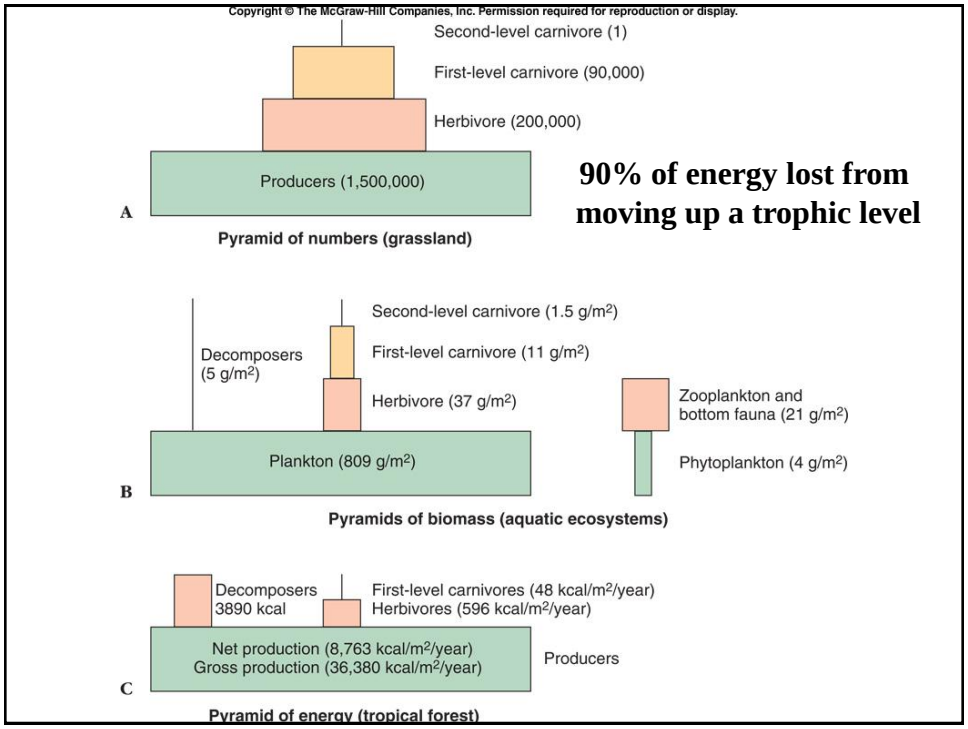


Food Web

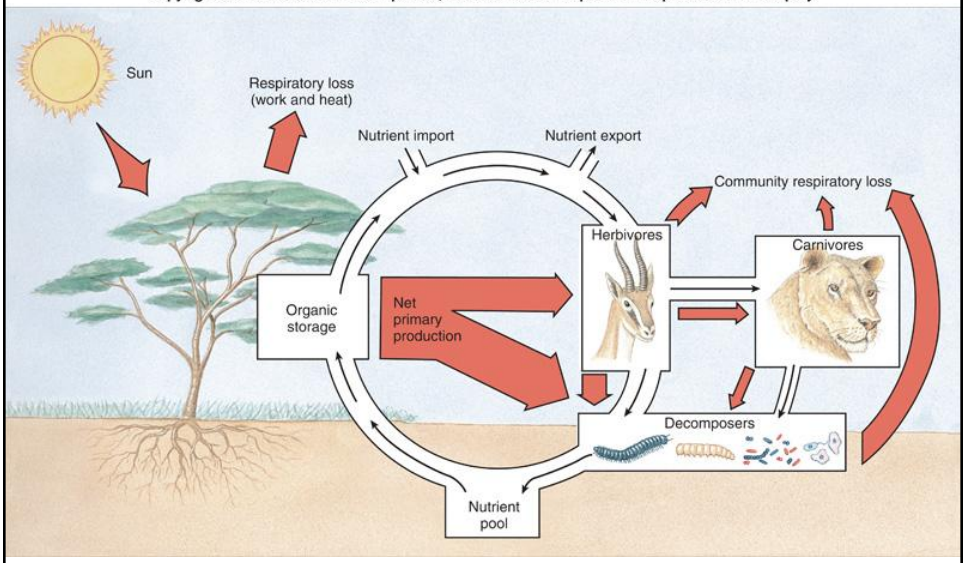
5 trophic levels

food chain





Nutrient cycle & energy flow in terrestrial environment



Predator-Prey Relationship

Mutualism

acacia gall provides protection for ants & larvae
ants provide protection for acacia when disturbed by herbivore

gall whistling thorn acacia

ants & larvae inside cut gall

Batesian Mimicry

monarch butterfly toxic

viceroy butterfly non toxic

A

Batesian Mimicry

harmless clearwing moth

aposematic: warning coloration

yellow jacket

B

Mullerian Mimicry

Two unpalatable species from different families resembling each other

C

walking stick insect

Cryptic: camouflage or blending with environment

Pognophoran worms in deep sea vents no gut, blind, meter in length, live in tubes

Chemautotrophic bacteria in worm skin: convert hydrogen sulfide gas into organic compounds for worm's nutrition

Comparison of Species Extinction Levels for the Big Five Mass Extinctions*

Extinction Episode	Age, Myr Before Present	Percent Extinction
Cretaceous	65	76
Triassic	208	76
Permian	245	96
Devonian	367	82
Ordovician	439	85

*After David Raup (1995).