

# Populations

## *1: Population Growth*

- Population: a group of individuals of the same species that live in the same area
- Population Growth: an increase in a population
- Population Growth Rate: the change in the number of individuals in population over time
  - $\text{population growth rate} = \frac{\text{change in number of individuals}}{\text{time}}$
- A population may grow at such a great rate that available resources become insufficient to support all its members.
  - When natural resources are limited, the fittest members of a given population would survive and the least fit would perish.

## Biotic Potential

- Biotic Potential: the rate at which a population will grow if all individuals survive and reproduce at maximum capacity
  - Biotic potential can be reached when organisms capable of reproducing are put into an ideal environment (unlimited resources and space & no hazards such as disease and predators).
  - In nature, populations rarely achieve their biotic potential for any sustained period.
    - Eventually the number of individuals declines because of shortage of food, shortage of space, predation, or accumulation of waste.

## Growth Curves

- Growth Curve: a graph showing the number of individuals in a population over time
  - J-Shaped Curve: a growth curve that tracks two phases of population growth – the lag phase and the exponential phase
    - Lag Phase: a period of little increase in the number of individuals in a population
    - Exponential Phase: a period of population growth in which the population keeps doubling in increasingly shorter time periods
  - S-Shaped Curve: a growth curve that depicts the period of relative stability in a population that occurs after its lag and exponential phases
  - Carrying Capacity: the maximum number of individuals that the ecosystem is capable of supporting
    - When the environment is stable, the maximum number of individuals in a population fluctuates near the carrying capacity of the environment.
    - If the environment becomes unstable, the fluctuations become more radical.

## Limits to Growth

- Population Density: the number of individuals in a population in a given area in a given time
- Density-Dependent Factors: factors that affect populations in different ways depending on population density
  - Examples: food availability, number of predators, oxygen supply, etc.
- Density-Independent Factors: factors that affect populations regardless of population density
  - Examples: changes in weather, temperature, humidity, sunlight, etc.

## 2: *Human Populations*

- Domesticated: plants and animals that are adapted or trained to live in a human environment
  - By domesticating plants and animals early humans were able to increase their food supply, even to create surpluses that could be stored.
    - Domestication gave people a more reliable and constant supply of food, which is an important factor in determining human population size.

### **Human Population Growth**

- The exponential growth rate of the human population can be explained by the increase in food production, rise of industry, and advances in medicine.

### **Human Population Structures**

- The growth rate for a human population in a given area is dependent on a number of factors.
  - To make predictions about population growth, population biologists must consider the composition of a population (age, etc.).