1.00_ECOLOGY_BIO 1 INTRO

Population Growth Rate

Slides 157-168

Big Picture

Populations are groups of the same species. Populations make up communities and have many factors that can influence their population size, population density, and population distribution. A population's rate of growth reflects how healthy the group of organisms is. The equation r=(b+i)-(d+e) displays the factors that impact r (the growth rate).

Key Terms

Population: Refers to a group of organisms of the same species that lives in the same area.

Population Size: The number of of individuals in a population.

Population Density: The individuals that make up the population size per unit area or volume.

Population Distribution: How the individuals in a population are distributed throughout their habitat.

Age-Sex Structure: The number of individuals of each sex and age in the population.

Population Pyramid: A bar graph that represents age-sex structure.

Survivorship Curve: A line graph that represents the number of individuals alive at each age.

Population Growth Rate (r): How fast a population changes in size over time.

Immigration: When part of a population joins another population elsewhere.

Emigration: When part of a population leaves to go elsewhere.

Dispersal: When offspring move away from their parents.

Migration: The regular movement of individuals or populations every year during certain seasons.

Exponential Growth: Pattern of population growth in which a population starts out growing slowly but grows faster as population size increases.

Logistic Growth: Pattern of population growth in which growth slows and population size levels off as the population approaches the carrying capacity.

Carrying Capacity: Represented by the variable (K), carrying capacity is the largest population size a niche can support without being harmed.

K-Selected Species: Species that live in a stable environment, in which their population growth is controlled by density-dependent factors.

r-Selected Species: Species that live in an unstable environment, in which their population is uncontrolled and rapid.

Population Growth

The number of individuals comprising a population may fluctuate considerably over time. Populations gain individuals through **births** or **immigration** and lose individuals through **deaths** and **emigration.**

https://www.boundless.com/biology/

http://www.ck12.org/book/CK-12-Life-Science-Concepts-For-Middle-School/section/12.5/

- **Population Growth**
  As an individual you are born, you grow and you die. A population has a birth rate and a death rate.

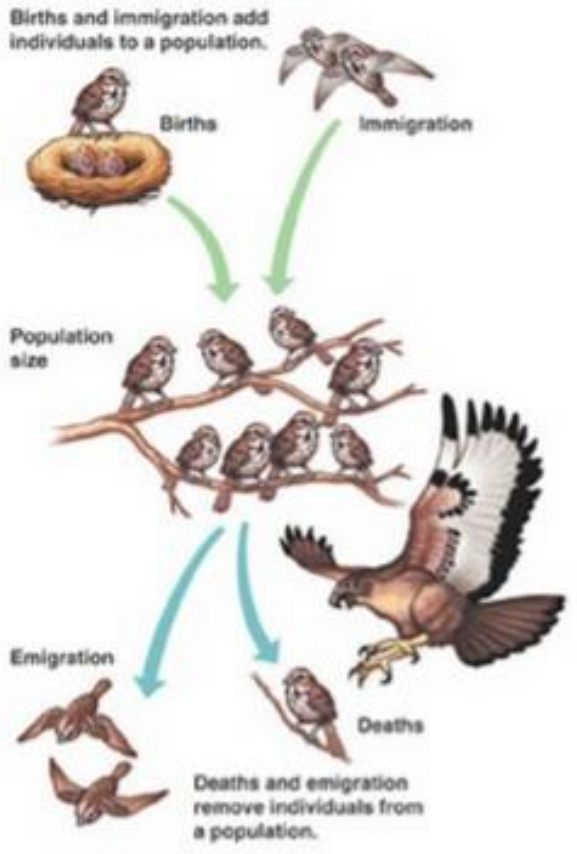
1. The size of a population is always changing.

2. Four factors affect the size of a population:
   1. Births (natality)
   2. Deaths (mortality)
   3. Immigration
      - (Moving into an area)
   4. Emigration
      - (Moving out of an area)

Factors affecting population size

- Births – number of new organisms
- Deaths – number organisms dying
- Migration
  - Immigration – organisms entering the population
  - Emigration – organisms leaving the population

These are all generally given as rates per 1000.



Net Population Size

Growth rate (r) = birth rate (b)+ I – death rate (d) + E

Growth = (births + immigration) – (deaths + emigration)

- Birth & Immigration brings more individuals into a population

- Death & Emigration decreases the number of individuals in a population.

Population Growth Rate

The **population growth rate (r)** gives us an idea on how fast a population changes over time. The rate can be calculated with this equation:

$$r=(b+I)-(d+e)$$

r = population growth rate
b = birth rate
I = immigration rate
d = death rate
e = emigration rate

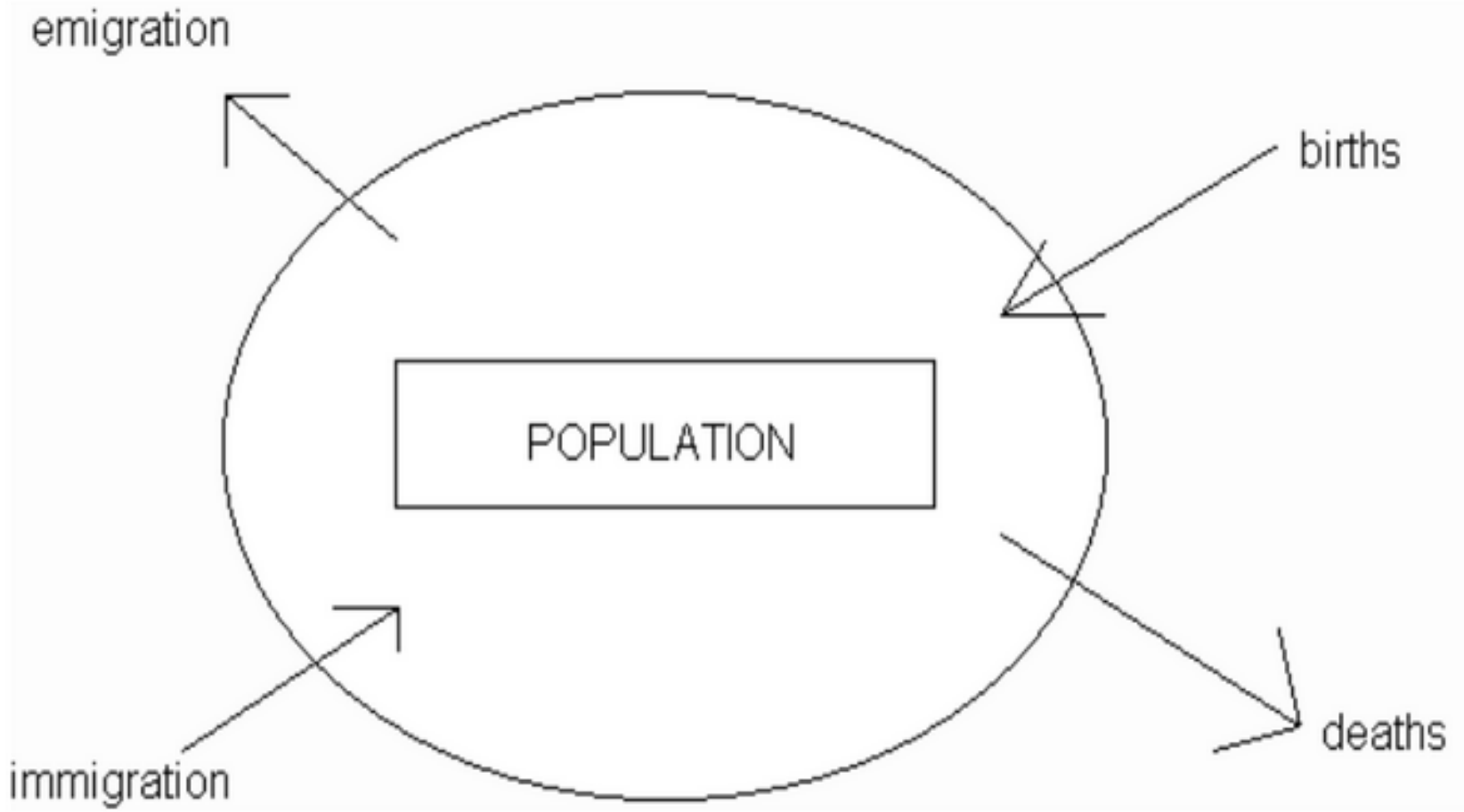
- A population growth rate is most affected by the birth rate (b) and the death rate (d).
- **Immigration** rate (I) also reflects individuals entering the population from somewhere else.
- **Emigration** rate (e) reflects individuals leaving the population to go somewhere else.
- If the population growth rate is positive, the population is increasing. If the rate is negative, the population is decreasing.

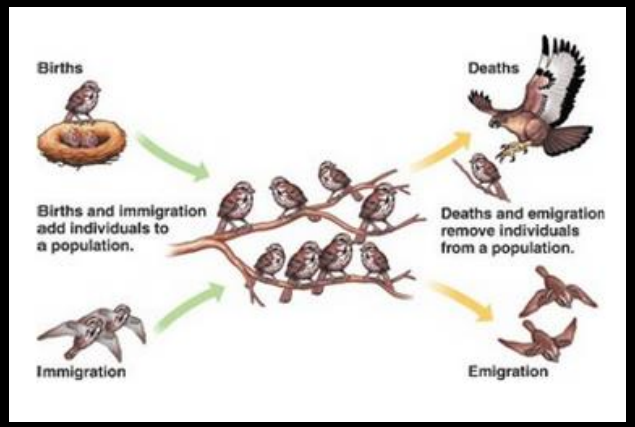
Think of Immigration as coming In, emigration as exiting.

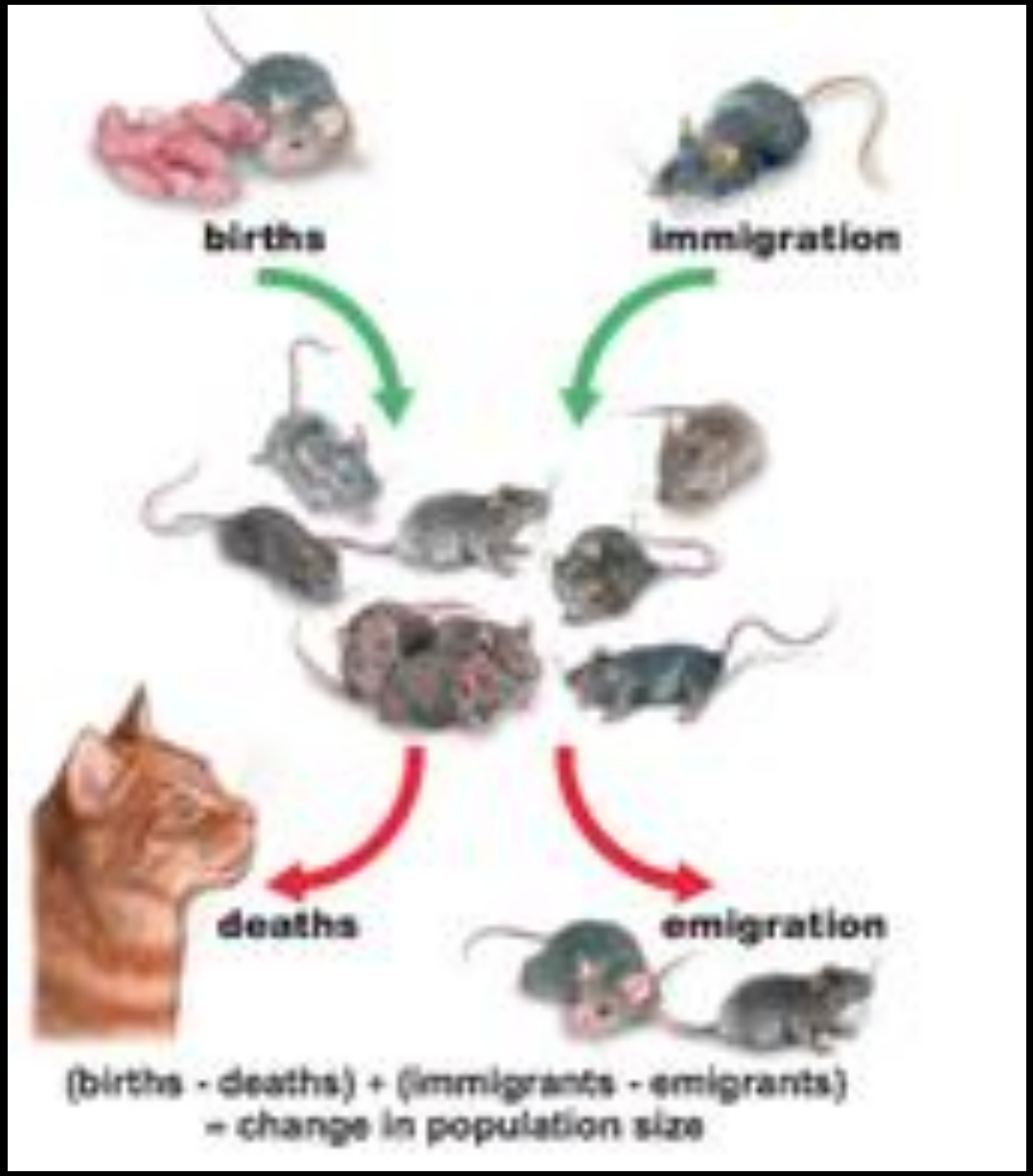
There are other factors that can affect population size and growth:

- **Dispersal** prevents competition with the parents for resources.
- **Migration** changes population size in a regular pattern. The purpose of migration is generally to find food, mates, or other resources.

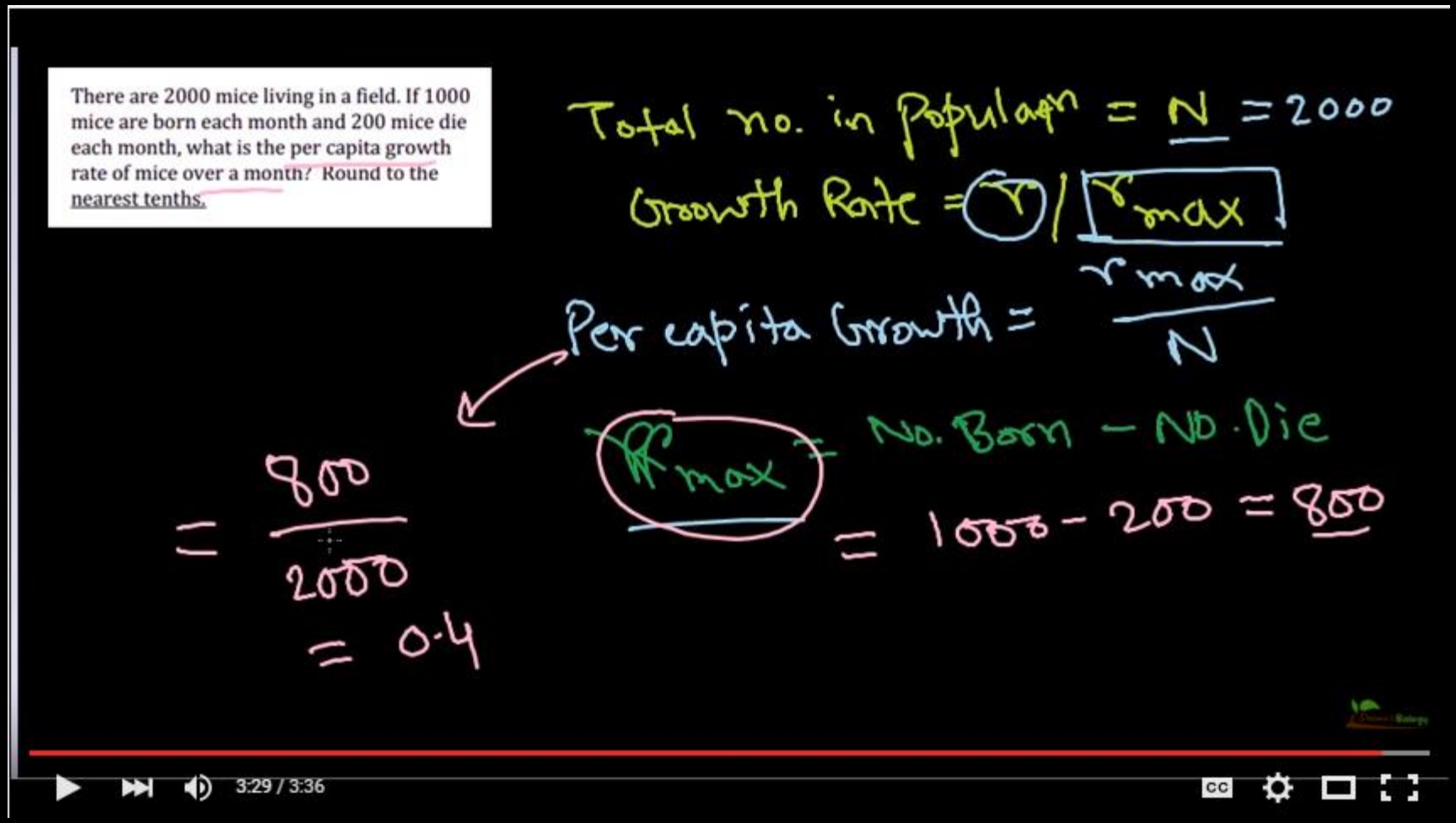
Population Size is Determined By. . .




Births
Deaths
Births and immigration add individuals to a population.
Deaths and emigration remove individuals from a population.
Immigration
Emigration


births
immigration
deaths
emigration
(births - deaths) + (immigrants - emigrants)
= change in population size

Population growth rate calculation



https://www.youtube.com/watch?v=PSDJE8ejYak

Birth & Death Rates (Real Time)

http://www.breathingearth.net/

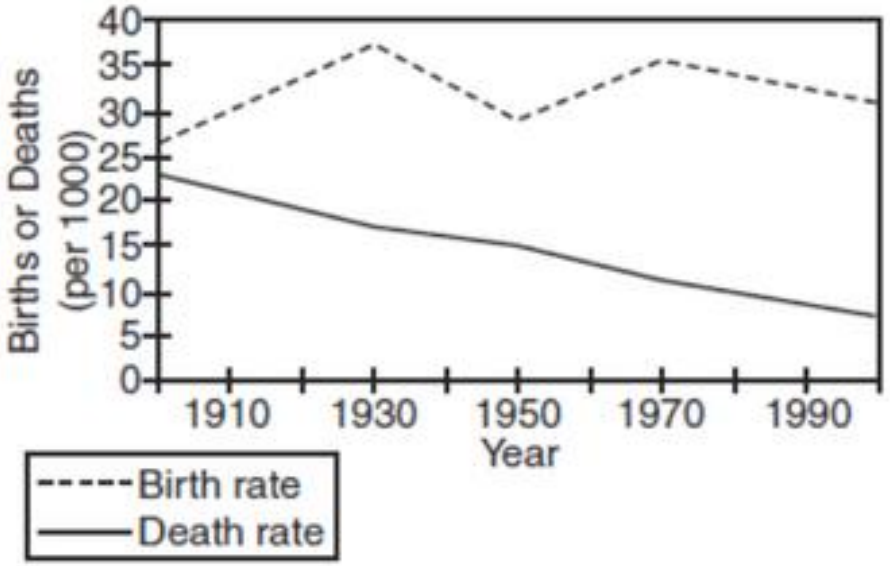
http://worldbirthsanddeaths.com/

https://learnforeverlearn.com/usbirthsdeaths/

http://www.worldometers.info/

Practice:

54 **The graph below shows the birth rate and death rate for a population during the 1900s.**



From 1900 to 2000, the population has

A increased.

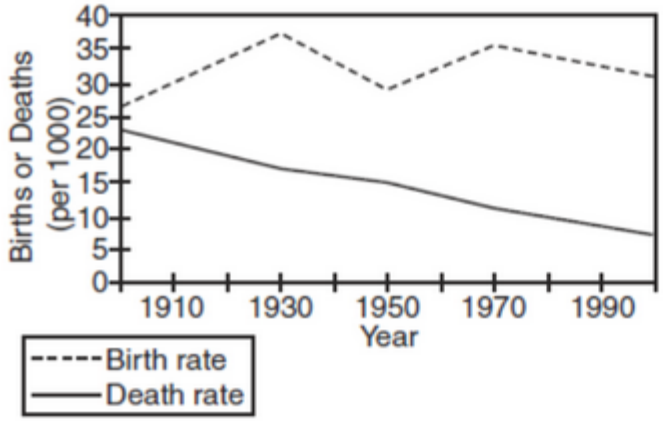
B decreased.

C stayed the same.

D increased until 1930, then decreased.

Practice:

54 **The graph below shows the birth rate and death rate for a population during the 1900s.**



From 1900 to 2000, the population has

A increased.

B decreased.

C stayed the same.

D increased until 1930, then decreased.

The answer is A because the birth rate has stayed relatively the same while the death rate has decreased, therefore the overall population size has increased.

POPULATION GROWTH

- Nearly all populations will tend to grow exponentially as long as there are resources available.

- Two of the most basic factors that affect the rate of population growth are the birth rate, and the death rate.

- r(rate of growth)=birth rate – death rate