Population Ecology
Same
↳ *All organisms of 1 species living in an area*
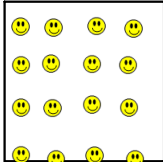
Population density ⟶ *# of organisms per unit area*

845 / square mile

Spatial distribution

dispersion ⟶ *How organisms in a population are arranged in space*
  - *pattern of spacing*
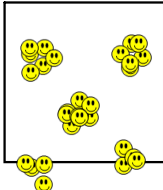 - *3 patterns*

Dispersion Patterns

Uniform distribution

Ex. *Black Bear*

Clumped distribution

Ex. *American Bison*
    Herds, schools of fish

Random distribution

Ex. *white-tail deer*

Why are certain populations dispersed in this manner?

- *protection*

- *reproduction*

- *Availability of resources (food, water, space)*

Population Ranges
→ where an organism can live

Not all populations can live everywhere

* ex. iiwi bird

  native to Hawaii only

Human population range = HUGE

Limiting factors

Any factor, biotic or abiotic, that limits the growth, reproduction, or distribution of a group of organisms

Prevent populations from..... *growing out of control*

Density Independent Limiting Factors

Any limiting factor that... Does _not_ depend on population size

Usually are abiotic factors or natural phenomenon

Ex. Natural Disasters (floods, fires, tornadoes)
Temperature
Sunlight

Density Dependent Limiting Factors

Any limiting factor that... Does depend on population size

Are usually biotic factors

Ex. Hunting   parasites
Competition   Disease
Predator/prey

Population Growth Rate

Increase the population

① Birth rate / natality

② Immigration
↳ moving into an area from somewhere else

Decrease the population

① Death rate / mortality

② Emigration
↳ moving out of an area to somewhere else

Equation for population growth

(Birth rate (natality) + immigration) - (Death rate (mortality) + emmigration)

increase pop.   decrease pop.

The natality for a population is 5 individuals per year. The mortality is 6 individuals per year. The immigration is 4 individuals per year, and the emigrations is 6 individuals per year. After one year, how many individuals has the population increased or decreased by

$(5 + 4) - (6 + 6)$

$9 - 12$

-3

Pop. decreases by 3

The mortality for a population is 21 individuals per year. The natality is 30 individuals per year. The immigration is 16 individuals per year, and the emigrations is 18 individuals per year. After 10 years, how many individuals ~~has the population increased or decreased by~~ are in the population

$(30 + 16) - (21 + 18)$

$46 - 39$

$+7$ per yr. $+7$
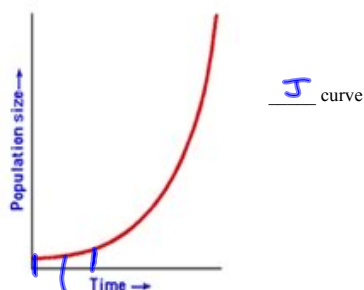 $\times 10$
                    $+70$
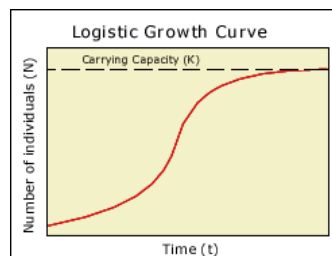
The initial pop. is 200

Population Growth Models

Exponential Population growth

J curve

slow growth at beginning = lag phase

this type of growth pattern is rare

Population Growth Models

Logistic Population growth

S curve

begins exponential. Looks like J curve

Levels off at a certain point

when it reaches
its
carrying capacity

When does a population stop increasing?

Carrying Capacity

The maximum number of individuals in a species that an environment can support for the long term

Created / limited by...

LIMITING
FACTORS

Used to explain why populations tend to stabilize

An employer offers you two equal jobs of one hour each for 14 days. The first pays $10 / day. The second pays only 1 cent for the first day, but the rate doubles each day. Which job would you take.

JOB 1 → $140

JOB 2

.01 , .02 , .04 , .08 , .16 , .32 , .64

1.28 , 2.56 , 5.12 , 10.24 , 20.48 , 40.96

81.92 $165.8