NOTES - Populations.pdf

INVESTIGATION 1.2: 'A Sample Census - Wildlife on the Move'

- **population** - the total number of individuals of a single species that live in a designated region at a given time.
  - ex: human population is ~ 6 billion
- **population density** - the number of individuals of a single species that live in each unit area (km^2, mi^2, hectare, acre) of habitat at a given time.
  - ex: deer population is 6 deer per square mile
- **census** - a count of the population.
- **true census** - actual count of all of the individuals of a species in a given area.
- **sample census** - is an estimate of the population.

(used when actual count is not possible)

ESTIMATED POPULATION = Estimated Population Density x Area of Habitat

- The '**mark-return-recapture method**' is used to estimate population density.

ex: DFO at Millerton and Cassillis estimate salmon populations on Miramichi River.

$$P = \frac{T_F T_L}{M}$$

P - estimated population

T_F - total animals captured in first trapping

T_L - total animals captured in later trapping

M - recaptured animals that are marked

copy down

Changing Population Sizes

Four variables affect changes in population sizes:

1. births
2. deaths
3. immigration - act of entering
4. emigration - act of leaving

[A person emigrates **from** Germany and then immigrates **to** Canada.]

population change = (births + immigration) - (deaths and emigration)

[gain in population] [decline in population]

The term population growth refers to how the number of individuals in a population increases (or decreases) with time.

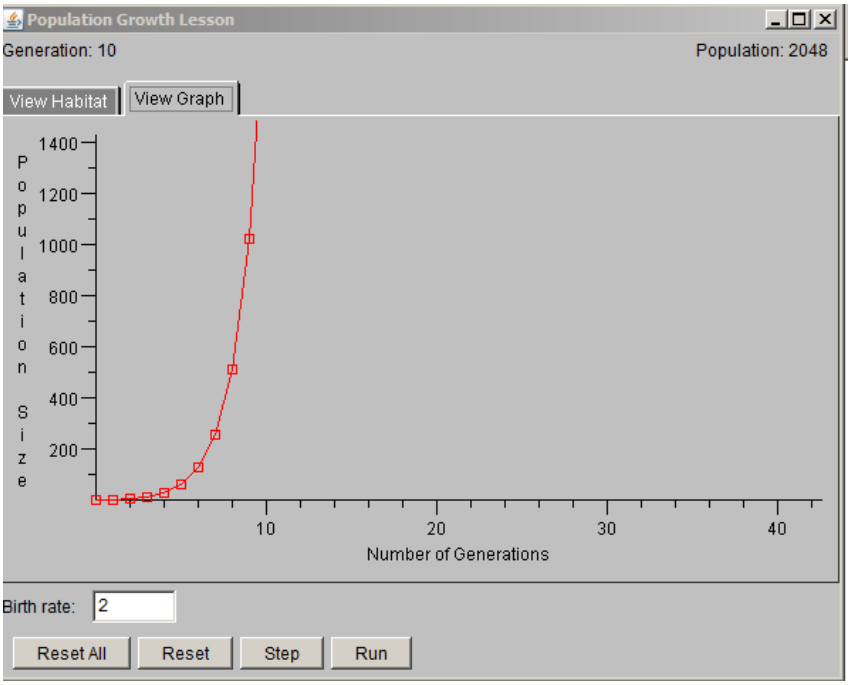
Under ideal conditions:

NOTES - Exponential Growth.pdf

Print out for class

1. the biotic potential of a population is the maximum rate at which it can increase.
2. exponential growth occurs - the population increases by the same percent from one time period to the next.

http://www.otherwise.com/population/exponent.html



Exponential Growth of Bacteria - Video Clip

http://www.youtube.com/watch?v=KIpcCyuypzg

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Calculating Exponential Growth

Formula for Exponential Growth

A quantity A that has exponential growth can be modeled by

$$A = P(1 + r)^n$$

- A measures the quantity at any time.
- P is the initial value of A, when $n = 0$.
- r is the rate (%) of growth, *in decimal form.*
- n is the elapsed time.

http://www.math.andyou.com/pdf/152.pdf

http://www.math.andyou.com/152

The growth rate of a bacteria culture is 52% each hour. Initially, there are two bacteria. How many bacteria are there after 12 hours?

A = ?
P = 2
r = 52% = 0.52
n = 12

$A = P(1+r)^n$
$= 2(1+0.52)^{12}$
$= 2(1.52)^{12}$
$= 2(152.05\ldots)$
≈ 304

Handed out

In nature, there are always limits to growth. A population will reach a size limit imposed by a shortage of one or more of the **limiting factors** of light, water, space and nutrients.

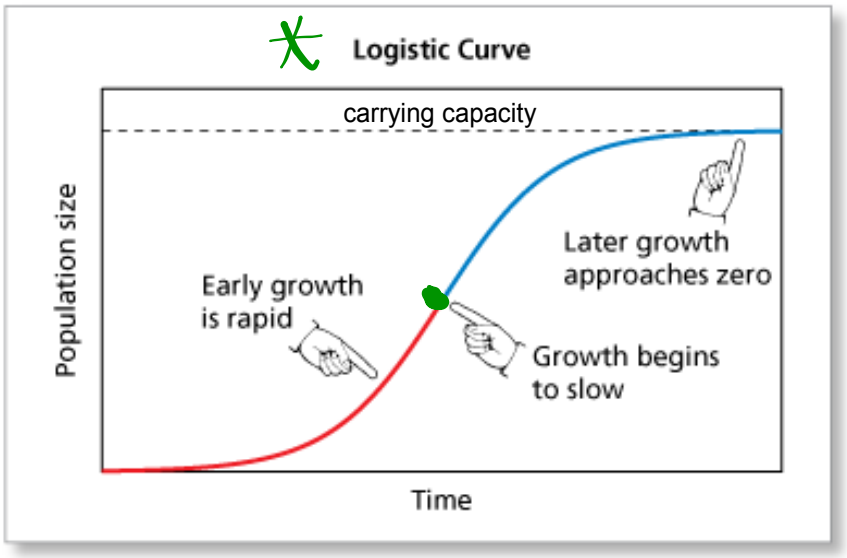
Carrying capacity represents the highest population that can be maintained for an indefinite period of time by a particular environment.

When a population grows exponentially at first, and then levels off to a stable number near the carrying capacity, it is called **logistic growth**. Logistic growth is much more common in nature than long-term exponential growth.

Natural Capital - refers to all the natural resources on which people depend upon and includes resources we use to produce manufactured goods.

Introduction to Environmental Science 120

Exponential grow



Exponential Growth -> "J"Curve

Logistic Growth -> "S" curve

ON TEST

Doubling Time - Rule of 70

never change

$$\text{doubling time} = \frac{70}{\text{growth rate}}$$

will he give this in a word problem

ie/ annual growth rate of 7%

$$\text{doubling time} = \frac{70}{7} = 10 \text{ years}$$

Attachments

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NOTES - Exponential Growth.pdf