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 ~ 7 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

Bill Taylor Talks Salmon on As-It-Happens

ASF President Bill Taylor talked on CBC's **AS IT HAPPENS** Sept. 17 regarding the low number of Atlantic salmon returning to the Miramichi River.

5 ECO-POINTS...Join a Environmental Newsletters

http://asf.ca/main.html

asf

Atlantic Salmon Federation News

Tuesday, Sept. 18, 2014

ASF Rivernotes - Will Scotland's Referendum Affect Salmon?
~~~~~~
his week's update hits several points, including a new **PHOTO CONTEST**, as well as raising the question of impacts on salmon from the **Scottish Referendum** vote. Plus the latest on river reports across the Atlantic salmon range in North America
http://atlanticsalmonfederation.org/rivernotes/

ASF RESEARCH BLOG UPDATE -
ASF researchers continue the process of bringing to the surface acoustic tracking devices with their valuable data, and the assessment of streams with electrofishing gear proves very successful.
http://asf.ca/research-in-the-field.html

Where have all the Miramichi Salmon Gone?
~~~~~~
ASF and the MSA raise the alarm that Miramichi salmon returns this year show the runs are in danger.

ASF's Bill Taylor discusses the issue on **CBC's *AS IT HAPPENS***
http://asf.ca/bill-taylor-talks-salmon-on-as-it-happens-.html

Another perspective is given with coverage in **video** and text.
http://asf.ca/miramichi-salmon-numbers-hit-record-low.html

The need for bold action is emphasized:
http://asf.ca/bold-action-needed-to-save-atlantic-salmon.html

Calculating Exponential Growth

Formula for Exponential Growth

A quantity A that has exponential growth can be modeled by

$$\boxed{A = P(1 + r)^n.}$$

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

EXAMPLE: 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 = 2(1 + 0.52)^12

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

```
2(1.52)^12
          304.1956862
```

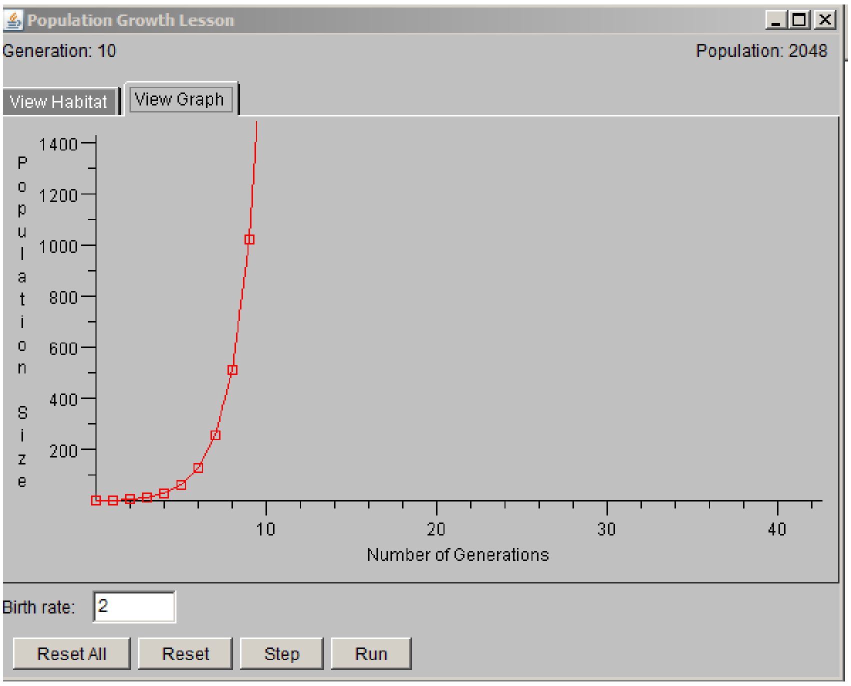
304 bacteria

SOLUTION

Under ideal conditions:

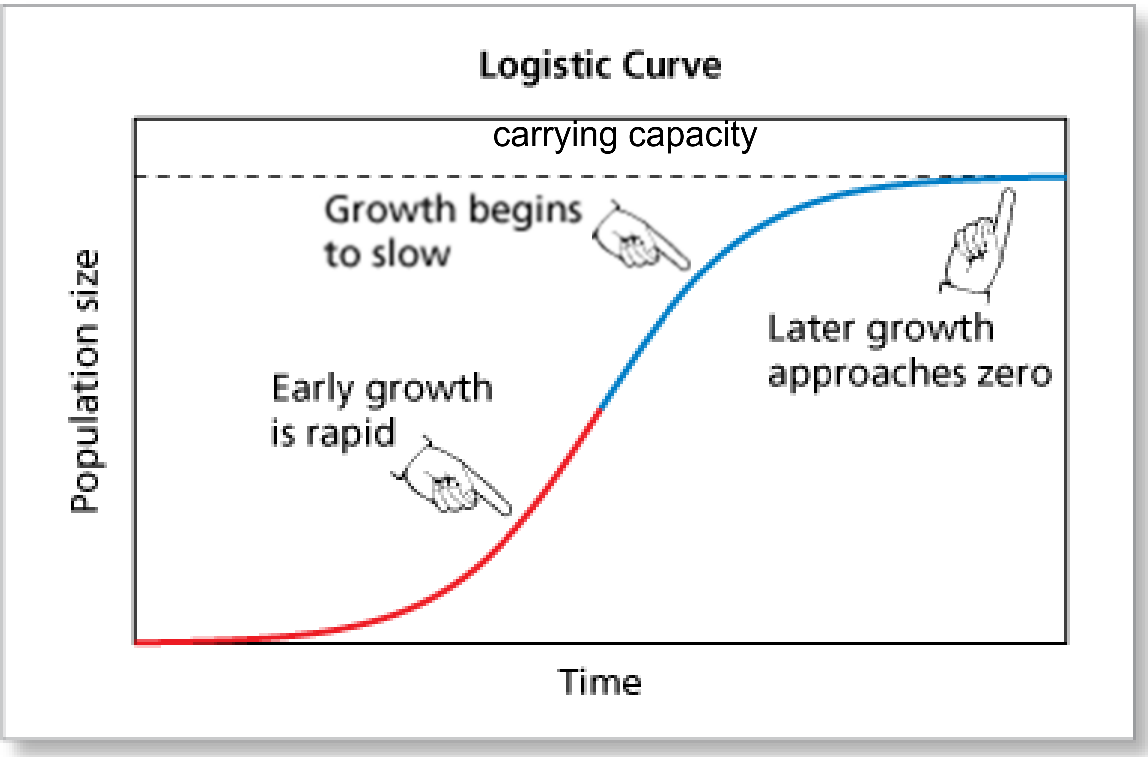
1. the **biotic potential** of a population is the maximum rate at which it can increase
2. **exponential growth** occurs - the population increases by the same percent from one time period to the next.

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



- 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.

Exponential Growth -> "J"Curve
Logistic Growth -> "S" curve



Doubling Time - Rule of 72

$$\boxed{\text{doubling time} = \frac{72}{\text{growth rate}}}$$

ie/ annual growth rate of 8%

doubling time = 72/8
= 9 years

HOMEWORK...

Read - Lessons from Easter Island.pdf

Attachments

NOTES - Populations.pdf

Read - Lessons from Easter Island.pdf