Notes - Population Calculations.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.
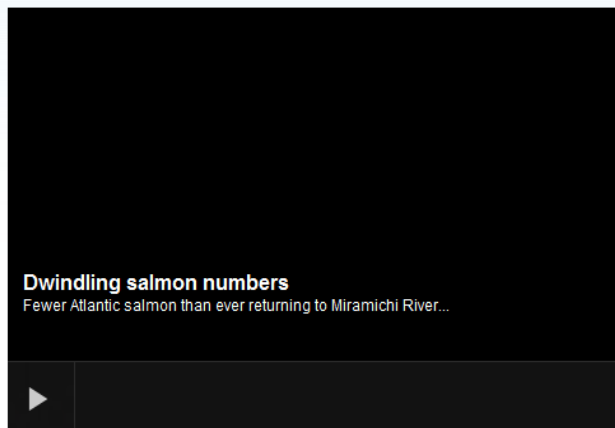
$$P = \frac{T_F T_L}{M}$$

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

Miramichi Salmon Numbers Hit Record Low

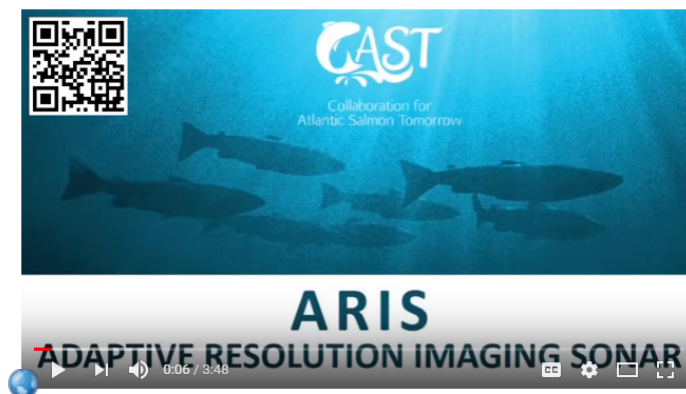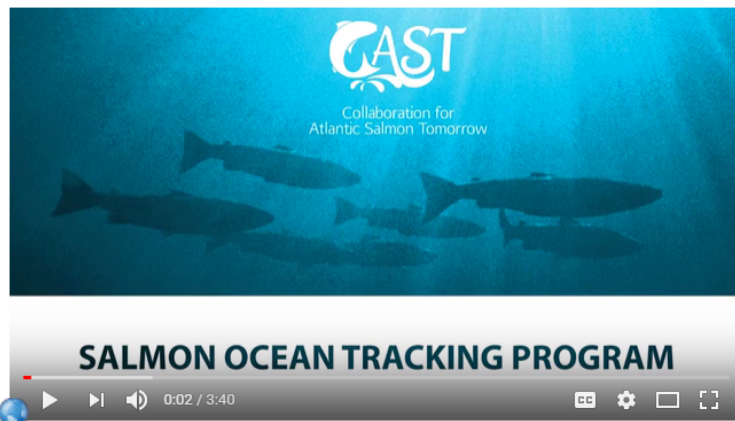**Dwindling salmon numbers**
Fewer Atlantic salmon than ever returning to Miramichi River...

▶

CBC NEWS

Miramichi River salmon numbers hit record low in 2014

http://www.cbc.ca/news/canada/new-brunswick/salmon-stocks-dip-2017-1.4142749

http://www.cbc.ca/news/canada/new-brunswick/salmon-striped-bass-population-new-brunswick-1.4232693

What is being done...population studies!

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

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?

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

A → Population
P → intial Population.

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

r → growth rate

n → # of years

```
2(1+0.52)^12
      304.1956862
```
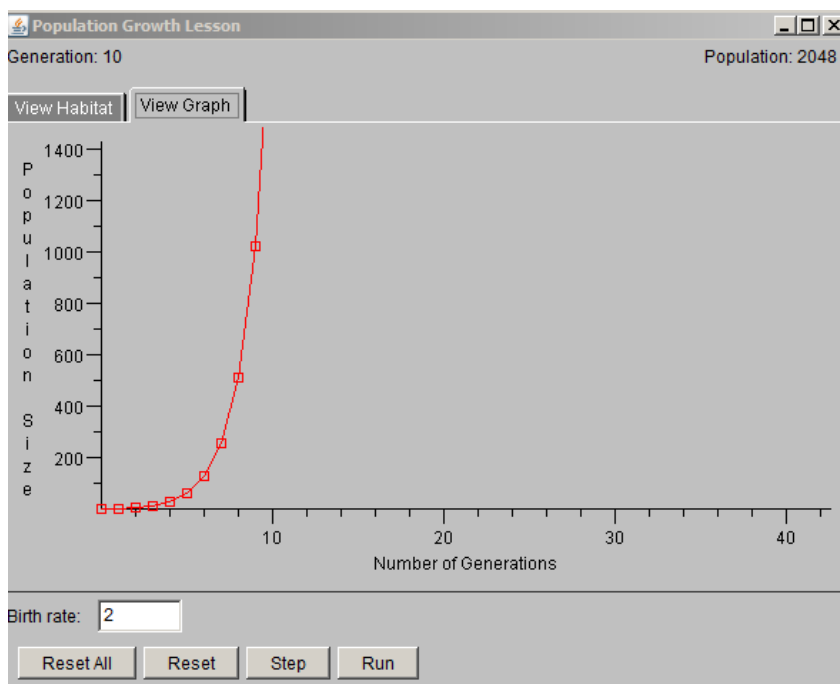
SOLUTION

A = 304 bacteria

Under ideal conditions: **NOTES - Exponential Growth.pdf**

1. the **<u>biotic potential</u>** of a population is the maximum rate at which it can increase
2. **<u>exponential growth</u>** 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
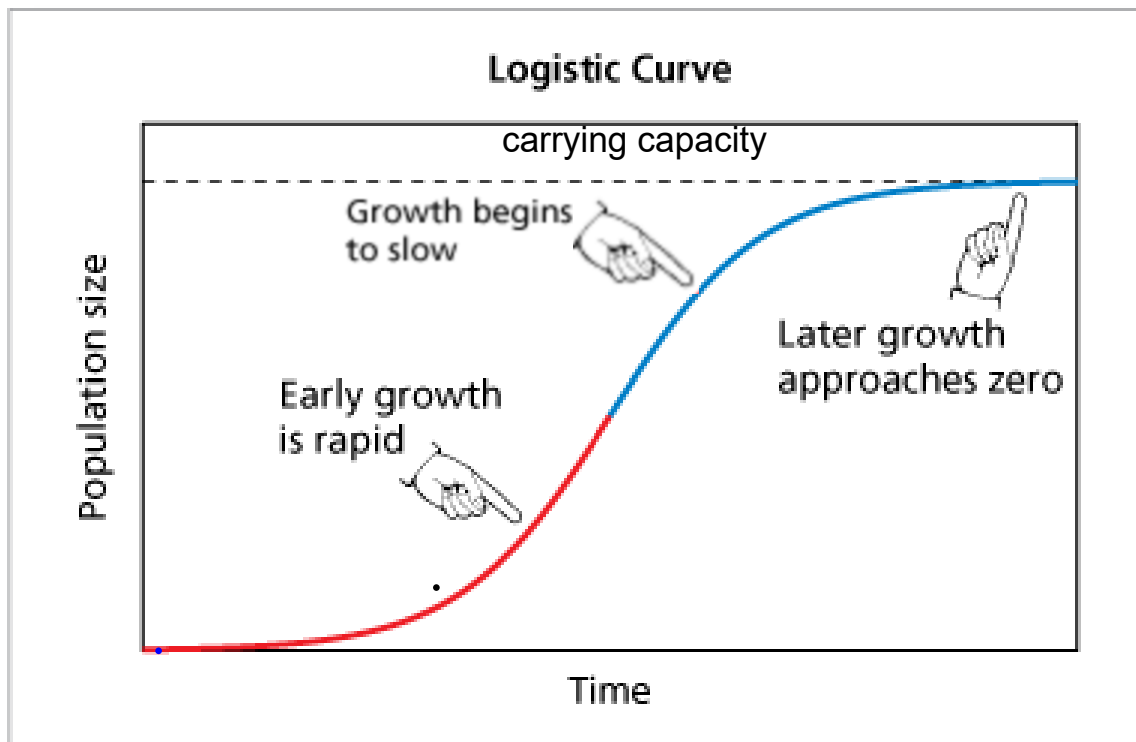
Logistic Growth in Nature...

CANADIAN LYNX - Amazing Animal Species

589,909 views

👍 1.2K   👎 139   ➤ SHARE   ≡₊   ...

Attachments

Notes - Population Calculations.pdf

NOTES - Exponential Growth.pdf