

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 ~ 7 billion
- **population density** - the number of individuals of a single species that live in each unit area (km², mi², 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.

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

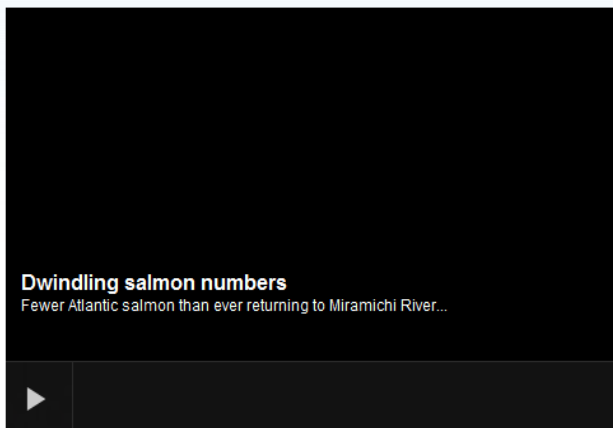
P - estimated population

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



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-stripped-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

Population

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

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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.

y^x or \square^{\wedge}

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

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

$\therefore 52 \rightarrow 0.52$

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?

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

$A = 2(1 + 0.52)^{12}$
 $A = 304$ bacteria

SOLUTION



Case Study - How Many Fish in The Sea.pdf



Crew members sort fish on a trawler. As the large predators, such as cod have been exhausted, we turn our attention to smaller prey. Some call this fishing down the food chain.

Attachments

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