Guide to:
Capture recapture

maths Links

Explanation:

Capture-recapture estimates a total population size **N**. First, **M** animals are caught, marked, and released. Later, a second sample of **n** animals is caught and **m** of them are found to have marks. Assuming the marked animals mixed randomly, equate the two proportions: $\frac{M}{N} = \frac{m}{n} \rightarrow N = \frac{M \times n}{m}$.

Key assumptions: no births, deaths, or migration between samples; marks do not rub off; and every animal has an equal chance of being caught.

Example 1: A scientist catches **40 fish** in a lake, marks them, and releases them. Next day she catches **60 fish** and finds **8** are marked. Estimate the total fish population.

Solution:

Set up equal proportions: $\frac{40}{N} = \frac{8}{60}$

Rearrange for N: $N = \frac{40 \times 60}{8}$

$N = 2400 \div 8 = 300$

Answer: 300 fish

Example 2: How would the estimate in Example 1 be affected if some of the marks had washed off overnight?

Solution:

Fewer marked fish (a smaller denominator **m**) would be recorded in the second sample.
Dividing 40 × 60 by a smaller number gives a larger result:
Answer: The population estimate would be too high (an overestimate).

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