

Capture - Recapture



A population estimation technique.

Capture and recapture is a method commonly used in ecology to estimate population size. Instead of trying to capture and count all the animals in an area, you only have to capture a sample.

Formula

$$N = \frac{MC}{R},$$

where

N = Estimate of total population size

M = Total number of animals captured and marked on the first visit

C = Total number of animals captured on the second visit

R = Number of animals captured on the first visit that were then recaptured on the second visit

Example Calculation

A biologist wants to estimate the size of a population of turtles in a lake. She captures 10 turtles on her first visit to the lake, and marks their backs with paint. A week later she returns to the lake and captures 15 turtles. Five of these 15 turtles have paint on their backs, indicating that they are recaptured animals.

$$N = \frac{MC}{R} = \frac{10 \times 15}{5} = 30$$

In this example, the method estimates that there are 30 turtles in the lake.



Experiment

Because we unfortunately cannot go out and capture turtles, our turtle-replacements will be beans.

If you have a really good imagination (really, really good) you can perhaps imagine that you are a giant and the beans we are using are turtles with brown shells.

Aim:

Materials:

Method:

1. Take a container and place in it 1-2 handfuls of **Kidney beans** in it.
2. Take 20 **Bortlotti beans** from the containers up the front and add them to your container of kidney beans (these are your "marked" beans)
3. Shake the container so the 20 marked beans mix with the unmarked beans.
4. Tip the container and spill approximately 10 beans from the container (this simulates "recapture" of the beans).
5. Count the total number of beans recaptured including the marked bean (**total recaptured**).
6. Count the total number of Bortlotti beans in the recapture sample (**number of marked recaptured**)
7. Return all beans to the cup.
8. Shake container again, then tip out approximately 15 beans.
9. Repeat steps 5-7. Follow these steps for 20, 25 and 30 recaptured beans.
10. Using the formula calculated the estimated population for each recapture.
11. Count the total number of beans in the cup including the marked ones.
12. Compare your estimates to the total number of beans.

Results:

Marked Beans (M)	Total Captured (C)	Marked Recapture (R)	Population Estimate (N)	Actual Population
20				
20				
20				
20				
20				

Conclusion:

Which trial produced the best estimation of the population?

Can you identify any trends in your data? What are they?

When using this out in the field, what should you do to make sure your estimate is as close as possible to the real population?

What might be some of the disadvantages of using this method when estimating populations of animals in the wild?
