

Introduction to Ecology: Mark and Recapture Exercise

We will do a simple experiment to show how ecologists try to estimate population size. We will use a method called 'Mark and Recapture'. It is (almost) impossible to count every member of a population, so ecologists must estimate *population size* from a *sample size*.

- You will be given a container of noodles.
- Remove 30 pieces of noodles randomly and mark each piece of noodle with a marker.
- Put the marked noodles back into the container and mix.
- You will recapture the noodles 3 times. The first time you will recapture 40 pieces, then 60 pieces, and then 85 pieces.
- For each recapture you will need to record the number of marked noodle pieces recaptured.
- Use the equation below to estimate the population size of the noodles.

$$N = \frac{C \cdot M}{R}$$

N = Estimated population size

C = Total number of individuals recaptured

M = Number of individuals initially marked

R = Number of marked recaptured

Low Marking Effort (30 marked; M=30)

	Total number recaptured (C)	Number of Marked Recaptured (R)	Estimated Population Size (N)
Recapture 1	40		
Recapture 2	60		
Recapture 3	85		

IMPORTANT: Before you begin the 'high marking effort exercise' you must remove 20 pieces of noodles randomly and mark each piece of noodle with a marker. If the noodle has already been marked return it to the container and choose another piece. When you are finished marking put the marked noodles back into the container and mix. Then start the 'high marking effort exercise'.

High Marking Effort (50 marked; M=50)

	Total number recaptured (C)	Number of Marked Recaptured (R)	Estimated Population Size (N)
Recapture 1	40		
Recapture 2	60		
Recapture 3	85		

Actual Population Size: _____ (this will be given to you by the teacher at the end of the exercise)

Assumptions for Mark and Recapture Studies

Each type of sampling has a set of assumptions. These are things that are believed to be true. Mark and recapture studies have a number of different assumptions, but for our experiment we will only consider the assumptions below:

- 1) Each individual has an equal chance of being captured.
- 2) Marking does not influence an individual's chance of being recaptured.
- 3) Births and immigration do not occur between the marking and recapture efforts.
- 4) Marks are not lost between capture and recapture.

Answer the questions below.

1. Assumption #1 is almost never true. Explain how the chance of capture is not the same for all individuals. How would you minimize this problem?

2. Think about assumption #2 '*Marking does not influence an individual animal's chance of being recaptured*'. Describe how being captured and marked could (a) increase and (b) decrease an individual's chance of recapture.

3. Think about assumption #3 '*Births and immigration do not occur between the marking and recapture efforts*'. How might a researcher attempt to make sure that the assumption is met?

4. Think about assumption #4 '*Marks are not lost between capture and recapture*'. How can an ecologist make sure that this assumption is met? What would happen to the population estimate if marks were lost?