A Population Estimate Study - Mark-Recapture Lab

Purpose/Problem: To simulate a population census technique commonly used by wildlife biologists in the field.

Research/Hypothesis: The first step in understanding an ecosystem is to inventory the living organisms in an area. Plants can be easily counted or using random sampling estimating their populations. Animals are more difficult because they move around. Marking and recapturing provides a fairly reliable method of determining the population size in an area.

   The first step in this method is to trap a random sample of animals of the desired species and ear-tag, radio tag or mark each in some manner and then release them back into the wild. The next step is to do another trap. Some of the newly trapped animals may have been marked on the first sample trapping. Using a simple data ratio the biologist can come up with a quick population estimate. The ratio is as follows:

$$\frac{N}{M} = \frac{n}{m}$$

N = the population estimate
M = the number of animals captured and marked in the first sample
n = the number of animals captured in the second simple
m = the number of "n" that were already marked

Experiment:

A. Equipment and Materials - population in a bag, markers, cages, organismic capture device

B. Procedure -
1. Make a guess of the number of individuals in the population given.   Record guess_____

2. Using the capturing device take a unit of organisms from their environment. Count the number captured. This is your first trapping M. (Use caution when working with these organisms. They are "whiley" and can jump.)

   M = _____

3. Mark these organisms by replacing each one with a colored bean. Release them back into the wild. (These wild things!!!!!)

4. Shake the population and using the capturing device take another unit of organisms from their environment using extreme care. These organisms will be your second trapping sample, n.

   n = _____

5. How many organisms in your second trapping sample were already marked, m?

    m = _____

6. Using the formula given above calculate the N for this population. Show your work. Replace each tagged organism with the original organism to return the population to it's pure form.

7. Repeat the procedure two more times then calculate the average of N.

    a. M = _____   n = _____   m = _____   N = _____

    b. M = _____   n = _____   m = _____   N = _____

    c. Average of N = _____

8. Count the actual number of organisms in the bag population. _____

9. Calculate the % error for:

    a. Estimated number N: $\dfrac{\text{estimated average} - \text{actual count}}{\text{actual count number}}$ X   100 =

    b. Guestimated number: $\dfrac{\text{guess number from question 1} - \text{actual count}}{\text{actual count number}}$ X 100 =

10. Which of the above (#9) values were the closest to the actual value – the experimental estimate or your initial guestimate?

11. How could you increase the accuracy of your experimental estimate?

12. What species of animals would this technique work best for? What species of animals would this technique not work for? Explain why for each.

Conclusion: Why is it important to have a population count of organisms in an area?   Think!!!