Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pd. \_\_\_\_\_\_\_

Lab – “Estimating Populations”

**Overview and Purpose** – The number of animals in a wild population cannot be easily counted. Wildlife biologists have developed a formula that can estimate a population’s size by using small samples. This method is referred to as mark and recapture. In this investigation you will:

\*use the mark-recapture method to estimate population size.

\*test the effectiveness of the mark-recapture method by simulating an outbreak of disease in a population.

**Problem** – How effective is the mark-recapture method in estimating population size?

**Hypothesis** – Write a hypothesis to explain how you will use a sudden change in population size to determine the effectiveness of the mark-recapture method. Your hypothesis should take the form of an “If…then…because….” statement.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Procedure**

1. Review data Table 1 and Table 2.
2. From your teacher, obtain a paper bag containing a “population” of white kidney beans.
3. Remove a small handful of bean. Count the sample and record the count in Table 1, under First Capture Total.
4. Use a colored marker to mark your sample population. Return the beans to the bag, and gently shake the bag to mix all the beans.
5. Remove and count a second sample of beans. Record the count in Table 1, under Recapture Total.
6. Count the number of beans from this sample that were marked from the first capture. Record this number in Table 1, under Recapture Marked. Return all the beans to the bag.
7. Use a calculator and the following formula to estimate the population size. Record the estimate in Table 1 as the Calculated Population Estimate.

First Capture Total x Recapture Total = Population Estimate

Recapture Marked

1. Disease strikes. Remove a small handful of beans from the bag. Count the beans and record this count in Table 2, under Killed by Disease. Set these beans aside.
2. Repeat steps 3-7 to mark and recapture your survivor population. This time use a different colored marker to mark your sample population, and only include the beans marked in the second color in your counts.
3. Fill in Data Table 2 for the survivor population. Use the formula from step 7 to calculate your estimate of the survivor population.
4. Once you have calculated your estimate of survivors, dump out the paper bag and count all the beans that were inside. Record this count in Table 2, under Actual Survivors Total.

**Data Tables**

Table 1 – Population sampling BEFORE disease

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| First Capture Total | Recapture Total | Recapture Marked | Calculated Population Estimate | Actual Population Total |
|  |  |  |  |  |

Table 2 – Population sampling AFTER disease

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Survivors First Capture Total | Survivors Recapture Total | Survivors Recapture Marked | Calculated Survivors Estimate | Killed by Disease | Actual Survivors Total |
|  |  |  |  |  |  |

**Observe and Analyze**

1. From Table 2 add together the number of actual survivors and the number killed by disease. Put this in Table 1, under Actual Population Total.
2. Find the percentage of the population affected by disease using the following formula:

Killed by Disease \_\_\_\_\_\_ x 100 = Percentage affected

Actual Population Total

**Conclude – Answer in complete sentences**

1. How did the estimated number of beans compare with the actual number?
2. What aspects of this investigation most likely would not be possible in a natural habitat? Why not?
3. Compare your results with your hypothesis. Does your data support your hypothesis?