Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date\_\_\_\_\_\_\_\_\_\_\_\_\_

**Lincoln Index Calculations**

A capture, mark, release and recapture technique is called the **Lincoln Index**. It is used to estimate the population size of animals which move about.

Assumptions are made:

* Mixing is complete, i.e. the marked individuals have spread throughout the population.
* Marks do not disappear
* Marks are not harmful nor increase predation by making the individual more easily seen.
* It is equally easy to catch every individual.
* There are no immigration, emigration, births or deaths in the population between the times of sampling.

This can be expressed as:

 n1= number of animals fist marked and released

 n2 = number of animals captured in the second sample

 m2 = number of marked animals in the second sample

 N = total population

Then m2 = n1  or N= n1 xn2

 n2 N m2

First we are going to do a VIRTUAL LAB to illustrate how the Lincoln Index is used. **Go to classzone.com and click on “high school science”, then “Washington”, then “go”. Next click on “Biology 2008”. Under the “labs” section click on “Virtual Labs”. The name of the lab is called “estimating population size”.**

Purpose:

Materials:

Prediction:

Procedure:

1.

2.

3.

4.

5.

6.

7.

Data Table Title: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Analyze:

Lincoln Index Calculation (Write the formula, plug in the numbers, solve)

Conclude:

Apply:

Evaluate:

Use the formula to calculate the following populations. Please show all your work by identifying the variables, writing out the formula, plugging in the numbers and circling your final answer (see question one for an example).

1. Woodlice live under logs and stones in damp soil. To assess the population of woodlice in an area, students collected as many of the animals as they could find, and marked each with a drop of fluorescent paint. A total of 303 were marked and the released. 24 hours later, woodlice were collected again in the same place. This time 297 were found, of which 99 were marked from the first time. What is the estimated population of woodlice in this area?

n1= Formula: Calculation: Final answer circled:

n2 =

m2=

1. While studying field voles, an ecologist caught 500 and ringed one foot on each vole before releasing them. Every day for the next two weeks he examined the waste material found in the nests of their predators. He collected a total of 300 field vole skulls and 15 rings. How many field voles were probably in the area examined?
2. 100 water snails were captured from a pond and marked with a small spot of paint on the undersides of their shells; they were then returned to the pond. One week later, a second sample of 100 was captured, of which 25 had paint spots on their shells. What is the estimated number of snails in the pond?
3. 2000 bark beetles were caught in a given area, marked and liberated. Later, 200 individuals were recaptured and, of these, 20% had the mark. Based on this information, what is the estimated size of the beetle population in that area?
4. In a woodland, the undergrowth was sampled for snails and 430 were found and marked. They were then released and the population similarly sampled after a two-week period. This second sampling produced 410 snails, 100 of which were marked. What is the estimated snail population of the woodland?
5. A tropical rainforest is inhabited by a species of large carnivorous lizard. 119 of these lizards were counted in 240 hectares of the forest. What is the population density of the lizards?