



The Lincoln Index for estimating mobile populations.

The best way to measure the size of a population is to count all the individuals in that population. When determining the population sizes of trees or other relatively immobile organisms, this method is practical.

If the organism is mobile, however, such as a fish, counting every individual would be difficult. Some individuals might be counted twice or not at all, since the experimenter would not know which fish had been counted and which had not.

In determining populations of a variety of species, one method biologists use is tagging. Sometimes the ‘tags’ are stickers, ear clips, or notches made in the fins of fish. The purpose of these tags is to track migration patterns, health, and range as well as to help determine population numbers of species in an area.

Determination of population occurs by capturing and tagging a sample of animals. Biologists then release the animals and allow them to naturally “redistribute themselves.” By then taking random samples and determining the percent tagged, biologists are able to predict the population of the species in that area.

This method – used to estimate the size of a mobile organism – is called the *Lincoln Index*.

To use the Lincoln Index, we will capture a sample of the population we want to measure. We mark these individuals and release them. After waiting a set time period, we return and capture another sample. Some of the individuals in the second sample will carry the mark from the first sample.

Use the following formula to estimate the size of the population:

$$N = \frac{n_1 \times n_2}{m_2}$$

N is the estimated size of the population

n₁ is the size of the first sample

n₂ is the size of the second sample

m₂ is the number of marked individuals recaptured in the second sample

Lincoln Index recording sheet.				
Site number	n1	n2	m2	N
1				
2				
3				
4				
5				

The Lincoln Index makes several assumptions that must be met if the estimate is to be accurate. These assumptions are:

- ∅ The population of organisms must be closed, with no immigration or emigration.
- ∅ The time between samples must be very small compared to the life span of the organism being sampled.
- ∅ The marked organisms must mix completely with the rest of the population during the time between the two samples.