Grace Dalton

Section 7

Lab 3

**Mark-Recapture of Pinto Beans**

**Research Question**

How do population estimates using mark-recapture techniques compare to the true population size (using Lincoln Peterson Index and Schnabel Index)?

**Hypothesis 1:**

When using the Lincoln Peterson Index method to estimate the population the results will not be as accurate as when using the Schnabel Index.

**Hypothesis 2:**

When using the Schnabel Index method to estimate the population the results will be more accurate than the results complied with the Lincoln Peterson Index.

**Data Analysis: Population Size Estimate**

**Table 2:** Mark-Recapture Data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***i*** | ***Ci*** | ***Ri*** | ***New Marked*** | ***Mi*** |
| 1 | 59 | 0 | 59 | 0 |
| 2 | 39 | 4 | 35 | 59 |
| 3 | 41 | 2 | 39 | 94 |
| 4 | 50 | 2 | 48 | 133 |
| 5 | 48 | 8 | 40 | 181 |

2. Using the Lincoln-Peterson index, calculate the number of pinto beans in the population (N).

Show your calculations.

**N = (M \* S)/R** M = animals marked and released

 N = population size

 R = animals recaptured on the second day

 S = sample size on the second day

$$N=\frac{59×39}{4}=575.25$$

3. Using the Schnabel index, calculate the number of pinto beans in the population (N). Show your calculations.

N = ∑ M*i* C*i*/∑R*i* (where *i* goes from 1 to m = number of different samples)

$$N=\frac{\left(59×0\right)+\left(39×59\right)+\left(41×94\right)+\left(50×133\right)+\left(48×181\right)}{\left(0+4+2+2+8\right)}=\frac{\left(0+2301+3854+6650+8688\right)}{16}$$

$$=1343.31$$

**Discussion**

1. How do your estimates compare to the true population size? If your estimated values differ from the true value, why do you think this might have occurred?
	1. Using the Lincoln Peterson method our results were underestimated. The true amount is 1,014, but our numbers resulted in an answer of 575.25. When using the Schanbel method we overestimated the population. We received a population of 1343.31. The Lincoln method is not as accurate because it only looks at one row instead of looking at the data as a whole.
2. Did the Schnabel index give you a better estimate of the actual population size than did the Lincoln Peterson index? Why?
	1. The Schanbel method was much more accurate because it includes all of the data in its calculations. You use the entire table, which gives you much more data to work with which results in more accurate population estimates.

**Conclusion**

Comment on the assumptions and limitations of determining population abundance of terrestrial and marine species using this method.

 When collecting data from marine and terrestrial species they are not immobile and they move around. You also have the issue of assuming that the species are going to intermingle with animals that are not already marked. If they do not do this than you will not have a varied collection the next time you take a sample. You are also competing with animals dying off which will affect your results because it will mess up your numbers. Unlike the beans in our experiment where our markings where permanent, animals can break free from their collars which will skew your result. You also have to consider that animals are easier to catch and mark on land than they are to catch in the water, but the boundaries are easier defined in water than they are land.