

Homework No. 5 – Simple and Stratified Sampling

Instructions

Wildlife biologists studying moose have used metatarsal length (length of a particular leg bone) of calves as an index of the nutritional status of the mother during pregnancy¹. In this homework, you will compare simple and stratified random sampling for estimating mean metatarsal length from a set of data approximating metatarsus observations from Isle Royale.

Download data representing a population of metatarsus bones in a collection from the class website. These give lengths (in mm) and gender of 4-year-old moose from a single birth year.

Part One: Simple Random Sampling

1. Select a sample of size $n=30$ from the metatarsus data. List the data in your selected sample.
2. Using your sample, calculate the mean length and a 95% confidence interval.
3. In last year's 4-year-old sample the mean length was 366 mm. The belief is that the winter was less severe for the current sample. Test the hypothesis that the mean length in the current sample is greater than 366 mm.
4. How many samples should you have taken to be $\pm 10\%$ of the mean with 95% probability?

Part Two: Stratified Random Sampling

1. Select a stratified random sample of size $n=30$ with proportional allocation to each sex. List the data in your selected sample.
2. Using your sample, calculate the mean and standard deviation of length for each sex separately and for the entire population. How do these values differ? What does this tell you about the subpopulations?
3. Calculate a 95% confidence interval for each of the three means. Compare the 95% confidence interval for the mean length from the stratified sample to that from the simple random sample. How do they differ, and why?
4. Assuming the sex ratio is 1:1 for the moose population, how should you allocate next year's sample of $n=30$ to the two strata?

Product

Submit your answers in professional memo format.

Due Date

This assignment is due at the beginning of class on Monday March 02, 2009.

¹ http://www.nps.gov/history/history/online_books/science/11/chap3.htm#t30