

Homework 3 – Putting it all together, in Excel

Stand Level Structure Summaries

Timber and non-timber resource values are related to stand structure. Clearly, the value of a stand for timber products is related to the distribution of trees or basal area by diameter class. More big trees, all else equal, equals more money when the trees are cut. Also, for many non-timber values, big trees or many trees or a diversity of trees by size might be very valuable. So describing stand structure is a key task that you've done before (in measurements and multi-resource assessment) and will do many, many times in the future, whether you go to work as a timber cruiser or as an ecologist for the Parks Service, Nature Conservancy, or as a consultant.

Foresters and forest ecologists often argue that stands with a “reverse-J” or “inverse-J” diameter distribution are probably uneven-aged stands. You can describe a “reverse-J” distribution with a “class ratio”, in forestry often called “ q ”. If $q = 1.3$, then the number of trees per acre in diameter class i is 1.3 times the number of trees in diameter class $i + 1$. With 2 in. diameter classes, a value of 1.3 for q is often expected in northern hardwoods. Foresters try to return stands to this distribution during a partial harvest. Is this natural? You can test to see if the stand retains this distribution after it has recovered somewhat from the last harvest, or if it changes into something else.

Objective

In this assignment, you practice generating stand level summaries from plot level data. You need to use pivot tables, and remember some basics of forest measurement. Then you'll test an ecological hypothesis using a goodness-of-fit test.

The Data

There are two historic research projects, Study 75 and Study 76, on Section 30 of the School Forest and that were harvested in the winter of 2003-04. Prior to harvest, the continuous forest inventory plots in the area were re-measured. Your job is to generate some pre-harvest stand statistics using the CFI data.

Instructions

Download the CFI data from the class website. Note that these were 1/5 ac. fixed area plots. A copy of the CFI field data sheet is also on the class website to help you make sense of the raw data.

Generate the following summaries at the stand level, for live trees only.

a) two-way crosstabulations

1. trees per acre by species and diameter class
2. basal area per acre by species diameter class

b) one way crosstabulations

1. trees per acre by diameter class and the 95% confidence intervals
2. basal area per acre by diameter class and the 95% confidence intervals

Then plot these last two frequency tables as histograms and include error bars to show the confidence intervals.

Finally, using a Chi-square goodness-of-fit test, test the hypothesis that the stand is uneven-aged, with $q = 1.3$ for 2 in. diameter classes.

Product:

Summarize your results, including any tables or figures, in a professional memo no longer than one double-sided page. Include a very concise description of your procedure.

This assignment is due in one week, at the beginning of class on Monday February 5, 2007.