



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Jacquelyn B. Opalach	Project Number 35197
Project Title Investigating the Accuracy of the Method Foresters Use to Estimate the Radial Growth Rate of Trees	
Abstract Objectives/Goals The objective of this experiment is to determine whether the current method foresters use to measure radial growth rate on redwood trees and spruce trees is accurate. This was a two-year study beginning with the experiment meant for redwoods which triggered the idea for a similar project conducted using spruce trees. I hypothesized that the method may be inaccurate for redwood trees because they grow in clusters. However, my hypothesis for spruce trees was quite different. Because spruce trees grow singularly I expected that the practice of extracting a single increment core would result in accurate information for this species. Methods/Materials Two recently harvested forests were visited; a redwood forest and a spruce forest. Fourteen tree disks were obtained from each study site, which were collected by locating accessible tree stumps. The redwood disks came from stumps that had varying amounts of neighbors within their own sprout clump, and the spruce disks came from trees with different amounts of nearby trees within 15 feet of the subject tree. The place on the disk where radial growth would most likely be measured by a forester was determined, followed by calculating the average growth by measuring radial growth in each of the four cardinal directions, adding them together, and dividing by four. The forester's estimate of growth was then compared to the average growth for each disk. Results For redwood trees it was found that for 9 out of 14 disks radial growth rate is overestimated by the forester's method that relies on a single measurement. The average overestimation of all my redwood trees was 11 percent. The spruce tree data showed that the forester would overestimate radial growth 6 out of 14 times and that the average overestimation was 12 percent. It was found that there is no obvious relationship between the amounts of neighboring trees and the difference between the forester's growth rate and the average growth rate for each species. Conclusions/Discussion Although measuring radial growth in only a single place on the stem is typically expected to be accurate, this method is flawed when applied to redwood trees from sprout clumps and stand-alone spruce trees. Estimates of growth rate are more likely to be accurate if the subject tree is measured in more than one place around the stem on both tree species studied.	
Summary Statement This study found that the current method foresters use to estimate the radial growth rate of redwood trees and spruce trees leads to inaccurate results.	
Help Received My father operated a chainsaw to cut the tree disks and he also showed me how to use Microsoft Excel.	