U.S. House of Representatives, Committee on Resources
Subcommittee on Forests and Forest Health
Congressional Oversight Hearing:
Scientific Research and the Knowledge-base concerning Forest Management Following Wildfires and Other Major Disturbances
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Medford, OR

Dr. Beverly Law and her graduate student, Dan Donato, asked me to provide an independent evaluation of the statistical methods used in their SCIENCE article "Post-Wildfire Logging Hinders Regeneration and Increases Fire Risk" (Vol. 311, 20 January 2006). I am a retired professor of Statistics at Oregon State University. I have no professional ties with the OSU School of Forestry or with Dr. Law and Mr. Donato.

Mr. Donato provided their data set. I have read their article, visited the web address summarizing additional information, discussed the methods with Mr. Donato, and read the letter of Dr. Paul Adams et al. requesting SCIENCE to withdraw the article. In my evaluation, I found several ways in which I would have analyzed the data differently. So I produced my own analysis in order to compare it with the analysis presented in their article. The conclusions I draw are similar to theirs. My estimates of logging effects on the salvage stands sampled are as follows:

[1] Logging activity was associated with a 57% decrease in seedling counts.
[2] Logging activity was associated with a 320% increase in fine fuel levels.
[3] Logging activity was associated a 600% increase in coarse fuel levels.

These estimates were derived using nonparametric Rank-sum methods. All associations were statistically significant: 1-sided p-values = .015, .0007, and .013, respectively.

To achieve such statistical significance with only sixteen sample points requires that the data show dramatic, unequivocal differences between logged and unlogged stands. The data in this study meet this requirement. Although there can be differences of opinion on methods of analysis, all reasonable methods will lead to congruent conclusions.

Statistical inferences that these effects reflect similar effects on a wider scope are possible only to areas that have some chance of being sampled. The sampling methods employed by the authors allowed a chance of selection to any 1-hectare plot in the sampled salvage units. Thus they are justified in inferring that the results can be extended to the salvage units sampled. The salvage units sampled were not randomly selected, so inferences beyond those selected for study are speculative.

Statistical inferences of causation require some method that eliminates the possibility that factors other than logging were responsible for the observed differences between logged and unlogged plots. One method is matching, where logged and unlogged plots are paired on the basis of their having nearly identical factors other than the logging activity. A second method is random assignment of plots to logged or unlogged status. The researchers used neither of these design methods. Their design did, however, provide the opportunity to compare the response measurements on the plots in 2004, before logging occurred. That there were no discernible 2004 differences between

the plots logged in 2005 and the plots left unlogged in 2005 does provide some support for inferring causation.

Inference of causation can also be based on direct visual evidence that seedlings had been destroyed and that fuel items were created by logging activity.

Any study such as this may be criticized on many bases. Such criticisms are important in the interpretation of the study and are useful in designing future studies. Simply criticizing cannot, however, negate the study's conclusions. Only contradictory data from new scientific studies could do that.

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