Fire Ecology Chats: A Podcast Series by the Association for Fire Ecology

Transcript of Episode 8 – A large database supports the use of simple models of post-fire tree mortality for thick-barked conifers, with less support for other species

Host: Robert Keane (Editor of Fire Ecology and Retired Research Ecologist, USDA Forest Service)

Guest: Alina Cansler (School of Environmental and Forest Sciences, University of Washington)

Link to Full Article in Fire Ecology: https://fireecology.springeropen.com/articles/10.1186/s42408-020-00082-0

Bob Keane: Good morning everyone. My name is Bob Keane. I'm the editor of Fire Ecology and the host of Fire Ecology Chats. Today, we're very pleased to have Alina Cansler. She just published a paper called "A large database supports the use of simple models of post-fire tree mortality for thick-barked conifers, with less support for other species." This is an incredibly important paper; it's rare that people have done a comprehensive review of post mortality. Alina, could you tell us a little about yourself?

Alina Cansler: Yeah. My name is Alina Cansler and I did this work while working for the USDA Forest Service Rocky Mountain Research Station at the Missoula Fire Science Lab in Missoula, Montana. I now work for the University of Washington in Seattle for the School of Environmental and Forest Sciences.

Bob Keane: Alina, why would someone want to read this great paper?

Alina Cansler: This paper evaluates empirically-derived statistical models that are used in management decision support systems. And these decision support systems influence how managers do prescribed fire when and how and what they do after a fire across the United States. Also, globally, these types of models are used in many other places around the world. So it's a really important system for making decisions. And we wanted to bring some data to bear on how well that system was working.

Bob Keane: What did you use for data?

Alina Cansler: (laughs) Okay, so this is what is so neat. This evaluation of post-tree mortality models is the most comprehensive one to date. We evaluated 44 species, and we were able to do that because of a database we built for this project, which could be used for many others. It's called the Fire and Tree Mortality Database, and it's published and available on the USDA Forest Service Data Archive, and it contains data from 41 contributed datasets from across the United States of post fire tree injury and survival and mortality observations. So there's 170,000 tree level observations in that database. For this paper, we used about 93,000 of those tree observations.

Bob Keane: Oh. So it looks like the data support the use of the equations for the fire-adapted trees, or the trees with the thick bark. Why won't it support the other trees that are have more thin bark, or are adapted to competition?

Alina Cansler: So, the models that were made and used in the First Order Fire Effects Model were developed initially from thick bark, western conifers. These are the tree species, like ponderosa pine and Douglas fir, that we often are concerned about when we're reintroducing fire or managing fire in western fire prone dry forests. But this model as it's built into FOFEM, the First Order Fire Effects Model, can be applied to any species for which there's a bark thickness coefficient, so you could estimate bark thickness. What we found was for thinner bark conifers and for angiosperms, so any of the hardwood species, the prediction accuracy was much lower. So approximately 75% of the models tested had excellent to outstanding predictive ability. But for these other species, maybe we need to take a different modeling approach than this logistic regression equation based on crown damage and tree bark thickness.

Bob Keane: So you mentioned FOFEM, the results of the study have been integrated in FOFEM?

Alina Cansler: They have not yet been integrated in FOFEM. So what we did in this study was evaluate the models that are already in there and show how they work and what direction the errors are. We didn't develop new models for this study. And one of the things that comes out of it is because the errors are related to species and taxa, that maybe for those species, like say oak species, we need to really rethink the modeling approach of how we're modeling mortality for those species.

Bob Keane: Oh, so it's safe to say that this is probably the most comprehensive review of tree mortality we've had in quite some time.

Alina Cansler: It is, and there's been a lot of work in the past to develop new models for one species at a time. But we probably need to keep improving the models we have to make predictions in the short term, but also think about different approaches, maybe machine learning approaches or addressing whether the bark thickness estimates are correct for a group of species for thin bark conifers and angiosperms in the future.

Bob Keane: Okay. So do you like to recognize any funding agencies that funded the work?

Alina Cansler: Absolutely, yes. So this work was funded primarily by the Joint Fire Science Program and that funded the bulk of the mortality database and the analysis. But we received some additional funding from Rocky Mountain Research Station and the National Fire Plan. And I should also mention the “we” in this is: Sharon hood was a really important lead on this project, Phil van Mantgem with the USGS, and Morgan Varner who's now with Tall Timbers Research Station.

Bob Keane: Well, thank you very much Alina for coming to Fire Ecology Chats. We really appreciate your time. And everyone if you want to read this wonderful paper, it is only available from the journal Fire Ecology. Thank you very much, Alina.

Alina Cansler: Thank you.