

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



Transcript of Episode 14 - Housing arrangement and vegetation factors associated with single-family home survival in the 2018 Camp Fire, California

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Guests: Eric Knapp (USDA Forest Service) and Yana Valachovic (University of California Cooperative Extension)

Link to Full Article in Fire Ecology: <https://fireecology.springeropen.com/articles/10.1186/s42408-021-00117-0>

Bob Keane: Hello everybody. My name is Bob Keane. I'm the editor of the journal Fire Ecology. And this is another one of our exciting podcasts that we do for each paper that comes out. Today we have a really important paper, and we have Yana and Eric here to talk about this paper about the Camp Fire and the destroyed structures. Yana and Eric, you want to introduce yourself, Yana first.

Yana Valachovic: Hello, everyone. I'm Yana Valachovic. I'm with the University of California.

Eric Knapp: And I'm Eric Knapp. I'm a research ecologist with the US Forest Service, Pacific Research Station in Redding, California.

Bob Keane: Thank you both and, Yana, why don't you tell us about this paper? What makes it one of the most important papers we've published in a while?

Yana Valachovic: Wow, that's quite flattering. This project came out of a community reaction, we've all had for at least the last five years of really devastating wildfires that have impacted homes and communities throughout California. And let me just put it in context. In the last 10 years, we've had 14,000 structures burned in California and 171 lives lost. So the Camp Fire was in 2018 and it followed a series of other devastating events in Redding and the Carr Fire. And we were interested to try and look at patterns and whether or not there were lessons that we could learn from one of these really damaging events. And after a little scoping project, we figured out there was quite a bit of opportunity, given the uniform conditions of burn period in the Paradise area. So what can we learn in terms of how buildings survive? Are there any key lessons? And how do construction codes make a difference or not in home survival?

Bob Keane: That's great. Eric, can you tell me what you found?

Eric Knapp: Well, we looked at some really simple variables. We looked at just the distance of a neighboring structure that burned, the number of structures within 100 meters that burned—just with some Google Earth imagery. And then looked at vegetation, just coarsely, canopy cover of overstory trees, which we know might be linked to understory fuels and just things like slope. And whether the house was in the wildland urban interface or intermix things like that. In general, we found that both the proximity to neighboring burning structures and vegetation were really strong in the statistical models. And what came out probably the strongest is the effect of a neighboring structure burning. So a lot of the emphasis in the past has been on defensible space. And

you know, you manage the vegetation that is presumed that you're okay, but I think what this shows is that homes are fuel too. And that the neighboring homes is really something we have to factor in these environments.

Bob Keane: So Yana, one of the things I was amazed at how many homes were included in this study, can you tell us a little more about the methods that you use?

Yana Valachovic: Sure, the project that we did, we took on just the town of Paradise itself and looked at single family construction alone. So there's other types of construction, multifamily and there's also a whole lot of trailers in Paradise. But we stratified our sample to just look at three time periods looking at either side of the adoption of California's new construction code in 2008. So looked at construction during 10 year bins, so 2008 to 2018, and then 2007 to 1997, and then proceeding with each successive decade. And we compared how homes performed within those three decades and looked at those variables that Eric was talking about.

Bob Keane: Okay. What also amazes me, Eric, was the fact that the building code implementation didn't really make a difference, is that correct?

Eric Knapp: The analysis, it was not statistically significant, even though newer homes did better. The homes on either side of that building code update, it was like 37% versus 43%. And with all the other variation that occurs in fires and other sources of variation, that was not a significant effect. So even though the building codes, in all likelihood, had a positive impact. I mean homes built to those codes probably performed better. You know, there's probably other factors that overrode that building code.

Yana Valachovic: I think some people maybe want to make more of the story about the building code piece, and I will admit that I was a bit surprised by not seeing such a strong statistical signal. But I think what we've been able to unearth are some of the key vulnerabilities and construction and fuel management such that we can help inform the building code process going forward. And I think that's the really good news. All building codes get better with time and this one dates back to 2008, that's not that long of a vintage. So our work will move into that policy arena and help us think through some of those key vulnerabilities which, in specific are looking at the issue of radiant heat. So when you have that community or neighborhood effect, where so many buildings in relatively close proximity to each other are ignited and putting forces and pressures on surrounding buildings, our codes really could use a little bolstering in that arena.

Bob Keane: Uh huh. One of the things that we feel in fire sciences is to get across the fact that there's a high variability in all the results. Eric, I wonder if you could speak to the contributions of fire behavior, both meteorologically and the fuels. What was their effect on your analysis?

Eric Knapp: Well, during the Camp Fire that occurred during a really high northeast wind event, and the winds blow down this canyon pretty viciously at times. And it's been known for a long time that Paradise is vulnerable to these winds. But problem was that the fire started maybe five to seven miles upwind. And so by the time it got to Paradise, it was a five plus mile flaming front that hit the community all at once. And it burned through this town of Paradise during this wind event. So it crossed from one end to the other, under very similar conditions, where a lot of previous analyses that I've done work to try to understand home survival, they've had to combine data from multiple fires under multiple different burning conditions. In this case, so many houses were lost in Paradise, but you can actually do some good statistics with just this one fire. And this one burn period

Yana Valachovic: It's like putting that town in one wind tunnel over one full hour period to see how it would do, As impersonal as it is to study such a horrific event, this particular fire really allowed for a more robust conclusion, some more extrapolation of behavior because of that consistent burn period.

Bob Keane: Very interesting. So one could assume that we could extrapolate these kinds of results to other California fires, right Yana.

Yana Valachovic: Well, you know, there's caveats to all of this. But this was a monster fire. We're under extreme events, but the vegetation type, the pattern, and building and development across Sierra Foothill towns, they're relatively similar. And when we get to this point, it's when we're in those extreme conditions, you know, many of us wish we didn't have to plan for that type of event. But I think the reality is that it's becoming more common and so there's a great opportunity to say, well, under those types of conditions, what is it really going to take, when we do not have the capacity to put an individual engine on each home, when our focus is on getting people out of the way where our priority should be.

Bob Keane: Well, I'd like to end with this one question: Do you want to give any recommendations to homeowners in the forested California areas?

Eric Knapp: It's a great way to end because yeah, one of the things that we did with this study is we also compiled information from CAL FIRE, the California Department of Forestry and Fire Protection. They took pictures of every house that was damaged and pictures (of houses) that were destroyed. And we were able to then tease apart just from those images of the damaged homes of where the point of entry was. And we saw radiant heat was a major source of damage, which went along with our findings. And a lot of it had to do with proximity to a neighboring structure that burned. But we also saw a lot of evidence of ember ignition of near home fuels, you know, whether it be leaf material, gutters catching on fire, fences catching on fire that been transmitted to the home. And so those then lead to some recommendations that could be made. There's a lot of talk now in California about having 5-foot noncombustible zones and just not having anything combustible within the first 5 feet of your home. Yana and I were up in the Camp Fire area yesterday; yesterday was the 3 year anniversary of the fire. And we noticed that the homes that are being rebuilt at this point, it looks like that information is actually being used. And we noticed that people are not generally putting wood fences straight up into their houses. They're using maybe a wrought iron fence and a gate in between to break up the continuity of those fuels. People are putting rocks in their front yards rather than bark mulch, things like that. So there's definitely some changes that have occurred. And if that continues to occur, I think we can live in a much more fire-resilient way.

Bob Keane: This has been a wonderful chat. I want to thank you both giving your thoughts on your paper. I wonder if you would like to recognize your funding sources?

Eric Knapp: This paper was not funded by any sources other than our organizations that paid our salary.

Bob Keane:

And that would be the USDA Forest Service, correct?

Eric Knapp: USDA Forest Service. And Yana?

Yana Valachovic: The University of California Cooperative Extension Program.

Bob Keane: Okay, well, we'd like to thank those, and we'd like to thank everyone for listening to our Fire Ecology Chats. Thank you so much Eric and Yana, look forward to reading your paper.

Yana Valachovic and Eric Knapp: Thank you.