

Grass fire and bushfire behaviour

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Chair

Justin Leonard is one of our regular presenters and he's provided really helpful information based on his 26 years of research with the CSIRO. We really appreciate Justin presenting again. Over to you Justin.

Justin

Thanks very much Malcolm. After that fantastic exploration of the unique aspects of grass fires and how they compare to bushfires I want to delve into that similar topic and perspective but really looking out from the house's perspective to understand what it really means to experience the impact or onset of those grass and forest fires and how they fundamentally differ.

Unpacking it from that house or experiential perspective helps us to unpack what it might be in terms of solutions and approaches to manage those interactions that can be the most problematic in potentially igniting our homes and threatening our own life safety.

At the highest level what's really important to note is the things that are drying out the landscape and priming the vegetation such as the grasslands to allow it to become a continuous and formidable fire source are exactly the same weather conditions that are drying out and priming our homes and the elements around our homes to make them at their most flammable. Unfortunately that coincides with the flammable landscape. Our houses and the combustible aspects of our houses and the things around it are at their driest and most combustible at exactly the same time for the same reasons. The weather drivers and contexts prime them up at exactly the same time.

Rather than thinking about how combustible a deck, a fence, a garden bed is currently we really have to take our minds to that dry soil dry lofted mulch and the constructed timber elements that are ever present around our houses and how part of our houses are being really well primed for impact from the various things that we've worked through in previous sessions that spanned things like ember attack, radiant heat, flames from an approaching fire front, and surface fire which is the more belying low level burning surfaces in that continuity that Kevin highlighted so eloquently.

The consequential fires are all those other elements around our houses like retaining walls, vehicles and fences. The ever present issue of tree and branch strike which is largely exacerbated by the wind and the fact that the fires are getting up into the trees and exploiting the defects in knots and whatnot where they can drop branches or even fall over completely. That can even be a reality in a sparsely treed grassland as well. Don't forget that grass fires can burn through and pass those trees. It can wick up certain trees according to their bark type and involve and get into knots and defects in those trees and cause the tree or branch to fall. We can't rule those out even in a grassland context.

And the debris accumulation which can happen during those events. Obviously the many months and years that lead up to these events can be very effective debris contributors. If we channel out the grassy attack mechanism in itself ember attack's still there. Kevin would have highlighted that embers are definitely not as virulent and aggressive from a grassy source. The bark on trees are far more effective at creating persistent and resilient bark. Many of the photos that Kevin showed really didn't show a very strong ember plume or cloud above those grassy fuels at all and that's because they're not particularly good at causing ember attack although they do cause some. And the few grassy based embers that are created certainly burn out quicker as they're travelling through the air. So they only really have a reach or effect at a much shorter distance. So well less than 100m - more up to 50m if you like.

But that's not to discount that there's many other sources of embers in the landscape. So the bark on the few trees that are around. And certainly as we approach an urban interface things like mulch beds or tanbark on the ground and other sources become the dominant ember attack sources that can persist. And obviously because there are less trees associated with a grassland you can think of wind and the wind actions as being far more prevalent. It will drive those fewer embers further and also be a direct attack mechanism on these structures themselves. If you look carefully at this diagram it's showing a fire in a predominant wind direction from the left to the right. And what's worth highlighting is that the debris and the way things are ignited tend to build up. Obviously they can attack the windward side of the structures. That's where the wind's blowing against the structure and air pressure blows things up against the structures.

But it might be surprising that it's actually not those windward attack sides of the structures that are the first to necessarily ignite and start to burn from this ember attack debris attack surface fire attack approach. It's actually the leeward sides and the hidden cavities and little obscure nooks and crannies around the house where the wind speeds are much lower that allow the ignitions of debris to actually build up and take hold into a flaming fire. It's almost like the windward side or the windy side of the structures are too windy for them to take hold as easily. So certainly think about every aspect of your house and all the nooks and crannies in terms of their combustibility. And where you might get water to for example are all key things to consider.

As we move to considering the effects of a grass fire we're thinking less about the sheer intensity of the flame front that arrives, the sheer radiant heat that might be generated. Therefore thinking far less about a dominant attack direction type thinking of the fire to a more insidious or ubiquitous type of attack that could see little fires spring up in unusual spots not in that dominant attack direction. And in terms of how we then extend that to our thinking about property siting and how our house siting actually plays out the obvious issue around vegetation separation from the housing footprint is a common one that we all talk about.

Considering the wind directions that are common in a fire. So down here we think about a north or east just swinging around to a south southwester. And that escalation of fire in the landscape as you swing from a narrow expanding conical fire to that whole cone turning into a massive flank fire.

But as Kevin pointed out in terms of wind there's so many complex little terrain factors. And even the vegetation and the roughness of that vegetation causes winds to swirl locally. And there's many accounts of how fires can come from unusual directions but also multiple directions. So think about the potential of fire fronts coming at you from many or all possible directions and to think carefully about what that means to how you choose to manage your own life safety and how you prepare your house.

In terms of the other main factors too. A house isn't necessarily threatened by smoke itself. But smoke is a major factor if we're thinking about our own behaviour and exposure. I really liked that key observations from Kevin around how those more oily canola cropping grassy fuels were far more acrid because there was significantly more oil in those types of grasses than other types. That can translate very quickly to how incapacitating that smoke is. And when you think about those open grassier environments the wind's blowing those more aggressively and pushing that smoke along the ground reaching more places than necessarily seeing the smoke go up in a plume and away from being a more direct exposure risk to individuals.

As we get into those urban environments of course there's lots of urban fuels that become sources of smoke as well. And they're significantly more toxic again. Have a good hard think about the sources of toxic smoke and fumes that belong to the assets around you. It could be a car, a fibreglass boat, the contents of your shed, or even a painted or stained fence or trellis. They're all really key things. And of course when a house starts to burn itself well it really takes that smoke and toxicity to the next level. In terms of then how we really think about the building itself and its adequacy for standing up even if we're thinking about a grass fire attack the surface fires that continuity of surface fire even if it's a mown dry grass we've obviously significantly reduced the intensity of the grass fire itself but we have not eliminated that continuity of fuel on the ground. So we'll see a much more benign fire spread but the fire will still arrive and therefore it can still find all those near ground elements that are at risk. It might find a wheelie bin and burn it, it might find and burn in under a deck. All of those near ground combustible elements are particularly relevant.

And because those elements that we're trying to seek out and understand are combustible themselves, you don't need much of a fire to actually get the thing to burn. Particularly if debris has built up on it or against it. So reducing and lowering that arrival intensity is important. But it's really important to recognize and understand that under these really dry conditions unless you've got a really good water supply to keep your lawn nice and green right through these epically dry summers you're going to have a fuel continuity problem even if it's very short grass. And therefore that attention to all of those consequential fire sources and weaknesses near the ground of your house itself is absolutely critical to address.

In terms of moving to the actual physical house design itself all houses certainly aren't created equal. If we're talking about houses that have a raised sub floors or even open sub floor spaces very important to pay attention to the degree to which they're clean. Ideally if they're sealed off from ember and surface fire attack that's the ultimate scenario. But things like stored material and attention to detail around that base of the house is key as well as what we've decided to immediately build off the side of our houses. It might be living areas and patios or driveways and carports. All of that near ground level attack is absolutely critical. And as I mentioned earlier, less so the elevated areas because the ember attacks are less important higher up because you get less virulent embers. Unless the particular trees and iconic trees that you might have around your property have a high bark hazard which means they might be burning over those barky surfaces (which is a process known as candling where the bark itself burns in isolation). It's not really part of a formal fire front it's just burning over the surface of the bark. And with the wind conditions that will be spraying embers all over the place so that brings back that ember element.

It's important to think about embers more of a process of eliminating ember vulnerability of your structure of your house and its surrounding elements is the way you have to think about embers and less so about whether you've got a landscape that's particularly low or high capacity to actually generate the embers. There's still always going to be a lot of embers kicking around. And it's very important to note that those embers while they can certainly arrive before the fire front which is

really challenging because it can actually ignite houses prior to the main peak of their arrival which has obvious life safety issues. It'll really crescendo around that main part of the fire arrival process.

But then once that fire front passes and moves through, the winds can be particularly strong and persist. If those winds persist in the many hours after the fire fronts so will the embers. And in fact because the burnout of various aspects of the landscape can last for hours if not many days so will the embers. So if winds can persist well beyond these initial fire impacts you will get embers that could persist. And unfortunately we've seen houses ignite and burn down many days after the fire events because of that persistent ember attack which makes it even more appropriate and relevant to really focus your attention on embers and their role in burning houses down.

In wrap up what I really want to emphasize is living with this implication of bushfire risk is regulation can take us so far. But there's no really effective overall regulation that can just specify and require ultimate effectiveness of a house surviving. So it comes down to we're all in this together in terms of accepting what regulation can do for us and how far it can get. Then it's over to us to have a good hard think about what an integrated approach that involves a shared responsibility between the homeowner as a modifier and maintainer of our structures to work with either our legacy houses that were built before regulation or the ones that were built with regulation.

And unpacking this whole process and enabling community to understand what fires can and can't do and how these elements do and don't respond are really the core of working out how to effectively manage it and maintain our houses in an effective way. And really embracing this idea that these fires play a really important role in shaping our unique landscape and making it healthy and virulent and defining it as a landscape. And I'll leave it there. Thank you.