Bushfire Resilience Inc. Webinar 4 2024. Presentation 2

Understanding our changing bushfire weather

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Malcolm

Welcome to the fourth webinar of our 2024 series. Understanding Our Changing Bushfire Weather.

I know from firsthand experience Understand your weather Know your risk. It's a fact.

Tonight we have three industry experts - Kevin Parkyn, Justin Leonard and Mika Peace.

Our objective is to provide information to help you and explain how you will be affected.

Malcolm
Please take it away Justin

Justin
I just wanted to follow on from that great presentation by Kevin to really cement the idea about how weather and life loss impact are tied together. And I guess how the changing context of weather that Mika is going to really drill into is influenced by that life loss and risk and steps we can take in response to warnings issued in the fire danger categories.

I've taken a bit of artistic license here in that I've revived some of my old data sets that link fatalities and fire weather and I've used the assumption that the old FFDI or Forest Fire Danger Index and its numbers are roughly translatable to the FBI - the Fire Behaviour Indexe in the new AFDRS system. That a real strength of the AFDRS system is that it tried to maintain an equivalence in the numbering 50 is a total fire ban whether it be an FBI or what we used to remember as an FFDI.

The orange line or brown line is house loss. Our measured house loss over quite a broad period from 1926 to 2011. The blue line is life loss.

We can see from all of the measured life and house loss from 0 to 100 percent that well over 50% of our life and house loss occurs in the category of Catastrophic. Six to eight events have driven all our life and house loss in Catastrophic.

We can relate these older loss profiles with the categories of our current simplified Fire Behaviour Index (FBI) and the rating system that underpins it. What's interesting is it's quite well calibrated.

For the no rating area there is in fact no real measurable life and house loss. Now the changing climate is pushing the likelihood and frequency of this category up. And the further we get to the end of the century the more increase will occur.

What's also going to occur is an increase in frequency of Extreme classified days. And that'll push the middle of this curve up also both in life and house loss.

High is relatively benign but we will get a lot more highs as well.

Think about those categories and the relative escalation that Kevin articulated. Here it is in terms of the resultant life and house loss and how much of a massive contextual increase it is as you march through these figures.

If we talk about the seasonality of fires you're going to hear from Mika shortly about how fire seasons may in fact lengthen. They might start earlier and finish later. And in terms of fatality context that means we'll get a broader number of months where we need to be concerned about loss and we'll see a broadening into November and March in the loss potential.

In a daily profile there's a really interesting profile. Virtually all our life loss or fatalities actually occur during daylight hours and into the evening and night. So that's the big drive through the day. The wind change in the late afternoon and then the persistent burnout into the evening. But a conspicuous absence of life loss in the early hours of the morning through to the beginning of the day.

I guess that's because we tend to enjoy a more moderate event. But you'll also hear from Mika shortly about how the night time paradigms are shifting in some interesting ways and we might actually start to see more instances of problematic fire behaviour and we might start to see fatalities in those early hours of the morning.

If we look at individual weather parameters like temperature, Kevin's 30 30 30 rule that he presented earlier actually stacks up really well. So we can see that the vast majority of our life loss context really builds once we've passed that 30 degree threshold and then continues to escalate in a very clear way. Of course when you hear about climate change and a warming climate directly translatable to temperature and the propensity to have hotter days, that's going to drive our fire weather to be more severe simply because things are hotter.

If we look at that 5th percentile to 90th percentile range we can actually see a really interesting profile where temperature has to push well past 30 to even get going. But the median loss of all of our fatalities is around 40. By 45 that's pretty much the hotter end of our typical days. Ninety-five percent of all of our losses is sorted by 45 but there's 5% more loss beyond the temperature of 45 just as a qualifier.

We can expect warmer days. This temperature profile will play out meaning that we'll potentially experience more loss.

Wind is a really interesting one in that we get mixed messages about wind and wind intensity. By and large we can expect to get more energy in this climate system. And that means more energy to drive not only average winds but gusting winds. And I guess the 30 30 30 rule is looking pretty interesting in that we step up in this 20 to 30 range.

I guess there is a bit of a caveat around this particular graph in that this is the 3:00 PM average wind speed on the day the fatality happened. And what would have almost certainly also been at play is the gusts and the winds at the time of the actual fatality were probably a bit higher than the 3:00 PM average so that would push that well into the 30 to 40 and beyond category and why you see a bit of variance there. So that really holds up as a viable metric as well.

And in terms of relative humidity we obviously get the reverse effect. The lower the humidity the greater propensity for bushfires and fatalities. The 30 30 30 rule once again works pretty well in that we really get escalating fatality once we see the 20% to 30% range.

It starts stepping up and then really gets away in the 10% to 20% and the 0% to 10% relative humidity.

Now interestingly in our changing climate particularly in Victoria you'll notice our last few summers have actually been conspicuously humid and a little bit tropical. The good news is that the climate signals are actually showing that we'll potentially get a little bit more relative humidity during our summer periods and that will have a slight moderating effect on our fire weather severity. But unfortunately that's counteracted by the hotter conditions and the potentially a little bit windier conditions. So not all the metrics are heading in the bad direction and it's interesting to watch how these ones will play out.

When we combine those together as Kevin highlighted it's the combination of wind, humidity, temperature and whatnot drives it. We can also look at this in terms of the context of how that FFDI or that FBI which are roughly equivalent can show us our escalation.

So our No rating pretty much no loss.

Moderate starts to pick up and then we really see a pick up.

These two categories from 50 out to 100 is actually a one big fat combined category that we call Extreme. So you can add those two columns together for parity and you'd be up around here.

But still the vast majority of our fatalities are in Catastrophic.

If we want to put one more slide or twist on that range of categories instead of going for the aggregate bars of all fatalities. Let's slice that up into the nature of the fatality from everything from inside structures in red which shows quite a nice building trend from Moderate through High through Extreme to Catastrophic. Interestingly a really big sharp escalation towards the end.

Inside vehicles a lot flatter profile but nonetheless building as we move through the categories.

Open air conspicuously some losses in No Rating and quite a lot of loss in Moderate that's reflective of getting caught in relatively low intensity fires in the open with no protection. And that builds but then conspicuously falls away as we get to Catastrophic.That's because the conditions in Catastrophic are actually really difficult to actually even persist outside from a heat stress perspective and people are intuitively finding shelter in vehicles and homes being the resultant place where the fatality is more likely then to occur.

So think about those categories and think about those changing contexts and really deeply consider the fact that our propensity to have more Extreme days and more Catastrophic days in our future fire seasons and how that context will really emphasize those types of losses and risk to your lives and your property.Thank you.

Malcolm
Thanks Justin