

Triggers to take action

Chair: Malcolm Hackett OAM

Presenter: Dr Kevin Tolhurst



Chair

Tonight's webinar will begin with Dr. Kevin Tolhurst from the University of Melbourne. Kevin will discuss a method to identify triggers for taking action in different circumstances. A panel discussion will follow involving Dr. Katharine Haynes from the University of Wollongong, Associate Professor Dr. Danielle Clode from Flinders University, and our panel convener Dr. Raphaele Bianchi from the CSIRO.

Kevin Tolhurst

We're going to start this evening session by doing a poll. The poll will be up for about 60 seconds. The question of the poll is consider your household is planning to travel for 12 months. Before leaving home, when would you start planning your trip given that you're going to be away for that 12-month period and certain things are going to need to continue. The options are two hours before you leave, a day before, three months before, six months before, or two years before you go. So I'll leave you a few seconds so that you can answer the question. Okay, so we'll come back to those results and discuss them later.

I specifically want to talk about setting triggers to take action for hilly terrain where we have forests and woodlands, because the triggers that you set will vary depending on where you sit in a topography and what the nature of the bushfire threat might be. So the first thing is that you need to appreciate that you're dealing with uncertainties so don't expect to get precise information, whether it's from some fabulous app, whether it's from some reliable person. No matter how good you think those sources might be there's always uncertainty in what you're being provided. So you have to make the decision yourself based on the best available information, and Malcolm gave a great example of bringing three sources of information together before he made his decision. But one of those observations was just his observation.

So if you don't have a plan through those range of options there's not much sense in having triggers because your actions will be reactionary rather than working to some plan where you've already worked through what some potential scenarios might be. You have to have a unique plan for you and your family, everybody's situation's different, and every day the plan may vary a little bit depending on the situation. You can learn from others but you can't just copy what others have done and hope that will work for you because it's unique to you and your situation.

There's no simple solution to setting these triggers because we're dealing with complex and dynamic situations. So the triggers must be continually checked and acted upon. They're not set and forget. So don't wait to be told what to do because no one is necessarily going to be any wiser than you are in a sense. Take information on board but appreciate that there's going to be a large level of uncertainty associated with that. So in setting the triggers there's an assumption that you have this viable preparation, response, and recovery plan. It also assumes that you have access to and monitor the weather and the fire activity so your assessment of a fire event and the response option that you take is sufficiently accurate and feasible. It depends on your knowledge and your understanding of what's going on.

The triggers are going to be set based on your knowledge, your skills, your physical ability, your psychological ability, your equipment and other resources, the defendability of your property, your

position in the landscape, the time before the various threats impact, the scale and severity of the fire and the seasonal and weather conditions that you're facing at the time. There's a lot to take on board.

So what is a trigger point anyway? Well basically it's the point beyond which the chances of you being able to successfully implement your plan or your strategy will be unacceptably low. So you basically have to use the trigger to take action, but then you have to continually assess that and decide whether or not in fact you need to change your strategy, or perhaps even go and change the objective what it is you're trying to achieve so that you're continually working on something that is likely to be successful. There's no point in wishful thinking. You'll be found out if that's the case.

So for example some broad options might be about leaving early. Or it might be about preparing to stay and defend, or it might be about sheltering indoors. Or in fact it may even be about having to sell up and shift because you don't want to accept that level of risk. But there are a range of options and each of those options then have further options beyond them. So leaving early is not just as simple as leaving early. There are where you leave to, when you leave, and so on. So in leaving early, what we're talking about is have you planned enough time to pack all that you need if the house is destroyed. So documents, precious objects, animals, clothing, medication, phone, etc. Because it may be several days before you get back to your house if your house has survived or your house may in fact get destroyed. So you have to take account of that.

Know where you're going. Where can you stay for the next 24 hours? Or perhaps even the next few days. It's not just a matter of retreating for a few hours. You need to know what your route is, and whether or not you have options to how you get to your safer place, and whether that safer place is available at the time. And leaving early you also need to make sure that you've notified people who might be concerned for your welfare because they may put their own life at risk in trying to help you.

If you're going to prepare and stay and defend then you need to have a good idea of what the hazards are that you're going to face so that you can prepare yourself and deal with those hazards. Know when to be outside, when to be inside. What happens if your primary shelter is damaged? What options do you have then? Know what mitigations can be taken and what backup options you may have if the preferred option fails. Know what to do if someone gets injured or becomes incapacitated for some reason. Know what to do if a stranger or a neighbour arrives looking for help. Know that it may be a few days before you can leave your property because access may be blocked.

So if we go back to some of the hazards that we might be dealing with. There are the obvious fire related hazards, to do with perhaps the smoke, the embers, heat from the fire flame contact, or fire induced winds if the fire is large enough. And I'll talk about those a little bit more. But there are other hazards you need to consider as well. The ambient weather conditions that may affect your body temperature and whether or not you're able to function the way you think you need to. There may be falling trees and branches because of strong winds. You may have pre-existing medical conditions - that's a hazard. There may be road accidents or road congestion that prevents you escaping as quickly as you think you might be able to. There may be poor communication so you're not getting the information from outside sources that you might have expected to get. A neighbouring house or structure may be within 12m of your property, and if that's likely to burn that's going to affect your ability to defend your property.

So, you need to consider which of those hazards affect you. And I would start off by saying that if you live in a Bushfire Management Overlay area then you need to have a written plan. So that's the first trigger point. Have a look to see whether the area you're assessed in is has been assessed of being capable of carrying a high intensity fire. If you live in a Bushfire Prone Area then whether you have a written plan or not is probably a bit more optional. But the advantage of writing it down is it forces you to think about what goes into that plan and forces you to look at the rationale behind it a bit more.

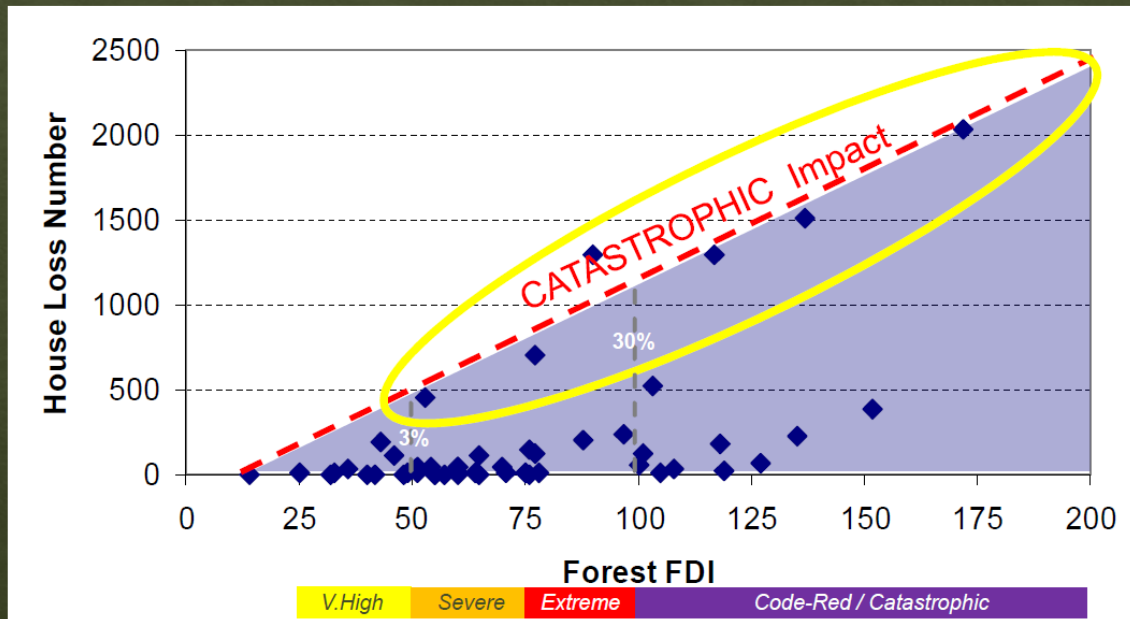
Then it's a matter of are you really bushfire ready. Have you actually done all the preparation you need? Because when the time comes there's a limit to how much you can actually achieve at that time so you need to be well prepared. One of the things might be can I accept a loss of my property? Am I adequately insured? Do I have other options? Do I have savings? Maybe the loss of the property is not the worst thing that could happen to you. And have I done sufficient preparation to increase the chances of me and my family surviving? So your life there's no point having your house surviving if you lose your life. And you may lose your life through a heart attack, rather necessarily through a direct fire loss.

So they're big picture issues but beyond that when we get closer to an event the response options you might have might be to leave early, to prepare stay and defend, or shelter indoors. Let's look a little more at that. Some of the assumptions about these triggers are - have you really thought through what you're planning to do and what all your options might be, your fall-back options? You've got to have a number of options. So a realistic visualization of what could happen is really important.

Have you made all the necessary preparations that will mitigate against those hazards so that there's far less to do in the event of a fire. What about the response triggers? Will they enable you to choose the most preferred response option that you have to make your probability of success greatest? So your response triggers do they provide enough time for you to successfully implement your plan? Rather than just being last minute decisions or you having too much to do given the time available. And I would suggest that a response trigger needs to give you at least a two hour leeway before any of those hazards' impact on you. The two hours gives you a little bit of wriggle room if there is some unforeseen thing that happens on your way out. You may find a person on the side of the road, there may be an accident, there may be a tree across the road. You need some lead time. And the very least I would suggest is two hours.

When we're talking about the weather conditions associated with property loss a lot of people get driven by total fire bans or the declaration of a code red or catastrophic fire danger rating. This graph shows the blue dots are a whole lot of fire events and the number of houses that have been lost during those fire events. If we actually look at the area under the graph you see in a lot of cases we can have really severe fire weather but very few houses and lives are lost because the fires occur in areas where there aren't very many people or houses. However, the red dashed line at the top is basically showing us the potential for loss. And what I would like to just point out to you here is that even down under very high fire danger rating we could have hundreds of houses lost. So we shouldn't just be focused on the code red catastrophic conditions or even total fire ban conditions. We need to be looking at broader ranges of conditions. And it may be for example we have no intention of necessarily leaving on a very high fire danger day, but that doesn't mean that we can't have a fire start a couple of kilometres away from our property and burn into us within a very short period of time. So, we still need to have done considerable amount of preparation and planning. The catastrophic impact goes well beyond the worst fire weather conditions.

House loss per event



Summary of house loss statistics in Australia from 1939-2009
(Source: Bianchi et al, 2006, various others)

There is a fair bit to take in on this table

Adequate Leeway / Margin for Error

- ◆ Action response before 10am or at least 2 hours before expected exposure to hazards

(approximate estimates)

	Very High	Severe	Extreme	Code-Red
Fire Danger Rating	Very High	Severe	Extreme	Code-Red
FFDI	25-49	50-74	75-100	100+
Total Fire Ban	Possible	Likely	Always	Always
Rate of spread (km/h)	2	4	8	12
Spotting Distance (km)	10	15	20	30
Fire size 2 hrs after ignition (ha)	400	1,600	6,400	14,400
Proximity trigger (km)	5	10	20	30

The table gives you a bit of a guide to work out some times and distances. What I'm saying is for a fire danger rating of very high the rate of spread of a fire forest fire will be about 2km/hr, spotting distance is about 10km away from the fire front. So your proximity trigger a fire within 5km of you, you'll have less than two hours to respond before embers, smoke, whatever, will start to impact you. So under a very high fire danger condition you'll be interested in fires that occur inside or outside this 5km zone.

If we go up to the code red conditions where the fire danger rating is similar to what it was on Black Saturday, we see it's going to be a Total Fire Ban day. The rate of spread of fire might be 12km/hr, the spotting distances might be 30km. So we ought to be interested in fires that would be up to 30km away.

So how does that look? If we take an example of an area near North Warrandyte I've just picked a random house here. What we see is this random house is on a dead-end road. To get out of this area we're going to have to go through a lot of intersections, a lot of tree-lined streets, the potential for a lot of intersecting traffic, and we've got to go across the river down here. There's a single bridge and it's the only bridge for quite some distance. So there are a lot of reasons why that escape route or that exit route won't work for us if we have strong winds that might be blowing a tree across, or if fire starts to impact the area. So even though it's not very far in kilometres it could be an impossible route to get out of there in the passage of a fire. And that's the importance of leaving early. And when I say leave early I don't mean that you plan to evacuate or leave two hours before. What I mean is you're sitting in the car starting the engine two hours before you go not start packing the car up.

If we look at that random house and look at 5km, 10km, 20km, 30km radiuses, those distances are relating to embers or flame fire travel under different fire danger indices. And then we take into account the forecast weather conditions we might see the area of interest that we have. So we might say down here to the south we're not particularly interested in that because no fuel it's an urban area, we're expecting northerly winds with a south-westerly change. So this is the area within which we're really particularly interested in fires occurring. If the weather forecast was different and the winds were coming perhaps more from the west we would change that area of interest. We're not so interested in a fire starting over here because likelihood of getting to us is almost zero. Probably is zero.

Just zooming in we might identify a few places that we could go to. So, we might have a couple of neighbourhood safer places, which are places of last resort, so they're probably not the best places to go to but we may have identified from our random house up here that there's an area here might be a shopping centre, or it might be a friend's place. Likewise down here there may be someone that we can go to. We have a couple of options at least as to places that we might go under conditions where we can stay for 24 hours or several days if we need to.

The neighbourhood safer place obviously is not somewhere that you could stay for 24 hours or for several days. So we need to think about that and where those areas are and how long it might take us to get there under extreme conditions, where there might be an accident on the road, trees across the road, and so on. If we look at a specific example like on Black Saturday this is a reconstruction of the fire, so this is about four o'clock. Well in fact about three o'clock in the afternoon. What we can see here is that it's beyond the 30km boundary here but it's moving so rapidly that it already is potentially threatening to our property down here in North Warrandyte because it's within two hours. Potentially two hours of reaching us.

So if we were going to leave early we needed to have been leaving before three o'clock that day given the fire situation there. Because the fire was about 40km away from us at that time but it quickly gets to us. In this particular case the wind change came through a bit earlier and so the direct impact on the house didn't occur but that's not true of many other areas a little distance to the north. So that fire certainly is within that zone of interest for us in terms of the zone of concern for setting our triggers.

So when we're looking at our triggers as well we need to consider well how viable is the option to stay and defend under the forecast or the expected weather conditions? Here's a house, a different house to that random house I was looking at before, but we can see there's been some radiation barriers put in there, there's some metal structures, sheds close to the house. We've got 10-15m of cleared area around here. We have to assess how defensible is that house. So a lot of work and thought has gone into this house in terms of its defence but we're still likely to be subjected to embers and radiation from fire in the surrounding forest area here. And again we can see this is a

dead-end road attached to a gravel road. There's no quick exit from here. And likewise the likelihood of getting ambulances or fire services into assist is very limited especially if it's a large fire and there's a lot else going on.

So, one of the things that we might consider in terms of the hazards are the embers and the potential for firestorms. This is showing a map of Victoria where firestorms are most likely to occur. The blue line here's showing outline of Nillumbik. You can see the northern side of Nillumbik. There are areas there which potentially could be subjected to firestorm conditions. This is where embers would be dropped from a rapid run of a fire up a steep hill, and what I'm saying is a hill that has at least a 300m increase in elevation. And within a 5km area downwind of that you could expect a firestorm to potentially develop. Strathewen that Malcolm was talking about was an example of an area that fits into that category.

Fire induced winds can often be underestimated. Here is where we get a large enough fire to basically produce cyclone strength winds in the fire ground. So what's our potential to have these large fire events? They're more likely to be under the most severe weather conditions but we need to be prepared for them. We might think we're well prepared for a fire under a severe or extreme day, but perhaps not under a code red day. And here's an example of what those fire induced winds can do to trees snap them off. They blow roofs off houses, they blow doors in, they blow windows in. Your house that you might have thought was a refuge in fact may be a refuge no longer, or we may get fallen trees and branches falling on the house as well compromising the structure.

There's people like myself that have pre-existing medical conditions. And I'd say you might think you're relatively strong and fit but my question would be can you split wood for four hours in 40 degrees heat fully clothed? Because that's the amount of strenuous activity that you may be required to undertake to defend a property. I'd say for me I can't do that. But I might be able to do it under milder conditions. So where's your limit that is realistic rather than just optimistic? You may have other pre-existing medical conditions related to your lungs to your heart. You may have stress and psychological issues as well. And it's just interesting as well I've just written down here about 50% of fire fighter fatalities are due to cardiac arrest. They're not being burnt they're basically the stress is so much that they have heart attacks.

Ambient weather. Again if you've got temperatures of greater than 40°C it's quite possible for your body to overheat. And once that starts to happen you make bad decisions, your body collapses. So being able to operate under high temperatures is a difficult thing to do. There has to be rest, has to be hydration. There's a number of factors that need to be taken into account.

We may lose communication. That means that if we're reliant on electronic forms of communication we may be sadly disappointed come the event. So we need to also be able to rely on making useful observations ourselves. And trying to observe what's happening 20 or 30km away is very difficult. So even using observations can be difficult so you need to have contingencies for when those communications break down. If we're expecting to be able to use the roads there are all sorts of reasons why roads won't be open. Trees across them, smoke across them, a road accident and so on.

To try and sum up. A plan must have meaningful triggers, and triggers without a plan are basically meaningless. The plan must have optional strategies to deal with varying current and expected situations. Each person, each family, each property must have their own plan, and the associated triggers with it. It has to be customized. And it has to be customized for today. The plan you have today may not be suitable for tomorrow. If any trigger is pulled you must then either mitigate it or move to the next option.

Triggers should be based on a good understanding of what the risks are that you're facing and the values you're trying to protect. And they must be based on a good understanding of the weather, the fire and what that impact might have on you. And the alternative to that is lurching from crisis to crisis in a reactive manner, and we've seen many videos, books, stories written, seeing people

doing exactly that and they're lucky. If you want to put your life and your property into the category of "hope for the best" and "luck" then you're really playing with fire as they say. It's unforgiving.

And there's no simple solution to a complex and dynamic situation such as fires. So triggers must be continually checked and responded to. We need to have cascading options to be realistic to deal with this complexity.