The chances of your bushland house surviving a wildfire

A neat little circular slide-rule, developed by the CSIRO National Bushfire Research Unit, allows bushland home-owners to assess, realistically, the chances of their hideaway turning into a pile of ashes when the next wildfire sweeps through.

The ingenious piece of cardboard, with its four rotating dials, has been dubbed the 'house-survival meter'. It highlights the major factors that contribute to the hazards of living in the bush.

These factors are: amount of surrounding fuel; slope of the land; which materials the walls are constructed of; what the roof is made of, and its pitch; whether the house is occupied during a fire; and whether trees, woodheaps, or sheds are located nearby.

The beauty of the new gadget is that it conveys, numerically, the relative importance of each factor. Now a householder can calculate how much the survival chances of his or her house will be improved if certain hazards are eliminated.

Is your house prepared to confront this?

For existing-home-owners, the answers can provide welcome news. For example, the gadget shows that, with adequate attention, even an old weatherboard house can be made very safe.

Within the rotating dials of the 'house-survival meter' are distilled the bitter lessons gained from a study of why 450 houses did, or did not, survive the tragic 'Ash Wednesday' fires of 1983.

The study was undertaken by Mr Andrew Wilson while at Melbourne University, before he joined the National Bushfire Research Unit. (He is now in the Fire Protection Branch of the Victorian Department of Conservation, Forests and Lands.)

After the roaring wall of fire had swept through the secluded Mt Macedon township, Mr Wilson undertook the lengthy task of accumulating data on the design and siting of the 229 houses that were destroyed and the 221 that survived. Interviews with residents took 6 months.

Colour aerial photographs taken 9 days after the fire contained the information on the intensity of the fire that confronted each home: if adjacent trees showed no crown scorch, the fire intensity must have been less than 500 kW per m of fire front; partial crown scorch corresponded to 500–1500 kW per m; full crown scorch was equated to 1500–10 000 kW per m; and crown defoliation (caused by a raging crown fire) represented a searing 10 000–60 000 kW per m.

Then Mr Wilson used a computer, and its statistical package, to analyse the data, seeking to gauge the contribution that each factor made to house survival. The computer's linear logistic model identified seven significant contributory factors, and these are the ones that have been built into the circular slide-rule.

Fire intensity was found to be the factor that dominated the outcome. Translating this conclusion to any given bushland home is a matter of using a standard formula for fire intensity, which involves fuel load, ground slope, and current weather conditions.

The slide-rule assumes that the fire occurs on a day of extreme fire danger (with the McArthur Forest Fire Danger Index at its maximum) — the sort of weather in which the majority of houses in Victoria and Tasmania have, historically, been lost to fire.

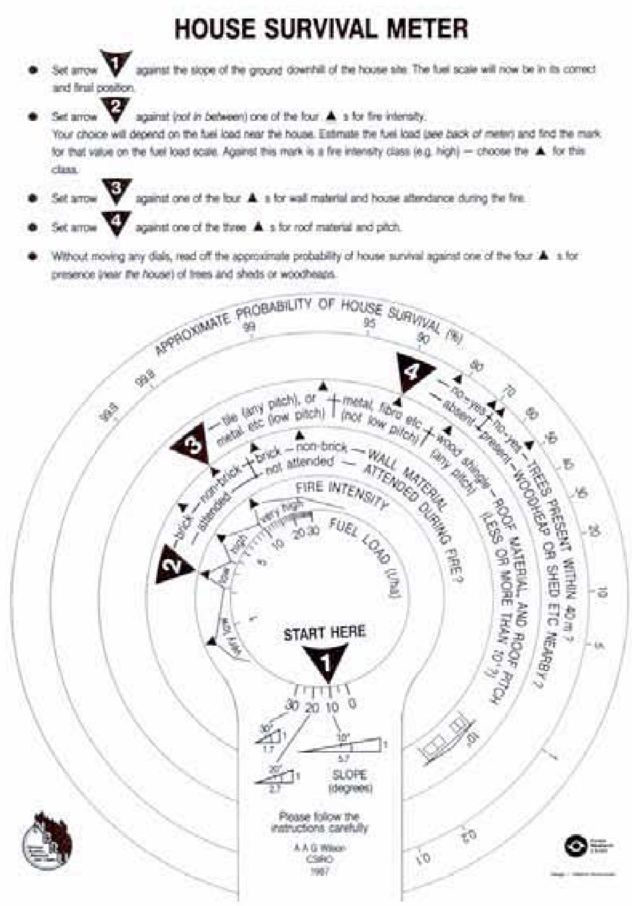
Mr Wilson suggests that householders calculate the appropriate fuel-load figure themselves. Here, they need only consider the amount of fine fuel lying on the ground — dead leaves, bark, grass, and twigs thinner than a pencil. These instantly contribute to a conflagration, and determine its intensity, whereas larger pieces do not ignite quickly enough to contribute to the moving fire front (although they may burn for some time after it has passed).

Simply measure out a 1-m square on the ground near the house and collect all the dead fuel in it. Thoroughly dry the fuel (keep it in a warm place inside for a number of days), then weigh it on kitchen scales. A good idea is to measure out several plots within about 40 m of the house and average the results.

Once the fuel-load figure and land slope are set on the slide-rule, the fire intensity can be read off. This step highlights an important point: that fire intensity increases with the square of the fuel load. Thus, if you can halve the fuel load, intensity will fall by a factor of four. Mr Wilson emphasises that minimising the amount of fine fuel lying on the ground is the best way to improve the odds for survival.

For most houses, reducing the fuel load is the cheapest and most effective way of protecting it, and of making it a safer refuge during a fire.

The house-survival meter.



What could have saved this one?

Fuel can be removed by burning in mild weather, or by raking, grazing, or mowing.

Trees near a house (within about 40 m) do increase the fire hazard by a small amount, and another wheel on the slide-rule makes due allowance for them, as well as for the presence of woodheaps and sheds, which catch alight easily and, even if fire-fighters are on hand, are difficult to extinguish. Apart from trees, most other garden vegetation doesn't appear to have a significant effect one way or the other.

Another vital point demonstrated by the meter is that residents have a strong chance of saving their homes if they stay in them while the fire front passes. At Mt Macedon, 90% of the houses defended by able-bodied occupants survived, whereas only 30% of unoccupied houses (which were also unattended by neighbours or fire-fighters) survived.

A house is usually your safest refuge during a fire, for even a house that subsequently burns will protect you from the lethal peak of the blazing bushfire. Evacuations on smoky, fire-lashed roads are risky. Of course, children and disabled people should never be left alone during a fire.

According to the meter, an unattended brick-veneer house on level ground, with a flat metal roof and no trees within 40 m, but having a nearby garden shed and a surrounding fuel load of 2 kg per sq. m, would have about a 10% chance of survival. But if the same house was attended, the chance would rise to more than 50% — a substantial increase.

Not all factors are included on the meter. The importance of window protection, under-floor enclosure, elevation, and the presence of timber decking has been singled out by Dr Caird Ramsay and colleagues at the CSIRO Division of Construction and Engineering (see *Ecos* 43). Like Mr Wilson's, their work began after Ash Wednesday, but covered 1153 houses in the Otway Ranges.

However, Mr Wilson reiterates that the real key to bushfire safety for any house lies in clearing up surrounding tinder.

Meters can be obtained from: CSIRO National Bushfire Research Unit, P.O. Box 4008, Queen Victoria Terrace, A.C.T. 2600.

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Predicting the probability of house survival during bushfires. A.A.G. Wilson and I.S. Ferguson. *Journal of Environmental Management*, 1986, 259–70.

How bushfires set houses alight — lessons from Ash Wednesday. *Ecos* No. 43, 1985.