

Spatial and temporal trends in bushfire arson

C.J Bryant and M Willis
Australian Institute of Criminology, ACT

Introduction

The Bushfire Arson Project aims to reduce the impact of deliberately lit fires in Australian bushland environments. Such an undertaking is necessarily underpinned by an accurate understanding of the incidence, distribution and timing of deliberate firesetting nationally. This presentation summarises preliminary findings relating to the spatial and temporal distribution of deliberately lit bushfires in Australia.

Bushfires per person per year

The numbers of deliberately lit bushfires typically varies between 1 and 80 fires per 10,000 people per year for individual postcodes (Fig. 3), irrespective of the population size of that postcode.

A smaller proportion of postcodes (approximately 5 to 40 postcodes across a state) experience greater than 100 fires per year. These are typically characterised by high rates of arson (Fig. 2), and almost exclusively located in or near a major metropolitan centre. Collectively these postcodes account for a high proportion of fires attended by urban-based fire brigades (34-65%; Fig. 4).

Variations are also evident within metropolitan centres. The highest frequency of fires and proportions of arson typically occur in suburbs more distant from the city centre – innermost suburbs have low fire frequencies but commonly have a higher proportion of cigarette-related fires (up to 30% for some jurisdictions).

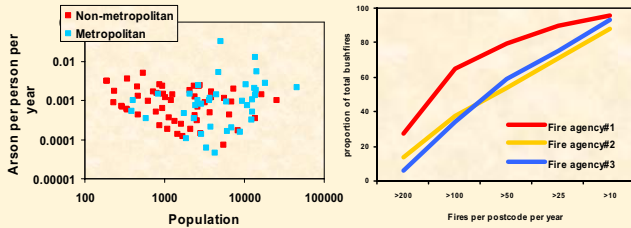


Fig. 3: Relationship between the average number of deliberately lit fires per person per year and the population of that postcode for both metropolitan and regional areas for fire agency#1.

Fig. 4: The proportion of fires across the state that occurred within those postcodes in which there was greater than 10 to more than 200 fires.

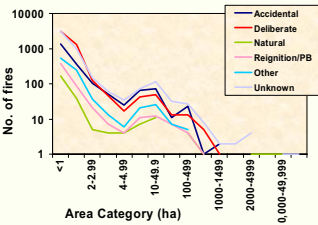


Fig. 10: Frequency distribution of fire size for each cause for a single urban-based fire agency (fire agency#2).

Relative areas burnt

•Fire frequency decreases with increasing size irrespective of cause (Fig. 10) – this trend is observed across agencies although non-urban agencies tend to experience a higher frequency of 10-500 ha sized fires.

•Deliberate fires account for a decreasing proportion of fires as fire size increases.

•Fires in urban areas, and by inference arson accounts for a small proportion of the total area burnt – the majority of land is burnt in:

>The tropical savannas and deserts (where fire agencies attend such fires).

>Large forest or grass fires, particularly during adverse bushfire weather which are commonly but not exclusively associated with El Nino events

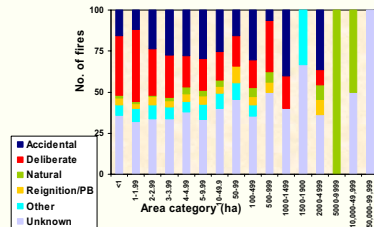


Fig. 11: The proportion of fires attributable to each cause within each size category (fire agency#2).

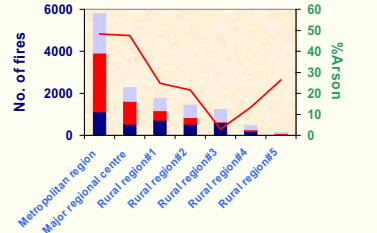


Fig. 1: This example illustrates regional variations in the frequency of fires and the proportion of arson across the state for one fire agency (fire agency#3).

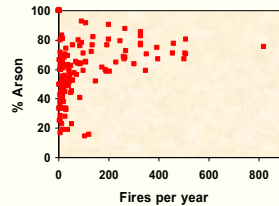


Fig. 2: The relationship between the frequency of bushfires and the proportion of arson within individual postcodes (fire agency#1).

The Human Element

Bushfires attended by fire agencies in Australia are primarily the result of human actions. Hence there is a strong correlation between the incidence of bushfires and the distribution of the population. As Australia is highly urbanised, the vast majority of fires occur within or near metropolitan and to a lesser extent major regional urban centres (Figure 1).

The frequency of arson (identified and suspected deliberate firesetting) is variable both within and across regions and fire agencies. Although difficulties exist in accurately identifying rates of arson, it is likely that nationally, 30-50% of all fires are the result of deliberate firesetting, although locally the rates may be as high as 60-80% (Figure 2).

Overall, there is a strong correlation between the total numbers of bushfires and the number of deliberate lightings for a given fire agency. Hence, regions that incorporate a metropolitan centre and postcodes that contain a major regional centre have a higher frequency of deliberate lightings.

Timing of bushfire arson

Overall, the variations in the frequency of deliberate firesetting parallels the trends observed for accidental and natural fires which predominate during the bushfire season (Fig. 5). The timing of the bushfire season varies with climatic patterns across Australia (Fig. 6).

Bushfires are 20-30% more likely to occur on Saturday or Sunday than a weekday. Although increased incidence of accidental fires is also observed on weekends this trend is most consistently observed for deliberate firesetting – the maximum occurs either on Saturday or Sunday depending on the state (Fig. 7).

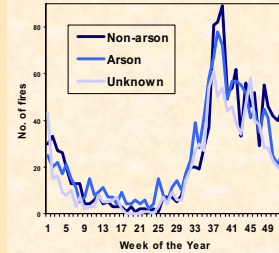


Fig. 5: Number of fires lit by week of the year (several years data) for fire agency#3.



Fig. 6: The timing of bushfire seasons in various regions across Australia.

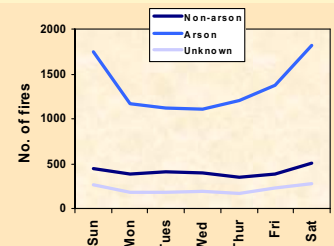


Fig. 7: Frequency of fires by day of the week by cause, for fire agency#1.

•Most fires occur during daylight hours, peaking between 2 and 4 pm – deliberate fires peak later due to the higher frequencies between 3 and 4 pm (Fig. 8).

•An additional spike in deliberate firesetting occurs after sundown – peaking near midnight. Night-time fires primarily occur on Friday night and Saturday morning and Saturday night and Sunday morning. They are the principle cause of higher fire frequencies on weekends, and may account for up to 20% of fires for some fire agencies (Fig. 9).

•There is regional and national variability in the propensity of night-time firesetting.

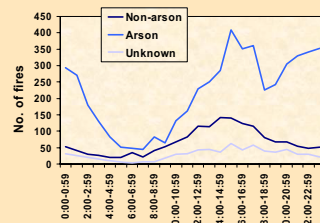


Fig. 8: The time of detection of deliberate and non-deliberate fires for fire agency#1.

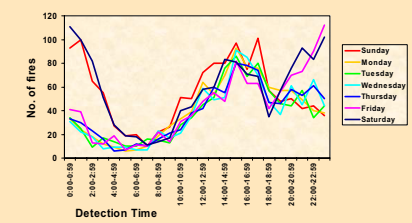


Fig. 9: The time of detection for deliberate fires by day of the week for fire agency#1.

We gratefully acknowledge the assistance and generosity of all fire agencies across Australia who provided data necessary for this study