

# Bushfires in a Nutshell

---

## ***A guide for journalists prepared by the AusSMC***

This is part of the *Science in a Nutshell* series produced by the AusSMC. This document provides a simple explanation of bushfire terminology and includes information on the environmental and ecological effects of these events.

If you would like to know more about bushfires, please contact the AusSMC by email ([info@aus-smc.org](mailto:info@aus-smc.org)) or call us on 08 8207 7415.

---

## **What is a bushfire?**

A bushfire is a fire that occurs in the bush (woodland, scrub, or grassland), usually in rural areas in Australia.

## **What is a “Fire Danger Index” (FDI)?**

A “Fire Danger Index” (FDI) is a numerical index, assigned separately to forest and grassland areas, which takes into account the following:

- Seasonal dryness – this is indicated by a drought index, or a soil dryness index for forests, by the degree of curing (removal of moisture) in grasslands
- Temperature and relative humidity of the air
- Wind speed
- Amount and duration of rainfall (rainfall is not used in calculating a grassland fire danger index because the effect of recent rain in open grasslands may evaporate in two or three hours)

The index ranges from 1 – fire will not burn or burn so slowly that control is possible – to 100 – fires will burn so fast and hot that control is virtually impossible.

In regions where there are tracts of both forest and grassland, fire authorities calculate both the forest and grassland fire danger and set their fire danger rating signs according to the system that calculates the highest index. At times, particularly early in the season, these signs may indicate a High fire danger when the surrounding grasslands are still green and obviously will not burn. This is because the neighbouring forest fuels have already dried out and are quite flammable.

## **What constitutes an extreme-hazard fire day?**

When the fire danger rating reaches Extreme, fire authorities declare a day of total fire ban, when lighting of any fire in the open is prohibited by law. A day of total fire ban normally stays in place for 24 hours but it may be extended for longer periods if fire-fighters are already tied up fighting large fires in the region.

### **What is a crowning fire?**

A crowning fire occurs when a pre-existing fire gains access to tree-tops. These fires will often explode and burn ferociously, and are caused by either a fire front heating up unburnt wood, or by the wind which blows the fire into tree tops.

### **What is a fire storm?**

A fire storm is a natural phenomenon which occurs when a large fire generates its own wind flow, which is then maintained due to the fire continuing to pull in more air. These erratic wind-currents are capable of causing fire-whirls (similar to dust-devils) which can set objects alight in their path.

### **What are the weather patterns that contribute to bushfires?**

In the south-east of Australia, drier conditions during summer and autumn contribute to a greater bushfire risk. Also certain climate patterns in this region cause long drought periods where once blooming undergrowth is severely dried out, causing south-eastern Australia to have a huge bushfire potential.

In the south-west of Australia, the summer dry-season is associated with more bushfires, whilst in the northern parts of Australia the dry season occurs around winter. The bushfires in these areas are often due to seasonal changes, where hotter and drier conditions ignite dry foliage fuel that has gathered during the wetter months of the year.

### **What are the natural regenerative affects that bushfires have on Australian flora?**

Bushfires have long been known to have a restorative effect on the Australian landscape. However regenerative fires generally need to be of a less intense nature, and occur on a not-too frequent basis; ecosystems become severely affected when fires are too hot and large, or occur too frequently.

Some Australian flora requires a combination of heat and smoke to release seeds. Furthermore, eucalypt decline has been linked to an absence of bushfires in areas where bushfire management opted for fire exclusion, as opposed to low intensity burns (which were historically frequent for the regions).

### **What are the environmental effects of bushfires?**

Bushfires not only cause stress on ecosystems, they are also responsible for carbon emissions and increased water requirements. Regrowing forests after a bushfire requires much more water than maintaining forests, leaving less water for rivers and dams. Bushfires in catchment areas can also cause reductions in the amount of water collected by these forested areas.

On the carbon emissions front, large and ferocious bush fires (like those Australia has been experiencing over the past decade) are capable of producing massive carbon emissions. Step-increases in the amount of atmospheric carbon dioxide (CO<sub>2</sub>) could be measured after large fires in Indonesia and Siberia. Bushfires change the amount of carbon released by soil, by changing the nature of the vegetation. "Soil respiration", which is the rate of CO<sub>2</sub>-release by soil, is different in grassland and woodland areas. In cases where bushfire has caused

forested areas to become grassland, carbon emissions will be increased in the long term due to the slower release rate, or soil respiration, in these areas.

Little is known about the how bushfires interact with biomass carbon, which produces charcoal and ash, and how long this remains in the soil. “Black carbon”, produced by intense heat, can stay the soil for hundreds of thousands of years and doesn’t release CO<sub>2</sub>, making it an interesting option in terms of its carbon control capabilities.

### **What are the measures that should be taken by the public to ensure that they are prepared for a bushfire?**

The Australian Country and Rural Fire Services provide information about surviving a bushfire. They recommend early planning, such as making a pre-prepared bushfire checklist or ‘action plan’ which outlines what families should do for themselves and their property in the event of an imminent bushfire front (see Australian country or rural fire service websites for suggestions). Extra pumps and having a cleared property are recommended ways to reduce bushfire risks too. However given the increasing ferocity and unpredictability of bushfires in recent years and the loss of life involved, it is likely that these recommendations may be reviewed.

### **What are the most life-threatening actions taken by people during a fire?**

Indecision is the biggest killer for people facing an oncoming bushfire. People still decide to leave at the last minute which is a high-risk manoeuvre, and at such a late stage it is usually safer for them to stay and wait for the fire front to pass. The golden rule stressed by Australian fire-services is: stay and defend or leave *early* in bushfire circumstances. This is an initiative that has saved many lives in the past, and is now being adopted by many overseas countries. But bushfire safety recommendations will be reviewed in light of the 2009 Victorian tragedy.

Unpreparedness is the second most life-threatening condition when facing a fire. Understanding what to do in preparation for a bushfire is quintessential; whether it be readying to leave early, or preparing for the oncoming fire front. A currently identified key risk factor by fire experts is the lack of knowledge about bushfires and bushfire preparedness of residents at urban-rural interfaces.

### **What are the techniques used by fire-fighters to subdue the intensity of bushfires?**

A bushfire’s intensity is measured by the heat it emits. The greater the intensity of a fire, the harder the fire is to control and extinguish. The removal of vegetation by “burning-off” the foliage which provide fuel for bushfires helps to control the amount of devastation wrought by a fire. Fire breaks, which are areas with no foliage that separate regions with vegetation, are also used to control fire movement.

CFS joint strategies are recommended for bushfire-risk communities. Garden refuse should be disposed of regularly by community members, and information on surviving bushfires dispersed among community members. Most of all, household and community planning strategies for bushfire management are stressed by fire-fighting services. Recent research and action by Bushfires CRC has focussed on saving communities and lives through

## **Bushfires in a nutshell** (Continued)

mentally preparing people for bushfires, as opposed to just strengthening fire-fighting services (which may still not be able to save properties from fires).

---

### **Acknowledgements:**

**Paul Fletcher**, Executive District Officer in the South Australian Metropolitan Fire Service.

### **Further information:**

**South Australian Country Fire Service**, <http://www.cfs.sa.gov.au/site/home.jsp>

**South Australian Metropolitan Fire Service (SAMFS)**,  
<http://www.samfs.sa.gov.au/site/home.jsp>

**Bushfire CRC**, <http://www.bushfirecrc.com/centre/>

**Wikipedia**, <http://en.wikipedia.org/wiki/Mai>

### **Australian Science Media Centre (AusSMC)**

This fact sheet has been prepared by the AusSMC with assistance from Megan Wright. The AusSMC is an independent organisation that provides scientific information and experts for the news media.

Last updated: February 2009

---

Australian Science Media Centre

PO Box 237

RUNDLE MALL SA 5000

Ph: 08 8207 7415 | Fax: 08 8207 7413 | [info@aussmc.org](mailto:info@aussmc.org) | [www.aussmc.org](http://www.aussmc.org)

The Australian Science Media Centre (AusSMC) is an independent national venture working to make evidence-based science available to everyone through the media. The not-for-profit centre is advised by a Science Advisory Panel and governed by a Board of Management. It is supported by a wide variety of sectors with each contribution capped at 10% of total running costs. Foundation sponsors are the ABC, APN News & Media, Cochlear Foundation Ltd, CSIRO, Fairfax Media, the Govt of SA, Innovative Research Universities Australia, Macquarie Bank, Media Monitors, News Ltd, New South Wales Govt, NHMRC, Orica Ltd, ResMed Inc, Shell Australia Ltd, Network Ten, the University of Melbourne and the State Govt of Victoria. Gold Sponsors are Johnson Winter & Slattery, BHP Billiton, CSL Ltd and the University of Adelaide. Disclaimer: Please note that any views expressed are the personal opinions of the experts named. They do not represent the views of the AusSMC or any other organisation unless specifically stated. The AusSMC attempts to provide a range of views from the scientific community.