

Bushfires

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Introduction

Humans have always tried to control the environment. With the aid of technology people can move mountains, clear vast forests, change arid lands into fertile fields and alter the flow of rivers.

There are, however, elements of our surroundings that remain beyond our control. From time to time, nature reminds us of its power. Extreme events within natural environments can devastate whole communities, disrupt communications and cause economic hardship.

We cannot control these forces, but we can study the processes that cause them. This allows us to better predict extreme events and enables us to develop ways of better coping with their effects.

Natural disasters

As we go about our daily lives it is easy to forget that our natural environment contains threats to human life and property. These extreme and unusual events are called

natural hazards. They include major disturbances in the atmosphere and on the earth's surface. Australia's most common natural hazards include storms, cyclones, floods, droughts and bushfires. When natural hazards affect people, they are termed 'natural disasters'.

Defining bushfires

'**Bushfire**' is an Australian word used to describe any fire burning out of control. In other countries the term 'wildfire' is used to describe such an event.

In Australia, bushfires occur as forest fires (bushfires with the trees, undergrowth and litter on the forest floor as the main fuel) and grass fires (bushfires with grass as the main fuel). Large areas of Australia suffer from the threat of bushfires, especially in the eucalypt forest and woodlands of the south-east and south-west corners of the continent.

Disasters, such as those listed in Table 1, have placed bushfires high on our country's list of natural hazards.

Table 1: Australia's five deadliest bushfires

| Bushfire event | Loss of life and property |
|--|--|
| Gippsland fires and Black Sunday February–March 1926 | 60 people killed |
| Black Friday (Victoria) January 1939 | 71 people were killed and 650 homes destroyed |
| Black Tuesday (Tasmanian) 1967 | 62 lives lost and over 1,300 homes destroyed |
| Ash Wednesday (Victoria and South Australia) February 1983 | 75 people and 2,500 homes were destroyed |
| Black Saturday (Victoria) February 2009 | 173 killed and more than 2000 homes destroyed. |

Figure 1: Bushfire risk zones in Australia

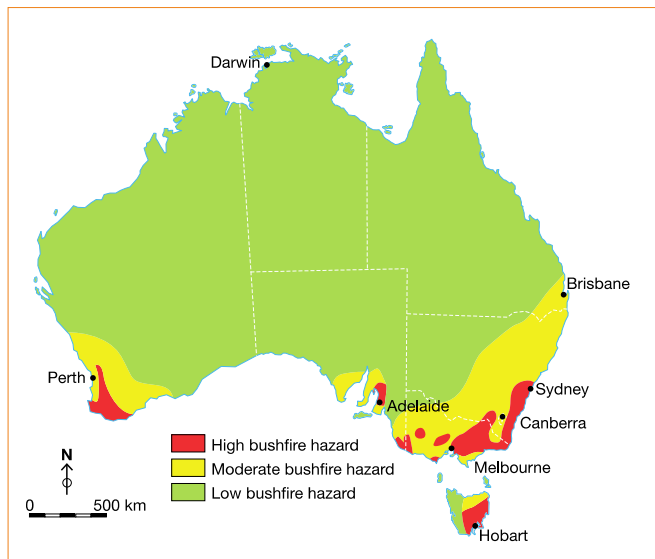
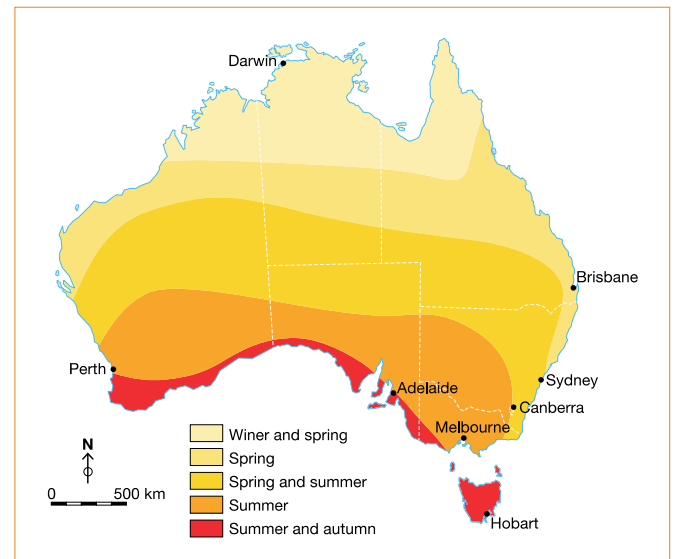


Figure 2: Bushfire seasons in Australia



The conditions under which bushfires occur

Fuel and ignition

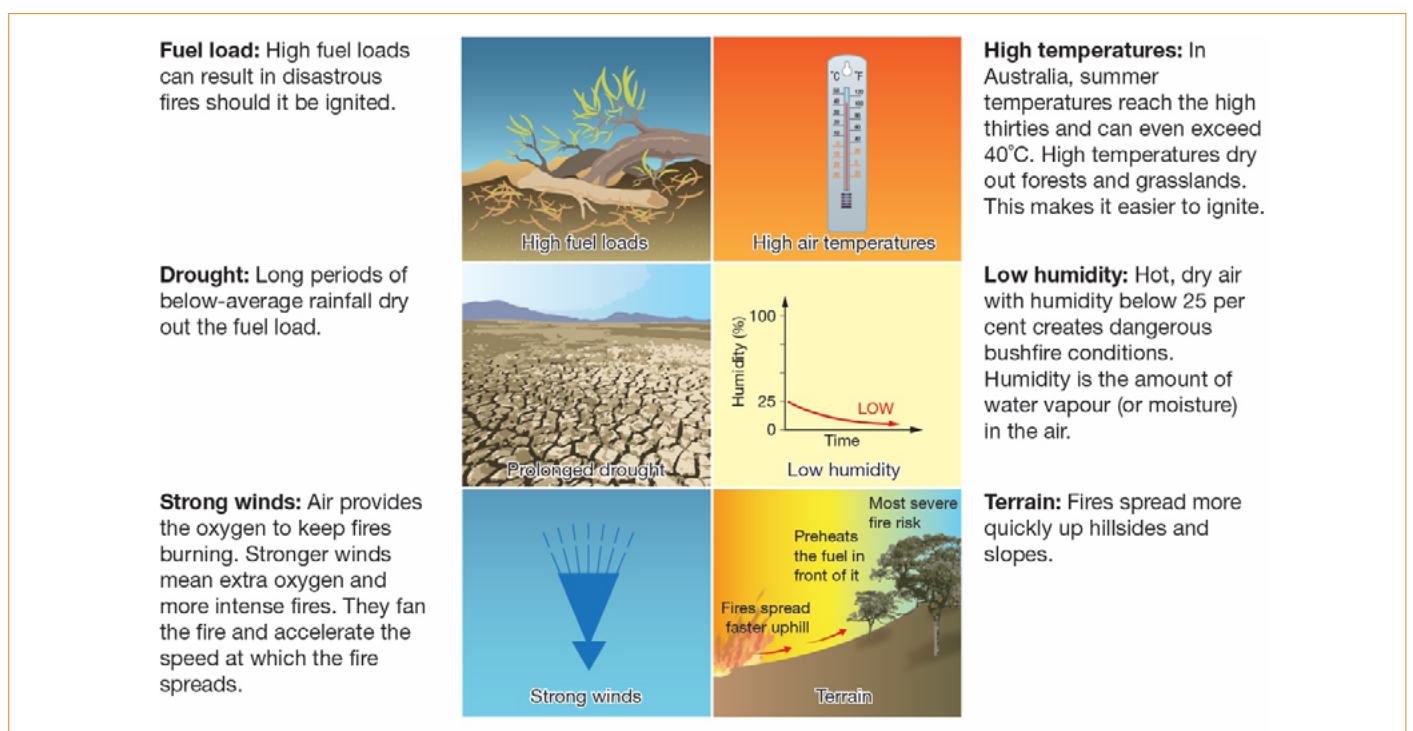
For a bushfire to start there needs to be material that can burn (referred to as fuel), and a source of ignition:

- **Fuel:** The fuel is the material that builds up in the bush over time as eucalypt trees shed their bark, branches and leaves. In the cooler months 'hazard reduction' burns are used to reduce the amount of fuel on the forest floor.
- **Ignition:** Bushfires are a natural event in Australia and can be triggered by a lightning strike. They can also be lit deliberately (called arson) or be the result of an accident.

Factors affecting the spread of bushfires

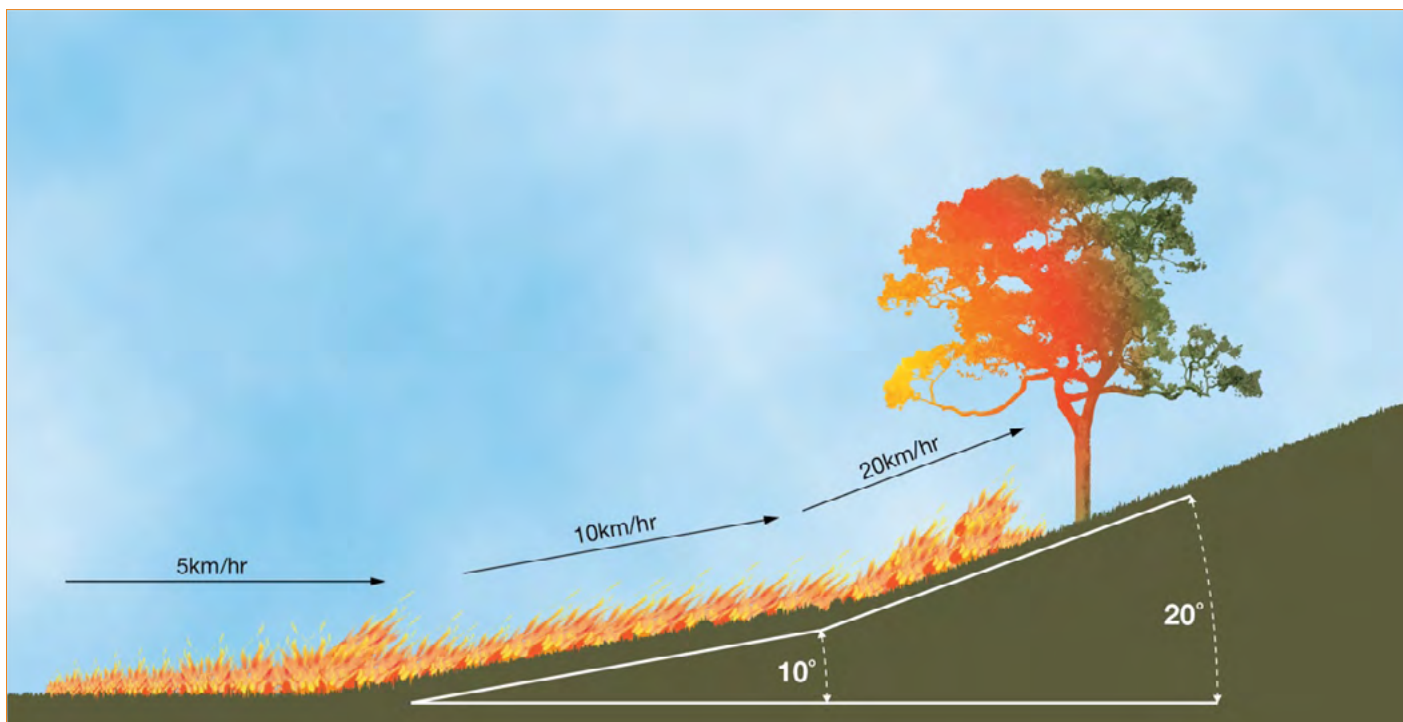
The speed at which a bushfire spreads is determined by a number of factors. These are shown in Figure 3. A combination of these factors has resulted in 'blow-up days' when Australia's most severe bushfires burn out of control and spread rapidly.

Figure 3: Factors affecting the spread of bushfires



The relationship between slope and the speed of bushfires

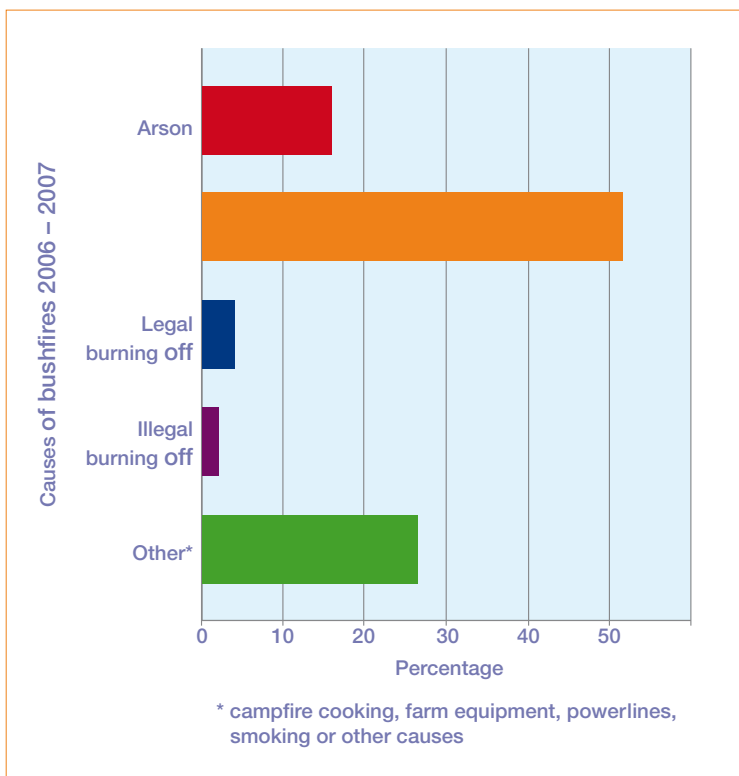
Figure 4: The speed of a fire increases with the steepness of a slope



Bushfire causes

Figure 5 shows the causes of bushfires in Australia. Lightning strikes are the main cause followed by 'others' (campfires, fallen power-lines and cigarette smokers). Arson (the deliberate lighting of fires) is the third most common cause.

Figure 5: The causes of bushfires

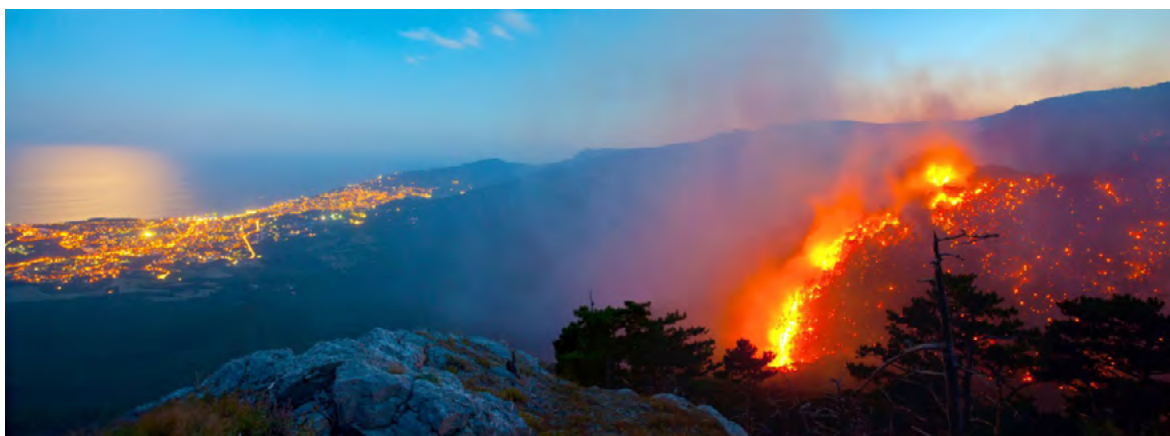
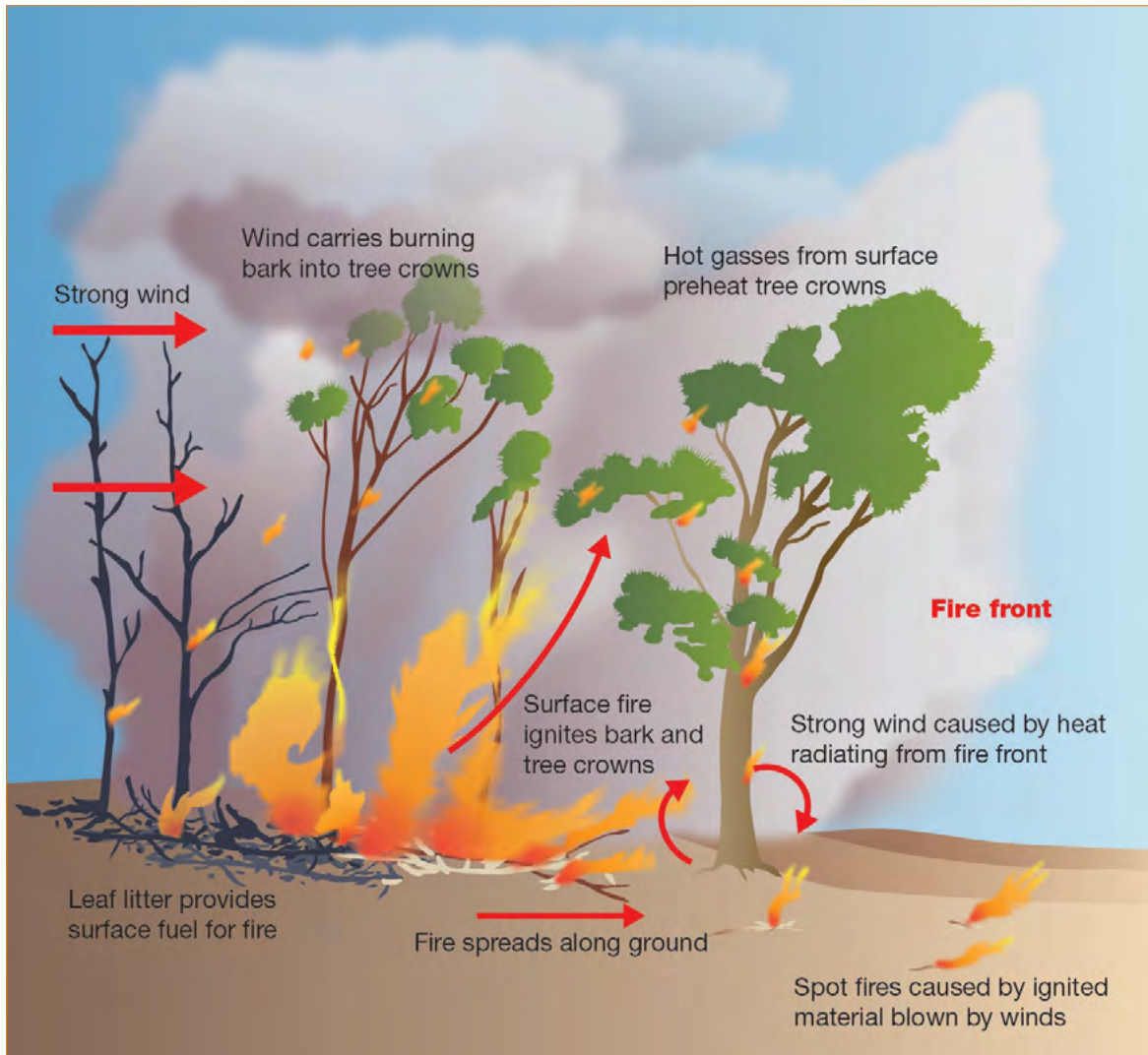


Xanthorrhoea (grass tree) during fire event Source: Wikimedia Commons

The way bushfires move

Figure 6 shows the way in which bushfires move across the land. Study the diagram carefully to identify the key factors driving the progress of the fire.

Figure 6: The movement of bushfires



Fire front moving across a mountainous environment towards a settlement. Source: Shutterstock

BUSHFIRE ATTACK

Bushfires are a threat to life and property in a number of ways, these include:

- **The fire front.** The flames of the fire front (the leading edge of a blaze) ignite anything flammable with which it comes into contact. The most dangerous of all fire fronts is one that burns in the crowns, or tops, of trees (called a running crown fire). In eucalypt forests, bushfires can advance at alarming speeds through the upper layers of the forest. The tops of the trees often appear to explode as the fire roars through. On hot days the oils in eucalypt leaves pass into the atmosphere as a vapour. This vapour is quite flammable. The trees themselves do not explode; instead, it is the oil-rich vapour given off by the leaves that ignites in a fireball.

Figure 7: Fast moving fire front



- **Ember attack.** Even if the fire front itself never reaches where you are, spot fires can break out well ahead of the advancing blaze when hot embers fall from the sky. Embers are burning leaves, bark, and small pieces of wood from tree branches. They can be carried great distances by strong winds. Ember attack can occur before or during a fire and for a long period after the main fire has passed.

Figure 8: Ember attack and spot fires

- **Heat.** The amount of heat coming from a large fire can be extreme. It can melt metal and boil water in tanks. It may last for only a few minutes as the fire front passes, but can last much longer when large logs, branches, grass tussocks and stump holes continue to burn and smoulder.

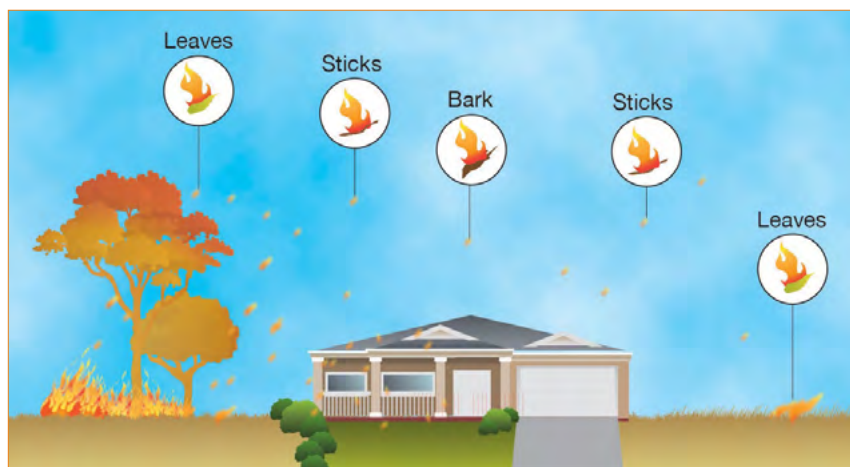


Figure 9: Radiant heat can kill living things and damage property



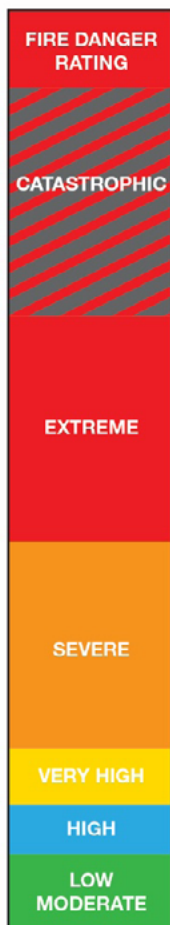
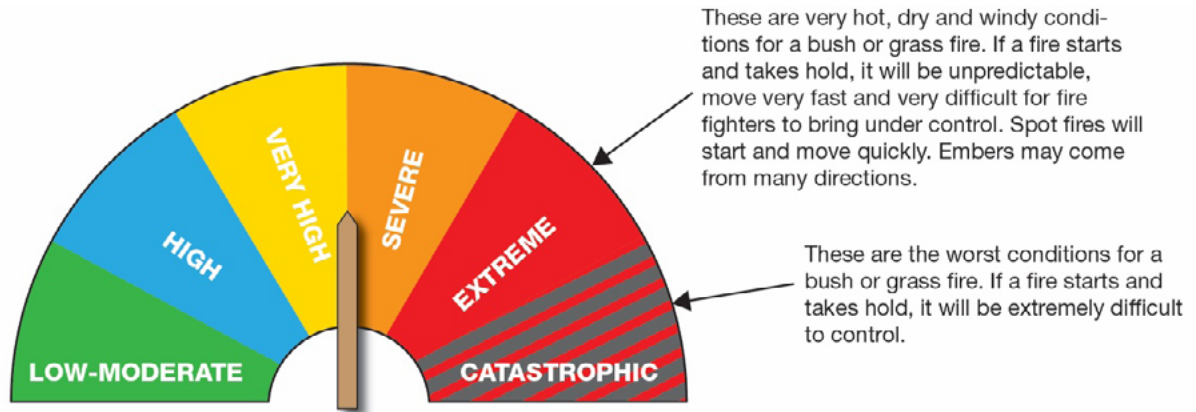
- **Wind.** Strong winds usually accompany a bushfire. They fan the fire by delivering more oxygen to it, as well as carrying the embers of the fire over great distances.

Fire Danger Ratings

The Bush Fire Danger Ratings are based on possible impacts of a fire, if one was to start.

Fire authorities base the rating on forecast conditions such as temperature, humidity, wind and the dryness of forests and grasslands.

The higher the fire danger rating, the more dangerous the conditions.



What you should do

- For your survival, leaving early is the only option.
 - Leave bush fire prone areas the night before or early in the day – do not just wait and see what happens.
 - Make a decision about when you leave, where you will go, how you will get there and when you will return.
 - Homes are not designed to withstand fires in catastrophic conditions so you should leave early.
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- Leaving early is the safest option for your survival.
 - If you are not prepared to the highest level, leave early in the day.
 - Only consider staying if you are prepared to the highest level – such as your home is specially designed, constructed and modified, and situated to withstand fire, you are well prepared and can actively defend if a fire starts.
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- Leaving early is the safest option for your survival.
 - Well-prepared homes that are actively defended can provide safety – but only stay if you are physically and mentally prepared to defend in these conditions.
 - If you're not prepared, leave early in the day.
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- Review your bushfire survival plan with your family. Keep yourself informed and monitor conditions. Be ready to act if necessary.

Surviving Bushfires

It is not always the flames or the smoke that presents the greatest danger in a bushfire. The scorching radiant heat is often just as deadly. This invisible heat surrounds the flames and scorches plants, animals and people caught in its path.

Some of the best ways to increase your chances of survival if you are caught in the path of a rapidly approaching bushfire are listed in Figure 10.

Figure 10: Bushfire survival guide

Personal survival (indoors)

- Wear as much cotton or woollen clothing as possible; avoid wearing cloths made from synthetic-fibres.
- Crouch or lie down on the floor of a room that is away from the approaching fire; the air close to the ground contains less smoke.
- Take as many of the precautions shown in Figures 12 or 13 as is possible in the time available.
- The fire front and its radiant heat usually pass in two to four minutes. Even if the house is set alight, it is safer to stay indoors until the fire front has passed.

Personal survival (outdoors)

- Don't panic. Find the clearest or most open area. Move across-slope, away from the fire-front, then down-slope towards the rear of the main fire front. Don't try to outrun a fire, or go uphill, or through even low flames unless you can clearly see a safe area close by.
- If possible, lie down in a depression in the ground, a pond or dam, or cover yourself with loose earth or rocks. Thick, woollen clothing or a woollen blanket offers some protection from the radiant heat. DO NOT take shelter in a tank of water.
- If in a car, park by the roadside in the clearest area possible. Stay in the car, wind up the windows and put on the headlights. Crouch down and shelter under a rug, floor mat or anything similar that is available. See Figure 11.

Figure 11: Bushfire survival in vehicles

Position the car to minimise exposure to radiant heat. You can do this by parking away from dense bush – try to find a clearing; parking behind a barrier such as a wall or rocky outcrop if one is available; and face the car towards the oncoming fire front.

Park off the roadway and turn hazard lights on. Car crashes are common in bushfires due to poor visibility.

Turn the engine off.

Call Triple Zero 000. Give them your name and location.

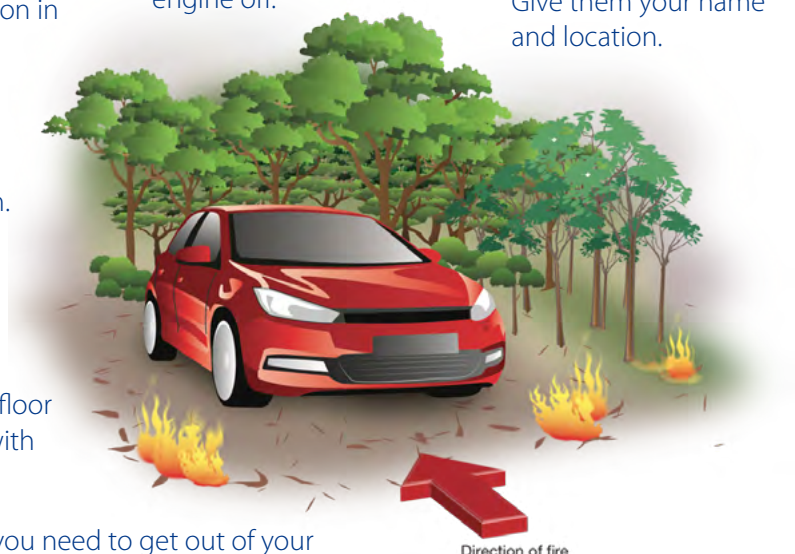
Stay in the car, and tightly close windows and doors.

Drink water to prevent dehydration.

Shut all vents and turn the air conditioning off.

Curl into a ball and get down on the floor – below the window line. Cover up with woollen blankets if available.

Once the fire front has passed you need to get out of your vehicle. Move to burnt ground, but stay close to your vehicle and wait for help.



Protecting your home

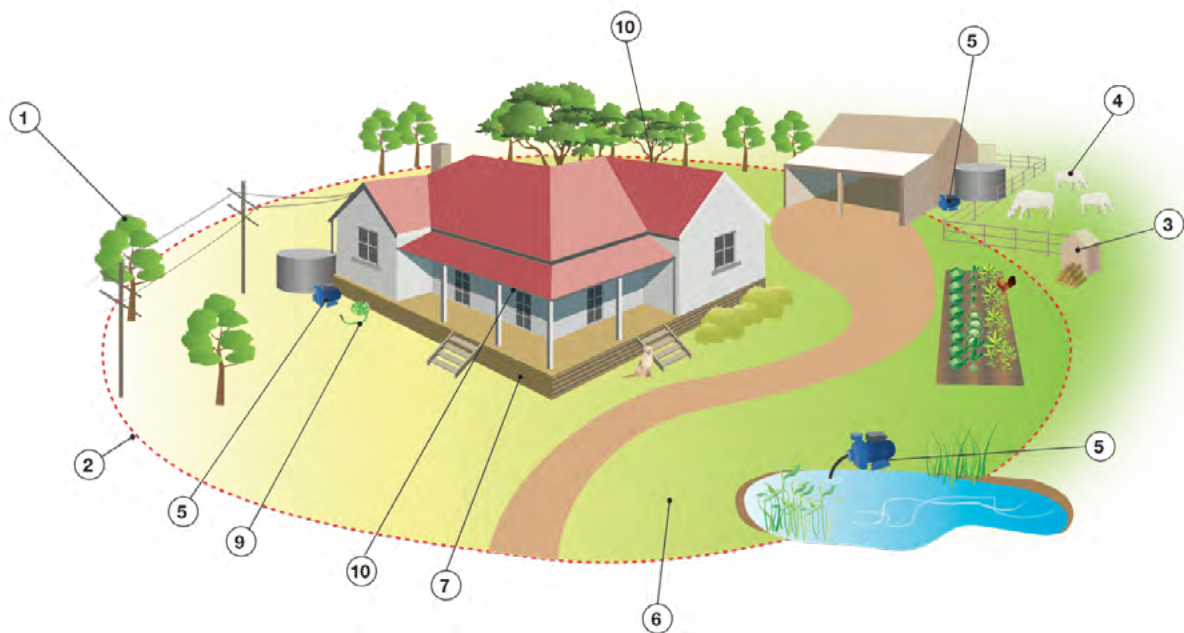
There are also steps you can take to prepare your home in the case of an approaching bushfire. These are shown in Figures 12 and 13.

Figure 12: Protecting your home – a suburban property



- | | |
|--|---|
| <p>1 Clear leaves from gutters and cut back overhanging vegetation</p> <p>2 Seal any openings under the house or eaves. Fit wire screens to doors, windows.</p> <p>3 Keep lawns and shrubs trimmed. Rake up leaves.</p> <p>4 Install a non-electric-driven sprinkler system that uses water stored in swimming pools and/or tanks.</p> <p>5 Ensure that hoses are in good order and long enough to reach all parts of the property.</p> <p>6 Wear clothing as described in Figure 10: Bushfire Survival Guide.</p> <p>7 Block downpipes and fill gutters with water. Hose down the house and surrounding areas.</p> | <p>8 Maintain a minimum two-metre gap between your house and tree branches. Make sure that no trees overhang the house.</p> <p>9 Turn on sprinklers. Remove all flammable substances, such as gas cylinders and paints, from around the house.</p> <p>10 Make sure that everyone (including pets) is inside.</p> <p>11 Put wet towels against spaces under doors. Close all windows, curtains, blinds and doors. Fill buckets, basins, baths and sinks with water to put out spot fires.</p> <p>12 Install metal (rather than timber) fencing that shields the property from an advancing fire-front.</p> <p>13 Store wood, gas, petrol and oil-based paints well clear of the house.</p> <p>14 Keep ladders handy for roof access (inside and out).</p> |
|--|---|

Figure 13: Protecting your home – a farm-based property



- 1 Trim tree branches away from power lines
- 2 Create a firebreak around the homestead and other farm buildings
- 3 Store firewood, petrol and gas well away from the house
- 4 Move livestock to a well grazed paddock
- 5 Use a diesel powered pump to access water from farm dams, water tanks and swimming pools
- 6 Keep lawns short and shrubs away from farm buildings
- 7 Seal underfloor spaces to prevent embers entering
- 8 Install gutter guards and keep gutters clear of leaf litter
- 9 Have a hose ready to put out spot fires
- 10 Block downpipes and fill gutters with water. Hose down the house and surrounding areas.

Being a responsible citizen

There are things you can all do to make sure that we act as responsible citizens in times of bushfire emergencies.

These include:

- making sure that you obey all total fire bans. At all other times, never light a fire without adult supervision
- checking to see that your family has a bushfire emergency plan
- leaving the house when advised to do so by authorities
- ensuring that any elderly and/or disabled neighbours are taken care of.

Community information campaigns

Community awareness is critical to any bushfire emergency. During a bushfire emergency community briefings are held on a regular basis. Letterbox drops of Community Information Updates are also used to keep people informed. Phone-based warning systems are activated and the media is used to provide the public with information.

Note from the Editor

A teaching program and series of lessons on Bushfires using this material is a part of the GTA NSW & ACT resource **Primary Geography Alive**.

This resource can be found on the GTANSW & ACT website and is freely accessible to all primary teachers, as is membership of GTANSW & ACT – www.gtansw.org.au

CIVICS EDUCATION

How to Make Change

A Whitlam Institute Civics Education Program

The Whitlam Institute's civics workshops combine a "unique understanding and practice of civics education with the philosophy of positive social change". PROFESSOR MURRAY PRINT, UNIVERSITY OF SYDNEY



In a complex, rapidly changing and technology-rich world, students are increasingly exposed to local challenges as well as those facing Australia and the world.

How to Make Change equips high school students with the skills to engage with democracy, to empower them to take their place in democratic society and meet challenges with confidence. Through a series of thought-provoking and interactive activities, students are encouraged to reflect on their civic rights and responsibilities, and critically and creatively consider how they can become active and informed citizens.

Compelling contemporary examples of civic participation help students to gain an understanding of the value and importance of their voice in contributing to social change.

How to Make Change is available as an incursion, delivered offsite at schools, or by attending onsite workshops in our dedicated learning space at the Whitlam Institute in the Female Orphan School at the Parramatta South campus of Western Sydney University.

Workshops are available as both a full or part day program, consisting of multiple modules that can be selected and adapted to suit individual school or class needs. A sample workshop could include:

Rights & Responsibilities

Students discuss universal human rights and the things we need to thrive in a society. Exploring the Universal Declaration of Human Rights, they consider Australia's role in upholding human rights nationally and globally.

Secret Ballot

Students explore democratic processes and the importance of enfranchisement by participating in an anonymous vote on contemporary issues.

Public Vote

Students practice their political skills by participating in a group debate to express their opinions and attempt to persuade their peers on a range of issues.

Curriculum Connections

How to Make Change supports the Australian Curriculum Civics and Citizenship content for stage four and five, and the NSW 'learning across the curriculum' objectives for Civics and Citizenship.

Australian Curriculum Key Inquiry Questions:

What are the freedoms and responsibilities of citizens in Australia's democracy?
What are the features of a resilient democracy?
How is Australia's democracy defined and shaped by global context?
How are government policies shaped by Australia's international legal obligations?

NSW Curriculum Links:

Stage 4: AC:HC K05/2, AC:HC S05/6, AC:HC K06/2, AC:HC S07/1, AC:HC S07/4
Stage 5: AC:HC K07/6, AC:HC K07/9, AC:HC K09/4, AC:HC E09/8, AC:HC S10/2, AC:HC K09/1, AC:HC S09/9

Program cost: Full day rate \$15

The Whitlam Institute seeks to maximise access to this program, and can work with your school on the arrangements for your visit. As a not-for-profit organisation, we consider student numbers and other program elements to facilitate access for students.



Inspiration waits in the Female Orphan School (1813)

Students attending How to Make Change workshops on-site will enjoy exploring the home of Whitlam Institute, the Female Orphan School.

Built in 1813, this building has a tumultuous history. First opened as the Female Orphan School, it became the Protestant Orphan School, before becoming Rydalmere Psychiatric Hospital. After decades as a mental health facility the building was left abandoned and fell into disrepair, but was painstakingly restored to become the home of the Whitlam Institute.

Students will be fascinated by the tour of the building's history, when they will be invited to put themselves in the shoes of those people who passed through this building.



A Changing Australia: The Time of Gough Whitlam

Our on-site exhibition explores the election and achievements of the Whitlam Government, a time of rapid social change in Australia.

Students will find out how many of the building blocks of life in modern Australia – like a Medicare card, or sewerage in Western Sydney – came about through Whitlam Government policy changes.

Images, audio, video and items from the Prime Ministerial Collection help immerse the students in this brief but frenetic period of social change, highlighting the ways in which the issues that they as citizens care about can influence the election of governments - and those governments can enact change.

“Insightful and highly relevant to the students, it allowed them to reflect on broad societal issues and make meaningful connections to their experience.”

- Teacher feedback on How to Make Change

