

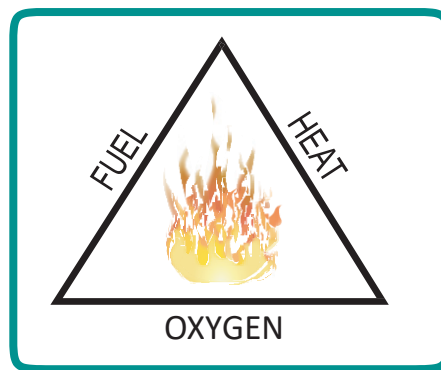
Bush Fire Behaviour

How bushfires occur

Fire needs three things to burn:

- fuel
- heat
- oxygen

This is shown in the fire triangle below:



Fuel - can be either solid, liquid or gas. For example, leaves, tree trunks, petrol or a gas tank.

Heat - from embers or a naked flame can start a fire or warm up the fuel until it burns.

Oxygen - can come from the air around us, or from chemicals that release oxygen when they break down such as pool chlorine.

Bushfires spread in several ways:

- burning embers driven by wind



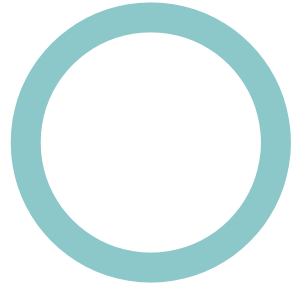
- heat radiating in front of the fire



- flames directly touching the unburned fuel



Embers threaten your property over a longer period of time than radiant heat or direct flame contact





How fire behaves

Understanding how fire behaves will help you to prepare your home prior to the start of the bushfire season. It will also help you to predict the fire's movements during operations.

Bushfire behaviour is affected by:

- fuel
- weather
- topography.


Fuel

How hot the fire becomes or how fast it can spread depends on what the fire has to burn. A fuel is anything that will burn under the right conditions.

In Australia, common fuels are:

- grass (usually dead), garden mulch
- litter lying on the ground
- small herbs and shrubs
- decomposing plant matter
- trees (eucalypts, wattles, she-oaks, pine trees)
- material remaining after logging (including sawdust)

Most of these fuels will ignite and burn easily in the right conditions.



Prepare your home
well before the
bushfire season
begins

Research shows that ember attack is the major cause of house fires during a bushfire

Small fuels like bark, leaves, twigs, garden mulch and grass can burn quickly and give off heat fast. They can cause spot fires as the burning embers are carried through the air, starting new fires ahead of the main fire. Eucalypt fuels, in particular bark, are well known for causing spotting. Stringy bark from eucalypts can travel up to two kilometres. Heavier fuels like branches and logs ignite less easily and burn more slowly.

Generally, the more small fuel there is, the faster the fire will travel and the more intense it will be.

Fire behaviour is affected by how dry the fuels are, that is, their moisture content. The fuel moisture content will vary depending on factors such as weather conditions, vegetation type, the moisture content of the soil and whether the fuel pieces are dead or living vegetation.

Fuel that is dry and fine will burn better than heavy fuels that are wet. Some grasses for example will not burn readily until fully dried out. Fine loosely stacked materials burn quickly and fiercely. Separated pieces of fuel are harder to ignite.



Ground fuel



Mid storey fuel and bark

Sudden weather changes can be dangerous. **Always have a planned escape route as per your Bushfire Survival Plan**

Weather

Weather impacts on the spread of fire. The four key elements of weather are air temperature, relative humidity, wind and atmospheric stability.

Air temperature

The sun warms solid objects such as fuels and the surface of the land. This raises the temperature of the fuels and the air. A change in temperature and the resulting change in relative humidity will change the fuel moisture content and make it easier to ignite.

This means, if it is hot the fuel will be warmer and drier, so will burn more easily.

Relative humidity

On a typical summer day the air may contain very low levels of moisture, a low relative humidity. Fuels will lose their moisture and burn quickly and fiercely.

On humid days, fine dead fuels absorb moisture from the air and burn more slowly or not at all.



Wind (speed and direction)

Big fires usually come with strong hot northerly or westerly winds. However, the direction of an approaching fire will depend on many local factors.

Wind will supply oxygen to the fire and help it to burn faster. The stronger the wind, the faster the fire will travel. Wind can lift burning materials such as bark and embers and carry them ahead of the main fire. This can start spot fires. A southerly wind can cool the fire and slow it down.

Atmospheric stability

Atmospheric stability refers to the vertical movement of air masses which occurs when hot air rises and is replaced by cooler air. Atmospheric stability can affect local wind patterns, cloud development and thunderstorm development.

If the atmosphere is unstable, fire behaviour may be unpredictable. In unstable atmospheric conditions:

- cumulus (cotton wool) type clouds show noticeable vertical growth
- smoke columns can rise to great heights
- winds are gusty and unpredictable
- lightning strikes may occur from thunderstorms
- dust whirls (willy willies) may occur.

Make sure that
you listen to
weather
forecasts

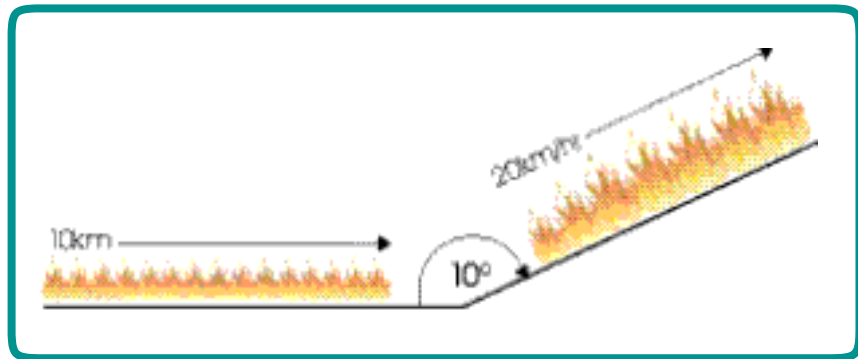


Topography

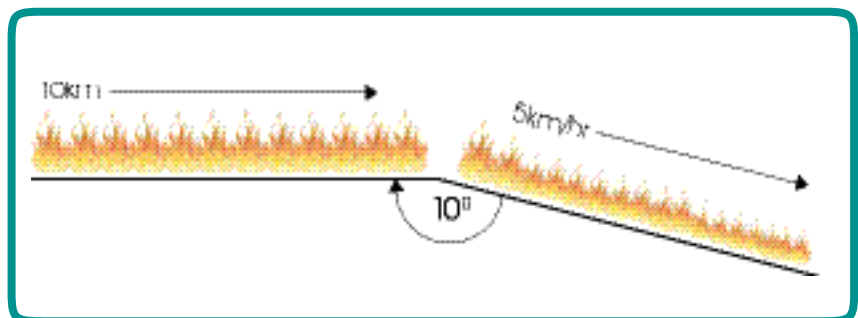
Topography describes the shape of the land. Topography has a strong effect on the direction and the speed of the fire. It will also, at the same time, change the local wind speed and direction.

Slope

Fuels at the top of a hill burn more quickly than fuels at the bottom. This is because fire travels faster uphill. As the heat rises, the fuels at the top of the hill get warmer. When the flames arrive, they are already hot and burn quickly. Slope therefore affects the speed of a fire.



For every 10 degrees of upslope, double the rate of spread.



For every 10 degrees of down slope, halve the rate of spread.

Houses upslope from bushland are generally more at risk

Aspect

Aspect is the direction that a feature or slope faces. The position of your house will influence how much sun it receives. This will also influence the type of vegetation growing on different aspects.

Northerly to westerly aspects will be warmer and drier than southerly and easterly aspects. Fires on northern to western aspects, where the vegetation is drier and more flammable will usually burn more fiercely than fires on southern and eastern aspects. House located at the tops of bushy gullies are most at risk.



Wind

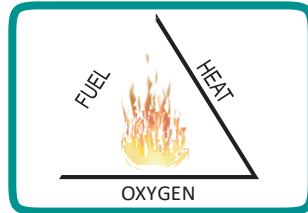
Exposed faces of hills and ridges will have increased wind speed while the other side of the hill (the leeward side) may be almost calm.

Houses with a north/westerly aspect to bushland are in more danger

Basic fire suppression principles

To put out a fire you need to break the fire triangle:

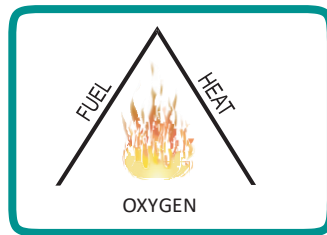
1. Remove the fuel



Removing the fuel is one way of stopping large bushfires and a way to ensure that large bushfires don't occur. You could rake a trail or firebreak between the bushfire and your property.

or

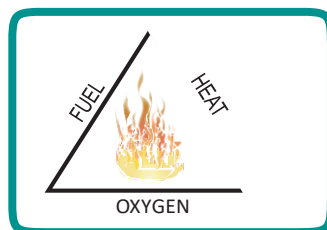
2. Remove the oxygen



Removing the oxygen is mainly used to put out small fires. You could shovel sand or dirt onto the fire. This smothers the fire by starving the fire of oxygen.

or

3. Remove the heat



Removing the heat is the most common way. Spraying water on the fire cools the fuel so the burning stops. A strong jet hose nozzle can also break up the fuel so that there is not enough heat for it to burn.

Conclusion

To protect your property you need to know how fire behaves and how bushfires occur.

- A fire needs three things to burn - fuel, heat and oxygen. To put out a fire you need to break the fire triangle.
- Bushfires spread in several ways:
 - o burning embers driven by wind
 - o heat radiating in front of the fire
 - o flames directly touching the unburned fuel.
- Bushfire behaviour in your area is affected by the surrounding fuel, the weather and the natural characteristics of the land near your home.
- When protecting your property, always wear your PPE.
- **Never try to put out a large fire. Alert anyone in danger and then ring 000**
- Always work in pairs.

