

Bushfires: Worksheet 2:

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:

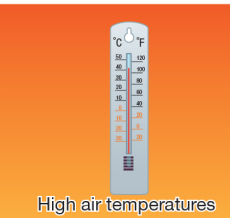
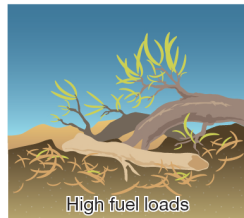
- **Fuel:** The fuel is the material that builds up in the bush over time as eucalypt trees shed their bark, branches and leaves. In the cooler months 'hazard reduction' burns are used to reduce the amount of fuel on the forest floor.
- **Ignition:** Bushfires are a natural event in Australia and can 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 1. A combination of these factors has resulted in 'blow-up days' when Australia's most severe bushfires burn out of control and spread rapidly.

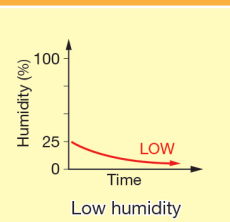
Figure 1: Factors affecting the spread of bushfires

Fuel load: High fuel loads can result in disastrous fires should it be ignited.



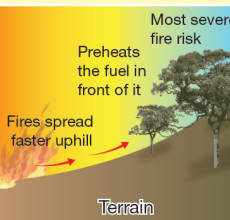
High temperatures: In Australia, summer temperatures reach the high thirties and can even exceed 40°C. High temperatures dry out forests and grasslands. This makes it easier to ignite.

Drought: Long periods of below-average rainfall dry out the fuel load.



Low humidity: Hot, dry air with humidity below 25 per cent creates dangerous bushfire conditions. Humidity is the amount of water vapour (or moisture) in the air.

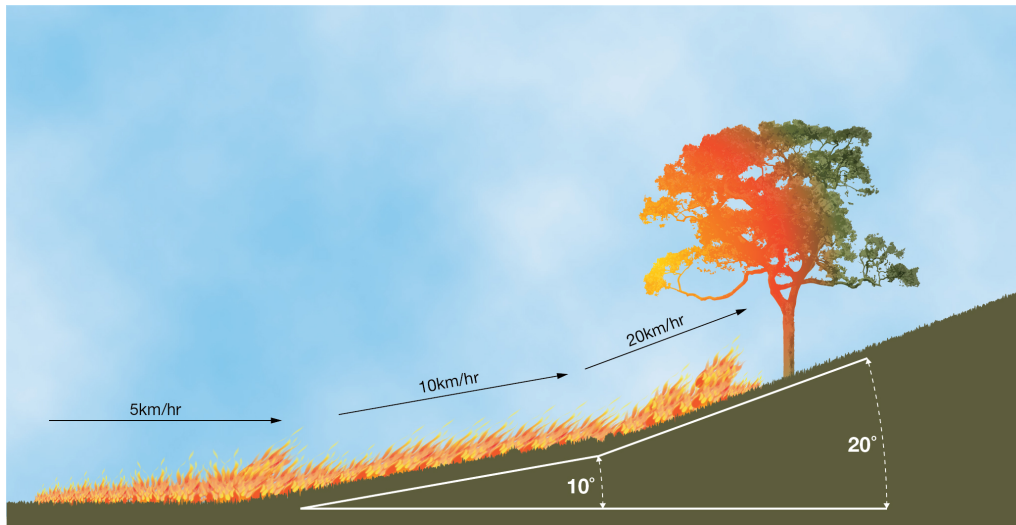
Strong winds: Air provides the oxygen to keep fires burning. Stronger winds mean extra oxygen and more intense fires. They fan the fire and accelerate the speed at which the fire spreads.



Terrain: Fires spread more quickly up hillsides and slopes.

The relationship between slope and the speed of bushfires

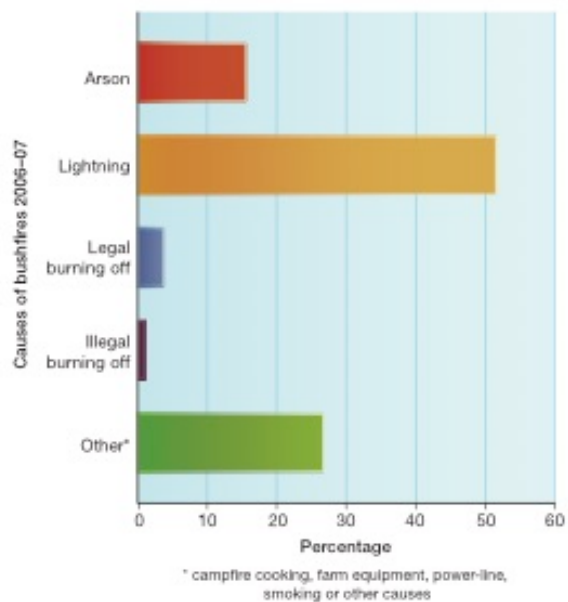
Figure 2: The speed of a fire increases with the steepness of a slope



Bushfire causes

Figure 3 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.

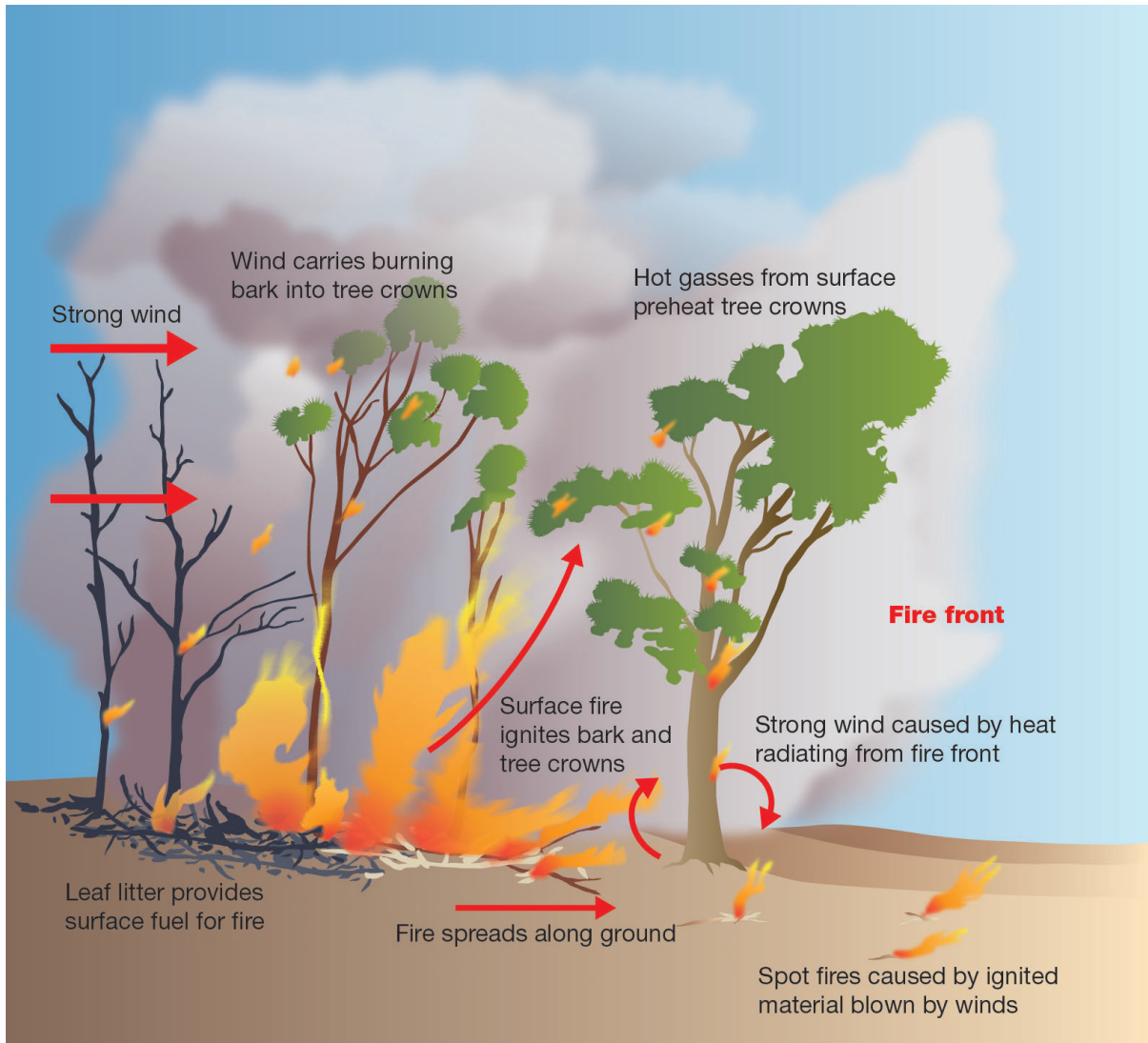
Figure 3: The causes of bushfires



The way bushfires move

Figure 4 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 4: The movement of bushfires



Activities:

1. What do we mean by the word 'fuel' when we study bushfires?

2. What is the most common cause of bushfire ignition in Australia? What do we mean by the term arson?

3. Study Figure 1. Outline the factors that affect the ignition and spread of bushfires.

4. Study Figure 2. By how much does the speed of a fire increase on a slope of:

- a. 10° _____
- b. 20° _____

5. Study Figure 3 and answer the following questions:

- a. What percentage of bushfires are caused lightening strikes? _____
- b. What percentage of bushfires are caused by 'other' causes? _____
- c. What percentage of bushfires are caused by arson? _____

6. Study Figure 4. Identify the factors driving the progress of the bushfire.

7. Draw your own profile of a forest fire. Add the following labels.

- Wind direction
- Leaf litter and bark provides the fuel for the fire
- Burning embers are carried into the crown of the forest
- Oily vapour from eucalypt trees explodes

- Fires spreads in the tree crowns
- Surface fire ignites bark and tree crowns
- Fire spreads along the ground
- Spot fires ignite material ahead of the fire front
- The fire front