**Causes of Wildfires**

**Wildfire Definition**: an Uncontrolled fire which breaks out in a Natural Environment. It may be ‘controlled’ (put out) after some days or weeks – but for a time it is out of control – and takes place in forests, grasslands or crop fields – not in cities.

<table>
<thead>
<tr>
<th>Natural</th>
<th>Lightning: Common in summer when thunderstorms develop. The biggest single ‘natural’ cause</th>
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<tbody>
<tr>
<td></td>
<td><strong>Volcanic eruptions</strong>: lava, ash, pyroclastic flows can spark a fire</td>
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<td><strong>Spontaneous combustion</strong> of decomposing vegetation - haystacks</td>
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<tr>
<td>Human (Accidental)</td>
<td><strong>Campfires and Barbecues</strong> left unattended in forested areas</td>
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<td><strong>Careless littering</strong>: dropped cigarette ends and broken glass bottles which magnify the sun's rays</td>
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<td><strong>Fireworks</strong>: many villages in the Mediterranean have festivals in the summer. Fireworks can start fires.</td>
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<td>Human (Intentional)</td>
<td><strong>Arson</strong>: possibly the biggest cause of fires near settlements. Even firefighters have started fires.</td>
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<td><strong>Controlled burning</strong>: getting out of control; burning off grasslands or heather moorland gets out of hand.</td>
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<td>Mechanical</td>
<td><strong>Trains</strong>: can create sparks from electric connectors, friction &amp; sparks</td>
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<td><strong>Combine harvesters &amp; tractors</strong>: bursting into flames in dry harvest fields</td>
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**Weather**

Unusually long period of dry weather with high day and night temperatures to reduce moisture content of ground & vegetation & dry up lakes & rivers

**Vegetation**

Thick undergrowth, tall, closely spaced trees. Tree species which produce combustible oils & resin eg. Pine & eucalyptus

**Population Density**

Sparse – so there’s lots of vegetation, but enough to be in the area doing careless things

**Wind**

**Strength**

Strong winds which provide more oxygen and blow embers downwind. Wildfires develop their own ‘firestorm’ winds as more hot air rises rapidly

**Wind Direction**

Blowing towards new areas of vegetation (ie not ‘offshore’). Changing wind directions confuse fire services so they can’t predict the path of the wildfire.

**A.N. Other**

Tourist area – so there are a large number of campers lighting fires, barbecues & smoking – or having firework celebrations.

Climate

Not so dry that vegetation doesn’t grow – but has a distinct ‘dry’ season each year when the undergrowth is tinder dry
The October 2007 California wildfires were a series of wildfires that began burning across Southern California on October 20. They covered the area from Santa Barbara County to the U.S.–Mexico border (almost 400km in length). The raging fires were visible from space. The last fire was fully contained on November 9, 2007, 19 days after the series of fires started.

The two largest fires were in the San Diego area where 640,000 people had to evacuate their homes.

**Natural causes**
Major contributing factors to the extreme fire conditions were drought in Southern California, hot weather, and the strong Santa Ana winds with gusts reaching 85 mph (140 km/h).

The fires occurred at the end of a dry summer and were exacerbated by the seasonal Santa Ana winds. Southern California was in the midst of an unusual drought; in Los Angeles it was the driest year on record. The combination of wind, heat, and dryness turned the chaparral into fire fuel. Officials believed that some of the fires generated their own winds.

**Human causes**
Increasing number of homes built in canyons and on hillsides surrounded by brush and forest. Several were triggered by power lines damaged by the high winds. One fire started when a semi-truck overturned. Another was suspected as having been deliberately caused; the suspect was shot and killed in flight by state authorities. A 10-year-old boy admitted that he accidentally started the Buckweed Fire playing with matches. Causes of the remaining fires remain under investigation.

**Physical Effects**:
- 9 people died of breathing in smoke or surrounded by flames. 85 were injured with burns or lung problems
- smoke drifted over the Pacific Ocean, reducing sunshine and light levels reaching the ground

**Economic Effects**:
- Farmers lost their entire crops of avocados, strawberries and salad crops from the heat and ash
- Shops, restaurants and factories lost weeks of profits as over half a million people were evacuated
- Tourist income fell as the San Diego zoo and Sea World had to be closed and tourists stayed away
- property insurance rose afterwards as so many houses had been destroyed

**Social Effects**:
- levels of stress and depression rose for the survivors who had watched their homes destroyed
- people were told to stay indoors and keep windows and doors closed to keep out smoke & ash

**Environmental Effects**:
- water supplies were polluted by ash so people were told to drink only bottled water
- natural habitats in the Californian forests were destroyed along with many wild animals and timber
- soil erosion increased off the Californian hills as there was no vegetation left to intercept heavy autumn rainfall
Preparations to reduce wildfires in advance

- Leaflets to encourage safe behaviour
- Warning the public of the fire risk
- Making fire-beaters available

Reducing wildfire damage once started

- Trees trimmed to level of roof or chimney so they don’t overhang the roof
- Lower branches removed to prevent ‘fire ladder’
- Space plants and shrubs apart to prevent fire from spreading
- Putting a fire refuge in your garden
- Trees spaced to reduce fire spread
- 30m ‘clear space’ and 70m ‘intervention space’

- Clearing brushwood
- Leaving fire-breaks in forests

- Air-drops of water from helicopters or planes onto the fire to put out the blaze – known as Air Tankers
- Spraying water onto the roof of your house to keep it damp and stop embers setting it alight
- Using a swimming pool as a source of water to put out locally burning vegetation – or in extreme wildfires – to submerge yourself in the water.

- Dropping fire-retardant such as SKY-JELLO onto surrounding vegetation to contain the wildfire
- Evacuating to a community refuge – an underground fire shelter. Lists of their locations can be found on the internet in Australia
Why more people may be affected in the future

Many fire experts worry that the number of severe wildfires will increase in the future. This will be the result of Global climate factors, Human factors of settlement expansion and increasing tourism to arid regions.

The red columns show the frequency of wildfires in the western USA. As the temperatures have increased from 1970 to 2005 (black line) – so have the number of wildfires from less than 25 a year in the 1970s to over 100 a year by the 2000s.

In the 35 years between 1970 and 2005 the winter snow has been melting earlier each year. The red dots indicate an ‘early spring’ (or ‘short winter’) – and there are more in the 1990s and 2000s. This means there is a longer ‘dry spring and summer’ – so the ground will be drier and more ready to catch fire in the summer if there is something to start a fire.

The black wedge indicates how long wildfires are ‘out of control’ for. Over the past 35 years there have been more and more wildfires which have been out of control for longer – indicating they are more intense and more difficult to put out.

People are increasingly moving out of cities and living in semi-rural areas within commuting distance of big cities such as Melbourne in Australia or Los Angeles in the USA. Living further out means having larger areas between houses – often filled with trees. The smouldering remains of houses from the 2009 Australia wildfires show this effect. As global climate change takes place there are likely to be more droughts and stronger winds in many parts of the world which have unreliable rainfall at the moment. This will provide the conditions for more wildfires to break out – and to affect more people who have moved out of cities to live in these areas where land is cheap.

Some vegetation and long dry periods – but very sparsely populated – very few towns in NW Australia so any wildfires here affect very few people

Future Wildfire Risk Map of Australia

Central Australia: Too Dry for Vegetation to grow – Great Australian Desert

High Risk of Future Wildfires:
- Enough moisture for vegetation to grow, but increasingly severe droughts – and most densely populated area of western Australia with Perth being the largest city on the west coast

Too Wet for Wildfires – Australia’s high rainfall
- Tropical forest northern zone

High Risk of Future Wildfires:
- Enough moisture for vegetation to grow, but increasingly severe droughts – and most densely populated area of Australia with Sydney and Melbourne - Australia’s 2 largest cities expanding out into bush forest