

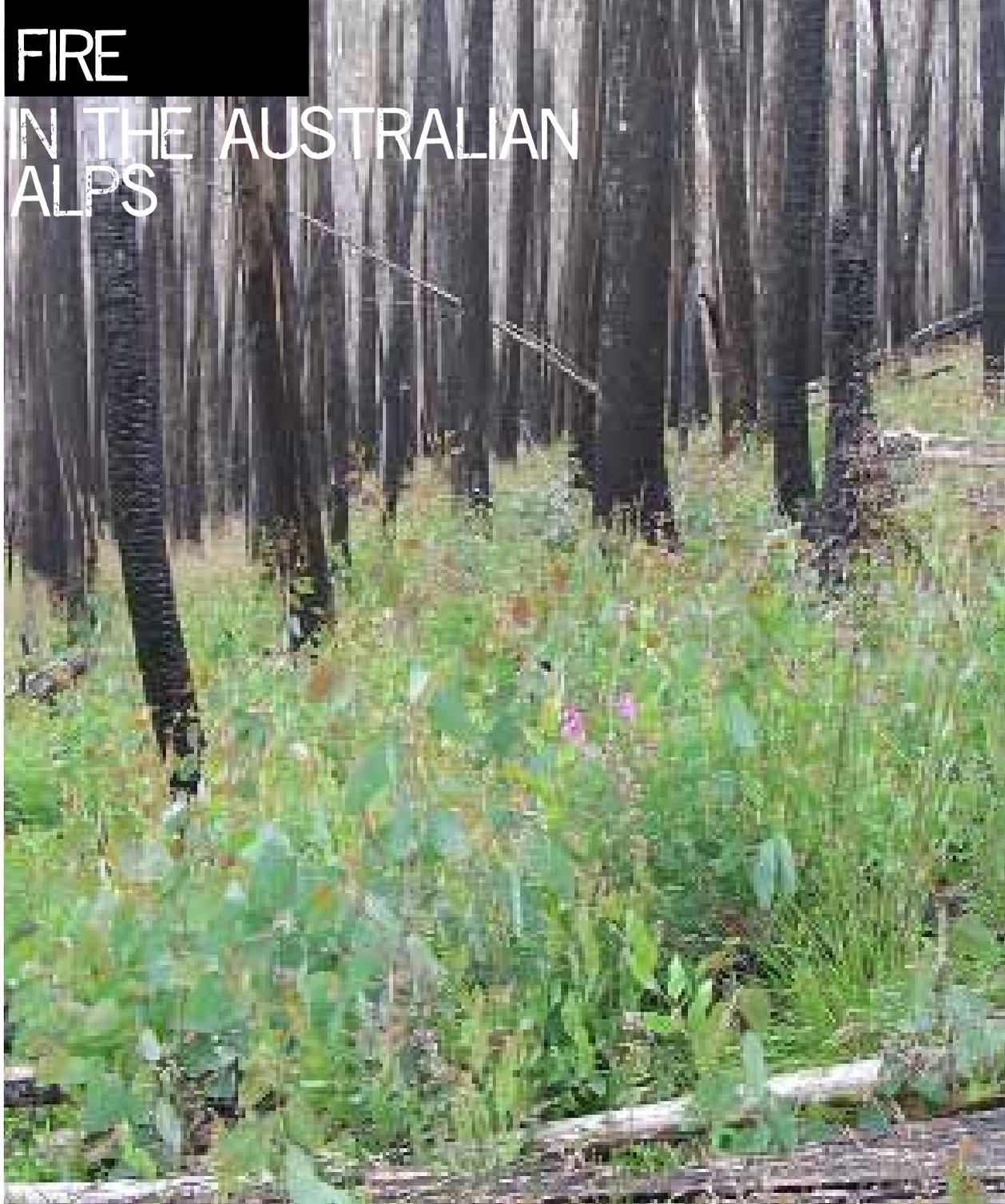
# FIRE

## IN THE AUSTRALIAN ALPS

Fire, wind and rain are living spirits. Respect for these spirits lies at the heart of many laws governing the behaviour of Aboriginal people. This respect includes acknowledging that fires started by lightning are the deliberate action of the fire spirit, or spirits, and are therefore not to be interfered with. These fires are a gift for the land. Lighting of fire is a spiritual act and is accompanied by ceremonies and songs as the fire spirit is released to renew the landscape. Senior men and women hold knowledge regarding when and how often to burn.

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### RELATIONSHIPS WITH FIRE

Fires have been a natural part of the landscape of south-eastern Australia for thousands of years. Through exposure to fire, many plants in the Australian Alps have evolved to live with fire, some developing special adaptations in response.

Fire has been used by Aboriginal people in many ways: to flush out game or encourage grasslands to grow for hunting; to help seed production; to cook food; to clear trails through dense vegetation, to communicate through signalling; for ceremonies and warmth. Many different groups of Aboriginal people continue to understand the management of fire through customary law. Customary law determines not only how fire should be used but who should be involved. For example, it is forbidden for someone to burn Country for which they aren't responsible.

Tim Flannery, in his book *The Future Eaters*, argues that Australia's landscape was changed prior to the coming of European people through the use of fire by Aboriginal people.

Yet, as Mitch Tulau explains (1998), Aboriginal people did not use the same fire stick practices over the entire continent. “There is no doubt that Aboriginal people did use fire to change parts of the landscape. The question is which parts of the landscape were burnt, and what were the effects? Aboriginal people understood that certain landscapes were less productive than others, and directed their attentions accordingly.”

With the arrival of European people it was common practice in the first half of the 1900s for graziers to burn to encourage new grass growth. As a result, frequent burning became an important part of grazing in many parts of the high country of the Australian Alps, particularly where sheep were grazed. Cattle selectively grazed Alps vegetation, and this has not only changed the mix of species but also the behaviour of fire.

The effect of one fire might not be as environmentally significant as the frequency, timing and intensity of fires over many years. This is called the fire regime and plants in Australia have evolved to particular fire regimes in different ecological zones and regions. For example, vegetation communities in the alpine zone have evolved to a regime of infrequent and low intensity fires. Fires of an appropriate intensity and timing can trigger a successful survival response.

The way in which some plants respond to fire is not always a specific fire adaptation. It might be a general response to stress and could also be triggered by drought, frost, disease or browsing. For these species fire is not essential for their healthy survival.

Most plant species survive bushfires by using one or both of two basic mechanisms – one involving the re-sprouting of damaged plants, the other a range of responses which result in new plants being established from seed.

Eucalypts, in particular, have a number of specific adaptations that enable them to survive and recover from fires. Snow Gums and many other eucalypts have swellings called lignotubers at the base of the trunk or below the soil. Lignotubers have many dormant buds that are stimulated to grow by the death of the tree above ground.

Eucalypts also have the ability to sprout leaves from epicormic buds under the bark in the trunk and branches. These bud strands are capable of producing leafy shoots, but are normally restrained by growth substances produced in the leaves and shoots above them. Should the canopy or part of the canopy be lost through insect attack or fire, this restraining mechanism is removed and leaves may develop from the epicormic buds.

Although individual species have developed adaptations to one-off fire events it is the response of the whole ecological community to a fire regime that is of most importance.

- 1: Fern regeneration.
- 2: Grass Tree (*Xanthorrhoea* species). The tightly packed leaf bases do not burn readily. The stem and apex of most mature plants survive a fire and quickly regenerate the crown. Fire also acts as a flowering stimulus.
- 3: Wattle regrowth from lignotuber.
- 4: Epicormic shoots.

## FIRE AND PLANTS



## FIRE AND ANIMALS



During a fire, koalas, possums and other tree dwelling animals hide in hollows or climb up high into the canopy to avoid the flames and smoke. Their survival depends on flame height and fire intensity.

Soil is a good insulator, therefore burrows are an excellent place to hide during fires. After the fire has passed, burrows continue to provide shelter from predators until the protective cover of vegetation re-grows. Wombats, lyrebirds, wallabies and even foxes, feral dogs and cats may inhabit burrows during fires. Rock outcrops, logs, creeks and streams provide valuable refuges for birds, reptiles, frogs and small mammals.

Larger, more mobile animals including wallabies and many birds move away from danger, seeking escape routes ahead of the fire front and taking refuge in pockets of unburnt habitat. The survival of many animals depends on a complex combination of fire intensity, frequency and distribution as well as an individual's ability to adapt to post-fire changes in their habitat.

**Lucky, the only captive Tidbinbilla Nature Reserve Koala to survive the 2003 bushfires. Badly burnt on her face and back, she was given drugs to fight infection and a special formula.**

## FIRE AND THE ALPS



**Burnt Sphagnum Bog, Ginini Flat, Namadji National Park.**

Sediments examined from Yarrangobilly Caves indicate that bushfires have occurred over a period of 400,000 years in the Australian Alps. Our knowledge of Aboriginal people's use of fire in the Alps is extremely limited. It is thought that small fires were used to smoke Bogong Moths out of rock crevices. Elsewhere fire may have been used to promote new growth to attract animals for hunting and to clear undergrowth for moving around.

Alpine vegetation communities have evolved in response to a regime of less frequent fires and fires of lower intensity than generally experienced in other habitats. Some montane vegetation communities need fire to preserve biodiversity. Alpine Ash forests need fires at intervals of 30 to 100 years in order to survive. Fire kills most Alpine Ash but triggers the release of millions of seeds that are protected from fire by woody capsules high in the canopy. The seeds quickly spring into life aided by increased light levels and the nutrients in the ash bed. Alpine Ash takes 15 years to mature and produce seeds, therefore fires of less than 15 year intervals would kill trees that have not yet had a chance to produce seeds and could result in the death of the Alpine Ash forest. However for heathlands and grasslands, a regime of more frequent fires is needed to preserve diversity.

Although, many of the Alps' vegetation communities can recover fairly readily from fire, the alpine wetlands, which include the bogs and fens, can be very slow to recover because of the changes in the hydrography of the community, particularly if the peat below the Sphagnum Moss gets burnt. After fire, water that was once held in bogs is no longer there, which means the bog plants won't grow and peat will not be produced over time. The whole community will change. However, bogs and fens only burn in severe drought years, when they dry out enough for the moss and then the peat to ignite. In most years, when they retain water from the snow-melt, it is unlikely that they would carry fire. Sphagnum Bogs in subalpine regions of the Alps did burn in the Jan 2003 bushfires due to the intensity of the fires and the drought before the fires. Post fire bog restoration work in Namadji National Park has involved trying to slow and spread the flow of water in the stream channels using sterile hay bales as mini-dams.

Even though fire is a natural part of the ecosystem in the Australian Alps, the impact it has on people, animals and industries means there is a need for fire to be managed and controlled. Fire management forms an important part of the lives of all who live and work in the Australian Alps and fire management strategies and plans are part of the management plans for each park and reserve. The type of strategy developed for each varies depending on how complex the fire issues are, but overall a fire management plan aims to:

- prevent injury or death of people;
- prevent damage to infrastructure both within and outside national parks;
- protect important natural features e.g. restricted, rare or endemic plant or animal communities, alpine and karst systems from damage by fire;
- promote a natural diversity of vegetation communities and age classes through ecologically appropriate fire regimes;
- ensure that fire does not contribute to reduced water quality; and
- protect sites and features of cultural significance from fire damage.

Fire management is a year round activity for national park staff. It involves:

- fire trail maintenance; fire prevention, for example, hazard reduction burns, education campaigns, declaration of fire bans
- fire preparedness through staff training and equipment preparation
- fire response, eg occupying fire towers on high fire danger days to report smoke and speed response times; hiring aircraft to fly over the park as soon as possible after a lightning storm; having staff on standby for fast response;
- fire recovery - the repair of fire trails, bulldozed fire breaks, fences and other damaged built structures.

### Incident Control System

Generally, fires are managed using the Incident Control System which has four functional areas, all of which can be different depending on the size of the fire:

**Incident controller** – has overall responsibility for managing the fire incident.

**Logistics** – including facilities and services, for example, food and medical services.

**Planning** – how to deal with the fire including, where is it now, where is it heading, what assets are in the path of the fire and other strategic questions that help provide response directions.

**Operations** – people who do the work on the ground.

Although government agencies still play a critical role in fire management in the Australian Alps, there is a greater understanding that all stakeholders are responsible for fire management. In this way government authorities, private landholders and the general community are now working together. It's also been recognised that fire needs to be managed across the whole landscape and across State and Territory boundaries, not just as separate pieces of land, such as parks and reserves, established in each of the jurisdictions.

The fires of the summer of 2002-2003 affected on the whole of the Australian Alps although these impacts varied, depending on location, the nature of the vegetation, the intensity of the fires, and the prevailing weather conditions.

The result was a mosaic, ranging from the blackened skeletal remains of trees to areas untouched by fire. The full extent of vegetation, soil and fauna losses is still unknown and there is real concern for some ecosystems, especially in the alpine and subalpine areas. Impact on the fauna was substantial, especially endangered species such as the Mountain Pygmy Possum and the Northern and Southern Corroboree Frogs.

The Australian climate of 2002-2003 reflected the typical life cycle of an El Nino event and its impact upon Australian rainfall and temperature. The total annual rainfall averaged over Australia for 2002 was the 4th driest since 1900 and the warmest on record. This meant that evaporation rates were high.

Lightning storms ignited five fires on 17 December and a further 15 fires on 20 December, 2002 in southern Kosciuszko National Park. These were declared 'contained', that is a control line had been established around the perimeter of the fire, by 6 January, 2003.

On January 8, a major storm passed over the mountains and lightning strikes ignited 185 fires in Victoria, NSW and ACT. These fires began in the worst possible weather conditions, which included strong, north-westerly winds, extremely low humidity and high temperatures. Many of the fires were in remote mountainous places, where it was too dangerous to drop fire crews into the area to mount an initial attack. Thick smoke reduced visibility to such an extent that helicopters were unable to reach many of the fires. Some fires were contained early while others joined to become huge fires, too large to contain quickly.

These conditions resulted in the 2002- 2003 bushfires being the 3rd largest fire known in south-eastern Australia after the 1939 fires and the 1851 fires. The fires were still being fought in NSW until late February and in Victoria until mid March.



## THE FACTS AND THE STATS

- Following a single storm event coinciding with already extreme fire weather, 185 fires were ignited across the Australian Alps.
- Prior climatic conditions were created via an El Nino rainfall deficit during 2002/03 the effects being severe and widespread.
- The final extent of fires totalled an area of 1.87 million hectares which breaks down to 1.12 million hectares in Victoria, 597,000 hectares in New South Wales and 156,000 hectares in the ACT.
- The impact of the ACT fires outside the national parks and reserves: four lives lost; 414 houses destroyed and 161 damaged in suburban Canberra, 89 houses destroyed and 14 damaged in rural areas; 57% of rural lands affected; majority of ACT pine forests lost; extensive public and private infrastructure damage; historic Mount Stromlo Observatory destroyed.
- The impact of the ACT fires within the national parks and reserves: 88% of Environment ACT managed lands affected by fire, including 91% of Namadgi National Park and 99% of Tidbinbilla Nature Reserve.
- The impact of the Victorian fires outside the national parks and reserves: one life lost; 41 houses and more than 200 other structures; 75,000 hectares farming land, 3000 kilometres fencing, 11,000 head of stock, 42 grazing licences.
- The impact of the Victorian fires within the national parks and reserves: 470,000 hectares of national parks impacted by fire, including 396,000 hectares (60%) of Alpine National Park, 25,000 hectares (80%) of Mount Buffalo National Park and 26,000 hectares (27%) of Snowy River National Park.
- The impact of the NSW fires outside the national parks and reserves: no lives lost, two houses, six other structures, 77,200 hectares private land affected, 14,200 hectares Crown leased land, 1,400 hectares State forest.
- The impact of the NSW fires outside the national parks and reserves: 555,000 hectares of Park Service managed lands affected by fire, including 522,000 hectares (71%) of Kosciuszko National Park and 18,000 hectares (94%) of Brindabella National Park.

Evidence of major fires in or near the Australian Alps National Parks.

Date	Location and description
1932	Major fires occurred in many districts across Victoria throughout the summer. Large areas of State forest in Gippsland were burnt and nine lives were lost.
1938/39	Largest fires recorded in the Australian Alps burnt 3.4 million ha in a continuous swathe between Melbourne and Canberra killing 71 people in Victoria and destroying countless homes and entire towns. Although the fires burnt over the period of September through to March, the vast majority of country was burnt between 8 and 14 January 1939. 'Black Friday' (13th) saw most of the impact in Victoria, whereas the fire spread nearly 70 km in NSW the next day destroying several homes but taking no lives. Post-fire inquiry found that the fires were caused by escapes from grazier's and miner's 'hazard reduction' burns.
1941-1944	Dendrochronology and recollections of firefighters suggest large fires in the upper Tooma River catchment through to Providence Portal in KNP.
1942 3-4 Mar	Fires in South Gippsland caused one human fatality, large loss of stock and destroyed more than 20 homes and 2 farms.
1943/44	Fires reported in Dargo, Bogong and Tambo counties, Victorian grass fires claim 51 lives.
1957 Jan	Fires at Tharwa.
1964 to 1965 Mar	Fires in the Snowy Mountains and Southern Tablelands.
1972	Fires in Gippsland burnt 315,000 ha, destroying 60 buildings. 86,300 ha burnt in northern KNP, one fire in the Bogong Ranges and a major fire that burnt 40 km from the Ravine to near Adaminaby in one day.
1972 14 Dec	A fire at Mount Buffalo burnt for 12 days, covering an area approximately 12,140 ha. This area included 7,400 ha of State forest and 4,520 ha of National Park.
1972 to 1973 Dec to Jan	Fire within Kosciuszko National Park: 13,000 ha burnt near Schlink's Pass in KNP, 30,900 ha burnt in the Pilot wilderness from arson.
1978	Escaped prescribed fire burnt 20,700 ha of Kosciuszko NP and neighbouring parts of Victoria over a 3 month period.
1983	Lightning ignited fire burnt 34,000 ha of Namadgi and Kosciuszko National Parks.
1985	Mt Buffalo fire burnt 4,500 ha over 12 days. The fire began as a result of lightning.
1988	'Blackjack and Gattamurh' fires burnt 62,000 ha of south eastern KNP and the Alpine National Park over 26 days, ignited by 5 lightning strikes.
1998 Dec 31 to 9 Jan	The 'Caledonia Fire' burnt a total of 32,000 ha. Of this area, 22,000 ha was in the Alpine National Park (12,500 ha of which is Wilderness or Remote Natural Area) and 10,000 ha was in the Carey River State Forest. The suspected cause of the fire was a campfire.
2003	Extensive fire across Vic, NSW & ACT, affecting 1.8 million ha over a period of 3 months, ignited by lightning.
2006	Over 70 fires caused by lightning strikes in Victoria on 1st Dec. The two most serious fires occurred in the north east (the 'Great Divide North' fire) and Gippsland (the 'Great Divide South' fire). These fires were eventually contained in mid February 2007 after 1,048,238 hectares had burnt.
2009	Victoria suffered Australia's most tragic bushfires on Feb 7th & 8th. Over 2000 properties were lost and 173 people died. Marysville, Kinglake, and Strathewen townships were devastated.

## REFERENCES

Australian Broadcasting Corporation (1998) M. Tulau, 'Aboriginal Fire', Quantum website: <http://www2.abc.net.au/science/future/196.shtml>, sourced: June 2005.

Crabb, P, (2003) *Managing the Australian Alps: a History of Cooperative Management of the Australian Alps National Parks*, Australian Alps Liaison Committee/ANU, Canberra.

Department of Conservation and Environment (1992) *Management Plan - Alpine National Park Bogong Planning Unit*, Melbourne.

Department of Conservation and Environment (1992) *Alpine National Park Cobberas-Tingaringy Unit*, Melbourne.

Flannery, T. (1994) *The Future Eaters: an Ecological History of the Australasian Lands and People*, Reed Books, Chatswood.

International Union for Conservation of Nature and Natural Resources (IUCN), Prescription Burning Debates in the Snowy Mountains: <http://www.nrsm.uq.edu.au/iucn/pages/chap/12/main12.htm#Top>. Sourced: July 2005.

Kosciuszko National Park (2004) 'Draft Plan of Management', New South Wales National Parks and Wildlife Service, Department of Environment and Conservation, Hurstville.

## GLOSSARY

**Dendrological data:** tree scarring data. Dendrochronology is the dating of past events (climatic changes) through the study of tree-ring growth. This form of dating is based on the principle that the growth rings on certain species of trees reflect variations in seasonal and annual rainfall. Trees from the same species, growing in the same area or environment will be exposed to the same conditions and, therefore, their growth rings will match at the point where their lifecycles overlap.

**El Nino:** where a change in the surface water temperature in the Pacific Ocean affects weather in countries which border it.

**Hydrography:** the science of surveying and charting the sea floor and coastlines for navigation and other purposes. It is a branch of marine science concerned with the measurement, description and depiction of the nature and form of the seabed.

**Lignotuber:** a lignotuber is a thick, rounded, woody part of a stem, usually found underground or just below the point of attachment of the cotyledons (the structure where food is stored) in young seedlings. Encased within the lignotuber are various types of buds from which the plant might regenerate after fire or other damage to the plant. The existence of these axillary or adventitious buds provides a potential source of shoot regeneration.

**Montane:** high slopes with mean midwinter temperatures above 0°C, very high precipitation. Here snow falls but does not persist. Landform includes steep slopes dissected by deep gullies, escarpments, deep gorges and waterfalls. Vegetation comprises tall, wet, open forests, dry, open forests and rainforests.

## PLANT AND ANIMAL SPECIES

Alpine Ash, *Eucalyptus delegatensis*  
 Bogong moth, *Agrotis infusa*  
 Mountain Pygmy Possum, *Burramys parvus*  
 Northern Corroboree Frog, *Pseudophryne pengilleyi*  
 Snow Gum, *Eucalyptus pauciflora*  
 Southern Corroboree Frog, *Pseudophryne corroboree*