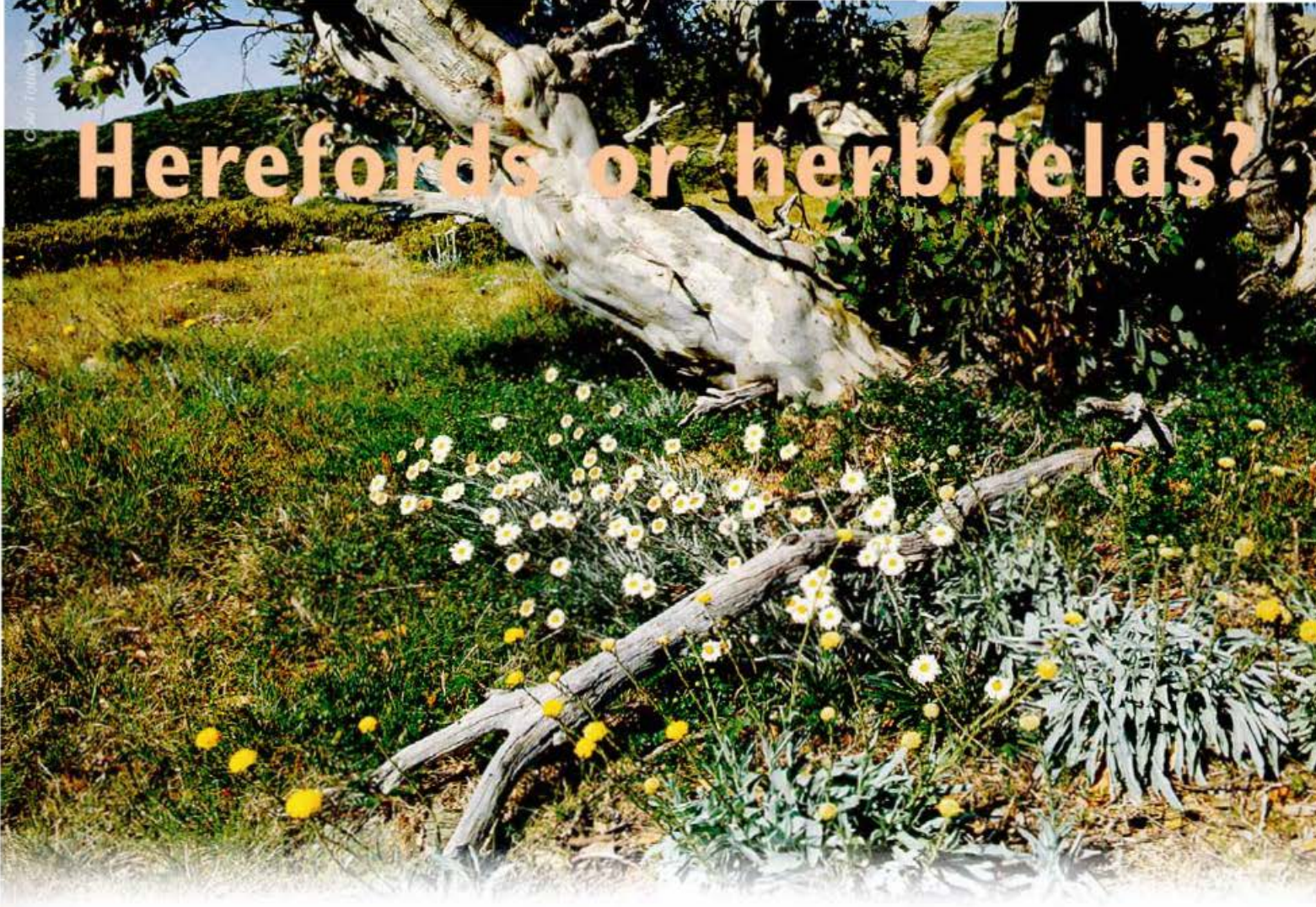


Herefords or herbfields?

Cattle grazing is entrenched on Victoria's high plains. But a mountain of scientific evidence – including an experiment spanning half a century – suggests it shouldn't be. **Bryony Bennett** reports.

Maisie Fawcett's arrival at the remote Victorian high-country town of Omeo in 1941 probably aroused a mixture of suspicion and amusement among the local graziers. She had been sent there by Victoria's Soil Conservation Board to investigate erosion problems, including those of the Bogong High Plains, an area that for almost a century had been grazed by cattle in summer.

The adverse effects of overgrazing in the high-country had been reported as early as the 1890s, but it wasn't until the Hume Reservoir and Keiwa Hydro-electric schemes were taking shape half a century later that the fragility of alpine catchments was recognised officially.

In 1944, the New South Wales Government removed grazing from the summit of Mount Kosciusko and nearby areas. Action was needed in Victoria too, where the degradation was accelerated by overstocking in drought years, and bushfires in 1939.

Summer use of the Victorian high country by nearby graziers began in the 1850s. During droughts in the late 1800s and early 1900s, other pastoralists brought stock to the area for drought relief. In the summer of the severe drought of 1902-1903, an estimated 40 000 sheep, and large mobs of cattle and horses, grazed the Bogong High Plains. Many starving sheep came from as far away as the Riverina. This practice was repeated during other severe droughts, when stocking pressure was intense. During the 1939 bushfires, much of the region's snowgum and heathland was burnt to the ground. Even some mossbeds smouldered for weeks.

Three common signs of damage were vegetation loss exposing bare soil, soil erosion, and deep channelling of drainage lines. In some places the soil mantle was stripped entirely, resulting in stony erosion pavements.

Today the Bogong High Plains is protected from degradation of the scale observed in the 1940s. In 1946, government departments and graziers agreed to controls on alpine grazing. Sheep, horses and burning-off were banned, the grazing season limited, and cattle numbers stabilised. The area is now part of the Australian Alps National Park, which links alpine and subalpine zones of Victoria, New South Wales and the Australian Capital Territory.

Despite these conservation measures, the grazing continues. It's a situation that rankles with conservationists, ecologists and some politicians, particularly those favouring nomination of Australia's alps for world heritage listing. A history of the politics and science related to high-country grazing can help to explain how this situation has evolved. The latest results of long-term ecological research offer clues as to whether it should continue.

An enduring experiment

Fawcett, a botanist and ecologist, made her alpine forays on a mare named Sheila. She befriended the graziers who let her join them at mustering time.

She believed that the vegetation damage and soil erosion were due to overgraz-

In the 1950s parts of Victoria's high plains were severely degraded.

1. Gully erosion at Mount Hotham.

2. Advanced water, wind and frost erosion of an alpine herbfield, also at Mount Hotham.

3. Tracks in the vegetation reveal the many paths trodden by cattle.

4. In contrast, this grassland on the Bogong High Plains did not appear degraded.

ing, with fire as a contributing factor. (The graziers burned off to promote the growth of succulent, young pastures). To test this theory, and learn more about the area's ecology, Fawcett and Professor John Turner from Melbourne University's School of Botany set up a far-sighted experiment.

A seven-hectare site with areas representing most subalpine plant communities on the Bogong High Plains was selected and fenced. Inside, a reference plot was set up in each of three common vegetation types: open and closed heathland and a sedge/herbfield snow patch community. Plots were also set up outside the exclosure on similar slopes and aspects, providing a grazed and an ungrazed plot in each vegetation community. These 'Rocky Valley' plots were first sampled in 1945.

In 1946, another site of about 0.2 ha was selected in exposed grassland at Pretty Valley. It contained many plants thought to be favoured by cattle. The same year, sheep, horses and burning-off were banned on the Bogong High Plains and cattle numbers pegged at about 8500 adults plus calves.

Fawcett and Turner's investigations, unlike the alpine explorations made in the 1850s and 60s by State botanist Ferdinand von Mueller, involved the painstaking collection of data over many years. A voluntary labour force was duly assembled. It was the birth of a pilgrimage destined to be repeated for decades. Each summer, students, graduates and staff descended on the Rover Scout Hut, turning it into a holding house for botanical specimens. The State Electricity Commission helped with food, transport, and fencing. (The fences are lowered in autumn so as not to endanger skiers).

Dr David Ashton, former Reader in Plant Ecology at Melbourne University , joined the surveys from 1949 to 1953. His own studies back then concerned the regeneration of mountain ash forests. He remembers it as the time when ecology became respected as a field of science. 'The surveying was a social event, but hard work,' Ashton says. 'We would be down on our hands and knees taking samples, day after day for three weeks.'

Conservation wins favour

Nine years after her appointment, Fawcett left the area to teach at Melbourne University, yet continued to measure the plots. In 1960 she went to Belfast with her husband, Professor Denis Carr. The Soil Conservation Authority kept up the plots. Two papers summarising the survey results from 1946 to 1958 were published in the *Australian Journal of Botany* in 1959.

During the 1950s and 60s grazing was withdrawn from Victoria's highest ridges and peaks, which invariably were most degraded. This included the Mount Bogong, Mount Loch, Mount Feathertop and Mount Hotham summits. Grazing was also banned between 1944 and 1968 from what is now Kosciusko National Park. Former CSIRO Division of Plant Industry scientists Dr Alec Costin and Dane Wimbush, and the Australian Academy of Science, helped to achieve this.

By 1970 public interest in land-use had risen and there were calls for an alpine national park. Mountain grazing had become an issue of nature conservation as well as catchment health. The Victorian Government established the Land Conservation Council (LCC) and in 1973 asked it to investigate the area.

Spurred on by the land-use controversy, the scientists stepped up studies of the region. Maisie Carr was invited to revisit the plots and Costin was asked to inspect the Bogong High Plains, an area he was familiar with from his work with the Soil Conservation Authority in the 1950s. Both Costin and Carr produced reports critical of the effects of grazing.

The LCC's final report in 1979 proposed four national parks, one of which incorporated the Bogong High Plains. These were gazetted in 1981 and in 1989 were linked to become the Victorian Alpine National Park. The report also said grazing should be phased out in high-altitude, environmentally-sensitive areas covering about 20% of the Bogong High Plains by 1991, but allowed to continue elsewhere, with seven-year, rather than annual, permits.

Neither conservationists nor graziers were happy with the recommendations. Conservationists had hoped for a larger park with no grazing, while graziers felt the withdrawn leases might hasten calls for a total ban onhigh country grazing.

The return of Carr and Turner to survey the plots in 1979 spawned a new wave of research on the Bogong High Plains. Keith McDougall of the Soil Conservation Authority started mapping the vegetation and Harm van Rees began studying the diet and behaviour of free-ranging cattle. Also, two more sites were selected about one kilometre from the Pretty Valley site, near Cope Hut and Cope Creek. These grazed sites were set up to monitor vegetation change in the fledgling national park.

It was during the 1979 field trip that Warwick Papst, then with the Soil Conservation Authority, met Dick Williams, a Melbourne University graduate. Williams began a PhD in 1980 and his investigations were to verify Carr's earlier

hypotheses on ecological processes in grassland and heathland. Upon finishing his doctorate, Williams spent four years at Monash University, continuing his work on high-country ecology.

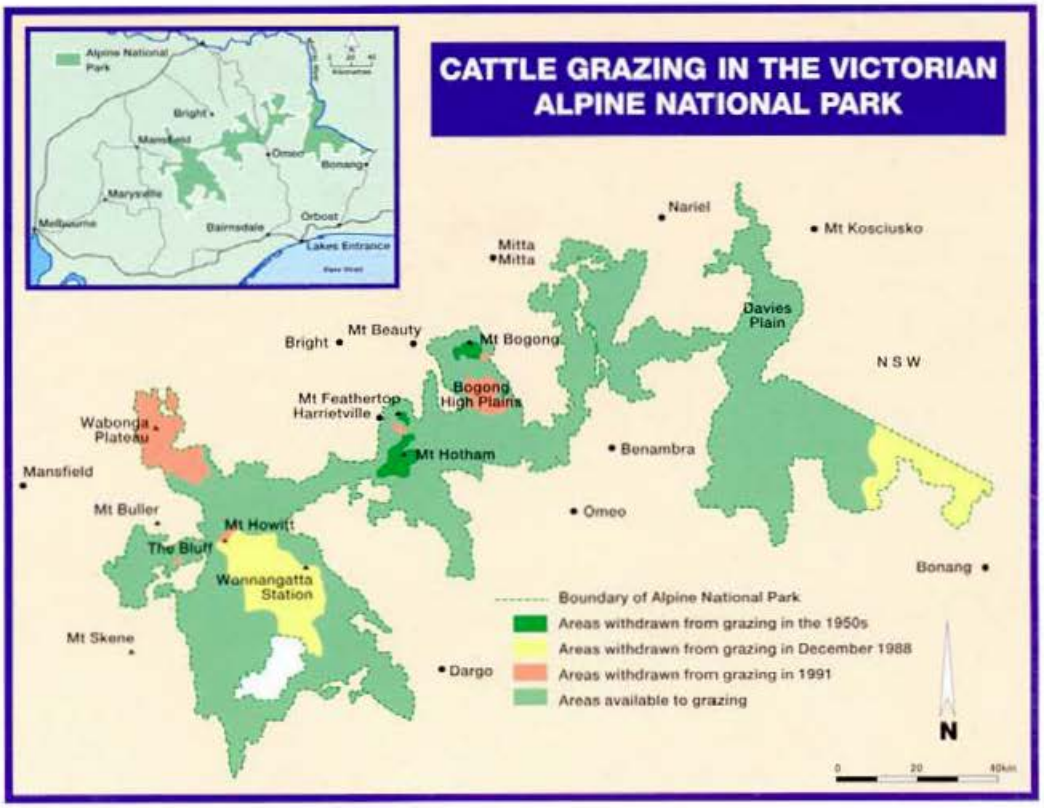
Today he studies landscapes of a different kind – the savannas of the Top End (see *Ecos* 82) – from his base at CSIRO's Division of Wildlife and Ecology at Darwin. Warwick Papst still roams the high country as a research worker with Victoria's Department of Conservation and Natural Resources.

A generous legacy

After Maisie Carr's death in 1988, Professor Carr offered Papst and Williams a windfall: all the data recorded at the Rocky Valley and Pretty Valley plots. He also provided a $5000 post-graduate scholarship for Henrik Wahren of Monash University's Department of Ecology and Evolutionary Biology to conduct the analysis.

'All the data were in folders with the plot names and years marked on them, dating all the way back to 1945,' Papst says. 'The folders filled a large trunk.'

Papst and Williams drove back to the high plains with the data and made sure they could find all the plots and transects. They had surveyed some of them in 1982, and were to repeat the exercise in 1989 and 1994. The 1989 survey, funded by the National Parks and Wildlife Service, followed the declaration of the Australian Alps National Park. This joined the Kosciusko and Victorian Alpine national parks and Namadgi National Park in the ACT.

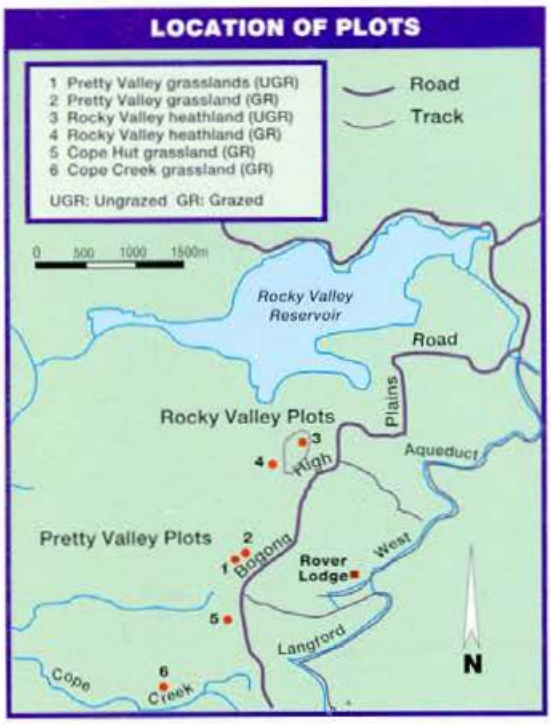


'Grazing alters natural processes in subalpine vegetation communities,' Williams says. 'Persistent, selective grazing alters the composition and structure of the vegetation and trampling by cattle damages the soil and vegetation. This leads to bare ground and soil erosion, and a reduction in native herbs (wildflowers).'

These changes are evident at the Pretty Valley and Rocky Valley plots (see aerial photo) where grazing has altered the natural balance of herbs and woody-plants. The species preferred by cattle, such as native herbs, have decreased in cover and the less-palatable ones, such as some woody shrubs, have been little affected or increased.

Based on this information, one might expect an area relieved of cattle to sprout a profusion of herbs. While this has certainly happened, the healing process doesn't work only in that way. Among the first plants to regenerate after disturbance are the shrubs, because they can colonise bare ground. If given enough cattle-free time (more than 50 years) certain shrubs senesce, allowing snowgrasses to regenerate under them. Herbs then colonise the inter-tussock spaces. 'When cattle are excluded from heath and grassland communities, the shrubs move ahead, but only temporarily,' Williams says. As the shrubs age and die (senesce) they provide a nursery for regenerating grasses and herbs.

'It wasn't until 1989 that we recorded the first measurable downward trend in shrub cover. This trend continued in 1994, indicating that the shrubs which regenerated after the 1939 bushfires and the removal of cattle were dying out.' (See Figure 1 on page 33.)



Natural order disrupted

The paper by Wahren, Papst and Williams reports that cattle have had a substantial and lasting impact on the structure and composition of subalpine grassland and heathland vegetation, and significantly interfere with natural regeneration.

Grazing has affected the abundance of the major herbs in the Pretty Valley grasslands. Between 1947 and 1994, the cover of *Celmisia* and *Craspedia*, two of the showiest wildflowers (see picture on page 33), increased substantially. On the grazed plot there was no change in the sparse cover of these species (see Figure 2 on page 33).

One herb, however, *Leptorhynchos*, was abundant on the grazed plot. This is a vigorous colonist of the bare, inter-tussock

spaces that result from cattle grazing. Grazing therefore gives it an advantage over other herbs such as *Celmisia*. With no grazing, *Celmisia* will eventually displace *Leptorhynchos*. This is an example of how grazing alters natural processes.

Ground cover conditions were also different on the two Pretty Valley plots. From 1982 to 1994, the amount of poor-quality ground cover was three to five times greater on the grazed plot than on the ungrazed plot.

These results are significant in terms of soil conservation, as bare ground or loose litter, with little vegetation cover, are susceptible to erosion by wind, rain and frost action. The ground cover condition of the ungrazed plot was also superior to that of the grazed sites at Cope Hut and Cope Creek. Hence the vegetation on the ungrazed plot better protects the soil surface than at any of the three grazed grassland sites studied. In the absence of grazing, the soils start to regain their original porosity and to accumulate organic matter.

Although there was little change in the nature of grazed grassland between 1979 and 1994, the condition of these grasslands, in terms of soil and nature conservation values, is inferior to that of the ungrazed plot at Pretty Valley. The scientists concluded that most of the grazed grassland on the Bogong High Plains is stable, but degraded.

The Rocky Valley heathland plots offer further examples of how grazing can interrupt natural processes. The vegetation at Rocky Valley was burned in 1939 and the expansion of shrubs on the grazed and ungrazed plots over the study period is part of the post-fire regeneration process.

Shrub cover increased on both plots until 1979. From 1979 to 1989, however, the shrub cover declined on the ungrazed plot, while continuing to increase on the grazed plot. On the ungrazed plot, the canopy gaps revealed by the dying shrubs were colonised primarily by *Poa* (tussock snowgrass). *Poa* is likely to increase further as these aged shrubs continue to die. Replacement of mature, dominant shrubs, such as *Grevillea* and *Phebalium*, by *Poa*, as canopy gaps expand, is common in open heathland. This is the latter stage of the regeneration process described earlier and, significantly, is occuring only in the ungrazed plot.

On the grazed plot, the shrubs that continued to expand over the entire study period were those non-palatable to cattle. *Prostanthera* shrubs, for example, are fast-growing and form dense heaths that cattle avoid (see picture on page 35). Gaps are usually colonised by shrubs, rather than *Poa*. Thus, due to interactions between life history characteristics and palatability, *Prostanthera* can persist in the face of grazing. In contrast to these unpalatable shrubs, *Grevillea* did not increase in cover in the grazed plot, probably due to selective browsing (see Figure 3 opposite).

Does grazing reduce blazing?

Supporters of high-country grazing say that shrub cover, and thus the risk of fire, is reduced by cattle. But the trial has shown that few shrubs are reduced in cover as a result of grazing.

The only evident reduction in total shrub cover which has clearly occurred as a result of browsing was that of *Asterolasia* at the grazed Pretty Valley grassland site. This shrub is only 20 centimetres high and is unlikely to be as flammable as the taller, faster-growing shrubs. In the taller, denser heaths which were extensively burnt in the 1939 fires, and are the most flammable of the subalpine vegetation, grazing has not reduced total shrub cover.

Williams says in the grasslands, cattle mainly eat snowgrass and other herbs (or other herbaceous plants), but this doesn't reduce the fire risk as the risk is low to begin with. This is because the grasses in most summers are green and ankle-height. Also, the grasses grow on gentler slopes where fire will never be intense. (The rate of spread is proportional to the slope: the greater the slope, the faster the spread, and the more intense the fire.)

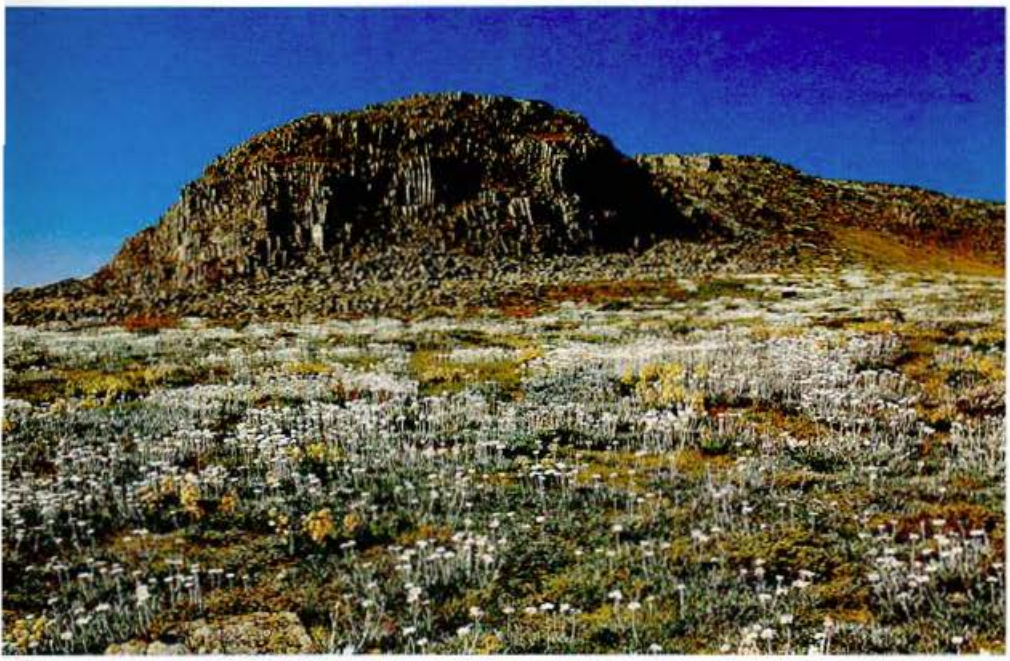
In the alps, intense, raging fires are rare, Williams says. Even in 1939 the grasslands were not badly burnt while the heathland and snowgum woodland was scorched. In fact, in most seasons the grasslands act as natural firebreaks.

Species composition changed

Cattle grazing clearly has substantial impacts on the composition and structure of subalpine vegetation. In grassland, it alters species composition and structure by selective grazing of the taller herbs and short, palatable shrubs. It also results in persistently greater areas of bare ground that are susceptible to soil erosion by frost heave and wind winnowing.

The expansion of shrubs in the past 50 years appears to be mainly the result of post-fire regeneration following periods of high grazing pressure and fires in previous decades. Ecological processes and selective grazing of some shrubs and avoidance of others have interacted to produce changes in species composition, some transitory and some permanent. In the

Left: An aerial view of the Pretty Valley plots in 1992. The ungrazed plot is clearly distinguishable from the ungrazed plot and surrounding vegetation.
Above: The Pretty Valley plots in 1993. The ungrazed plot is on the left.



Colin Totterdell

Between 1947 and 1994 the cover of *Celmisia* (white flowers) and *Craspedia* (yellow flowers) increased substantially. On the grazed plot there was no change in the sparse cover of these species.

prolonged absence of grazing, shorter-lived shrubs expanded initially, but are now senescing and being replaced by tussock grasses and herbs. Longer-lived shrubs may continue to expand, but are not reduced by grazing.

In grassland, continued grazing will reduce the abundance of taller herbs and dwarf palatable shrubs. Some shrubs, such as *Grevillea*, may continue to expand. Continued grazing in open heathland is likely to reduce the cover of short, palatable shrubs, but may lead to an expansion of taller, more persistent, non-palatable shrubs. It will not reduce the risk of fire.

Political parades

In 1991 about 100 seven-year grazing leases were issued for the Victorian high country. Seventy of these allow grazing in the Victorian Alpine National Park (a total of about 8500 head of cattle plus calves). Eighty per cent of the park's 646 000 ha is available for grazing.

Allowing grazing to continue was part of a compromise that in May 1989 enabled the Victorian Labor Government to pass the Alpine National Parks Bill. The Liberals agreed to support the Bill only if it was amended to allow grazing (and other activities such as once-only logging) in the national park.

The Liberals owed a favour to the mountain graziers who had helped them to win a byelection in 1986. That year they rewarded the graziers by blocking the proposed national park legislation. In 1989, however, the Liberals' support for the graziers was balanced by the need to acknowledge the voters' growing concern about conservation. Thus the Victorian Government's record of compromise on the issue of alpine and subalpine land-use continued.

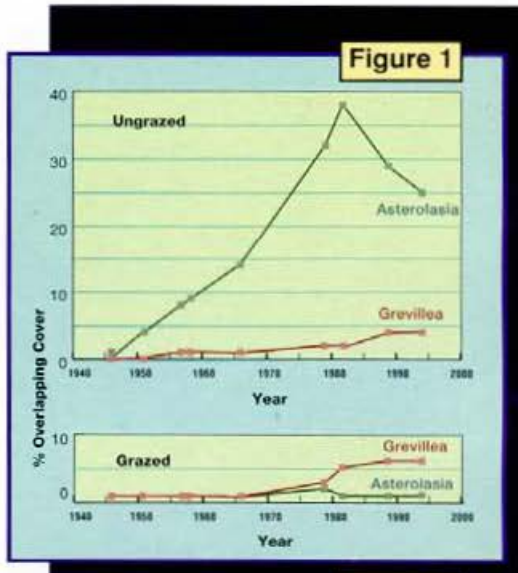
The graziers helped the Liberal Party to win the Nunawading byelection by repeating a spectacle first staged in 1984. On that occasion more than 300 graziers and supporters, rode through Melbourne to the steps of Parliament House to gain support for the continuing use of alpine and subalpine grazing lands. They attracted public sympathy to their claim that part of Australia's heritage was at stake in a bid to counter unfavourable scientific evidence about grazing. This support was translated into political action.

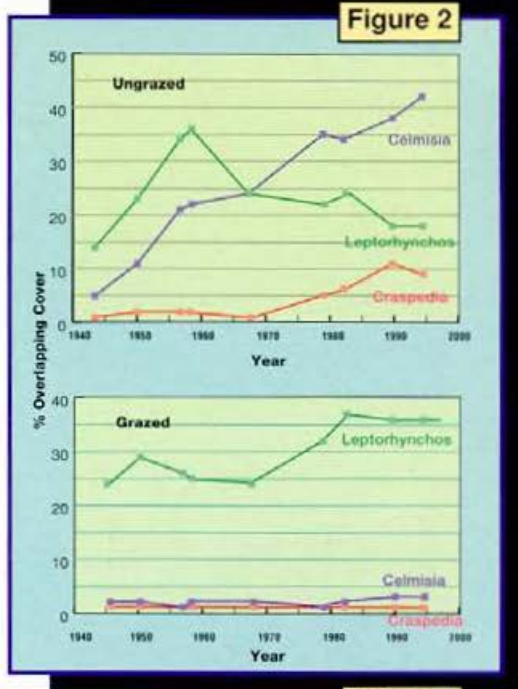
What is a national park?

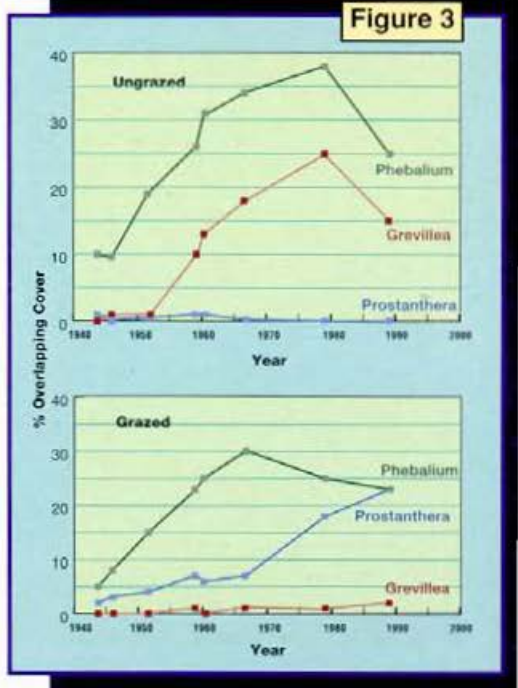
High country grazing is integral to debate about land uses in the Victorian alps. Cattle grazing does not conform with generally accepted national park management objectives. The interference to natural ecosystems, the presence of exotic animals (including horses and dogs at mustering time), and the use of four-wheel-drive vehicles, conflict with many people's expectations of national park land. 'It seems curious that people cannot pick wildflowers in the national park, but cattle can graze them freely,' Wahren says.

Ecologists, while recognising the heritage of mountain grazing, say it is an inappropriate national park land-use. Also, grazing hampers the recovery and protection of soils in eastern Australia's most important water catchments.

Dr Alec Costin and a senior scientific officer with the NSW National Parks and







Wildlife Service, Roger Good, both used to work for the NSW Soil Conservation Service. Between them they have invested more than 80 years in the research of Australia's alpine and subalpine ecosystems.

In 1986, with the help of the Australian Conservation Foundation, they helped set up a Memorandum of Understanding (MOU) relating to the management of alpine and subalpine national parks in Victoria, NSW and the ACT. This is a formal arrangement between the state, territory and federal ministers whose portfolios include alpine and subalpine nature conservation and land management. An Australian Alps Liaison Committee was also established to co-ordinate joint management programs.

Good says that although the MOU and the committee have engendered a common philosophy on some aspects of nature conservation and park management, differences in attitudes, priorities and time frames for implementing management strategies and programs prevail. Victoria's retention of grazing in national park land is one example, contrasting with its exclusion in Kosciusko and Namadgi.

'How can Victoria claim its area is managed as a national park and graze cattle in it?' Costin asks. 'Given that a main function of national parks is to preserve and restore outstanding natural environments, grazing is unacceptable. The scientific evidence is incontravertible. The condition of the grazed land is inferior from the national park point of view to that of the protected areas. Victoria should get its house in order if it's serious about having high-country national parks.'

Good says some traditional high-country grazing practices could be retained, but not in the sensitive alpine and subalpine areas. He says if, for political reasons some form of mountain grazing were to continue, it should only be in forested areas below and outside the national park.

High-country treasures

Cattle have grazed on Victoria's high plains since the 1850s. Pastoralists began the practice to overcome feed shortages during hot, dry lowland summers. In the early days, high-country grazing was not controlled. The 'law of the range' applied, with overstocking, particularly during drought years, and competition for the best areas.

Today things have changed, according to third-generation grazier and former president of the Mountain Cattlemen's Association, Doug Treasure.

Like many of Victoria's high-country graziers, Treasure is a direct descendant of one of the district's first settlers. Grazing leases can be transferred, but usually are passed from one generation to the next.

Treasure's great-grandfather came to Victoria's high country as a goldmine manager in 1878. His wife and family diversified into beef, and in the 1890s were issued their first high-country grazing lease, for areas of the Dargo High Plains.

Treasure, a member of the West Gippsland Regional Catchment and Land Protection Board, admits that, as in many industries, graziers have made mistakes. But their environmental awareness has improved enormously in the past 40-50 years.

'There was a need for scientists such as Maisie Fawcett to draw attention to grazing pressures,' he says. 'We needed to ask some questions and we still do. The further we go, the more conscious we become of the environment.'

He says now that the graziers have guarantees that their seven-year leases will be renewed, their relationship with the Victorian Department of Conservation and Natural Resources is less confrontational and more productive. He is a firm believer in the value of national parks, but says there can be problems when parks are used for too may activities.

'The mistake was to make all of that area a national park,' he says. 'It should have been a lot smaller; selected for specific sites of natural importance. These areas could be fenced off and managed intensively.'

Treasure says the 'environmental plus' of having cattle grazing in the park is management. He says the Kosciusko National Park is more poorly managed now than when there was grazing there. He says feral pigs and horses are out of control at Koscuisko, but in the Victorian high country, feral animals are controlled by graziers. He says graziers have an incentive to manage the land responsibly because their income depends on it.

A cattlemen's field day at the Rocky Valley plots in 1954.

The Treasure family's lease covers the whole of the Dargo High Plains. A total of 1500 head of cattle are grazed on national park and state forest land. Doug Treasure runs 500 Herefords at his home property at Stratford, on the high plains, and at various locations in between.

The high-country leases enable graziers to run larger herds by allowing them to conserve pastures on their lowland home properties during summer, which is then used for winter feed. This in some cases guarantees the viability of the farming enterprise. Stock grazed on the alpine pastures fetch top prices at sales, due to their perceived quality.

Cows and calves are taken up to the licensed blocks along established routes in December. Most of the area is not fenced and cattle are prevented from straying excessively by topographical features and the use of salt licks (alpine pastures are salt-deficient). At the end of the season (April/May) the herds are mustered and driven back to their lowland pastures. On their return, 70% of the calves are sold off as 'store' cattle, ready to be fattened and sold again.

The graziers have devised systems of management that integrate feed supplies on the home property and the grazing run. The level of dependence on public land for the viability of the farming operation varies from grazier to grazier.

Treasure says without the Dargo High Plains leases, he would have to reduce his herd by 35%. 'If I didn't have high-country grazing, I would be susceptible to drought,' he says.

Grazing versus world heritage

Despite the scientific evidence, and the views of ecologists, grazing on Victoria's high plains is set to continue, at least for another three years.

In 1992, the Victorian Department of Conservation and Environment tried to ban grazing from newly-declared Wilderness areas at Davies Plain in the Victorian Alpine National Park. The graziers, having just been issued seven-year leases, fought the ban in the Supreme Court, and won. As a result, it is now understood that any further removal of grazing in the national park would require amendments to existing legislation.

Such amendments would no doubt be welcomed by the conservationists, scientists and those politicians who are keen to see the Australian Alps National Park nominated for listing under the World Heritage Convention.

Last May (1994), Professor Jamie Kirkpatrick of the University of Tasmania's Department of Geography and Environmental Studies completed a report on the international significance of the natural values of the Australian alps. The report, commissioned by the Australian Alps Liaison Committee, revealed that the alps have 'outstanding international significance on the criteria used by the World Heritage Convention in a variety of areas'.

To gain a relative measure of their international significance, Kirkpatrick devised a scoring system to compare the Australian alps with the six recently-nominated world heritage areas in Australia. The system places the Australian alps well within the range and number of outstanding characteristics that have been sufficient for world heritage listing in the past. Thus the Australian alps could be considered to have world heritage significance.

Kirkpatrick said problems with incompatible land-uses in the national park, such as grazing, logging and inadequate protection of wilderness, would need to be tackled to allow a world heritage nomination the best chance of success. 'A commitment to the removal of stock grazing would be important,' he said.

Last November the ACT, Commonwealth, NSW and Victorian governments agreed to recognise the importance of these findings and encourage discussions between the parties with the object of seeing how these values are protected.

Under the spirit of the MOU, all relevant governments would need to support the world-heritage nomination. The ACT and NSW environment ministers support further examination of the issue. The Victorian minister declined to comment.

'Unfortunately the high country grazing issue is used by certain parties as a reason not to proceeed with a world heritage nomination,' Good says. 'While the reverse is often used as an argument to get rid of grazing.

'What this really means is that the powers that be cannot make a decision to address world heritage nomination for the alps, or to phase out grazing. The removal of grazing would certainly assist the world heritage nomination but is not absolutely crucial to it, provided a commitment were given to do so in the foreseeable future.'

According to the graziers, high-country grazing in Victoria's Alpine National Park is here to stay (see box story opposite). The issues this raises in relation to the multiple use of a national park are yet to be resolved.

Ecologists have shown that grazing and conservation cannot exist in harmony. They say there are plenty of other places in north-east Victoria suitable for grazing cattle, but only one place to have an alpine national park. Their solution is to continue the heritage of mountain grazing at lower elevations where the impact of cattle is less.

The future extent and management of land-uses of the Victorian alps will depend on a combination of ongoing research and monitoring, public perception and political process.

Colin Totterdell

Non-palatable shrubs such as *Prostanthera* are given a competitive advantage by cattle grazing.

More about mountain grazing

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