

Black Mountain Symposium 2018: synthesis

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1. Introduction

The symposium papers are rich with detail about the history, natural characteristics and uses of Black Mountain Nature Reserve. Few natural places in our region have received the detailed scientific and community attention that Black Mountain has attracted over the last 80 years, and perhaps even fewer could attract the numbers of people who have devoted significant time and effort to writing these papers, preparing for and attending this symposium.

Each of the contributing papers is valuable and interesting in its own right, but what might be said about their whole, their interactions, and how this might influence future Reserve management? What might be the most outstanding characteristics to prioritise for protection, what might be the claims on how to use the land, and how might the knowledge embodied in the symposium papers inform future management? This paper is a brief synthesis of the most outstanding characteristics of the Reserve, and some possible management implications for conserving them into the future.

It is customary in shaping management plans for places to consider the attributes of the place that are most 'valued'. The relative weight of values assists in making any trade-offs between them, and management actions are then developed to protect the agreed set of values. It has been common practice to classify values under headings such as 'Natural Values', 'Cultural Values', 'Heritage Values' and 'Indigenous Values'. This paper departs from this naming custom for two reasons. Firstly, all these values are essentially cultural (as in social) values. It is people who decide the value of nature, not nature itself. Separating natural values from cultural values risks obscuring the fact that the most difficult decision in deciding how a reserve will be managed is managing the trade-offs between 'existence' and 'use' values—but all of them flowing from the various desires of people. While they work as a simple organising principle, in practice some activities discussed in the paper embody both: taxonomic collectors enhance our understanding of existence values by taking specimens, a type of use.

These terms come from environmental economics which seeks to quantify them, but the underlying reasons for people's behaviour are perhaps better understood from studies in psychology. Many cultures have been found to demonstrate a common set of basic values that shape an individual's life goals and behaviour (Schwartz 2012). Some of these are internally focussed, and some externally focussed; people with a stronger focus on the latter are more likely to support the existence of other species in their own right.

The second reason for not following the conventional classification is that it sets aside Indigenous people, suggesting that they have no connection with natural or heritage values which plainly contradicts the basis of their lives, past and present.

This paper therefore offers very abbreviated summaries of the main points of the accompanying papers, focussing on the characteristics of Black Mountain that are of the highest significance and highlighting any implications for future management. Descriptive statements about each topic are very largely based on the submitted papers; the management implications come partly the submitted papers, discussion amongst participants and my own experience, and the final conclusions are mine alone.

2. Existence values: biophysical

2.1 Geology

Black Mountain has a distinctive geology, not repeated elsewhere in the ACT. It also contains the oldest rock unit in the Canberra region, the Pittman Formation, which dates back some 460 million

years. Beginning earlier as sediments accumulating in a 5 km deep ocean basin, they were compressed then brought near the surface over a long period of compression, uplift and folding. Overlaying the Pittman Formation is a layer of sandstone now around 450–800 m thick, laid down during the 10 million years following the Pittman Formation (Finlayson 2018). The Pittman Formation rocks outcrop in a few places, as does a small area of State Circle Shale under the sandstone near Parkes Way. Exposure of these extremely old rocks attests to the extremely long period of erosion of perhaps 5 km of material above them.

The geology of Black Mountain is significant for its age and distinctiveness. For management, these attributes provide opportunities for interesting and educational interpretation. Sites that display these geological features also need to be protected from destruction.

2.2 Landforms and soils

Black Mountain has two contrasting landforms: the ridges and steep slopes of the north, west and south side, generally with shallow soils of more recently eroded material, and the lower slopes with deeper soils accumulated from deposited material moving downslope from above (Tongway 2018). The latter soils are very prone to erosion if their upper level of sandy loam is disturbed and the underlying sodic clay layer exposed to water. This destroys the soil structure and, on slopes, erosion can be very rapid.

Across Black Mountain generally erosion rates are at about the natural geological rate due to management controls on disturbance and the presence of wood and leaf litter on the ground that slows the rate of water flow and hence its erosive power. However, along some roads and tracks and around infrastructure installations where the upper soil layer has been disturbed or removed there are some specific sites with significant erosion.

The main management issue is to minimise further erosion developing through better contouring new or replacement walking trails, monitoring and removing inappropriate informal trails, ensuring infrastructure is used and installed appropriately, and avoiding hot prescribed fires in order to protect ground litter.

2.3 Vegetation

The vegetation on Black Mountain is mostly dry sclerophyll forest that is broadly representative of those forests found widely across the southern tablelands. The forest is floristically and structurally diverse although relatively few species constitute the bulk of the biomass. Smaller areas of typical tableland grassy woodland exist on the lower slopes (Doherty 2018a). Early settlers used the mountain for rough grazing and an area in the south east was cleared by ringbarking during the 1800s. Firewood collection from the mountain continued through into the early years of federation and one area was set aside and managed as a firewood plantation. Although thinned for its timber, the steeper upper slopes were never fully cleared. The area once cleared has also recolonised, largely naturally, and since the reserve was established in 1970 an area of grassland has been densely colonised by the native shrub *Burgan*. Many exotic and non-indigenous plant species have been identified in the Reserve (Purdie 2018a) but the biomass is still dominated by native species. Volunteers have contributed significantly to weed control on the mountain (Beveridge 2018).

The main management implication in the future is how the pattern of planned fire and its interaction with a changing climate will impact on the composition and structure of the vegetation.

2.4 Plants

Over 4000 plant specimens have been collected on Black Mountain over the last 90 years (Purdie 2018b). They represent 728 species of vascular plants (ferns, conifers and flowering plants) (Purdie 2018a) and 313 species of non-vascular plants (macrofungi, lichens, hornworts, liverworts and mosses) (Purdie 2018c). From a conservation point of view, the current number of native vascular plant species is thought to be around 332 and the remainder are non-indigenous native species (83

species, most from local gardens and roadside landscaping) and exotics (169, some of them with weedy characteristics).

Compared to other reserves in the ACT the diversity of plants appears high but on an area basis and omitting the exotics and non-indigenous native plants, the diversity is comparable to Mulligan's Flat. Other reserves in the ACT have a less intensive history of collection and the presence of many more species in them is likely to be reported over time (Purdie 2018a).

Rare plants are usually an important focus for conservation. There are currently 280 plant species on the ACT rare plant list; 27 of these occur in Black Mountain Nature Reserve and another four nearby (Mulvaney 2018). Twenty of these rare species are orchids; moreover, for seven of them the Black Mountain sandstone may be their national stronghold and for an additional seven, most of their ACT population is found on this geology.

Management issues for the plants generally follow those for vegetation: understanding how the pattern of planned fire and its interaction with a changing climate will impact on the composition and structure of the vegetation. Invasive weeds need to be managed, and plants with conservation status and those that are rare in the ACT need to be protected from inappropriate fire regimes or other disturbances.

2.5 Mammals

There are at least 26 native and 10 introduced mammals on Black Mountain. The native species are reasonably diverse and typical of northern ACT forests and woodlands (Evans 2018). Most have persisted over time, but not the small ground-dwelling species, probably due to a reduction in litter and logs (due to hazard reduction burning) making them more susceptible to predation. Amongst the other mammals, the roads surrounding the mountain are a potential threat, both in terms of mortality and as barriers to connectivity with other reserves for re-population or for maintaining genetic diversity.

Management issues include constraints on connectivity, pest control and managing the impact of fire.

2.6 Birds

Based on bird observation data, 123 species used the Reserve between 1980 and 2016 with the earlier part of that period recording more species than the latter (Fennell 2018). Generally, the species complement is representative of the wider region. There is no obvious cause for declines in some of the species between the two periods although in the case of several threatened species, the decline is also seen elsewhere in the ACT. In particular, the threatened Painted Button-Quail that was once seen quite regularly on Black Mountain, has been seen only twice since 2006. This is a ground-feeding bird and there is concern that reduction in litter due to prescribed burning has accounted for this decline.

The main management issues are the persistence of ground-feeding forest species in regimes of frequent prescribed burning and disturbance from people as usage increases.

2.7 Frogs and reptiles

Records suggest that Black Mountain currently supports 8 frog species and 22 reptile species, including three that are threatened. Its reptiles are a little more diverse than records show for other reserves in the north of Canberra and its frog complement is similar (Osborne and Hoefler 2018). One species of frog, the Brown Toadlet, was once common on Black Mountain but appears to have disappeared in the 1980s, most likely due to the introduced chytrid fungal pathogen. Goannas have also disappeared from the reserve but are judged not likely to persist in a reserve of this size ringed by urban development. Despite these losses, the species reflect those found in comparable forested reserves in Canberra.

The main management issue is the impact of prescribed burning on litter specialists (two species) and on other reptiles that use logs and litter for shelter.

2.8 Invertebrates

Black Mountain has been the site of extensive invertebrate collections and surveys and the number of records is so large that not all are yet digitised and easily searchable. At the time of writing his paper, Pullen (2018) could document 2030 species from Black Mountain and by the time of the symposium this had grown to about 2150. Based on the number of physical records still to be examined, he estimates that more than 5000 would be a reasonable estimate of the total. The insect component is broadly representative of that found in the south-eastern tablelands of Australia.

Of the 2150 species documented in the paper, 180 were type specimens (the first recognised formal taxonomic record), making Black Mountain the type locality for these species. This is a significant legacy, perhaps not matched anywhere else in Australia in such a small area.

Conservation of this rich invertebrate fauna depends largely on maintaining its plant diversity and the diversity of habitats. A very widespread and severe fire on the mountain could threaten long-term persistence of the full complement of species due to difficulty in recolonisation from elsewhere; as for other organisms, any further restrictions on connectivity should be avoided.

3. Existence values: cultural

3.1 Indigenous

Wally Bell, Ngunawal elder, spoke to the symposium about the importance of Black Mountain in traditional Ngunawal life. As a recognisable landmark and vantage point close to sources of food on the floodplain and in the Molonglo River, parts of the mountain were used for ceremony and the lower slopes fronting down to the river were important meeting places. The archaeological record points to the importance of what is now Black Mountain Peninsula as a ceremonial site and oral histories record a series of stone cairns on Black Mountain (Butz 2018).

3.2 European settlement history

Butz (2018) describes the arrival and practices of white people in the Molonglo Valley from 1820 onwards and their uses of Black Mountain. While the lower slopes were heavily grazed, and the south-eastern flank ringbarked up to the ridge, the forest remained on the rest of the mountain, although used as a source of firewood and building timbers and the wildlife impacted by the introduction of rabbits and foxes. A quarry on the southern side provided sandstone for some early buildings and a forest reserve was established in the north-western section to manage the resource for its timber. Along with Mt Ainslie and Mt Majura, Black Mountain was a notable landmark rising from the then grassy valley and its name, dating from 1832, is thought most likely to have derived from its dark appearance.

3.3 Post-federation to declaration as a reserve (1913–1970)

Black Mountain was an important feature in the Walter Burley Griffin plan for Canberra. It was one of the hills forming the edges of the amphitheatre of city and lake, and a fitting high point at the end of the axis formed by the proposed lake “perpetuating there the only remnant of primeval luxuriance on the city site” (Griffin 1913, in Butz 2018). The hills were to remain vegetated as a contrasting backdrop to the city, and this concept remains firm in the National Capital Plan of today.

As Canberra’s population grew, the lower slopes of Black Mountain were gradually encroached upon for roads, building sites and formation of the Australian National Botanic Gardens. Community concern about conserving the integrity of Black Mountain built through the 1960s and a reserve was declared in 1970 (Shorthouse 2018).

3.4 Nature reserve to now (1970–current)

Soon after the reserve was declared, a proposal by the PMG to erect a major telecommunication and public viewing tower on the top of Black Mountain became public (Hotchin 2018a). Despite years of community protest (a good indicator of the significance of the mountain's appearance to local people), including a legal challenge, the tower was approved by the Federal Government and it was completed in 1980. A concurrent proposal to build an aerial gondola whose preferred route would transverse the city-facing slope of the mountain was also opposed by the community. It was finally rejected on the grounds that it would significantly detract from the visual amenity of Black Mountain.

The visual characteristic—its particularly dark and prominent appearance in the wider landscape—is one of the most significant characteristics of Black Mountain because it has endured through the contrasting histories of Indigenous, early settler and city dwellers in this place. Whether a recognisable landmark in its natural grassland setting for Aboriginal people, or a still largely clothed mountain amongst the grazed and partially cleared lower slopes by early European settlers, or as a backdrop to an inspired planned 'city in a landscape', this essential character of Black Mountain has been valued and conserved across many centuries. In its contemporary setting with its distinctive tower, Black Mountain has further come to represent the city of Canberra, not only instantly recognisable to Canberrans but widely used as an image to represent Canberra nationally (Hotchin 2018b). It is difficult to imagine a government brave enough to propose further alterations to the appearance of Black Mountain in the future.

3.5 Place of personal attachment

In the early years of Canberra's development, Black Mountain and the other inner hills of Canberra received little attention. They had been designated important natural backdrops for the city in the Griffins' plan for Canberra so they remained largely intact in the early years of urban development without having specific protection. As the city grew and began encroaching on the lower slopes, the issue of protecting Black Mountain was raised, and this began a long association of individuals and groups of people with the mountain as they actively worked to protect it, both from inappropriate development and activities, and in volunteer education and conservation works (Beveridge 2018). The efforts to have it established as a reserve (Shorthouse 2018), the protests against the tower and aerial gondola (Hotchin 2018a) and later the GDE (Hogg 2018a), as well as the scientific and shared conservation work on the mountain have clearly strengthened the sense of common purpose and attachment to this place for many people.

The main management issue is how the skills and dedication of the ParkCare group, Friends of Black Mountain, and other volunteers can play a more significant role in conservation and management of the Reserve.

3.6 Place of knowledge

Black Mountain is one of the most studied sites in the ACT, largely due to the scientific and educational institutions on its doorstep. Research has encompassed taxonomic collecting amounting to tens of thousands of specimens (Purdie 2018d), ecological studies leading to over 130 publications (Purdie 2018e) and monitoring studies focussed on changes in particular attributes over time. Monitoring the impacts of fire has been a particular focus (Purdie 2018d). The location of Black Mountain close to both of Canberra's universities has also shaped its suitability as an outdoor classroom and it has been widely used for formal education purposes as well as informal purposes like public education (Purdie 2018f). The value of this accumulated knowledge about Black Mountain lies partly in what it contributes to formulating a strong evidence-based management plan for the Reserve, but perhaps more significantly in what it has contributed to natural sciences in Australia and around the world.

The historical value of Black Mountain to taxonomic and ecological knowledge is not one that depends on protecting particular sites within the Reserve, as is more commonly the case with heritage protection. Its value to the Reserve lies rather in ensuring that its existence is well

documented (as in the records of this symposium) and opportunities are taken to use it in monitoring and interpreting the causes of change and then revising management actions.

3.7 Place of cultural inspiration

As part of the Canberra landscape, Black Mountain has featured in the artistic and cultural life of the people who have lived nearby for a very long time and continues to do so today. Hotchin (2018b) and Purdie (2018f) have documented examples of Black Mountain featuring in art, literature and music. Many of these reflect the presence of the mountain in the wider landscape—especially in the early days of Canberra as it was forming its identity. Its appearance, or rather the proposed changes to its appearance when the tower was proposed also stimulated considerable artistic response. Others have taken their inspiration for art, photography and books from visits onto the mountain itself. There are no substantial management issues arising from this use of the Reserve.

4. Use Values

4.1 Recreation

A wide range of recreational activities occur on Black Mountain (Purdie 2018f; Hogg 2018b). Most are informal individual or small group activities like walking, running, cycling, photography and bird-watching; some are more organised like orienteering, rogaining and bushwalking run by clubs. A survey of recreational users of Canberra Nature Park found that they most valued being in nature, being away from traffic and having ready accessibility to a nature park close to the suburbs (Chevalier and Hoffman 2011, in Purdie 2018f). The contribution of active recreation to health and well-being is well understood and provision of suitable open space for it in and around urban areas is an accepted aspect of city planning.

Less active recreational use includes visiting the tower and other lookouts; 430 000 people reportedly visit the tower annually¹ but their impact on the Reserve is relatively well confined to the impact of bus and car use of the road and car park. Benefits of these visitors should be acknowledged. The view of Canberra from the tower is memorable and contributes to an appreciation of Canberra's urban design, including the role of Black Mountain.

Access to the Reserve has become more limited over time as Black Mountain has become fully encircled with four-lane roads. Hogg (2018b) points out how this has shaped the pattern of use of the mountain for orienteering. Other speakers also referred to difficulties caused by being unable to easily access some of the sections for park care work.

The main management issues are managing erosion on walking trails and minimising prohibited use of the Reserve, for example, making new trails, taking dogs into the Reserve, taking mountain bikes off formed roads, removing plant material and dumping rubbish. No further restrictions to access would be appreciated by the user community; and conversely, improvements in the ease of access would likely bring additional users into the Reserve whose vigilance would help deter prohibited uses.

4.2 Fire

In the symposium papers, planned fires are mentioned more often than any other single potential threat to conservation on Black Mountain. Their frequency has increased since the major bushfire of 2003 raised awareness of the need to better protect Canberra from wild fire. A paper by Doherty (2018b) provided a detailed consideration of the implications of fire for the ecology of Black Mountain. While many of the plants on Black Mountain are adapted to fire, the nature of the fire regime (fire frequency, fire intensity, fire season and fire type, Gill 1981) influences the particular impacts of fire on vegetation composition and structure. Short-term changes at fire sites are expected, but the main conservation issue is whether these sites recover their original composition and structure in the longer term.

¹ <http://www.telstratower.com.au/history.aspx>

The management challenge is designing a fire regime that minimises long-term changes in vegetation structure and composition while adequately fulfilling the purpose of reducing the risk of a severe bushfire reaching or sending embers into the suburbs of the inner north. Essentially this is a case of finding the most acceptable trade-off between the main existence value, protection of biodiversity, and the use value, protection of human life. Long-term monitoring is essential for discerning between short- and long-term responses to burning.

5. Implications for future management

5.1 Most significant characteristics

In a wider context, Black Mountain's most significant characteristics are its distinctive and extremely old geology, its unusually high number of rare plants, its role as a city backdrop, clothed in native vegetation, and the size and strength of the community of people committed to its conservation. Its vegetation has mostly not been heavily modified by earlier land uses and along with other urban reserves in Canberra it also plays an important part in contributing to regional and national conservation goals and to the well-being of the people who use the reserve or enjoy its existence from a distance. Maintaining these characteristics would be expected to underpin the objectives of future management plans.

5.2 Looking forward

The management issues identified in these papers are very much shaped by practical experience of the recent past and the knowledge bank that has accumulated over the last 80 years or so. For the immediate future, the analyses and conclusions about management actions can be confidently based on these foundations. But any actions that are designed to have outcomes longer into the future need to consider two major drivers of future change: population growth and climate change.

Projections of Canberra's future population, based on a scenario of moderate immigration and natural increase, suggest that its population will reach some 740 900 people in 2061—43 years away (ABS 2013). Current population is estimated to be about 420 000 (ABS 2018), so the increase in demand for recreation in open space will be substantial, especially as the current ACT planning strategy is to promote infill and higher urban densities around the city centres.

At the same time, it is clear that climate is changing and will continue to warm. The latest IPCC report (IPCC 2018) indicates that global warming has already caused a warming of about 1.0 °C above pre-industrial levels and is likely to reach 1.5 °C between 2030 and 2052 if it continues at its current rate. Warming is generally greater over land than over sea, and extremes in mid-latitudes may warm by up to 3 °C at global warming of 1.5 °C. Of particular relevance to the biodiversity on Black Mountain, the report refers to meta-studies that have examined the geographic ranges of over 100 000 species and project that 6% of insects, 8% of plants and 4% of vertebrates are likely to lose over half of their climatically determined geographic range with a global warming of 1.5 °C.

Warmer extremes are a particular issue for Black Mountain as such days are frequently accompanied by extreme dryness and very elevated fire risk, even further accentuated in periods of drought. The ACT currently has about 10 days above 35 °C each year, but this could become 30 by mid-century². More extreme weather events are also likely to bring more intense rainfall which will increase the risk of erosion on the slopes of Black Mountain.

5.3 Main management issues

In summary, and in the context of these future scenarios, the main management issues identified in the papers are:

- conserving its appearance, including preventing any further loss of land area to urban development;

² <https://www.actsmart.act.gov.au/whats-happening-with-our-climate/about-climate-change>

- developing further collaborative arrangements with Friends of Black Mountain to make fuller use of their expertise and dedication;
- monitoring changes in the flora and fauna and landscape condition in a warming climate;
- designing planned fire regimes that achieve protection of inner north urban areas through fuel reduction without permanently threatening species, ecological communities or the stability of soil surfaces. Monitoring fire impact and interpreting this in the context of a warming climate is crucial;
- minimising soil erosion;
- protecting its native species from invasive weeds and pests;
- protecting and interpreting the distinctive geology;
- guarding against any further barriers to connectivity and using opportunities to enhance connectivity where possible;
- minimising prohibited uses of the Reserve; and
- reviewing access and using opportunities to improve the ease and attractiveness of access as potential users of the mountain grow with time.

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