HOTSPOTS FIRE PROJECT

Is fire a key to remnant diversity on the Cumberland Plain?

The beautiful floral display of Australian blackthorn is part of a strategy that helps give it an edge in a landscape adapted to fire.

Striking a Balance

In Cumberland Plain Woodland, fire can trigger new life, help maintain balance and even assist with weed control…

Woodland Wonder

Once sought after by early settlers for the cultivation and grazing opportunities it provided, Cumberland Plain Woodland is now valued for its conservation and recreation value. Restricted to a few scattered remnants, a fraction of the vast woodland area that once covered most of the Western Sydney basin, Cumberland Plain Woodland continues to delight people who care for the bush with its delicate herb flowers that grow amongst native tussock grasses. Across the Plain, land managers and community groups are working to protect and restore these historic bushland remnants. Finding management strategies that work for this unique environment is part of the challenge.

The Cumberland Plain supports a mosaic of vegetation types that can vary both across and within remnants. Early descriptions from the late 18th and early 19th centuries depict an abundance of open grassy areas with pockets of shrubby vegetation. In contrast, many of today's remnants would more aptly be described as having a dominance of shrubs. One shrub species, Australian blackthorn (*Bursaria spinosa*), is particularly abundant.

Native to the Cumberland Plain, blackthorn is unmistakable in summer with its myriad of beautiful white flowers. Insects feed on leaves and stems while its thorny growth provides shelter for woodland birds. But is it possible to have too much of a good thing? Blackthorn can get very dense, and when it does, other native shrubs may be excluded. Ground cover species that favour open sunny patches become less common. Increased shrub density may also affect habitat opportunities for fauna. Many of the birds that rely on the blackthorn for shelter also need open grassy patches for feeding. For ecologist Penny Watson, who researched the role of fire in Cumberland Plain Woodland for her doctorate at the University of Western Sydney, the increasing abundance and density of blackthorn may be partly explained by a reduced frequency of fire. The vegetation of the Cumberland Plain, along with much of the Australian landscape, has long been subject to periodic disturbance by fire. As a result, many Australian plants and animals have developed strategies to cope with fire, or even take advantage of the opportunities that fire creates.

Survival Secrets

Penny explains that plants growing in fire-prone bush adopt one of two strategies: they are either 'resprouters' or 'obligate seeders'. Those that are able to survive fire and regrow from buds under the bark, or woody underground lignotubers, are 'resprouters'. They may look completely dead straight after a fire, but very soon they send out new shoots. Most eucalypts resprout, as do almost all native perennial forbs and grasses on the Cumberland Plain. Many of these ground layer species have fleshy roots that help them to survive drought and grazing by animals.

For 'obligate seeders', the adult plants really are killed by fire, but these species live on through their seeds. Seedling regeneration allows them to retain their place in the bush over time, and they're called 'obligate seeders' because they are *obliged* to grow from seed. The Cumberland Plain hosts many obligate seeder shrubs such as the sickle wattle (*Acacia falcata*), and the threatened juniper-leaf grevillea (*Grevillea juniperina* subsp. *juniperina*) and *Dillwynia tenuifolia*.

Even though fire plays an important role in regeneration, too frequent fire can mean trouble for some species. Obligate seeder shrubs are particularly at risk, because they need time between fires to mature sufficiently to flower and set seed. Although Penny has found that many Cumberland Plain Woodland shrubs grow rapidly, some obligate seeders, for example juniper-leaf grevillea, may take up to four years to produce flowers - or perhaps even longer when drought slows growth. So if the interval between two fires is too short, the second fire may wipe out an entire generation of young obligate seeders before they have started producing seed.

Australian blackthorn is a champion resprouter but, unlike many other native shrubs on the Cumberland Plain, it has the additional advantage of being able to reproduce in

Nature Conservation Council of NSW
Environmental TRUST
FIREWISE
This project has been assisted by the New South Wales Government through its Environmental Trust.

HOTSPOTS FIRE PROJECT

Is fire a key to remnant diversity on the Cumberland Plain?

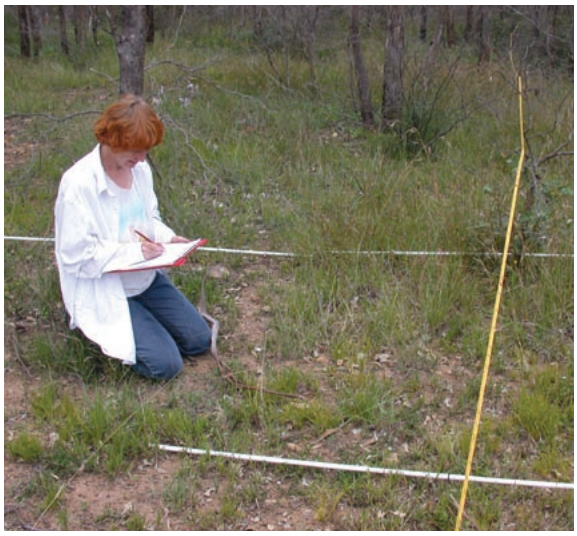
the absence of fire. Penny found that blackthorn was particularly abundant where the frequency of fire had been low. In places where fire had occurred more frequently, around once or twice a decade, the woodland was more open and grassy. Penny also found that there were less woody weeds, such as African olive, where fire had been relatively frequent.

Grasses and herbs

Much of the diversity in Cumberland Plain Woodland is found in the ground layer. Here, miniature daisies, peas, lilies and orchids form a patchwork with a wide array of native grasses. Kangaroo grass (*Themeda australis*), which dominated the ground layer of eastern Australia's woodlands at the time of settlement, is still found on the Plain today. This species is particularly vulnerable to grazing but loves fire: Penny found it was abundant where fire had occurred regularly about every five to ten years, but not in areas where fire had been excluded for decades. She also found there were less herbaceous weeds in patches with a good cover of kangaroo grass, and fewer weed species where fire had occurred regularly than in sites that had had a long period without fire. Unfortunately, this doesn't mean fire will reverse weed infestations where they already exist, although it may be able to help. Fire may present opportunities to target weeds – for example, exotic grasses may be easier to poison after a fire, when they're growing strongly and aren't overlapping native species.

Maintaining a balance

From the results of her studies, Penny believes that "Fires help maintain the balance of plant species in Cumberland Plain Woodland." Areas that continue to experience some fire have a mix of open and shrubby patches. There's lots of room for ground layer species that thrive in open patches, as well as shrubby habitat for shade-loving plants and for birds and animals that need shelter. Penny feels that "Fires less than four or five years apart generally aren't a good idea, as some shrubs need this long to flower and set seed. But without fire, open patches may gradually disappear, and weeds may be advantaged. Variable intervals between about 5 and 15 years should help make sure there's a place for everything."



Penny Watson records plant responses after fire

For those with an interest in maintaining and restoring remnant Cumberland Plain Woodland, an understanding of the effect of fire can provide insight into ecosystem changes over time. Restoration guidelines have already incorporated fire as a management strategy, prompting some managers to look into re-introducing fire to long unburnt remnants in order to complement existing restoration efforts. "There's a lot of great work happening on the Plain," concludes Penny. "Fire is a key ecological process in Cumberland Plain Woodland. So if we want to conserve its beauty and diversity, we need to manage fire."

WHAT LAND MANAGERS CAN DO

Different species have different needs in relation to fire. Ensuring variability in fire frequency helps to allow for the full range of species.

Both too frequent and too infrequent fire can trigger negative impacts that throw systems out of balance, such as loss of species and weed invasion.

When planning how often to burn, think about unplanned as well as planned fire. Unplanned fires may happen often enough to fulfill the needs of the bush.

Further Information

The Hotspots Fire Project is funded by the New South Wales Government through its Environmental Trust. For further information contact the Project Coordinator on (02) 9279 2466, email hotspots@nccnsw.org.au or visit www.hotspotsfireproject.org.au.

Reading

Burton, R. (2005) *Recovering Bushland on the Cumberland Plain: Best Practice Guidelines for the Management and Restoration of Bushland*. Department of Environment and Conservation, Hurstville.

Credits

Text: Christine Pfitzner and Penny Watson.
Photographs: Page 1 top and page 2 bottom – Penny Watson; page 2 top – Venesa Brusic.