Camden Town Farm demonstration site

- *Recovering and managing riparian bushland and integrating it into a productive farm on an intermediate scale*
- *Works to retain, enhance and expand a corridor of riparian bushland along the Nepean River*

Department of
Environment and Conservation (NSW)

Recovering bushland *on the Cumberland Plain*

Introduction

Camden Town Farm is a 54-hectare property owned and being developed by Camden Council as a demonstration farm that will educate the community about sustainable agriculture.

A strip of remnant vegetation on the property is located along the Nepean River. This riparian vegetation is classed as Sydney Coastal River-flat Forest, a vegetation community listed as endangered under the NSW *Threatened Species Conservation Act 1995*.

Management strategies used on the site to restore, protect and expand this bushland have included:

- works that focus on restoring the remnant riparian vegetation using bush regeneration and revegetation techniques
- an extensive planting program to create a commercial agroforestry plot that acts as a buffer between the activities on the farmland and the regenerating riparian bushland while also benefiting the farm's productivity.

Bush regeneration program (2004–05)

The management strategy for the riparian areas has focused on using 'best practice' bush regeneration and weed control techniques along the Nepean River. These techniques concentrate on controlling and removing environmental and noxious weeds over time, which reduces competition for native vegetation and allows natural regeneration to take place.

Tip: Assess the site's resilience

Wherever possible, a policy of minimum intervention should be followed. This is a sound philosophy from both a resource and ecological perspective. Assessing the resilience of the bushland will identify areas where regeneration or revegetation can be used and links created to achieve restoration goals.

Regeneration has been undertaken in stages with consideration of fauna habitat values as part of the program.

The restoration strategies used on the site have changed over time. This is because an effective restoration approach involves monitoring changes as works proceed and having the flexibility to re-order priorities as the conditions on site change.

Weed control

The regeneration zone was heavily infested with woody and environmental weeds. *Gleditsia triacanthus*, Moth Vine (*Araujia sericifolia*) and Balloon Vine (*Cardiospermum grandiflorum*) were just some of the exotic species that dominated this area. However an established native canopy and scattered shrubs and grasses suggested a potential for regeneration from seed stored in both the soil and the canopy.

Primary weed control selectively targeted woody and environmental weeds. Some of the debris from the treated woody weeds was spread across the site, while other dead woody weeds were left in place in order to provide habitat, and reduce the risk of erosion and the cost of weed removal.

Front cover: *Looking west into the riparian remnant after primary and secondary bush regeneration works. Many of the exotic annual and perennial weeds have been removed although some, such as Privet and Gleditsia, are still evident on the right hand side of this photo taken in 2005. (DEC/R.Burton)*

The trunks of large woody weeds, such as mature Privets (*Ligustrum sinense*), *Gleditsia triacanthus* and African Olive (*Olea europaea* spp. *africana*), were ring-barked using a chainsaw and then painted with an appropriate herbicide for that species.

A typical vista within the riparian remnant on the site, with understorey vegetation dominated by Privet. (Greening Australia (NSW))

The response to primary weed control was a flush of plant growth, but this included both native and exotic species. Most of the weeds triggered were annuals and vines which were targeted in secondary weed control. Natural regeneration of natives resulted in the germination of numerous *Acacia* spp., *Eucalyptus* spp., *Hymenanthera dentata*, *Commelina cyanea*, *Glycine* spp., *Bursaria spinosa*, *Clematus* spp. and many native grasses. The bush regeneration program was therefore tailored to ensure the survival and expansion of these native species.

There was no spraying of weeds where native species were identified because of the risk to them from spray drift. Instead weed control around these plants consisted of hand weeding, and 'cut and paint' and 'scrape and paint' techniques. In areas where no native regeneration was apparent, weed control techniques were expanded to include spot spraying.

Use of fire

Techniques using fire to trigger a regeneration response were trialled on the site. Pile burns allowed the resilience and diversity of the site's soil seed bank to be gauged, as well as being an effective and cheap means of removing woody debris.

Tip: Managing for fire

Conservation of western Sydney's vegetation communities involves the conscious management of fire. Species diversity is promoted by fire regimes that encourage variation in the intervals between fires, fire intensity and the burn season between August and January. The Rural Fire Service and the Department of Environment and Conservation can provide advice for land managers on managing for fire.

Creating long and narrow piles of woody debris is the best technique for ecological pile burns. Piles on the site were limited to around a metre in height and an area of not more than 10 square metres. This ensured the fire was able to be controlled and did not sterilise the soil by being too hot for the seed stored in it. Water was sprayed on the piles during burning to regulate the temperature.

Follow-up works

Following completion of the primary works, ongoing monitoring of the site began immediately as part of follow-up weed control. Despite the success of primary control measures, weed seedlings still managed to germinate and required treatment. Any regrowth of woody weeds and herb seedlings was spot sprayed; species treated included Privet, African Olive, *Sida rhombifolia*, *Solanum pseudocapsicum* and *Cirsium vulgare*.

Expansion zone

Up to 20 metres has been left between the riparian regeneration zone and the revegetation (agroforestry) further away from the creek. This area is designed to allow for the natural recruitment, regeneration and expansion of the remnant riparian vegetation. This is a very important best practice restoration technique that aims to both buffer the remnant vegetation while also encouraging it to expand.

Revegetation program (2004–05)

When considering the restoration of vegetation on the Cumberland Plain, it is important to be aware of the potential for revegetation programs to oversimplify an ecosystem. Any restoration project should aim to re-create an *ecosystem* not simply make a bushland *garden*. This will ensure that the genetic integrity of the re-created bushland does not compromise remnant bushland nearby.

Controlling access

A fence was erected in 2004 to control stock access into the regeneration and revegetation (agroforestry) areas. The fence encircles the agroforestry zone. Any future grazing in this revegetation area will be delayed for 12–24 months after seedling establishment and will never be permitted during the flowering and seeding times for native species.

The agroforestry plot acts as a buffer, protecting the regenerating and established riparian vegetation from the activities of the farm. Other benefits from this planting include a lower watertable; protection of riverbanks from erosion and thus improved water quality; acting as a windbreak and shelter for stock; providing emergency fodder; and acting as a barrier to weed encroachment into the riparian areas.

Site preparation

It was not necessary to slash the Camden Town Farm site in preparation for planting as the grass was quite low and green. Narrow lines of herbicide approximately a metre wide were sprayed along the contours to be planted. The site was left until the herbicide had taken effect (approximately two weeks) before seedlings were planted along the pre-treated contour lines. This staged process ensured that the young plants were free from competition as they established themselves.

Planting

The species planted in the agroforestry plot (*Eucalyptus tericornis*, *E.amplifolia*, *E.crebra*, *E.elata* and *E.euginioides*) were selected for their ability to provide useful wood upon maturity.

In early autumn 2005, over 1500 tubestock seedlings were mechanically planted in the agroforestry plot. The mechanical planting operation placed seedlings about a metre apart in each row, which was around two metres wide. These distances allowed for vehicle access during the maintenance program.

Seedlings used in the revegetation program were propagated from seed collected from bushland remnants on or

Before: *Looking south along the fenceline between the riparian remnant and the area to be revegetated for agroforestry in 2004. (Greening Australia (NSW))*

After: *Looking south along the fenceline between the riparian remnant and the newly planted agroforestry plot in 2005. (DEC/R.Burton)*

Tip: Plant selection

Careful plant selection is essential and local species from provenance stock should be used in any planting program on the Cumberland Plain. These local species are adapted to the local climate and soil conditions and are therefore more likely to lead to a successful self-perpetuating plant community.

adjacent to the property. All plants were mixed and planted in a random fashion, as this has been found to give the best results in re-establishing vegetation. Plants were also installed with a recycled cardboard weed mat and tree guard. This technique protects the seedlings from rabbits, weed competition and the extremes of weather, as well as ensuring valuable moisture is retained. Tree guards also help to protect the seedlings from herbicide drift during maintenance spraying regimes.

Bush regeneration and revegetation combined (2004–05)

In the area north of the entry gate, there were a few native shrubs and grasses but no canopy trees. The area was heavily infested with woody and environmental weeds and the potential for natural regeneration was considered low. As a result, a combined bush regeneration and revegetation program was implemented in 2004. Seedlings were planted along the property boundary to act as a buffer and protect the regenerating remnant riparian vegetation along the Nepean River from the adjoining car park and road.

Weed control

The initial restoration works included a weed control program to target woody and environmental weeds. Privet (*Ligustrum sinense*), African Olive (*Olea europaea* spp. *africana*), Fennel (*Foeniculum vulgare*) and Paddy's Lucerne (*Sida rhombifolia*) were the dominant species in the area.

Planting

Over 600 seedlings grown from provenance seed collected on or adjacent to the site were planted in March 2005 by hand. Species were included from the canopy, shrub and groundcover layers of local bushland remnants. However, given the prevalence of weeds thoughout this area, priority was given to species from the shrub and canopy layers. A wider selection of groundcovers will be planted in coming years (second and/or third) when the conditions on site will be more favourable for their survival and expansion.

All plants were installed with a recycled cardboard weed mat and tree guard.

Bush regeneration programs allow the selective control of weeds over time, thereby reducing competition between native plants for light, moisture and nutrients. Here an Acacia seedling has been able to germinate under the parent plant. (DEC/R.Burton)

Planting seedlings in this manner will result in an increase in the site's species diversity, as well as suppress weed growth through competition for resources, such as moisture, nutrients and light. This technique is based on the theory that getting the upper strata (trees and shrubs) established first will improve soil condition and create better conditions for colonisation by native grasses and herbs.

Maintenance

Regenerated areas need ongoing monitoring and management as self-sustaining conditions may take many years to reach.

An integrated weed control program has been implemented at the Camden Town Farm site. The bush regeneration maintenance program focuses on removing and controlling environmental and noxious weeds over time, using regeneration techniques. These techniques aim to reduce competition with native vegetation and thus encourage natural regeneration.

Maintenance in the revegetated areas involved spraying herbicide approximately three months after planting to a small area around the base of the newly planted seedlings. This reduces the competition for water and nutrients from the surrounding weeds and pasture. Competition for water during the first spring and summer is possibly the most important influence on seedling survival and growth rates.

Two types of herbicide maintenance spraying techniques have been used at Camden Town Farm. Backpacks were employed in the bush regeneration and hand-planted areas, while in the agroforestry plot a spray arm mounted to a 4WD vehicle was used.

Tip: Maintenance

Do not attempt to clear more than you will be able to maintain. It is essential that weeds are controlled throughout the process of seedling germination and establishment.

Seedlings were maintained under a regime where they were sprayed three times a year at peak weed growth periods, such as early spring, summer and mid-autumn. This maintenance program is followed only for the first 1–2 years (ideally two) of the plant's life, after which the plants are self-sustaining. At this point installing groundcovers, such as *Dichondra* or *Pratia* spp., is ideal but requires a commitment to maintain works for at least three years.

Tip: Monitoring

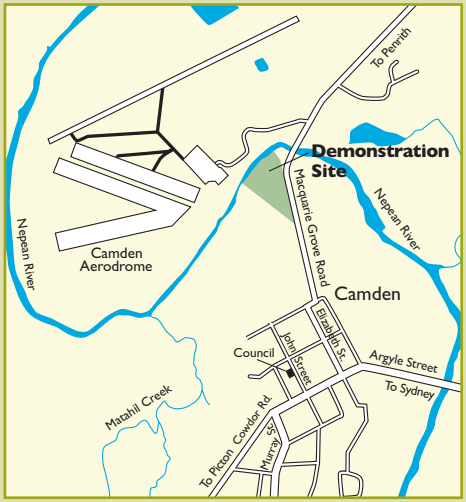
Monitoring at Camden Town Farm has revealed changes in the composition and distribution of both native and exotic species over time. Assessing the monitoring results has allowed for a more responsive tailored restoration program.

Applying herbicide using a spray arm mounted to a 4WD vehicle, a technique often used to control weeds on broad-acre mechanically planted sites. (Greening Australia (NSW))

More information

For further information and access to the Camden Town Farm demonstration site contact:

Camden Council
Phone: (02) 4654 7777



Detailed information on current and successful techniques for restoring ecosystems across the Cumberland Plain are available by downloading the report *Recovering Bushland on the Cumberland Plain: Best practice guidelines for the management and restoration of bushland* from the NSW Department of Environment and Conservation (DEC) website at www.environment.nsw.gov.au or by phoning DEC Environment Line on 131 555.

Identify the vegetation community on your site

Consult the report *Native Vegetation of the Cumberland Plain: Final Edition* (2002) to check which vegetation community is likely to be on your site: go to the DEC website www.environment.nsw.gov.au and enter 'Cumberland Plain Vegetation Mapping Project' in the search field.

Licensing

Anyone working on or in close proximity to bushland that has been classed as endangered under the *Threatened Species Conservation Act 1995* must have a licence from DEC. Contact the DEC Wildlife Licensing Unit on (02) 9585 6540 for details.

Published by:
Department of Environment and Conservation NSW
59–61 Goulburn Street
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Sydney South 1232
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Phone: 131 555 (environment information and publications requests)
Phone: 1300 361 967 (national parks information and publications requests)
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DEC 2005/234
ISBN 1 74137 384 0
July 2005

Printed on recycled paper

PROJECT PARTNERS

Department of Environment and Conservation (NSW)
NSW Department of Primary Industries
Department of Infrastructure, Planning and Natural Resources
Greening Australia New South Wales
Hawkesbury-Nepean CMA Catchment Management Authority
Natural Heritage Trust