



## Regional Pest Management Strategy 2012–17: Blue Mountains Region

A new approach for reducing impacts on native species and park neighbours

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Published by:

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ISBN 978 1 74293 621 5  
OEH 2012/0370  
August 2013

This plan may be cited as:

OEH 2012, *Regional Pest Management Strategy 2012–17, Blue Mountains Region: a new approach for reducing impacts on native species and park neighbours*, Office of Environment and Heritage, Sydney.

Cover photos, main: Blue Mountains National Park (D Finnegan/OEH); small: Blue Mountains water skink (V Richardson/OEH); bush regeneration volunteers (P O'Malley/HNCMA); gorse seedling (P O'Malley/HNCMA); cliff weeding (N Holland/OEH).

## Summary

The NPWS regional pest management strategies aim to minimise adverse impacts of pests on biodiversity, protected areas and the community. The strategies achieve this through identifying and focusing on the highest priority programs, ensuring that actions are achievable and deliver measurable outcomes.

This regional pest management strategy describes the local circumstances in the Blue Mountains Region where the highest priorities involve programs:

- protecting threatened species and endangered ecological communities
- reducing significant impacts on the economic enterprises of neighbours
- protecting the water storages for the populations of Sydney and the Blue Mountains
- responding to new and emerging pest threats as they arise
- protecting the Greater Blue Mountains World Heritage Area
- protecting significant cultural heritage assets.

The Region is undertaking numerous programs to protect threatened species and endangered ecological communities from weed and vertebrate pest impacts. Essential to the success of many of these programs is community involvement. The Region currently supports 25 volunteer Bushcare, Landcare and community pest control groups. Programs supported by stakeholders and conservation volunteers include the control of:

- foxes, Cape ivy, tree of heaven and blackberry to protect endangered brush-tailed rock-wallaby colonies
- lantana, willow, privet, cassia and honeysuckle in Cooks River/Castlereagh Ironbark Forest endangered ecological community
- *Erica lusitanica* and St John's wort in Blue Mountains Shale Cap Forest endangered ecological community.

The region maintains a proactive wild dog management program through wild dog management plans, collaboration with Livestock Health and Pest Authorities and local partnerships. While minimising the impact of wild dogs on livestock, the Region is also conserving dingo populations in core areas of reserves.

In the major water storage catchments for Sydney and the Blue Mountains, referred to as Special Areas, the Region is undertaking pest control targeting a number of species. In particular, feral pigs and cattle are controlled under joint management with Sydney Catchment Authority.

New and emerging highly invasive pest species present a major and ongoing challenge in the Blue Mountains Region which has a significant linear urban-park interface. As population density and visitor numbers increase on the edges of and within parks, together with changing rural land use to the west, so does the risk of new and emerging invasive species.

These pressures are exacerbated by a changing climate and the need for increased prescribed burning and wildfire management which can both create opportunities for invasive species management and increase pest risks. Ongoing monitoring and evaluation of adaptive pest management control programs is critical to determine their effectiveness. These review processes also provide new information to enable programs to be continually improved.

The Blue Mountains Region recognises that successfully implementing this regional pest management strategy requires a strategic and cooperative approach with a range of interested individuals, community groups and stakeholders, and is committed to developing effective partnerships to achieve this shared objective.

Blue Mountains Region pest management highlights include:

- threatened species programs, such as the continued successful recovery of the brush-tailed rock-wallaby, which involves a continuous integrated pest species control program supported by a volunteer program
- collaborative partnerships and working with community, for example, successful partnerships with Blue Mountains City Council, Environmental Trust funding and volunteers including bush regeneration in Braeside Swamp and Katoomba Creek projects
- ongoing projects such as the successful implementation of Stage 1 of the Wild Horse Management Plan, with the removal of 41 horses from the Blue Mountains World Heritage Area
- new and emerging pest programs, for example, the ongoing success of the boneseed eradication program
- innovation, for example, partnerships with volunteer groups to develop the new 'adventure volunteering ethos'.

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## Abbreviations

AMS	Asset Maintenance System
BMAD	bell miner associated dieback
BMCC	Blue Mountains City Council
BPWW	Biodiversity Priorities for Widespread Weeds (BPWW CC1-6 refers to control categories within BPWW Statewide Framework <sup>1</sup> )
CMA	catchment management authority
DPI	Department of Primary Industries
EEC	endangered ecological community
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
GBMWA	Greater Blue Mountains World Heritage Area
HA	Hawkesbury Area
HNCMA	Hawkesbury–Nepean Catchment Management Authority
HS	historic site
KCR	karst conservation reserve
KA	Kanangra Area
KTP	key threatening process
LHPA	Livestock Health and Pest Authority
LGA	local government area
MA	Mudgee Area
NP	national park
NR	nature reserve
NPWS	NSW National Parks and Wildlife Service
OEH	Office of Environment and Heritage
PWIS	Pest and Weed Information System
RHD	rabbit haemorrhagic disease
RLP Act	<i>Rural Lands Protection Act 1998</i>
RP	regional park
SCA	state conservation area
TAP	threat abatement plan
TSC Act	<i>Threatened Species Conservation Act 1995</i>
UMA	Upper Mountains Area
VEC	vulnerable ecological community
WoNS	weed of national significance

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<sup>1</sup> [http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/publications/cmas/cma\\_statewide-framework-web.pdf](http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/publications/cmas/cma_statewide-framework-web.pdf)

# 1 Introduction

Pest management within the Office of Environment and Heritage (OEH) is guided by two core planning instruments:

- *NSW 2021 – A Plan to Make NSW Number One* sets out performance targets, including a specific priority action within *Goal 22 Protect Our Natural Environment* which is to *address core pest control in National Parks through the delivery of NPWS Regional Pest Management Strategies and improve educational programs and visitor access*.
- *NSW Invasive Species Plan* provides specific goals, objectives and actions in relation to invasive species management.

This document is the Blue Mountains Region Pest Management Strategy and contains regionally specific components including prioritised pest programs.

The state strategy, *Managing Pests in NSW National Parks*, provides the broader planning framework for the management of pests by NPWS. It documents the policy and organisational context and describes the logic used for identifying, prioritising and monitoring pest management programs. It also establishes state-wide pest management goals, objectives and actions.

This regional strategy describes the local circumstances within the Region and applies the corporate framework from the state strategy to prioritise specific pest management programs. These priorities will be included in regional operations plans and implemented through the NPWS Asset Maintenance System (AMS). It also broadly identifies pest distribution and associated impacts across the Region.

## 2 Regional overview

### Location and regional context

The Blue Mountains Region covers four distinct biogeographical regions: Sydney, South Western Slopes, South Eastern Highlands, and Brigalow Belt South bioregions. The Region includes the dissected upland plateau of the Great Dividing Range, a major geological feature of eastern Australia. The Region has an early history of European exploration and settlement and includes some of the first areas in NSW cleared for agricultural purposes. The significant environmental changes to the Region, geology, altitudinal range (from 30 m to 1300 m), rainfall gradient (350 to 1500 mm) and variety of land uses including mining, rural, semi-rural, urban and natural areas, all contribute to a wide variety of pest management issues.

The Region covers 20 local government areas and both metropolitan and central west NSW community interests. Neighbours include residents of western Sydney, semi-rural and rural landowners, forestry, mining and horticultural industries.

### Park management

Blue Mountains Region manages 34 reserves comprising 12 national parks, eight nature reserves, eight state conservation areas, three karst conservation reserves, two regional parks and one historic site. Seven of these reserves were gazetted in 2010 and 2011. The total area of land under management is 869,777 hectares (see regional map).

Reserves in Blue Mountains Region are managed within four NPWS Management Areas: Hawkesbury, Kanangra, Mudgee and Upper Mountains. The management of the larger Blue Mountains National Park and Wollemi National Park are divided between three Management Areas: Hawkesbury, Kanangra and Upper Mountains, and Hawkesbury, Mudgee and Upper Mountains, respectively.

Major iconic parks within the Region include Blue Mountains, Wollemi and Kanangra-Boyd National Parks. These reserves form a significant part of the Greater Blue Mountains World Heritage Area (GBMWA). GBMWA was inscribed on the World Heritage list in 2000 for its outstanding biodiversity and in particular for its diversity of eucalypt species. The eucalypt forests within Blue Mountains Region, together with non-eucalypt ecosystems including rainforests, heaths and wetlands, protect a significant proportion of Australia's total biodiversity which is unique and important on a global scale. Within GBMWA the Grose, Kowmung and Colo rivers have been identified as some of the most pristine rivers in NSW and as such have been declared wild rivers. Parts of Blue Mountains, Kanangra-Boyd and Wollemi national parks are also declared wilderness areas.

In joint management with the Sydney Catchment Authority, the Blue Mountains Region manages the Blackheath, Katoomba, Woodford and Warragamba special areas, which hold the water storages for the populations of Sydney and Blue Mountains. OEH and Sydney Catchment Authority jointly sponsor the management of the Special Areas through the Special Areas Strategic Plan of Management (SASPOM) (Sydney Catchment Authority and DEC 2007). Through this plan of management OEH and Sydney Catchment Authority aim to jointly manage the Special Areas to provide high quality water in reservoirs, by protecting the ecological integrity and natural and cultural values of the Special Areas. Pest species management within the Special Areas aims to protect and optimise water quality entering the storages and conserve ecosystem integrity, natural and cultural values, by reducing and minimising the impact of pest species on water quality and addressing the critical threats to ecological integrity and conservation values. As joint manager of the Special Areas,



the Sydney Catchment Authority is both a major adjacent landholder and key partner with similar values in environment protection. Under the Joint Management Arrangements for the Special Areas, the Executive Steering Group and the Special Areas Operations Group provide opportunities for OEH and Sydney Catchment Authority to discuss, coordinate and cooperatively implement pest species management programs across land tenures within the Special Areas.

The Region's parks support significant visitation (exceeding four million visits each year) and a well established tourism industry. Track counters at 17 key walk locations recorded 1.25 million people using these tracks in 2010–11. Thirty-seven high use visitor assets such as the National Pass, Federal Pass, Giant Stairway and Grand Canyon are listed on the State Heritage Register. The Region has recorded on AMS 44,000 built assets including 320 km of walking tracks, 175 lookouts and 3300 km of roads and vehicle trails.

The Region acknowledges six Aboriginal language groups of the GBMWA and is actively engaging with Aboriginal community members and organisations to build partnerships and management alliances. The Greater Blue Mountains World Heritage Aboriginal Reference Group and a number of direct community engagement initiatives seek a more integrated approach to cultural heritage management. This involves understanding Aboriginal aspirations for Country in the Region, including pest management for cultural heritage outcomes.

Urban impacts are significant issues particularly in the Hawkesbury and Upper Mountains areas. Urban development creates conditions favourable for weed invasion (including nutrient enriched run-off, sewage overflows, high flow stormwater, soil disturbance, vegetation clearing, dumping of fill and garden waste and garden escape plants). The high density of weeds on urban boundaries and along creeks and rivers downstream of development is evidence of this issue.

The dissected plateau landscape is regularly impacted by wildfire and hazard reduction burning. High frequency fires are listed as a key threatening process (KTP), as they can result in the loss of vegetation structure and composition leading to an increase in weeds and vertebrate pests. Fire is also used as a tool for conservation, as the prolonged absence of fire can lead to degradation of native plant communities and increased weed invasion.

The Blue Mountains Region is managing a significant number of pest programs to protect listed threatened species and endangered ecological communities (EECs) (Appendix 3) and respond to KTPs (Appendix 4). A number of these KTPs have been recognised as operating at a national scale and are listed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The critical and high priority pest programs for the Blue Mountains Region are identified in section 4. The programs focus on:

- threatened species and EECs, such as fox control benefitting brush-tailed rock-wallabies
- neighbours whose economic enterprises are significantly impacted by pests, such as wild dog control in parks in proximity to livestock operations
- water quality protection in the catchments supplying Sydney and Blue Mountains drinking water, such as pig control in the Special Areas
- programs responding to new and emerging pest species threats, such as Coolatai grass in Wollemi National Park
- programs to protect GBMWA, such as removal of blackberry and riparian weeds in the waterways of Wollemi National Park

- programs to protect significant cultural heritage sites, such as removal of pigs disturbing Aboriginal artefact scatters along the riparian corridor of Abercrombie River National Park.

## Community engagement

Interwoven with successful park management and threatened species programs is the involvement of the community. The Region currently supports 25 volunteer Bushcare, Landcare and community pest control groups. Several of these volunteer groups are at the forefront of establishing a new volunteer ethos of 'adventure volunteering'. The Region works in close collaboration with neighbouring agencies, groups and landholders to coordinate programs. The catchment management authorities (CMAs) play a vital role in funding and facilitating cross-tenure community programs in the Region.

Examples of Blue Mountains Region programs to protect threatened species and EECs that are supported by stakeholders and conservation volunteers include the control of:

- foxes, Cape ivy, tree of heaven and blackberry to benefit endangered brush-tailed rock-wallaby colonies
- lantana, willow, privet, cassia, honeysuckle within the Cooks River/Castlereagh Ironbark Forest EEC
- *Erica lusitanica*, St John's wort to protect the Blue Mountains Shale Cap Forest EEC.

In mid 2012, the NSW Government announced a new initiative to involve volunteer shooters in pest animal management on National Parks and Reserves. This initiative has been developed by NPWS into the Supplementary Pest Control (SPC) program, which is being trialled in 12 reserves across NSW. All volunteers involved in the program will be supervised by NPWS staff and will be trained to the equivalent levels as NPWS staff. All shooting will be conducted according to an approved NPWS shooting operations plan, which includes a Job Safety Analysis (JSA) and a Job Safety Brief (JSB). As part of this process, the program will only take place in sections of reserves that have been closed to the general public. The trial program will help to refine how this additional pest control option can further engage this sector of the community while complementing the programs detailed in the Regional Pest Management Strategies.

## Pest management highlights

Major successes have built on the achievements documented in the 2007–2011 Blue Mountains Region Pest Management Strategy, and are summarised below.

### Threatened species programs

- Strategic review of the key threatening process dieback caused by the root-rot fungus *Phytophthora cinnamomi* at key sites in GBMWHA supported by Commonwealth Caring for Our Country funding.
- Ongoing management of *Phytophthora cinnamomi* affecting Wollemi pines.
- Continued successful recovery of the brush-tailed rock-wallaby at Jenolan Karst Conservation Reserve and Wolgan Valley, Wollemi National Park, involving a continuous integrated pest species control program supported by a volunteer program.

- Exclusion of grazing pressure and ongoing weed management combined with replanting projects resulting in the significant regeneration of the EEC White Box Yellow Box Blakely's Red Gum Woodland in Yerranderie State Conservation Area.

### **Collaborative partnerships and working with community**

- Strong partnerships with Central North Livestock Health and Pest Authority (LHPA) (Mudgee and Merriwa) and Oberon Pest Management Committees guiding collaborative dog management.
- Continued maintenance of a number of positive relationships with volunteer, stakeholder and community groups, notably growth of the Yellomundee Aboriginal Bushcare Group and continuance of the Great Grose Weed Walk, Willow Warriors, Galong Creek Bushcare Group and Friends of Glenbrook.
- Fostering implementation of CMA-funded integrated weed control projects, such as the treatment of bridal creeper in Avisford Nature Reserve, Abercrombie River National Park willow control, Friends of St Helena's Crater, Blue Mountains Bass Fisho's Lantana Busters and Friends of the Colo, using both volunteer groups and specialised bush regeneration professionals.
- Facilitating pest management workshops for community groups and ongoing involvement in community education at local shows and events.
- Successful partnerships with Blue Mountains City Council, Environmental Trust funding and volunteers including bush regeneration in Braeside swamp and Katoomba Creek projects. Over a 10-year period gorse and broom seedlings have been reduced from 5000 plants/m<sup>2</sup> after the 2001–02 fires to current levels of 20 plants over a 3.5 km<sup>2</sup> area. Threatened species such as *Epacris hamiltonii* have been protected by the removal of blackberry at these sites.

### **Other ongoing projects**

- Wild weeding in the Colo River valley, Breakfast Creek in Green Gully and Wollemi Wilderness, with successful treatment of blackberry, tree of heaven, lantana, wild tobacco and cape ivy in pristine wilderness.
- Extension of the Goulburn River willow control program, following significant primary control of this weed, to encompass the suite of riparian weeds threatening the ecological values of the river corridor.
- Successful implementation of Stage 1 of the Wild Horse Management Plan, with the removal of 41 horses from the GBMWHA.
- Significant reduction in fox numbers at the swamps of Narroneck Peninsula through ongoing controls, limiting recruitment to this 'island like' topographic landscape.
- Rehabilitation of the Leura sewage treatment plant with significant control of weeds at this site.

### **New reserves**

- Assessments of new lands in relation to pest distributions and their threats to park assets, with significant additions to the reserve system in Blue Mountains Region during the last pest management strategy period.

### **New and emerging pests**

- Ongoing success in implementing the eradication program for boneseed, in collaboration with Mount Tomah Botanic Gardens, Hawkesbury River County Council and partnerships with neighbours and Hawkesbury–Nepean CMA (HNCMA).

### **Innovation**

- Successful trialling of cost-effective methods of pest control in remote wilderness areas including the use of splatter guns to control blackberries and PIGOUT® baits to control feral pigs.<sup>2</sup>
- Partnerships with volunteer groups to develop the new adventure volunteering ethos.

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<sup>2</sup> [www.animalcontrol.com.au/pig-baits1.htm](http://www.animalcontrol.com.au/pig-baits1.htm)



### Blue Mountains Region

- PWG Regions
- PWG Areas
- Motorway
- Highway
- Major Road
- NPWS Estate
- State Forest
- Built Up Area



Map projection: Geocentric Datum of Australia (GDA) 1994  
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### **3 Regional prioritisation**

The following key factors are considered when determining priorities for pest management within the Region. However, a precautionary approach using risk management will be applied where there is uncertainty about the impacts of the pest on the asset. The feasibility of effective control will also be a consideration.

#### **Critical priority**

##### **C-TSC (Threatened Species Conservation)**

Programs targeting pests which are, or are likely to be, significantly impacting on threatened species, populations or communities. These include the highest priorities identified in the threat abatement plans (TAPs), Priorities Action Statements (PAS) and Biodiversity Priorities for Widespread Weeds (BPWW). For example, undertaking weed control at the Yerranderie State Conservation Area to protect White Box Yellow Box Blakely's Red Gum Woodland, which represents 70% of this EEC remaining in NSW, supports 20 threatened species and potential habitat for a further 14 threatened species and is nationally recognised as endangered under the EPBC Act.

##### **C-HD (Health and Disease)**

Programs that target pests which impact significantly on human health or are part of a declared national emergency, for example control of feral pigs in Warragamba Special Area, Blue Mountains National Park, the catchment area of Sydney and Blue Mountains domestic water supply.

##### **C-EC (Economic)**

Programs targeting pests that impact significantly on economic enterprises, for example wild dog control where there is potential for significant stock losses as identified in wild dog management plans.

##### **C-NE (New and Emerging)**

Programs addressing new occurrences or suppressed populations of highly invasive pest species with potential for significant impacts on park values (subject to risk/feasibility assessment), for example programs to control Class 1 and 2 noxious weeds such as horsetail if it spreads to Blue Mountains National Park from neighbouring land, and bell miner associated dieback (BMAD).

#### **High priority**

##### **H-IH (International Heritage)**

Programs that target pests that impact significantly on world heritage or international heritage values, for example control of pigs and goats to reduce impacts on world heritage values of Blue Mountains, Wollemi and Kanangra-Boyd national parks.

##### **H-CH (Cultural Heritage)**

Programs targeting pests that impact significantly on important cultural heritage values, for example control of feral pigs where they are disturbing Aboriginal artefacts in Blue Mountains, Abercrombie River and Wollemi national parks.

## **Medium priority**

### **M-WNH (Wilderness and National Heritage)**

Programs that target pests that impact significantly on wilderness, wild rivers, national heritage values or other important listed values, for example control of willows and blackberry along the Kowmung, a declared wild river, or within the Kanangra-Boyd wilderness area.

### **M-RA (Recreation and Aesthetic values)**

Programs that target pests that impact significantly on recreation, landscape or aesthetic values, for example control of prickly pear along walking tracks in Avisford Nature Reserve and campgrounds in Goulburn River National Park, and control of blackberry at Euroka, Blue Mountains National Park.

### **M-CP (Cooperative Programs)**

Cooperative programs (not covered in higher priorities above) targeting pests that impact significantly on park values or agricultural production (including the control of Class 3 noxious weeds or implementation of other endorsed state or regional plan), for example community willow control programs in Marrangaroo National Park.

### **M-II (Isolated Infestations)**

Programs addressing isolated infestations of highly invasive pest species, widely distributed in other parts of the Region, with high potential for future impacts on park values.

## **Lower priority**

### **L-LP (Localised Programs)**

Programs targeting pests that have localised impacts on natural ecosystems or agricultural lands that promote community skills, awareness and involvement with parks, for example control of Class 4 noxious weeds, serrated tussock, St John's wort at Evans Crown Nature Reserve and Coolah Tops National Park.

### **L-PP (Previous Programs)**

Previous programs targeting pests that have localised impacts on native species and ecosystems, and that can be efficiently implemented to maintain program benefits, for example the maintenance of the pine control program at Abercrombie River National Park.

In some circumstances, new programs may be introduced, or priority programs extended to target pests where a control window of opportunity is identified. These may arise where burnt areas become more accessible for ground control of weeds, where drought makes control of feral pigs and feral goats more efficient because they congregate in areas where water is available, or when a new biocontrol agent becomes available.

Future priorities for pest control will need to reflect changes in the distribution, abundance or impacts of pests that may occur in response to environmental changes, including climate change. NPWS is supporting research to understand the interaction between climate change, pests and biodiversity. The Region will respond to new and emerging pest issues as they arise (Appendix 1).

## Fire management and environmental changes

Pest management programs need to be responsive to fire events, particularly where an advantage for control could be gained or threats to a priority asset are significantly increased. Fire can be used to exhaust weed seed banks and promote bushland regeneration. Without post-fire pest management, fire can lead to increased threats to biodiversity such as significant competition between native and invasive plants through the germination of plumes of weeds (such as Scotch broom and gorse), increased predation of native wildlife by vertebrate pests (foxes and cats), and damage to regenerating plants by vertebrate pests (goats and rabbits). Where fire-responsive pest species are significantly impacting priority assets after fire events, management must be adaptive and timely to respond to these challenges.

Pest management programs need to also be considered in fire management planning. With the increase in urban interface area hazard reduction programs, community bush regeneration program capacities can be exceeded, and efforts reversed. However, successful implementation of post-fire plumes have occurred in the Blue Mountains Region. For example, external funding through Environmental Trust grants has enabled the drastic reduction of Scotch broom seedlings after the 2001–02 fires at Katoomba Creek in just 10 years. With initial control and ongoing effort the threatened species *Epacris hamiltonii* continues to exist at this site. Fire planning needs to consider how risks can be mitigated for particular sites that host fire-responsive pests. One potential strategy is to break up a potentially large hazard reduction burn into sectors to reduce the extent of pest impacts associated with fire, making these impacts more manageable.



## 4 Prioritised regional pest programs

Live versions of this table will be kept on the OEH intranet and updated annually over the five year period of the strategy. Sites are listed in order of priority category, management area, target species and then reserve.

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Hawkesbury	Yellomundee RP	1088 – Yellow Rock Lookout	African lovegrass, lantana	Shale Sandstone Transition Forest EEC (EPBC-e; TSC-e); BPWW – CC1	Asset protection	Foliar spray	C-TSC
Hawkesbury	Wollemi NP	827 – Bells Line of Road, Kurrajong Heights	<i>Erica lusitanica</i> , St John's wort, blackberry	Blue Mountains Shale Cap Forest (TSC-e) (small area on Wollemi NP), various threatened species, world heritage values; BPWW – CC1	Asset protection	Programs with Roads and Maritime Services and Hawkesbury River County Council	C-TSC
Hawkesbury	Blue Mountains NP	632 – Blue Gum Swamp, end of Whitecross Road, Winmalee	Kikuyu, African lovegrass, cobbler's pegs	Blue Mountains Swamps (TSC-v), giant dragonfly (TSC-e), world heritage values; BPWW – CC2	Asset protection	Bush regeneration, foliar spray, education	C-TSC
Hawkesbury	Blue Mountains NP	1054 – Western Nepean River riparian areas, especially Erskine, Glenbrook, Euroka and Breakfast creeks	Lantana	Shale/Sandstone Transition Forest EEC (EPBC-e; TSC-e), Cumberland Plain Woodland EEC (EPBC-e; TSC-ce); BPWW – CC1	Asset protection	CMA, bush regeneration, contractors	C-TSC
Hawkesbury	Blue Mountains NP	732 – Eastern Nepean River riparian areas, The Rock precinct	Lantana	Shale/Sandstone Transition Forest EEC (EPBC-e; TSC-e), Cumberland Plain Woodland EEC (EPBC-e; TSC-ce); BPWW – CC1	Asset protection	CMA, bush regeneration, contractors	C-TSC

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Hawkesbury	Wollemi NP	1022 – Tootie Creek	Lantana	Brush-tailed rock-wallaby (EPBC-v; TSC-e), <i>Callistemon shiressii</i> , <i>Olearia cordata</i> (EPBC-v; TSC-v); BPWW – CC1	Asset protection	Bush regeneration, foliar spray, CMA, Find it and Fix it, Friends of the Colo, Willows out of Wollemi	C-TSC
Hawkesbury	Wollemi NP	692 – Colo Meroo remote visitor area	Lantana, Cape ivy, poplars, blackberry, tradescantia	River-Flat Eucalypt Forest on Coastal Floodplains (TSC-e), Shale/Sandstone Transition Forest (EPBC-e; TSC-e), Cumberland Plain Woodland EECs (EPBC-e; TSC-ce), world heritage values, biodiversity; BPWW – CC1	Asset protection	Bush regeneration contractors, foliar spray, physical removal, Colo Valley Landcare volunteers, Find it and Fix it	C-TSC
Hawkesbury	Yellomundee RP	642 – Bridle and Old Mill	Lantana, castor oil, gleditsia, balloon vine, African lovegrass, cat's claw	Moist Shale Woodland (TSC-e), Shale/Sandstone Transition Forest (EPBC-e; TSC-e), Cooks River/Castlereagh Ironbark Forest EECs (TSC-e), koala (TSC-v), yellow-bellied glider (TSC-v); BPWW – CC1	Asset protection	Bush regeneration, foliar spray, cooperative program with Lower Mountains EEC Project	C-TSC
Hawkesbury	Yellomundee RP	743 – Fitzgeralds and Sarks addition	Lantana, castor oil, turkey rhubarb, gleditsia, balloon vine, cat's claw creeper, African lovegrass, mist flower	Moist Shale Woodland (TSC-e), Shale/Sandstone Transition Forest EECs (EPBC-e; TSC-e); BPWW – CC1	Asset protection	Foliar spray, physical removal, bush regeneration plan, contractors	C-TSC

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Hawkesbury	Yellomundee RP	1004 – Yellow Rock lookout south to Fitzgeralds Creek	Lantana, gleditsia, castor oil, African love grass, balloon vine, privet	River-Flat Eucalypt Forest on Coastal Floodplains (TSC-e), Shale/Sandstone Transition Forest (EPBC-e; TSC-e), Cumberland Plain Woodland EECs (EPBC-e; TSC-ce), <i>Eucalyptus benthamii</i> (TSC-v; EPBC-v), <i>Persoonia nutans</i> (EPBC-e; TSC-e), koala (TSC-v), spotted-tailed quoll (TSC-v; EPBC-e), eastern bentwing-bat (TSC-v), regent honeyeater (EPBC-e; TSC-e), brown treecreeper (TSC-v), <i>Dillwynia tenuifolia</i> (EPBC-v; TSC-v), <i>Pultenaea parviflora</i> (EPBC-v; TSC-e), broad-headed snake (EPBC-v; TSC-e), pink robin (TSC-v), hooded robin (TSC-v); BPWW – CC1	Asset protection	Foliar spray, cut and paint, physical removal, bush regeneration	C-TSC
Hawkesbury	Yellomundee RP	622 – Bike and Shaws riparian areas	Lantana, privet, gleditsia, castor oil plant, balloon vine, cat's claw creeper, African lovegrass	Moist Shale Woodland (TSC-e), Shale/Sandstone Transition Forest (EPBC-e; TSC-e), River-Flat Eucalypt Forest on Coastal Floodplains (TSC-e), Cooks River/Castlereagh Ironbark Forest EECs (TSC-e); BPWW – CC1	Asset protection	Foliar spray, physical removal, fire, bush regeneration, contractors, CMA, Yellomundee Aboriginal bushcare group, Hawkesbury Young Landcare, Willow Warriors, TAFE group	C-TSC
Hawkesbury	Blue Mountains NP	2752 – Mulgoa Precinct	Lantana, riparian weeds	Shale/Sandstone Transition Forest EEC (EPBC-e; TSC-e)	Asset protection	Bush regeneration, foliar spray, cut and paint, physical removal, contractors	C-TSC
Hawkesbury	Blue Mountains NP	1084 – Woods Creek, Lower Grose	Lantana, willow, other riparian weeds	Shale/Sandstone Transition Forest EEC (EPBC-e; TSC-e), world heritage values, wild river values, recreational values, riparian habitat for glossy black-cockatoo, powerful owl, gang-gang cockatoo, red-crowned toadlet, eastern firetail bat, large-footed myotis; BPWW – CC1	Asset protection	Bush regeneration, foliar spray, cut and paint, physical removal, contractors, Blue Mountains Bass Fishos, volunteers	C-TSC

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Hawkesbury	Wollemi NP	1058 – Wheeny Creek Camping Precinct	Riparian areas, mother-of-millions, lantana, blackberry, tradescantia, turkey rhubarb	Western Sydney Dry Rainforest EEC (TSC-e), world heritage values, recreational values; BPWW – CC1	Asset protection	Bush regeneration, foliar spray, cut and paint, physical removal	C-TSC
Hawkesbury	Wollemi NP	816 – Kangaroo waterholes	St John's wort, African lovegrass, whisky grass	Howes Swamp, koala, sandstone swamp woodland, distinct and important vegetation community not reserved elsewhere; BPWW – CC1	Asset protection	Bush regeneration, foliar spray, CMA, contractors	C-TSC
Hawkesbury	Blue Mountains NP	650 – Buralow Swamp, flowing into Grose Wild River	Whisky grass, African lovegrass	Blue Mountains Swamps (TSC-v), giant dragonfly (TSC-e), world heritage values, wild river values, recreational values; BPWW – CC1	Asset protection	Bush regeneration, foliar spray, fire – ecological burning	C-TSC
Hawkesbury	Yellomundee RP	786 – Hawkesbury Lookout	Whisky grass, African lovegrass, Cootamundra and Mount Morgan wattles	Shale/Sandstone Transition Forest EEC (EPBC-e; TSC-e), recreation and tourism values, koala (TSC-v); BPWW – CC1	Asset protection	Bush regeneration, foliar spray, physical control, cooperative program with Lower Mountains EEC Project	C-TSC
Hawkesbury	Wollemi NP	867 – Mellong	Whisky grass, African lovegrass, coreopsis, St John's wort, fennel, other environmental weeds	Mellong Swamp Complex – <i>Eucalyptus parramattensis</i> (EPBC-v; TSC-v), world heritage values; BPWW – CC1	Asset protection	Bush regeneration, foliar spray, CMA, contractors	C-TSC
Hawkesbury	Blue Mountains NP	738 – Erskine Creek – Nepean River junction	Willow, lantana, riparian weeds	Shale/Sandstone Transition Forest EEC (EPBC-e; TSC-e), lower Blue Mountains diatreme forest, world heritage values, regionally significant lower Blue Mountains diatreme forest, recreational values; BPWW – CC1	Asset protection	Bush regeneration, physical control, cut and paint, splatter gun, cooperative program	C-TSC

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Kanangra	Blue Mountains NP	810 – Greater Jorrilands Precinct	Berberis, bridal creeper, African olive, prickly pear, Paterson's curse, saffron thistle, serrated tussock	White Box Yellow Box Blakely's Red Gum Woodland EEC (EPBC-ce; TSC-e), world heritage values; BPWW – CC3	Asset protection	Regeneration, foliar spray, physical control, biological control for prickly pear	C-TSC
Kanangra	Yerranderie SCA	659 – Joorilands, Jorrilands to Scarlets	Berberis, bridal creeper, African olive, prickly pear, Paterson's curse, saffron thistle, serrated tussock	White Box Yellow Box Blakely's Red Gum Woodland EEC (EPBC-ce; TSC-e), world heritage values (Blue Mountains NP); BPWW – CC3	Asset protection	Regeneration, foliar spray, physical control, biological control for prickly pear	C-TSC
Kanangra	Yerranderie SCA	654 – Byrnes Creek	Berberis, bridal creeper, African olive, prickly pear, Paterson's curse, saffron thistle, serrated tussock	White Box Yellow Box Blakely's Red Gum Woodland EEC (EPBC-ce; TSC-e); BPWW – CC3	Asset protection	Regeneration, foliar spray, physical control, biological control for prickly pear	C-TSC
Kanangra	Keverstone NP	Box gum woodland	Blackberry, serrated tussock	Box Gum Woodland EEC	Asset protection	Foliar spray	C-TSC
Kanangra	Burwood Creek NR	2660 Burwood Creek NR	Blackberry, sweet briar, serrated tussock, thistle, horehound, St John's wort	Box Gum Woodland EEC (BPWW – TBA)	Asset protection	Foliar spray, monitoring	C-TSC
Kanangra	Jenolan KCR	2755 – Jenolan River downstream of Grand Arch	Blue periwinkle	Brush-tailed rock-wallaby (EPBC-v; TSC-e), world heritage values; BPWW – Cat	Asset protection	Bush regeneration, foliar spray	C-TSC

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Kanangra	Blue Mountains NP	EEC site	Cattle	White Box Yellow Box Blakely's Red Gum Woodland EEC (EPBC-ce; TSC-e), world heritage values	Asset protection	Aerial and ground shooting	C-TSC
Kanangra	Jenolan KCR	Jenolan	Fox, cat	Brush-tailed rock-wallaby (TSC-e), world heritage values	Asset protection	Ground baiting, trapping, ground shooting, trapping, ground shooting	C-TSC
Kanangra	Jenolan KCR	Limestone and Upper Jenolan River	Goat, deer	Brush-tailed rock-wallaby (TSC-e), world heritage values	Asset protection	Aerial and ground shooting	C-TSC
Kanangra	Jenolan KCR	805 – Southern limestone	Honeysuckle, English ivy	Brush-tailed rock-wallaby (EPBC-v; TSC-e), world heritage values; BPWW –CC1	Asset protection	Bush regeneration, volunteers, CMA program	C-TSC
Kanangra	Nuggety SCA	Nuggety SCA	Pig	Booroolong frog, large-footed myotis	Asset protection	Ground baiting	C-TSC
Kanangra	Mares Forest NP	Threatened species site	Pig	<i>Diuris aequalis</i> (TSC-e)	Asset protection	Ground baiting, trapping	C-TSC
Kanangra	Kanangra-Boyd NP	613 – Beefsteak Creek and Little River fire trails	Radiata pine, tutsan, blackberry	Booroolong frog (EPBC-e; TSC-e); BPWW – CC2	Asset protection	Foliar spray (blackberry), physical control (pines), biological control (tutsan)	C-TSC
Kanangra	Keeverstone NP	2662 Yass daisy site	Serrated tussock	Yass daisy (BPWW –CC*)	Asset protection	Foliar spray	C-TSC
Kanangra	Jenolan KCR	804 – Two Mile Hill	Sycamore maple, tutsan, tree of heaven	Brush-tailed rock-wallaby (EPBC-v; TSC-e), world heritage values; BPWW – CC1	Asset protection	Bush regeneration, foliar spray, scrape and paint, basal or stem injection, volunteers, CMA program	C-TSC
Kanangra	Abercrombie KCR	2753 – Abercrombie KCR	Willows	Booroolong frog (EPBC-e; TSC-e); BPWW – Cat	Asset protection	Stem injection	C-TSC

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Kanangra	Wiarborough NR	2756 – Abercrombie River	Willows	Booroolong frog (EPBC-e; TSC-e); BPWW – Cat	Asset protection	Stem injection	C-TSC
Kanangra	Abercrombie River NP	2754 – Retreat and Abercrombie rivers, river flats and creek lines	Willows, serrated tussock and blackberry	Booroolong frog (EPBC-e; TSC-e), habitat for Macquarie perch (EPBC-e; TSC-v; DPI); BPWW – CC*	Asset protection	Stem injection (willows), foliar spray	C-TSC
Mudgee	Wollemi NP	1077 – Capertee River corridor to the Wolgan–Colo River Junction	Blackberry, gleditsia, pampas grass, Cape ivy	Brush-tailed rock-wallaby (EPBC-v; TSC-e) habitat (weeds smother grazing areas), yellow-bellied glider, koala; BPWW – CC3	Asset protection	Physical removal, Friends of the Colo, cooperative program	C-TSC
Mudgee	Wollemi NP	113 – Blackberry – Box EEC in Wollemi NP	Blackberry, <i>Rosa rubiginosa</i>	White Box Yellow Box Blakely's Red Gum Woodland EEC (EPBC-ce; TSC-e); BPWW – CC*	Asset protection	Vehicle based foliar spray	C-TSC
Mudgee	Wollemi NP	112 – Nullo Mountain to Bylong	Blackberry, St John's wort, <i>Cineraria lyratifarmis</i>	White Box Yellow Box Blakely's Red Gum Woodland EEC (EPBC-ce; TSC-e); BPWW – CC*	Asset protection	Vehicle based foliar spray	C-TSC
Mudgee	Mugii Murumban SCA	Genowlan Point	Goat	<i>Pultenaea</i> spp., Genowlan Point <i>Allocasuarina nana</i> Heathland EEC (TSC-e)	Asset protection	Fencing, cooperative program with Botanic Gardens	C-TSC
Mudgee	Capertee NP	Capertee NP regent honeyeater habitat	Goat	Regeneration of regent honeyeater habitat	Asset protection	ground shooting	C-TSC
Mudgee	Wollemi NP	Wollemi pine catchment area	Phytophthora	Wollemi pines	Asset protection	Soil monitoring and treatment	C-TSC

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Mudgee	Goulburn River NP	350 – Mount Dangar, basalt caps	Prickly pear	<i>Kennedia retrorsa</i> and <i>Acacia dangarensis</i> ; BPWW – CC1	Asset protection	Foliar spray	C-TSC
Mudgee	Capertee NP	Capertee NP regent honeyeater habitat	Rabbit	Regeneration of regent honeyeater habitat	Asset protection	Trapping, ground shooting	C-TSC
Mudgee	Munghorn Gap NR	2678 – Moolarben, Honeyeater Flat	St John's wort thistles, Paterson's curse, blue heliotrope, hemlock and other pasture weeds	Habitat for regent honeyeater (TSC-ce) and woodland birds, brush-tailed rock-wallaby, square-tailed kite, powerful owl, glossy-black cockatoo and red-tailed black cockatoo; BPWW – CC*	Asset protection	Foliar spray	C-TSC
Mudgee	Coolah Tops NP	1394 – Bundella	St John's wort, prickly pear, olives, tree of heaven	White Box Yellow Box Blakely's Red Gum Woodland EEC (EPBC-ce; TSC-e)	Asset protection	Physical removal, scrape and paint, stem injection, foliar spray	C-TSC
Mudgee	Capertee NP	2760 – Capertee NP	Tree of heaven, blackberry, serrated tussock, willows	White Box Yellow Box Blakely's Red Gum Woodland (EPBC-ce; TSC-e); regent honeyeater habitat; BPWW – CC*	Asset protection	Quickspray, stem injection	C-TSC
Mudgee	Capertee NP	2761 – Capertee NP creek lines	Tree of heaven, blackberry, willows, serrated tussock	White Box Yellow Box Blakely's Red Gum Woodland (EPBC-ce; TSC-e)	Asset protection	Quickspray, stem injection	C-TSC



Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Mudgee	Goulburn River NP	267 – Goulburn River riparian corridor including tributaries	Willow, blackberry, tree of heaven, blue heliotrope, St John's wort, prickly pear, tiger pear, thistles, sweet briar, giant reed	White Box Yellow Box Blakely's Red Gum Woodland EEC (EPBC-ce; TSC-e); BPWW – CC1	Asset protection	Physical removal , foliar spray, stem injections, scrape and paint	C-TSC
Upper Mountains	Blue Mountains NP	733 – Echo point precinct	Agapanthus, montbretia, buddleia, privet, blackberry	Blue Mountains Swamps (TSC-v), Blue Mountains water skink; BPWW – CC1	Asset protection	Bush regeneration – specialist rope work	C-TSC
Upper Mountains	Blue Mountains NP	667 – Carne Creek	Blackberry	Regent honeyeater (EPBC-e; TSC-e), Blue Mountains Swamps (TSC-v); BPWW – CC1	Asset protection	Remote foliar spray	C-TSC
Upper Mountains	Gardens of Stone NP	755 – Sunnyside	Blackberry	Blue Mountains Swamps (TSC-v); BPWW – CC1	Asset protection	Remote foliar spray	C-TSC
Upper Mountains	Wollemi NP	2763 – Mt Cameron	Blackberry	Tableland Basalt Forest EEC (TSC-e), world heritage values; BPWW – CC*	Asset protection	Quad bike spraying	C-TSC
Upper Mountains	Blue Mountains NP	639 – Braeside, Shaws Paddock Blackheath	Blackberry, montbretia, agapanthus, gorse, Scotch broom	Blue Mountains Swamps (TSC-v), <i>Epacris hamiltonii</i> (EPBC-e), Blue Mountains water skink (EPBC-e), giant dragonfly (TSC-e); BPWW – CC1	Asset protection	Bush regeneration, foliar spray, physical removal, cooperative program	C-TSC
Upper Mountains	Blue Mountains NP	947 – Prince Henry Cliff Walk	Blackberry, Scotch broom, Japanese and Himalayan honeysuckle	Blue Mountains Swamps (TSC-v), <i>Pultenaea glabra</i> (EPBC-v); BPWW – CC1	Asset protection	Bush regeneration, cut and paint, physical removal	C-TSC

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Upper Mountains	Wollemi NP	740 – Farrer Road, Mt Wilson	Box elder, sycamore maple, Himalayan honeysuckle, banana passionfruit	Tableland Basalt Forest EEC (TSC-e); BPWW – CC1	Asset protection	Cut and paint, physical control	C-TSC
Upper Mountains	Wollemi NP	1071 – Wolgan River flats and corridor	Cape ivy, tree of heaven, blackberry	Brush-tailed rock-wallaby (EPBC-v; TSC-e) habitat (weeds smother grazing areas); BPWW – CC2	Asset protection	Volunteer Friends of the Colo, physical removal, vehicle based spraying, cooperative program	C-TSC
Upper Mountains	Wollemi NP	Wolgan and Capertee River Valley	Cat	Brush-tailed rock-wallaby (TSC-e), world heritage values	Asset protection	Trapping	C-TSC
Upper Mountains	Blue Mountains NP	818 – Katoomba Falls	English ivy, privet, montbretia	<i>Microstobis fitzgeraldii</i> (EPBC-e; TSC-e); BPWW – CC1	Asset protection	Bush regeneration, cut and paint, physical removal	C-TSC
Upper Mountains	Wollemi NP	Wolgan	Fox	Brush-tailed rock-wallaby (TSC-e), world heritage values	Asset protection	Monthly ground baiting	C-TSC
Upper Mountains	Blue Mountains NP	778 – Upper Grose River Valley to Victoria Falls	Gorse, Scotch broom	Blue Gum Forest (HNCMA priority habitat) alluvial forest – <i>Persoonia acerosa</i> (EPBC-v), <i>Diuris aequalis</i> (EPBC-v), spotted-tailed quoll (TSC-v), koala; BPWW – CC3	Asset protection	Bush regeneration, cut and paint, physical removal	C-TSC
Upper Mountains	Blue Mountains NP	771 – Govetts Creek	Gorse, Scotch broom,	Blue Gum Forest (HNCMA priority habitat) – alluvial forest – <i>Isopogon fletcheri</i> (EPBC-v), <i>Lepidosperma evansianum</i> (TSC-v), eastern pygmy-possum (TSC-v), world heritage values; BPWW – CC3	Asset protection	Bush regeneration, cut and paint, physical removal	C-TSC
Upper Mountains	Blue Mountains NP	772 – Govetts Leap Lookout	Inkweed, blackberry, montbretia, agapanthus	<i>Isopogon fletcheri</i> (EPBC-v; TSC-v); BPWW – CC2	Asset protection	Bush regeneration, foliar spray, physical removal, cooperative program	C-TSC

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Upper Mountains	Marangaroo NP	Marangaroo NP purple copperwing butterfly habitat	Pig	Habitat for the purple copperwing butterfly (TSC-e)	Asset protection	Ground shooting, baiting, tapping	C-TSC
Upper Mountains	Wollemi NP	Mount Cameron	Pig, donkey	Newnes Plateau Shrub Swamp EEC, world heritage values, donkey potentially impacting on the Tableland Basalt Forest EEC (TSC-e)	Asset protection	Aerial and ground shooting, baiting, trapping for pigs	C-TSC
Upper Mountains	Marangaroo NP	855 – Marangaroo, west of Lithgow	Pines, Scotch broom, blackberry, serrated tussock	Habitat for the purple copperwing butterfly (EPBC-v; TSC-e); BPWW – CC1	Asset protection	Vehicle quickspray, injection	C-TSC
Upper Mountains	Gardens of Stone NP	754 – Slopes of Airly Creek	Prickly pear	White Box Yellow Box Blakely's Red Gum Woodland (EPBC-ce; TSC-e); BPWW – CC1	Asset protection	Remote foliar spray	C-TSC
Upper Mountains	Blue Mountains NP	2758 – Kedumba River and valley	Privet, box elder, montbretia, tradescantia, periwinkle, holly, Japanese honeysuckle, buddleia, vinca, tree of heaven, blackberry, tutsan, willow	<i>Eucalyptus benthamii</i> (TSC-v) in the highly restricted Burragorang River Flat Forest, world heritage values; BPWW – CC*	Asset protection	Bush regeneration, cut and paint, physical removal	C-TSC
Upper Mountains	Blue Mountains NP	2757 – Katoomba Creek	Riparian, blackberry, gorse, Scotch broom, Himalayan honeysuckle	<i>Epacris hamiltonii</i> (TSC-e; EPBC-e), world heritage values	Asset protection	Bush regeneration, cut and paint, physical removal	C-TSC

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Upper Mountains	Blue Mountains NP	835 – Leura Cascades	Riparian, blackberry, montbretia, erigeron, English ivy, privet, ranunculus, Scotch broom	<i>Microstobis fitzgeraldii</i> (EPBC-e; TSC-e); BPWW – CC1	Asset protection	Bush regeneration, cut and paint, physical removal	C-TSC
Upper Mountains	Blue Mountains NP	1038 – Valley of the Waters and Wentworth Creek	Riparian, blackberry, privet, Scotch broom	Blue Mountains Swamps (TSC-v); BPWW – CC1	Asset protection	Bush regeneration, cut and paint, physical removal	C-TSC
Upper Mountains	Blue Mountains NP	830 – Lake Woodford Catchment creeks	Riparian, privet, willow, Japanese Honeysuckle, lily	Blue Mountains Swamps (TSC-v), <i>Pultanaea glabra</i> (EPBC-v), <i>Acacia bynoeana</i> (EPBC-v), Blue Mountains water skink; BPWW – CC1	Asset protection	Bush regeneration, cut and paint, physical removal	C-TSC
Upper Mountains	Wollemi NP	2762 – Capertee River flats and Coorongooba Camping Area	Riparian, tree of heaven, blackberry, gleditsia, privet, willow, moth vine	Brush-tailed rock-wallaby (EPBC-v; TSC-e) habitat (weeds smother grazing areas)	Asset protection	Volunteer Friends of the Colo, physical removal, scrape and paint, stem injection, foliar spray	C-TSC
Upper Mountains	Blue Mountains NP	767 – Gordon Falls Creek	Scotch broom, blackberry	Blue Mountains Swamps (TSC-v); <i>Pultanaea glabra</i> (EPBC-e; TSC-e); Blue Mountains water skink, giant dragonfly, world heritage values; BPWW – CC1	Asset protection	Bush regeneration, cut and paint, physical removal	C-TSC
Upper Mountains	Blue Mountains NP	2759 – Waratah Picnic Area	Solia, petrophilia	Blue Mountains Shale Cap Forest (TSC-e), recreational values; BPWW – CC*	Asset protection	Cut and paint	C-TSC
Hawkesbury	Blue Mountains NP	Peri-urban interface areas and campsites	Wild dog	Park users and neighbours threatened by wild dog attacks	Asset protection	Trapping	C-HD

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Kanangra	Blue Mountains NP, Kanangra-Boyd NP, Yerranderie SCA	Special Areas, Kanangra wilderness (escarpment areas for goats)	Pig, cattle, deer, goat	Special Areas (Sydney and Blue Mountains water quality), world heritage values (Blue Mountains and Kanangra-Boyd NPs), pigs impacting on <i>Acacia clunies-rossiae</i> in Kowmung Valley and Coxs River, Blue Mountains NP (TSC-v), <i>Diuris aequalis</i> in Kanangra-Boyd NP (TSC-e), <i>Baloskian longipes</i> on Boyd Plateau and in Kanangra-Boyd NP (TSC-v), Montane Peatlands and Swamps EEC (TSC-e), <i>Trachymene saniculifolia</i> on Boyd Plateau and in Kanangra-Boyd NP, Aboriginal cultural heritage sites (Blue Mountains NP – limeburners artefacts sites), Blue Mountains water skink and giant dragonfly habitat in swamps on Newnes Plateau, goats potentially impacting important Aboriginal cultural heritage sites, and broad-headed snake (TSC-e)	Asset protection	Aerial and ground shooting, and ground baiting and trapping for pigs	C-HD
Upper Mountains	Blue Mountains NP	Special Areas including Kedumba River and Cedar Creek	Pig	Special Areas (Sydney and Blue Mountains water quality), <i>Eucalyptus benthamii</i> (TSC-v) in the highly restricted Burratorang River Flat Forest, world heritage values	Asset protection	Aerial and ground shooting, baiting, trapping	C-HD
Upper Mountains	Blue Mountains NP	Peri-urban interface areas and campsites	Wild dog	Park users and neighbours threatened by wild dog attacks	Asset protection	Trapping	C-HD
Hawkesbury	Blue Mountains NP, Yellomundee RP (off park – adjacent areas)	Hawkesbury-Nepean River – alligator weed	Alligator weed	Neighbouring industry – turf production; world heritage values and local EECs; recreational values	Asset protection	HNCMA cooperative program	C-EC

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Kanangra	Kanangra-Boyd NP, Yerranderie SCA, Blue Mountains NP, Abercrombie River NP, Jenolan KCR	Oberon Wild Dog Management Plan	Wild dog	Neighbouring stock	Asset protection	Ground baiting and trapping, cooperative program	C-EC
Mudgee	Capertee NP	Rylstone Wild Dog Management Plan	Wild dog	Neighbouring stock	Asset protection	ground shooting, trapping	C-EC
Mudgee	Mugii Murumban SCA	Rylstone Wild Dog Management Plan	Wild dog	Neighbouring stock	Asset protection	ground shooting, trapping	C-EC
Mudgee	Durridgere SCA	Goulburn River Wild Dog Management Plan	Wild dog, fox	Neighbouring stock	Asset protection	Ground baiting, trapping, cooperative program with LHPA and neighbours	C-EC
Mudgee	Goulburn River NP	Goulburn River Wild Dog Management Plan	Wild dog, fox	Neighbouring stock	Asset protection	Ground and aerial baiting, trapping, cooperative program with LHPA and neighbours	C-EC
Mudgee	Munghorn Gap NR	Goulburn River Wild Dog Management Plan	Wild dog, fox	Neighbouring stock	Asset protection	Ground and aerial baiting, trapping, cooperative program with LHPA and neighbours	C-EC
Mudgee	Wollemi NP	Rylstone Wild Dog Management Plan	Wild dog, fox	Neighbouring stock	Asset protection	Ground and aerial baiting, trapping, cooperative program with LHPA and neighbours	C-EC

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Upper Mountains	Blue Mountains NP, Wollemi NP, Turon NP	Oberon Wild Dog Management Plan	Wild dog	Neighbouring stock	Asset protection	Ground shooting, trapping	C-EC
Upper Mountains	Gardens of Stone NP	Rylstone Wild Dog Management Plan	Wild dog	Neighbouring stock	Asset protection	Ground shooting, trapping	C-EC
Hawkesbury	Wollemi NP	Bells Line of Road	Boneseed		Eradication	Foliar spray, physical removal, HNCMA, neighbours, 'boneseed blitz' – annual spring seedling control	C-NE
Hawkesbury	Wollemi NP	Mellong – Putty Road	Coolatai grass		Containment	Foliar spray, liaise with Roads and Maritime Services, Hawkesbury River County Council	C-NE
Kanangra	Kanangra-Boyd NP	Kanangra-Boyd NP boundaries	Ox-eye daisy		Containment	Foliar spray	C-NE
Mudgee	Avisford NR	Avisford NR	Bridal creeper		Containment	Biological control, foliar spray, CMA project	C-NE
Mudgee	Munghorn Gap NR	Munghorn	Bridal creeper		Containment	Biological control, survey	C-NE
Hawkesbury	Wollemi NP	Tootie Creek and other affected areas	BMAD		Containment	BMAD working group advice	H-IH

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Hawkesbury	Wollemi NP	Edge areas, east of Wollemi creek, north of Culoul Range fire trail, west of Putty Road	Cattle	World heritage values	Asset protection	Ground shooting	H-IH
Hawkesbury	Blue Mountains NP	Glenbrook entrance	Coreopsis, African love grass, whisky grass, Mt Morgan silver wattle, Paddy's lucerne	World heritage values, Glenbrook entrance – entrance to GBMWHA, biodiversity, tourism	Asset protection	Bush regeneration, foliar spray, physical removal, contractors and volunteers, Glenbrook Precinct Plan	H-IH
Hawkesbury	Wollemi NP, Blue Mountains NP	North of Grose River and east of Bilpin, Bilpin to Kurragong (Bells Line of Road)	Deer	World heritage values	Asset protection	Ground shooting	H-IH
Hawkesbury	Blue Mountains NP, Wollemi MP	Mulgoa and various other sites	Goat	World heritage values with potential impacts on important Aboriginal cultural heritage sites	Asset protection	Ground shooting	H-IH
Hawkesbury	Blue Mountains NP	Mid-Grose	Gorse, Scotch broom, other riparian weeds	World heritage values, recreational values, riparian habitat for glossy black-cockatoo, powerful owl, gang-gang cockatoo, red-crowned toadlet, eastern firetail bat, large-footed myotis	Asset protection	Physical control, <i>Great Grose Weed Walk</i> , volunteers	H-IH
Hawkesbury	Blue Mountains NP	Springwood Precinct (Florabella and Sassafras)	Lantana, ginger lily, mistflower,	World heritage values, recreational values	Asset protection	Bush regeneration, foliar spray, physical removal, BMCC and volunteers	H-IH



Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Hawkesbury	Wollemi NP	Mellong Swamp Complex	Pig, deer	World heritage values with potential impacts on <i>Eucalyptus parramattensis</i> (EPBC-v, TSC-v)	Asset protection	Ground shooting, trapping, ground baiting,	H-IH
Hawkesbury	Blue Mountains NP	Peri-urban watercourses feeding Blue Mountains NP	Riparian weeds, lantana	World Heritage values, recreational values (esp. Glenbrook Creek precinct)	Asset protection	Volunteers, contractors, BMCC cooperative programs	H-IH
Hawkesbury	Blue Mountains NP	1008 – St Helena Crater, Glenbrook Precinct	Riparian, blackberry, willow, grasses, moth vine, cape ivy, turkey rhubarb	World Heritage values, Lower Blue Mountains diatreme forest; koala, yellow-bellied glider, gang gang and glossy black cockatoos, regent honeyeater, black chinned honeyeater; Glenbrook Creek is also habitat for Macquarie perch (EPBC-e; TSC-v; DPI); BPWW –CC4	Asset protection	Bush regeneration, foliar spray, Friends of St Helena Crater and Friends of Glenbrook, contractors	H-IH
Hawkesbury	Wollemi NP	Colo River and tributaries	Riparian, lantana, tradescantia, willows, cape ivy, blackberry	World heritage values, recreational values, wild river values	Asset protection	Bush regeneration, cut and paint, physical control, splatter gun, volunteer groups	H-IH
Hawkesbury	Wollemi NP	Putty Road	St John's wort, whisky grass, African love grass, bush	World heritage values	Asset protection	Foliar spray, physical removal, cut and paint	H-IH
Kanangra	Blue Mountains NP	Yerranderie	Berberis	World heritage values, natural ecosystem	Asset protection	Cut and paste, volunteer program	H-IH
Kanangra	Blue Mountains NP	Kowmung River and creek systems, Abercrombie River and Werong Creek	Blackberry	World heritage values, wild river values (Kowmung River)	Asset protection	Foliar spray, splatter gun	H-IH
Kanangra	Blue Mountains NP, Kanangra-Boyd NP	Special Areas	Blackberry	World heritage and catchment values	Asset protection	Foliar spray	H-IH

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Kanangra	Jenolan KCR	Jenolan River catchment	Blackberry	World heritage values	Asset protection	Foliar spray, splatter gun	H-IH
Kanangra	Kanangra-Boyd NP	Kowmung River and Boyd Plateau	Blackberry	World heritage values, wild river values (Kowmung River)	Asset protection	Foliar spray, splatter gun	H-IH
Kanangra	Jenolan KCR	806 – The Nest	Box elder, tree of heaven	World heritage values; BPWW – CC4	Asset protection	Bush regeneration, foliar spray, scrape and paint, stem injection, volunteers, CMA program	H-IH
Kanangra	Blue Mountains NP	Coxs Arm	Horse	World heritage values	Asset protection	Staged control as per the wild Horse Management Plan	H-IH
Kanangra	Blue Mountains NP	Coxs Arm	Lantana, olive	World heritage values	Asset protection	Mechanical control, foliar spray	H-IH
Kanangra	Blue Mountains NP	696 – Commodores, Coxs Arm of Warragamba	Lantana, Paterson's curse, prickly pear, saffron thistle, African olive	World heritage values; BPWW – CC4	Asset protection	Foliar spray, physical control	H-IH
Kanangra	Yerranderie SCA, Blue Mountains NP	Olive program scarlets, commodores and branjan	Olive	World heritage values and wilderness values (Blue Mountains NP)	Asset protection	Bush regeneration, foliar spray, physical control, Cooperative CMA project	H-IH
Kanangra	Jenolan KCR	Jenolan	Pig	World heritage values	Asset protection	Ground shooting, ground baiting, trapping	H-IH
Kanangra	Blue Mountains NP	Southern park entrance	Pines	World heritage values	Asset protection	Mechanical control	H-IH
Kanangra	Jenolan KCR	Jenolan KCR northern and western boundaries	Pines	World heritage values	Asset protection	Mechanical control	H-IH

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Kanangra	Kanangra-Boyd NP	Western boundary and Empress fire trail	Pines	World heritage values	Asset protection	Mechanical control	H-IH
Kanangra	Jenolan KCR	Jenolan	Rabbit	World heritage values	Asset protection	shooting	H-IH
Kanangra	Kanangra-Boyd NP	Kowmung, Hollanders and Jenolan Rivers	Riparian, blackberry, willows	World heritage values, wild river values (Kowmung River)	Asset protection	Bush regeneration, foliar spray, stem injection	H-IH
Kanangra	Blue Mountains NP	Coxs and Kowmung rivers	Riparian, willows	World heritage values	Asset protection	Bush regeneration, stem injection	H-IH
Kanangra	Jenolan KCR	Jenolan River	Riparian, willows	World heritage values	Asset protection	Bush regeneration, stem injection	H-IH
Kanangra	Kanangra-Boyd NP	Boyd Plateau	Scotch broom	World heritage values	Asset protection	Cut and paint, foliar spray	H-IH
Kanangra	Kanangra-Boyd NP	Ebertons	Scotch broom	World heritage values	Asset protection	Physical control	H-IH
Kanangra	Blue Mountains NP	Millnigang and Bullnigang	Serrated tussock	World heritage values	Asset protection	Foliar spray	H-IH
Kanangra	Jenolan KCR	Jenolan KCR	Sycamore maple	World heritage values	Asset protection	Implement control strategy, mechanical control, foliar spray, cut and paint, basal injection, HNCMA and Environmental Trust project, volunteers	H-IH
Kanangra	Blue Mountains NP	Coxs River, Six Foot track	Tree of heaven	World heritage values	Asset protection	Stem injection, scrape and paint, foliar spray	H-IH

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Kanangra	Kanangra-Boyd NP, Blue Mountains NP, Jenolan KCR	Tutsan biocontrol program	Tutsan	World heritage values	Asset protection	Investigating biological control	H-IH
Mudgee	Wollemi NP	1075 – Coricudgy and Coorongooba diatremes	Blackberry, tree of heaven – propagules via waterways	World heritage values, regionally significant diatreme habitat for spotted-tailed quoll (EPBC-e; TSC-v), yellow-bellied glider, koala, brush-tailed rock-wallaby, yellow-bellied glider, broad-headed snake, glossy black cockatoo, turquoise parrot, powerful owl; BPWW – CC3	Asset protection	Remote areas – helicopter access and remote area control methods	H-IH
Mudgee	Wollemi NP	Wollemi NP	Phytophthora	World heritage values	Asset protection	Monitoring	H-IH
Mudgee	Wollemi NP	Nullo Mountain	Pig, goat, deer	World heritage values with goats potentially impacting on important Aboriginal cultural heritage sites	Asset protection	Aerial and ground shooting, trapping, cooperative program with LHPA and neighbours and ground baiting for pigs, mustering for goats	H-IH
Mudgee	Wollemi NP	Wollemi NP	Prickly pear, thistles, Patterson's curse	World heritage values, natural ecosystems	Asset protection	Foliar spray	H-IH
Upper Mountains	Wollemi NP	Wolgan Valley, Carne Creek	Blackberry	World heritage values, regent honeyeater (EPBC-e; TSC-e) habitat	Asset protection	Annual spraying, recruitment of box seedlings	H-IH
Upper Mountains	Blue Mountains NP	Katoomba Special Area	Blackberry, Scotch broom	World heritage values, catchment values	Asset protection	Foliar spray, rehabilitation	H-IH
Upper Mountains	Blue Mountains NP	801 – Jamison and Valley of the Waters creeks	Blackberry, Scotch broom, riparian weeds	HNCMA priority habitat – alluvial forest, giant dragonfly (TSC-e); BPWW – CC4	Asset protection	Valley of the Waters Bushcare Group cooperative program	H-IH

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Upper Mountains	Marangaroo NP	856 – Marangaroo riparian areas	Blackberry, Scotch broom, willow	HN priority habitat – alluvial forest, platypus; BPWW – CC3	Asset protection	Bush regeneration, vehicle quickspray, injection, community willow removal program	H-IH
Upper Mountains	Wollemi NP	Newnes historic precinct and adjacent Wolgan River corridor	Blackberry, willows, tree of heaven	World heritage values, regent honeyeater (EPBC-e, TSC-e) habitat, koala (TSC-v), yellow-bellied glider	Asset protection	Stem injection, scrape and paint, foliar spray	H-IH
Upper Mountains	Blue Mountains NP	Sublime Point, Leura	BMAD		Containment	BMAD working group advice	H-IH
Upper Mountains	Blue Mountains NP	Pitts Amphitheatre, Federal Path	BMAD		Containment	BMAD working group advice	H-IH
Upper Mountains	Blue Mountains NP	Echo Point, Katoomba	BMAD		Containment	BMAD working group advice	H-IH
Upper Mountains	Blue Mountains NP	Green Gully catchment	Firethorn, Paterson's curse, pyracanthum	World heritage values	Asset protection	Foliar spray, rehabilitation	H-IH
Upper Mountains	Blue Mountains NP	Blue Mountains NP upland swamps	Fox	World heritage values, Blue Mountains Swamps (TSC-v), eastern pygmy-possum	Asset protection	Ground baiting	H-IH
Upper Mountains	Gardens of Stone NP	Gardens of Stone NP sandstone escarpment	Goat, pig	World heritage values	Asset protection	Aerial and ground shooting	H-IH
Upper Mountains	Blue Mountains NP	Grose Valley	Gorse, bush	World heritage values	Asset protection	Great Gorse Weed Walk cooperative program	H-IH

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Upper Mountains	Blue Mountains NP	Special Areas	Horse	World heritage values with potential impacts in the regionally significant dry alluvial paperbark woodlands	Asset protection	trapping	H-IH
Upper Mountains	Blue Mountains NP	628 – Upper catchment of Greaves Creek, Blackheath catchment	Pine, Scotch broom, gorse, blackberry, <i>Erica lusitanica</i> , Japanese honeysuckle, montbretia, whisky grass	World heritage values, Blue Mountains Swamps (TSC-v), Blue Mountains water skink, giant dragonfly (TSC-e); BPWW – CC4	Asset protection	Physical control, foliar spray	H-IH
Upper Mountains	Blue Mountains NP	Blackheath Special Area	Pines, Scotch broom, gorse, Japanese honeysuckle, tradescantia, crofton weed	World heritage values, catchment values	Asset protection	Foliar spray, rehabilitation	H-IH
Upper Mountains	Blue Mountains NP	Woodford Special Area	Privet, willows, Japanese honeysuckle, calla lily, Japanese honeysuckle	World heritage values, catchment values	Asset protection	Foliar spray, rehabilitation	H-IH
Upper Mountains	Blue Mountains NP	837 – Links Road, Leura	Scotch broom, Japanese and Himalayan honeysuckle, blackberry	World heritage values, <i>Pultenaea glabra</i> (EPBC-v, TSC-v), Blue Mountains Swamps (TSC-v); BPWW – CC4	Asset protection	Bush regeneration, cut and paint, physical removal, cooperative program	H-IH
Upper Mountains	Blue Mountains NP	Grose River Valley – riparian zone	Willow, blackberry, <i>Erica lusitanica</i>	World heritage values, wild river values; blue gum forest – HNCMA priority habitat – alluvial forest	Asset protection	Volunteer bush regeneration, stem injection, foliar spray, cooperative program	H-IH

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Upper Mountains	Blue Mountains NP	Cox River, Breakfast creek, wild dog range (adjacent to Megalong Valley precinct)	Willow, tree of heaven, blackberry	World heritage values	Asset protection	Bush regeneration, cut and paint, physical removal, scrape and paint, injection (tree of heaven), cooperative program with BMCC	H-IH
Hawkesbury	Blue Mountains NP	Euroka precinct	Blackberry, moth vine, fireweed, lantana, passionfruit, bush	Natural ecosystems, Apple Tee Flat and Red Hands cultural sites, major tourism and ascetic recreational values in camping and picnic areas	Asset protection	Bush regeneration, foliar spray, physical removal, Contractors and volunteers	H-CH
Kanangra	Jenolan KCR	Commercial Precinct	Honeysuckle, English ivy	Commercial precinct	Asset protection	Bush regeneration, volunteers, CMA program	H-CH
Kanangra	Abercrombie River NP	Abercrombie River NP riparian corridors	Pig	Important Aboriginal cultural heritage sites – disturbances to artefact scatters along the riparian corridor	Asset protection	Ground shooting, ground baiting, trapping	H-CH
Kanangra	Mares Forest NP	Slaters Hut	Tree of heaven	Cultural heritage, weeds compromising the hut structure	Asset protection	Foliar spray, scrape and paint, stem injection	H-CH
Kanangra	Jenolan KCR	Grand Arch	Honeysuckle, English ivy	Grand Arch	Asset protection	Bush regeneration, volunteers, CMA program	M-RA
Kanangra	Abercrombie River NP	Abercrombie River NP camping sites	Paterson's curse, serrated tussock	Recreational values	Asset protection	Foliar spray	M-RA

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Mudgee	Goulburn River NP	Morrison's, Drummers Flat, Pear Hill, Ringwood Road, Merriwa River, Murrumbo, Pogy, Whitebox, Spring Gully, Big River, Winter Bedding Grounds	Prickly pear, tiger pear	Recreational values at river flats and camping areas	Asset protection	Foliar spray	M-RA
Mudgee	Coolah Tops NP	Coolah Tops NP	Thistles, Paterson's curse, blue heliotrope, hemlock and other pasture weeds	Recreational values in picnic areas, walking tracks and reserve facilities	Asset protection	Foliar spray	M-RA
Mudgee	Goulburn River NP	Spring Gully, Big River, Thompsons Flat, Merriwa River, Mullein	Thistles, Paterson's curse, blue heliotrope, hemlock and other pasture weeds	Recreational values in picnic areas, walking tracks and reserve facilities, natural ecosystems	Asset protection	Foliar spray	M-RA
Upper Mountains	Wollemi NP	Newnes camp	Tree of heaven	Recreational values	Asset protection	Scrape and paint, stem injection, foliar spray	M-RA
Kanangra	Wombeyan KCA, Mares Forest NP	Mares Forest Creek	Blackberry	Riparian zone natural ecosystem values	Asset protection	Foliar spray, HNCMA project, neighbours	M-CP
Kanangra	Evans Crown NR	Evans Crown NR	Pig	Neighbouring properties, natural ecosystem values	Asset protection	Ground shooting, ground baiting, trapping	M-CP



Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Kanangra	Abercrombie River NP	Abercrombie River NP southern boundaries	Serrated tussock	Neighbouring production	Asset protection	Foliar spray, cooperative program with neighbours	M-CP
Kanangra	Wombeyan KCA	1079 – Caves Creek catchment	Serrated tussock	Restricted <i>Acacia chalkerii</i> ; BPWW – CC4	Asset protection	Bush regeneration, foliar spray volunteers, Wombeyan Weed Whacking Weekend, ULCMA program	M-CP
Kanangra	Abercrombie River NP	Abercrombie River NP rivers and creeks – willow program	Willows	Riparian zone natural ecosystem values	Asset protection	Stem injection, volunteers	M-CP
Kanangra	Evans Crown NR	Fish River – willow program	Willows	Riparian zone natural ecosystem values	Asset protection	Stem injection, volunteers	M-CP
Mudgee	Coolah Tops NP	Coolah Tops NP	Fox	Neighbouring stock	Asset protection	Ground baiting with neighbours	M-CP
Mudgee	Avisford NR	Avisford NR	Fox, wild dog	Neighbouring stock	Asset protection	Ground baiting with neighbours	M-CP
Mudgee	Avisford NR	Avisford NR	Goat, pig, deer	Natural ecosystems with potential impacts on important Aboriginal cultural heritage sites (goats)	Asset protection	Aerial and ground shooting, mustering, cooperative program with neighbours (goats)	M-CP
Mudgee	Munghorn Gap NR	Munghorn Gap NR	Goat, pig, deer	Natural ecosystems with potential impacts on important Aboriginal cultural heritage sites (goats)	Asset protection	Aerial and ground shooting, mustering, cooperative program with neighbours (goats)	M-CP

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Mudgee	Coolah Tops NP	Coolah Tops NP	Pig, goat, deer	Natural ecosystems	Asset protection	Aerial shooting, ground baiting and trapping (pigs), cooperative program with LHPA and neighbours	M-CP
Mudgee	Durrigere SCA	Durrigere SCA	Pig, goat, deer	Natural ecosystems with potential impacts on important Aboriginal cultural heritage sites (goats)	Asset protection	Aerial and ground shooting, mustering, cooperative program with neighbours (goats)	M-CP
Mudgee	Goulburn River NP	Goulburn River NP	Pig, goat, deer	Natural ecosystems	Asset protection	Aerial and ground baiting, cooperative program with LHPA and neighbours	M-CP
Upper Mountains	Turon NP	Turon River	Willows	Regionally important stands of riverine oak forest and snow gum ribbon gum woodland	Asset protection	Friends of the Colo cooperative program	M-CP
Kanangra	Thalaba SCA	Thalaba SCA	Blackberry		Containment	Foliar spray	M-II
Kanangra	Nuggety SCA	Nuggety SCA	Blackberry, sweet briar, serrated tussock, St John's wort		Containment	Foliar spray	M-II
Hawkesbury	Blue Mountains NP	Euroka Precinct	Cat	Natural ecosystems	Asset protection	Trapping and education	L-LP
Kanangra	Keverstone NP	Keverstone NP	Blackberry, Paterson's curse, serrated tussock, St John's wort		Containment	Foliar spray	L-LP
Kanangra	Keverstone SCA	Keverstone SCA	Blackberry, Paterson's curse, serrated tussock, St John's wort		Containment	Foliar spray	L-LP

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Kanangra	Abercrombie River NP	New additions area	Blackberry, serrated tussock	Natural ecosystem	Asset protection	Foliar spray	L-LP
Kanangra	Wiarborough NR	Abercrombie River and Wiarborough Creek	Blackberry, serrated tussock	Natural ecosystem	Asset protection	Foliar spray	L-LP
Kanangra	Wombeyan KCR	Wombeyan KCR Main Valley	Blackberry, serrated tussock, hemlock	Natural ecosystem	Asset protection	Foliar spray	L-LP
Kanangra	Razorback NR	Razorback NR	Blackberry, sweet briar, hawthorn, Paterson's curse, serrated tussock, St John's wort, thistle		Containment	Foliar spray	L-LP
Kanangra	Abercrombie River NP	Abercrombie River NP	Fox	Native fauna	Asset protection	Ground baiting, monitoring	L-LP
Kanangra	Abercrombie River NP, Wombeyan KCR	Abercrombie River NP, Wombeyan KCR	Goat	Natural ecosystems including impacts on the restricted <i>Acacia chalkerii</i> in Wombeyan KCR	Asset protection	Aerial and ground shooting	L-LP
Kanangra	Mares Forest NP	Mares Forest Creek (two locations)	Serrated tussock, tree of heaven	Natural ecosystem	Asset protection	Foliar spray	L-LP
Kanangra	Evans Crown NR	Evans Crown NR southern boundaries	St John's wort	Neighbouring production	Asset protection	Foliar spray	L-LP
Mudgee	Goulburn River NP	Goulburn River NP	Blackberry	Natural ecosystems	Asset protection	Foliar spray	L-LP

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Mudgee	Avisford NR	Avisford NR	Blackberry, prickly pear, olives, tree of heaven, St John's wort, <i>Cineraria lyratifarmis</i> , thistles, Patterson's curse	Neighbouring production, natural ecosystems	Asset protection	Foliar spray	L-LP
Mudgee	Avisford NR	Avisford NR	Rabbit	Neighbouring production and boundary sites	Asset protection	Ground baiting, fumigation	L-LP
Mudgee	Coolah Tops NP	Coolah Tops NP	Rabbit	Neighbouring production and boundary sites	Asset protection	Ground baiting, fumigation	L-LP
Mudgee	Durrigere SCA	Durrigere SCA	Rabbit	Neighbouring production and boundary sites	Asset protection	Ground baiting, fumigation	L-LP
Mudgee	Goulburn River NP	Spring Gully, Big River, Thompsons Flat	Rabbit	Neighbouring production and boundary sites	Asset protection	Ground baiting, fumigation	L-LP
Mudgee	Munghorn Gap NR	Boundaries	Rabbit	Neighbouring production and boundary sites	Asset protection	Ground baiting, fumigation	L-LP
Mudgee	Wollemi NP	Boundaries and huts	Rabbit	Neighbouring production and boundary sites	Asset protection	Ground baiting, fumigation	L-LP
Mudgee	Avisford NR	Avisford NR	Serrated tussock	Neighbouring production	Asset protection	Foliar spray	L-LP
Upper Mountains	Blue Mountains NP	Urban fringe	Cat	Natural ecosystems within reserve fringes	Asset protection	Support BMCC education and Wildlife Protection Areas	L-LP
Kanangra	Abercrombie River NP	Creek systems	Blackberry	Natural ecosystem	Asset protection	Foliar spray, splatter gun	L-PP
Kanangra	Evans Crown NR	78 – Fish River	Blackberry	Natural ecosystem; BPWW – CC5	Asset protection	Foliar spray	L-PP

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Kanangra	Hartley HS	Hartley HS	Blackberry, African love grass	Natural ecosystem	Asset protection	Foliar spray	L-PP
Kanangra	Kanagara-Boyd NP	Roadsides	Blackberry, serrated tussock	Natural ecosystem	Asset protection	Foliar spray	L-PP
Kanangra	Abercrombie River NP, Mares Forest NP, Abercrombie KCR, Wiarborough NR	All	Pig, deer	Natural ecosystem	Asset protection	Aerial and ground shooting	L-PP
Kanangra	Abercrombie River NP	Macks Flat	Pines	Natural ecosystem	Asset protection	Mechanical removal	L-PP
Kanangra	Blue Mountains NP, Kanangra-Boyd NP, Yerranderie SCA, Jenolan KCR, Evans Crown NR, Abercrombie River NP, Mares Forest NP, Hartley HS, Abercrombie KCR, Wiarborough NR	Boundaries	Rabbit	Neighbouring production	Asset protection	Monitoring	L-PP
Kanangra	Evans Crown NR	Evans Crown NR	Serrated tussock	Natural ecosystem	Asset protection	Foliar spray	L-PP
Kanangra	Jenolan KCR	Jenolan River catchment	Serrated tussock	Natural ecosystem	Asset protection	Foliar spray	L-PP
Kanangra	Evans Crown NR, Wombeyan KCR	Rivers and creeks	Willows	Natural ecosystem	Asset protection	Stem injection	L-PP

Area	Reserve	Site name	Target pests or weeds	Assets at risk	Aim of control	Action	Priority
Mudgee	Coolah Tops NP	All	Blackberry, pines	Natural ecosystems	Asset protection	Foliar spray, physical control	L-PP
Mudgee	Capertee NP	All	Pig	Natural ecosystems	Asset protection	Aerial (and ground shooting, baiting, trapping for pigs)	L-PP
Mudgee	Durridgere SCA	All	Prickly pear, blackberry, thistles, Paterson's curse, St John's wort	Natural ecosystems, recreational values	Asset protection	Foliar spray	L-PP
Mudgee	Munghorn Gap NR	All	Prickly pear, blackberry, tree of heaven, olives	Natural ecosystems	Asset protection	Foliar spray, basal injection	L-PP
Mudgee	Coolah Tops NP	All	St John's wort	Natural ecosystems	Asset protection	Foliar spray	L-PP
Upper Mountains	Marangaroo NP	Devonian sediment sites	Blackberry, Scotch broom, pines, serrated tussock	Plant communities on Devonian sediments	Asset protection	Vehicle quickspray	L-PP
Upper Mountains	Turon NP	All	Blackberry, serrated tussock	Natural ecosystems	Asset protection	Vehicle quickspray	L-PP
Upper Mountains	Turon NP, Marangaroo NP	All	Pig (and goat in Turon NP)	Natural ecosystems	Asset protection	Aerial (and ground shooting, baiting, trapping for pigs)	L-PP
Upper Mountains	Wollemi NP, Blue Mountains NP, Turon NP, Gardens of Stone NP	Boundaries	Rabbit	Neighbouring production	Asset protection	Fumigation, habitat modification	L-PP

\* Not yet ranked as of June 2012

## 5 Consultation

A regional pest management strategy forum was held in Hampton on 22 September 2011. Stakeholders attending this forum included members and representatives of the Warragamba Wild Horse Management Steering Committee, NSW Blue Mountains Region Regional Advisory Committee, Game Council of NSW, Adventure Safari Industry Association, Forests NSW, Friends of the Colo, Willow Warriors, Hawkesbury–Nepean Catchment Management Association, Gundungurra Aboriginal Heritage Association Inc., NSW Farmers Federation, Sporting Shooters Association of Australia, Mingaan Aboriginal Corporation, licensed conservation hunters, and landowners.

Issues and strategies identified at this forum have been considered throughout the development of this regional pest management strategy. From these discussions 11 matters were identified as priority issues by participants (outlined below), and are addressed in the state strategy. They relate primarily to two of the four goals identified in the *NSW Invasive Species Plan Goal 3: Effectively manage* and *Goal 4: Capacity building*.

### Prioritised issues identified by forum participants and sections in the State Strategy that consider these matters

Prioritised issues	State strategy
1 Surety and continuity of funding to both pest animal and weed management	<i>NSW 2021 – A Plan to Make NSW Number One</i> (DPI 2011) sets the target to <i>reduce the impact of invasive species at priority sites on NPWS parks and reserves leading to a positive response of native biodiversity at 50% of these sites by 2015</i> <i>NSW Invasive Species Plan Principle 6: Pest Management requires on-going effort</i>
2 Transparency of management of control activities for pest and weeds	<i>NSW Invasive Species Plan Principle 7: A partnership approach should be applied.</i>
3 Maintenance of staff capacity for pest control	<i>NSW Invasive Species Plan Goal 3</i> Objective 3.1 Action: Adequately resource priority pest management programs Objective 3.3 Action: Ensure staff and volunteers involved in pest management are adequately trained.
4 The need for pest and weed plans to be adaptive	<i>NSW Invasive Species Plan Principle 5: Outcomes of pest management must be clear, demonstrable and measurable. Control programs should be based on an adaptive management approach.</i>
5 Conservation hunting for vertebrate pest management	See Community engagement in section 2 relating to volunteer ground shooting by licensed hunters.
6 Cooperative management of pests and weeds	<i>NSW Invasive Species Plan Goal 2</i> Objective 2.2.4 Action: Support cooperative planning and operations that use integrated management across tenures.
7 The increasing numbers of vertebrate pests	<i>NSW Invasive Species Plan Goal 2</i> Objective 2.1.1 Action: Use a risk based approach to prioritise management programs based on the impacts and feasibility of control.
8 Control of vertebrate pests (wild dogs and wild pigs)	<i>NSW Invasive Species Plan Goal 2</i> Objective 2.1.2 Action: Implement actions to promote the recovery of threatened species, populations and ecological communities and manage key threatening processes related to the impacts of pests. <i>NSW Invasive Species Plan Principle 7: Pests occur and move across the landscape irrespective of tenure boundaries. To be most effective pest management should be</i>

Prioritised issues	State strategy
	collaborative and coordinated across the landscape.
9 Greater use of volunteers	<i>NSW Invasive Species Plan Goal 3</i> Objective 3.2.2 Action: Maintain and build on existing volunteer participation.
10 Source of and access to funding	<i>NSW 2021 – A Plan to Make NSW Number One</i> (DPI 2011) sets the target to <i>reduce the impact of invasive species at priority sites on NPWS parks and reserves leading to a positive response of native biodiversity at 50% of these sites by 2015</i>
11 High level cooperation	OEH Corporate Plan The Departmental priority is to ‘... <i>prepare, implement and monitor regional strategies for managing cultural heritage, pests and weeds and fire in parks and reserves ...</i> ’

The forum expressed concern over the surety and continuity of funding for pest management programs. The forum recognised that a high level of cooperation is required across government departments to achieve effective pest control. The importance of funding stability for pest management programs is well recognised by NPWS. *NSW 2021 – A Plan to Make NSW Number One* sets the target to *reduce the impact of invasive species at priority sites on NPWS parks and reserves leading to a positive response of native biodiversity at 50% of these sites by 2015*. Further, the *NSW Invasive Species Plan* acknowledges that *pest management requires ongoing effort*.

Through the development of regional strategies NPWS is prioritising programs across each Region. Stable funding for critical and high priority programs identified in the regional strategies will be considered as part of the recurrent budget allocation process. Distinguishing between pest-led and site-led pest programs keeps the focus in the strategy on why resources are being allocated to manage pests. The need to continue to review programs and adapt to new and changing pest threats is incorporated in this strategy. Prioritised pest programs will be reviewed and updated each year of this strategy.

The forum raised the importance of adaptive management, transparency about management actions and the need for cooperative efforts and greater use of volunteers. The *NSW Invasive Species Plan* and NPWS appreciate the importance of adaptive management and the increasingly critical role volunteers and stakeholder groups and organisations provide NPWS in achieving conservation outcomes. Blue Mountains Region recognises there is a range of activities that could be developed and welcomes future partnerships.

Priority areas of interest are the apparent increasing number of vertebrate pests and the control particularly of pigs and wild dogs. Pest programs with an ongoing effort are prioritised through this strategy through prevention, eradication, containment or asset-based protection. These programs are prioritised as critical, high, medium or low. As discussed in the forum, the control of wild dogs needs to balance both the impact on neighbouring stock and the conservation value of wild dogs. This is reflected through regional wild dog management plans and this strategy. Wild dog control is prioritised as a critical program to protect neighbouring stock and as such resources are prioritised for both strategic ongoing controls and reactive management when required.

### **Internal consultation to develop the draft Blue Mountains Region Regional Pest Management Strategy**

This strategy is based on the NPWS Regional Pest Management Strategy template. This template uses the same priority rankings for pest programs across the NPWS reserve system. Internal workshops were held in 2011 in each of the Blue Mountains



Areas: Mudgee Area, 8 November; Kanangra Area, 10 November; Hawkesbury Area, 15 November and Upper Mountains Area, 17 November. These workshops involved a review of the Blue Mountains Regional Pest Management Strategy 2007-2011 and planning for this strategy. Each Region additionally works cooperatively through the NPWS Pest Management Officers Working Group.

It has been identified through these workshops that regional pest management coordination is essential to plan, develop, oversee and implement operational activities.

### **Public submissions sought on the draft Blue Mountains Region Regional Pest Management Strategy**

The draft strategy was made available for public comment. Notification of the draft Strategy was made through public notices in regional newspapers. The draft strategy was available through:

- posting on the OEH web site
- copies available at all Blue Mountains Region NPWS offices
- copies sent to stakeholders.

This strategy has taken into consideration the comments made during the public consultation process.

### **Ongoing stakeholder engagement**

Blue Mountains Region works in close collaboration with neighbouring agencies, joint managers and landholders. Representatives from Blue Mountains Region work collaboratively with a number of groups.

In relation to the management of the Special Areas, the Special Areas Operations Group provides an opportunity for staff from Metropolitan South West and Blue Mountains regions to discuss, coordinate and implement pest species management programs across Regional boundaries. The forum also provides an opportunity for OEH and Sydney Catchment Authority staff to discuss, coordinate and implement pest species management programs across land tenures within the Special Areas.

**Representatives from Blue Mountains Region Areas work with the following groups:**

<b>Group/Committee</b>	<b>Upper Mountains</b>	<b>Kanangra</b>	<b>Hawkesbury</b>	<b>Mudgee</b>
Katoomba Creek Weed Management Committee	√			
Oberon Vertebrate Pest Group		√		
Yerranderie Management Committee		√		
Goulburn River Wild Dog Steering Committee				√
Rylstone Wild Dog Association				√
Goulburn River Wild Dog Association				√
Feral Animal Advisory Committee (Central North LHPA)				√
Wybong Wild Dog Association				√
HNCMA	√	√	√	
Hawkesbury Rainforest Network			√	
Warragamba Wild Horse Management Committee	√	√		
Special Area Operations Groups	√	√		
Hampton Wild Dog group	√	√		
Taralga Wild Dog Management Association		√		
Hartley Advisory Committee		√		
Lachlan CMA		√		

The Blue Mountains Region currently supports over 25 volunteer Bushcare, Landcare and community pest control groups including those in:

- Kanangra Area: Yerranderie Community/Berberis Weed Control Group, Abercrombie River Community Willow Control Group, Sycamore Jenolan Karst Conservation Reserve Volunteer Group, Wombeyan Weed Whakers, Jenolan Caves Landcare Group, Lithgow Oberon Landcare Association
- Hawkesbury Area: Friends of the Colo (Willows out of Wollemi), Willow Warriors (with Upper Mountains Area), Falconbridge Point, Hawkesbury Dry Rainforest Network, Great Grose Weed Walk (with Upper Mountains Area), Richmond TAFE Bush Regeneration Group, Conservation and Land Management classes, Colo Valley Landcare, Friends of St Helena, Friends of Glenbrook, Hawkesbury Young Landcare, Blue Mountains City Council (BMCC) volunteer groups
- Upper Mountains Area: Carltons Creek Bushcare Group, Lyrebird Dell/Gordon Falls Bushcare Group, Valley of the Waters Bushcare Group, Braeside Bush Regeneration, Green Gully Bushcare Group, The friends of Katoomba Fall Creek Valley Bushcare Group, Great Grose Weed Walk (with Hawkesbury Area), conservation volunteers at various sites and bushcare groups in conjunction with BMCC
- Mudgee Area: Friends of the Colo, Capertee Landcare group, Wollemi National Park, Goulburn River National Park and Durrigere State Conservation Area Cooperative Dog Control Programs (with park neighbours and LHPA).

## 6 Pest species overviews

Information about high profile pests for this Region is summarised below. More details regarding the distribution, impacts and management options for these and other pest species can be found in other reference documents and on the internet.<sup>3</sup>

### Feral cat (*Felis catus*)

#### Distribution and abundance

There are estimated to be 400,000 feral cats in NSW and around 12 million across Australia. Feral cats are present to varying degrees in all Blue Mountains reserves; however, it is also possible that stray and domestic cats are observed in some parks that adjoin private property and are located in close proximity to urban areas.

#### Impacts

Feral cats prey on native species, compete for food with native predators and act as a reservoir for diseases and parasites (such as toxoplasmosis) which can be transferred to native fauna, domestic stock and humans. There is clear evidence that feral cats have had a significant impact on island fauna. On the mainland, they have contributed to the extinction of many small- to medium-sized mammals and ground-nesting birds, particularly in the arid zone. They can kill vertebrates up to 3 kg; however, small mammals less than 220 g and birds less than 200 g are at particular risk from cat predation (OEH 2011). Cats also eat reptiles, amphibians and invertebrates. In some instances, feral cats have directly threatened the success of recovery programs for endangered species.

Predation by feral cats is listed as a KTP under the EPBC Act and the NSW *Threatened Species Conservation Act 1995* (TSC Act). The Threat Abatement Plan for Predation by Feral Cats has been produced under the EPBC Act. The threatened species of greatest concern that are most likely to be impacted in Blue Mountains Region include brush-tailed rock-wallabies (through predation on juveniles), Blue Mountains water skinks, bush-stone curlews and eastern pygmy-possums.

#### Priorities for control

The highest priorities for feral cat control in Blue Mountains Region are where cats are impacting on threatened species. Feral cats are being controlled as a priority at brush-tailed rock-wallaby sites to lessen their impact on juveniles and population recruitment. As current control measures for feral cats across the landscape are relatively ineffective, feral cat control outside of key asset protection areas is a lower priority. Blue Mountains Region will continue to support research into cat control and local government area (LGA) initiatives in declaring Wildlife Protection Areas on adjoining lands, particularly where threatened species such as the Blue Mountains

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<sup>3</sup> [www.dpi.nsw.gov.au/agriculture/pests-weeds/vertebrate-pests/general-information/pest-animal-survey](http://www.dpi.nsw.gov.au/agriculture/pests-weeds/vertebrate-pests/general-information/pest-animal-survey)  
[www.environment.gov.au/biodiversity/invasive/publications/humane-control.html](http://www.environment.gov.au/biodiversity/invasive/publications/humane-control.html)  
[www.invasiveanimals.com/](http://www.invasiveanimals.com/)  
[www.environment.gov.au/biodiversity/invasive/ferals/index.html](http://www.environment.gov.au/biodiversity/invasive/ferals/index.html)  
[www.environment.nsw.gov.au/threatenedspecies/KeyThreateningProcessesByDoctype.htm](http://www.environment.nsw.gov.au/threatenedspecies/KeyThreateningProcessesByDoctype.htm)  
[www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles](http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles)  
[www.weeds.org.au/WoNS/](http://www.weeds.org.au/WoNS/)  
[www.rirdc.gov.au/programs/national-rural-issues/weeds/weeds\\_home.cfm](http://www.rirdc.gov.au/programs/national-rural-issues/weeds/weeds_home.cfm)  
[www.weeds.gov.au/](http://www.weeds.gov.au/)

water skink are potentially impacted. Education for park neighbours where domestic cats may be impacting upon threatened species is a priority. Feral cat control needs to be adaptive and timely after fire events, when predation pressure on priority threatened species may increase.

### **Control**

Control methods include trapping and shooting. In remote areas feral cats can be attracted to traps with the use of sonic cat callers. There are currently no poisons registered for use on feral cats and large-scale fencing across the Blue Mountains is not feasible. Controls of feral cats need to be undertaken in conjunction with other predator control programs. Blue Mountains Region will utilise any appropriate new control techniques where possible and trials using a detector dog are to be investigated for priority asset protection areas.

NPWS educational information regarding responsible cat ownership is to be distributed to owners of cats through local community events and face-to-face as appropriate.

### **Monitoring**

Feral cat track counts on sand-pads are to be used at control sites to record changes in cat presence over time. Monitoring data is to be recorded as part of the implementation of the threat abatement to the brush-tailed rock-wallaby program. Feral cat control programs are to be recorded in PWIS.

## **Feral cattle (*Bos taurus*)**

### **Distribution and abundance**

Feral cattle are found in five reserves in Blue Mountains Region. They are often associated with open ex-pasture improved lands; however, some populations are found in upper gully bushland areas. Significant ongoing control of feral cattle over the past 10 years has occurred in Kanangra, Upper Mountains and Mudgee Area reserves.

### **Impacts**

Feral cattle impact on reserves by selective grazing, soil compaction and erosion, weed dispersal, increased nutrient loadings, the establishment of well developed movement pads and stream bank erosion. They have the potential to spread exotic diseases to farmed cattle. They can present a potential risk to human health through attacks and the spread of pathogens such as *Cryptosporidium* spp. which can be spread to humans via contaminated drinking water.

Threats that jeopardise the viability of EECs such as White Box Yellow Box Blakely's Red Gum Woodland include the deterioration of the remnant condition caused by grazing.

### **Priorities for control**

Where feral cattle are in the catchment of Special Areas of Sydney's and Blue Mountains' water supply and/or impacting upon the EEC White Box Yellow Box Blakely's Red Gum Woodland in Blue Mountains National Park, Kanangra Area, they are to be controlled as a critical priority. Where feral cattle are impacting on world heritage biodiversity they are a high priority. Feral cattle control needs to be adaptive and timely after fire where grazing pressure may significantly impact regenerating White Box Yellow Box Blakely's Red Gum Woodland sites.

## Control

Current control methods include mustering and ground and aerial shooting. An assessment has been undertaken on some remote dams (that are not accessed for fire fighting purposes due to heavy vegetation) that are sustaining feral cattle. These dams are to be either fenced or removed.

Where new incursions of cattle are found, there is a need to identify if the animals are wild or have strayed from neighbouring lands. Where strays are involved, liaison with the LHPA is to be undertaken and the owners are to be notified to remove the animals within a timeframe determined by OEH. Cooperative fencing of boundaries and construction or reconstruction of boundary fences is to be undertaken where required in accordance with the NPWS Boundary Fencing Policy.

## Monitoring

The presence of feral cattle is to be monitored in the Region. Areas of significant soil damage can be mapped and photographed over time. Monitoring of fenced and unfenced areas of regenerating White Box Yellow Box Blakely's Red Gum Woodland is to be undertaken. Feral cattle control programs are to be recorded in PWIS.

## Feral deer

### Distribution and abundance

Six deer species are known to have established feral populations in Australia. These are fallow deer (*Dama dama*), red deer (*Cervus elaphus*), sambar deer (*Cervu unicolour*), chital deer (*Axis axis*), rusa deer (*Cervus timorensis*) and hog deer (*Axis porcinus*). All deer species present in NSW have patchy distributions. Fallow deer, red deer and chital deer are known in scattered or isolated populations in 16 Blue Mountains Region reserves. Rusa deer are known to occur in proximity to the Region and are being controlled in Central Coast Region, near the eastern border of Blue Mountains Region. Deer are generally cryptic and although there is no state-wide census of numbers, deer populations in NSW are believed to have increased dramatically in recent years. NPWS staff are reporting anecdotal increases in deer numbers across Blue Mountains Region.

### Impacts

Herbivory and environmental degradation caused by feral deer have been declared a KTP under the TSC Act. Feral deer can have major impacts in parks by browsing opportunistically on buds, shoots and leaves of shrubs, understorey plants and grass species. They strip bark from woody plants and browse on reproductive structures of plants. Documented impacts of feral deer include overgrazing, trampling, ringbarking, antler rubbing, dispersal of weeds, creation of trails, concentration of nutrients, and erosion and resulting degradation of water quality. They can transmit diseases such as foot-and-mouth.

High densities of feral deer have been found to reduce understorey plant species in some EECs elsewhere in NSW by as much as 70% and they have been known to trample and browse threatened species. Of particular concern is the potential impacts on the threatened species sparse heath (*Euphrasia scabra*) and *Eucalyptus parramattensis* in the Mellong Swamp Complex. Grazing and trampling by deer could alter the composition and structure of ecological communities in Blue Mountains Region such as Montane Peatlands and Swamps, Newnes Plateau shrub swamp EEC, Blue Mountains Swamps VEC and River-Flat Eucalypt Forest on Coastal

Floodplains EEC. Feral deer have been found to browse on lantana, crofton weed, mistflower and mother-of-millions.

Male red deer are territorial and can be very dangerous if approached, especially during breeding season. They may additionally present a potential risk to human health as they have the potential to carry pathogens such as *Cryptosporidium* spp. which can be spread to humans via contaminated drinking water. Feral deer on roads have caused several major car accidents in NSW in recent years.

### **Priorities for control**

Feral deer control is currently a high priority in the World Heritage Area and a lesser priority at other sites. Where feral deer are found to be impacting on threatened species or EECs they are a priority. Feral deer control needs to be adaptive and timely after fire where grazing pressure may significantly impact regenerating threatened species or EECs.

### **Control**

Current control methods include ground and aerial shooting. As fallow deer do not look up, platform shooting at congregation points has been trialled with some success in the Blue Mountains Region. Cooperative programs are needed where deer move across reserve borders.

### **Monitoring**

The presence of feral deer is to be monitored in the Region. Monitoring can include spotlight transect counts, sand plots and scat count transects. Feral deer control programs are to be recorded in PWIS.

## **Feral goat (*Capra hircus*)**

### **Distribution and abundance**

Feral goats are found in 23 reserves in the Blue Mountains Region. Their distributions are isolated, scattered and widespread depending on the reserve. In the absence of control, feral goat populations can increase by up to 75% per year (Henzell 2000). They are often found in remote areas and can inhabit steep rocky escarpment.

### **Impacts**

Competition and habitat degradation by feral goats is listed as a KTP under the TSC Act and as a key threatening process under the EPBC Act. Feral goats compete with native animals for food, water and shelter. They are generalist herbivores and will browse on shrubs, trees, grasses, fallen plant material and bark. They will eat a variety of plant material including highly digestible nutritious parts of plants available to other herbivores and normally unpalatable parts of plants that other herbivores cannot eat. They can access areas inaccessible to other large herbivores, such as rocky slopes and cliff lines. They can cause significant habitat degradation through trampling and causing erosion and they can degrade habitats through accumulated droppings.

Through fencing, feral goats are being excluded from grazing upon the critically endangered species *Pultenaea* spp. Genowlan Point in the EEC Genowlan Point *Allocasuarina nana* heathland in Mugii Murum-ban State Conservation Area. Threatened species of greatest concern in Blue Mountains Region that are most likely to be impacted by feral goats include damage to the habitat of the broad-

headed snake and regent honeyeater regenerating habitat, damage to rock overhangs housing large-eared pied bat colonies and competition with the brush-tailed rock-wallaby. Grazing by feral goats additionally impact upon the restricted *Acacia chalkeri* in Kanangra Area. Concerns are greatest for brush-tailed rock-wallabies following times of drought when improved seasonal conditions may be reduced by the impact of feral goats. Feral goat control needs to be adaptive and timely in such drought events or post fire events where grazing competition increases.

Feral goats are additionally threatening important cultural heritage sites such as Aboriginal rock art sites and Aboriginal shelters in all reserves across the Region where goats are found. At these sites they denude vegetation, increase erosion and expose soil substrates disturbing archaeological records.

Feral goats have the potential to affect neighbouring livestock (including sheep) properties through spreading foot rot (for example, an outbreak occurred in February 2012 on a neighbouring property in Kanangra Area) and Johne's disease. They have the potential to carry pathogens such as *Cryptosporidium* spp. which may be spread to humans via contaminated drinking water.

### **Priorities for control**

The continuation of fencing to exclude feral goats from grazing upon the EEC Genowlan Point *Allocasuarina nana* heathland in Mugii Murum-ban State Conservation Area is a critical priority as are programs to control goats at priority brush-tailed rock-wallaby sites. Where feral goats are impacting on world heritage biodiversity they are a high priority.

### **Control**

Current control methods include ground and aerial shooting. Goat control needs to be taken across the landscape (ensuring that threat abatement is mitigated at the priority sites and recruitment back to these sites is lessened). Fencing can be used to protect isolated sites of threatened species.

Where new incursions of goats are found, there is a need to identify if the animals are wild or have strayed from neighbouring lands. Where strays are involved, liaison with the LHPA is to be undertaken and the owners are to be notified to remove the animals within a timeframe determined by OEH. Cooperative fencing of boundaries and construction or reconstruction of boundary fences is to be undertaken where required in accordance with the NPWS Boundary Fencing Policy. Continued liaison with goat owners and producers neighbouring park estate is essential, for example around Abercrombie River National Park in the Kanangra Area. Education packages can be distributed to goat owners in relation to industry standards for goat fencing.

If wild dog control is being undertaken in an area where feral goats are present, feral goat management must also be considered.

### **Monitoring**

The presence of feral goats is to be monitored in the Region. Monitoring of the EEC Genowlan Point *Allocasuarina nana* heathland in Mugii Murum-ban State Conservation Area is to be continued by the Royal Botanic Gardens Trust. Feral goat control programs are to be recorded in PWIS.

## **Wild horse (*Equus caballus*)**

### **Distribution and abundance**

In NSW, wild horses are a significant problem in a number of conservation reserves along the Great Dividing Range and eastern seaboard. There are estimated to be more than 8000 wild horses in NPWS reserves in NSW. Wild horses are found in a section of only one reserve in the Region: Blue Mountains National Park. Between 1988 and 2002, 304 horses were destroyed through aerial shooting programs at this site. Following this period there was no control of wild horses until the adoption of the Wild Horse Management Plan for the Warragamba Special Area in Blue Mountains National Park in March 2007. Under stage 1 of this plan 41 horses have been trapped and removed.

### **Impacts**

Wild horses disturb soil, accelerating erosion and sedimentation through the establishment of trails. Horse trampling significantly reduces the stability of the soil surface and the infiltration and nutrient cycling capacity of the soils in grassy woodlands and open forests (Lenehan 2010). Horses damage plants through grazing, trampling and wallowing. Wet and steep areas are highly susceptible to damage by trampling. Wetlands attract horses and can be drained through trampling and incised tracks. Weed invasion through seed dispersal by wild horse movement and manure is exacerbated by soil disturbance. Horses have been observed eating the bark of melaleuca trees in the dry alluvial paperbark woodlands in the Warragamba Special Area, a regionally significant vegetation community which is not recorded outside this area (NPWS 2007).

Wild horses have been observed wallowing and becoming bogged in water storage areas and creating pads and tracks on the foreshores of water storage. They have the potential to carry pathogens such as *Cryptosporidium* spp. which may be spread to humans via contaminated drinking water.

Stallions have also been known to act aggressively towards reserve users (NPWS 2007).

### **Priorities for control**

Wild horse control in Blue Mountains National Park is a high priority for Blue Mountains Region as per the Wild Horse Management Plan.

### **Control**

Control methods are outlined in the Wild Horse Management Plan for the Warragamba Special Area within Blue Mountains National Park.

### **Monitoring**

Monitoring and evaluation are outlined in the Wild Horse Management Plan for the Warragamba Special Area. Wild horse control programs are to be recorded in PWIS.

## **Feral pig (*Sus scrofa*)**

### **Distribution and abundance**

Feral pigs are estimated to inhabit 61% of NSW (West and Saunders 2003). Feral pigs are found with varying distributions in almost all of the reserves in Blue



Mountains Region. They are highly mobile and found in a range of habitats from open ex-pasture improved lands, riparian and swamp areas to upper gully bushland areas.

### Impacts

Feral pigs compete with native animals for food, water and shelter and they actively predate upon native birds, reptiles (including their eggs), frogs and soil invertebrates as well as underground storage organs of plants and the fruiting bodies of fungi. Feral pigs threaten native species and ecological communities as a direct result of their behaviour and feeding habits.

Predation, habitat degradation, competition and disease transmission by feral pigs is listed as a KTP under the TSC Act and feral pigs are also listed as a KTP under the EPBC Act and as a declared pest species throughout NSW under the *Rural Lands Protection Act 1998* (RLP Act). Threatened species of greatest concern that are most likely to be impacted by feral pigs in Blue Mountains Region include the booroolong frog (*Litoria booroolongensis*), double-headed buttercup orchid (*Diuris aequalis*), *Trachymene saniculifolia*, *Acacia clunies-rossiae*, *Baloskian longipes*, *Eucalyptus parramattensis* and *Eucalyptus benthamii* in the highly restricted Burragorang River Flat Forest. EECs of greatest concern that are most likely to be impacted by feral pigs include Montane Peatlands and Swamps and Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion. Both Blue Mountains water skink (*Eulamprus leuraensis*) and giant dragonfly (*Petalura gigantea*) are found in the Newnes Plateau Shrub Swamp EEC and are susceptible to habitat disturbance, as is the purple copperwing butterfly in Marrangaroo National Park. The Blue Mountains water skink would additionally be susceptible to predation by feral pigs. The giant dragonfly is also found in mountain peatlands and swamps on the Boyd Plateau where pig damage can be significant. If populations of southern brown bandicoots are rediscovered in the Region the management of feral pigs at such sites would be a critical priority.

The damage left by feral pigs can be very conspicuous and alarming due to the sheer force feral pigs have when they are muzzling and furrowing as they move across the landscape. They disturb and degrade habitats, increase erosion and reduce water quality through wallowing, trampling, fouling and rooting. In particular, wet areas and swamps are highly susceptible to pig damage. In drought periods this damage can be compounded by feral pigs focusing on limited productive areas which are additionally core areas of habitat for threatened species. They can reduce the regeneration of native plants and are implicated in the spread of weeds.

Feral pigs can cause significant damage to pasture lands, are known to carry diseases such as tuberculosis and foot-and-mouth disease, and can present a risk to human health through attacks and the spread of pathogens such as *Cryptosporidium* spp. via contaminated drinking water. They have been implicated in the spread of *Phytophthora cinnamoni* which is known to cause dieback in native vegetation.

### Priorities for control

Where feral pigs are in the catchment of the Special Areas of the water supply of Sydney and the Blue Mountains and/or are impacting on EECs and threatened species they are a critical priority. Where feral pigs are impacting on world heritage biodiversity they are a high priority. In relation to threatened species management feral pig control programs are carried out to protect the following assets:

- Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion at Mount Cameron, Wollemi National Park in Upper Mountains Area, where pig damage can be catastrophic for hanging wetlands

- Montane Peatlands and Swamps on the Boyd Plateau in Kanangra-Boyd National Park
- Blue Mountains water skink in the Newnes Plateau Shrub Swamp, Wollemi National Park, Upper Mountains Area
- giant dragonfly in the Newnes Plateau Shrub Swamp, Wollemi National Park in Upper Mountains Area, and the Montane Peatlands and Swamps on Boyd Plateau, Kanangra-Boyd National Park
- purple copperwing butterfly habitat in Marrangaroo National Park
- booroolong frog (*Litoria booroolongensis*) habitat in Nuggety State Conservation Area
- *Diuris aequalis* in Kanangra-Boyd National Park and Mares Forest National Park
- Deane's boronia (*Boronia deanei*) in Blue Mountains National Park
- *Trachymene saniculifolia* on the Boyd Plateau in Kanangra-Boyd National Park
- *Baloskion longipes* on the Boyd Plateau in Kanangra-Boyd National Park
- *Acacia clunies-rossiae* in riparian areas such as on the Kowmung Valley in Kanangra-Boyd National Park and the Coxs in Blue Mountains in Kanangra Area
- *Eucalyptus benthamii* in the highly restricted Burragorang river flat forest, Kedumba Valley in Blue Mountains National Park in Upper Mountains Area
- *Eucalyptus parramattensis* in the Mellong Area of Wollemi National Park in Hawkesbury Area.

Feral pigs must also be controlled if populations of southern brown bandicoots are found in the Region.

Additionally feral pig programs need to be considered where wild dog control is being undertaken as control of wild dogs may result in an increase in the numbers of feral pigs. Feral pig programs need to be considered where *Phytophthora cinnamomi* is managed as pigs have been implicated in the spread of this pathogen.

### **Control**

Current management of feral pigs involves integrated and coordinated approaches across the landscape (ensuring that threat abatement is undertaken at priority sites whilst pigs are controlled across the landscape resulting in less movement back to these sites). Control methods include aerial and ground shooting, baiting and trapping. Staff are investigating innovative methods of bait delivery to improve target specificity and cost. Trialling of PIGOUT® in remote wilderness areas has been successful.

Cooperative programs with neighbours, LHPA and other land management authorities are essential to the success of programs especially where populations of feral pigs are transient and numbers are being sustained by populations on neighbouring lands.

Law enforcement patrols and service presence prior to and during on-ground feral pig control periods need to be carried out to minimise adverse effects from illegal recreational pig dog activities dispersing pigs.

### **Monitoring**

Studies during the previous pest management strategy period recommend further research into the habitat preferences, seasonal movements and home ranges of feral pigs to produce information vital to the improvement of feral pig management in the Warragamba Special Area.

The presence and impacts of feral pigs are to be monitored in the Region. Assessments may be undertaken through both ground and aerial surveys with observed damage mapped to guide future operations. Feral pig control programs are to be recorded in PWIS.

## **Feral rabbit (*Oryctolagus cuniculus*)**

### **Distribution and abundance**

Feral rabbits are found in most habitats throughout Australia below the Tropic of Capricorn. The distribution of feral rabbits is widespread across rural lands on private property. In some Blue Mountains Region reserves rabbits are widespread; however, they are mostly found in reserves in relatively low densities with isolated or scattered distributions. Higher densities of feral rabbits are associated with disturbed grassland areas on deep, fertile soil types where rabbits can dig and access rich food sources. They are scarce in undisturbed and rugged sandstone plateau areas. Rabbit population densities in Blue Mountains Region have varied in relation to the spread of rabbit haemorrhagic disease (calicivirus) in the late 1990s.

### **Impacts**

Feral rabbits graze native vegetation, reduce regeneration and cause serious soil erosion, which can result in the modification of entire landscapes. They compete with native animals for suitable habitat, reduce food sources and can displace small animals from burrows. As rabbits need deep, fertile soil types supporting grasses to sustain large populations they do not proliferate or cause significant damage in undisturbed and rugged sandstone plateau areas. Rabbits are eaten by a range of introduced predators such as foxes, wild dogs and feral cats, which can result in an increase in those pest populations. When rabbit numbers decline, introduced predators can place significantly more pressure on native animal populations.

Competition and grazing by the feral European rabbit is listed as a KTP under the TSC Act. Feral rabbits are additionally listed as a KTP under the EPBC Act and declared a pest species throughout NSW under the RLP Act. The selective grazing pressure applied by rabbits can impact greatly on native plants, particularly when recovering from fire, and may also favour a number of weeds including serrated tussock, African lovegrass, St John's wort and Paterson's curse. The threatened species of greatest concern that is most likely to be impacted by feral rabbits in Blue Mountains Region is the brush-tailed rock-wallaby through dietary competition.

Rabbits impact on the economic viability of surrounding pastoral neighbours through land degradation.

### **Priorities for control**

Feral rabbit control in Jenolan Karst Conservation Reserve is a high priority especially in periods of drought and after fire where grazing competition with brush-tailed rock-wallabies may increase.

### **Control**

Integrated pest management techniques are essential for the control of feral rabbits. Current control methods include biological controls such as calicivirus and mechanical controls such as habitat modification, baiting, trapping, shooting and fumigation. Rehabilitation of degraded sites further lessens the foothold feral rabbits can have on a landscape. Where revegetation is being undertaken tree guards can be employed to lessen grazing impacts.

Cooperative programs with neighbours, LHPAs, LGAs and other land management authorities are essential to the success of programs, especially where populations of feral rabbit populations are located on boundary areas.

If wild dog and/or red fox control is being undertaken in an area where feral rabbits are present, feral rabbit management must be considered.

### **Monitoring**

The presence and impacts of feral rabbits are to be monitored in the Region. Monitoring can include the size of the affected area and feral rabbit induced impacts, spotlight counts and the use of exclusion plots to determine the impact of rabbits on vegetation. Photographs can be used to show changes over time. Feral rabbit control programs are to be recorded in PWIS.

## **Red fox (*Vulpes vulpes*)**

### **Distribution and abundance**

Foxes occur in most environments in Australia; however, they are usually most abundant in agricultural areas with patches of uncleared vegetation, because these areas provide abundant food, cover and denning sites. In contrast, foxes appear to be rare in closed forest distant from cleared land. Foxes occur throughout Blue Mountains Region, in both urban fringe areas and NPWS reserves.

### **Impacts**

Foxes prey upon native species, compete for food with native predators such as spotted-tailed quolls, and are implicated in the dispersal of weeds such as blackberry. They cause economic losses to rural industry primarily through attacks on sheep and poultry.

The introduction of foxes into Australia has had a devastating impact on native fauna, particularly among medium-sized (450–5000 g) ground-dwelling and semi-arboreal mammals, ground-nesting birds and freshwater turtles. Fox predation has been implicated in limiting habitat choice and population size of a number of medium-sized marsupials. Even at low densities foxes can eliminate remnant populations and jeopardise species recovery programs. Foxes have also caused the failure of several attempts to reintroduce native fauna into areas of their former range. Predation by the European red fox is listed as a KTP under the TSC Act and the EPBC Act. The subsequent NSW Threat Abatement Plan for Predation by the Red Fox (*Vulpes vulpes*) (Fox TAP) outlined a number of priority sites to measure the response of priority species to fox control. In Blue Mountains Region these include brush-tailed rock-wallaby sites.

Other threatened species impacted by foxes that are present in Blue Mountains Region include the eastern pygmy-possum, Blue Mountains water skink, koala, spotted-tailed quoll and bush stone-curlew. Eastern pygmy-possum and yellow-bellied glider were found in fox scats in the Greater Blue Mountains World Heritage Area between 2005 and 2007 (Purcell 2010). The long-nosed potoroo, southern brown bandicoot and brush-tailed phascogale may be close to or even extinct in the Region with only a few unconfirmed records in recent years. As these species are at significant risk from feral animal predation, a control program would be of the highest conservation priority in the event of a population of these species being discovered.

Breeding of the bush stone-curlew is probably no longer successful in Blue Mountains Region due to fox predation. Targeted surveys for this species are needed and should be undertaken in areas where possible sightings have been made or are

likely, including the western part of the Cumberland Plain and Blue Mountains in Hawkesbury, Upper Mountains and Kanangra Areas (DECC 2007a). Sites supporting bush stone-curlews need to be targeted for feral predator control.

Studies on the fauna of Greater Southern Sydney Region recommend that fox control be undertaken in upland swamps such as the Temperate Highland Peat Swamps on Sandstone EEC under the EPBC Act encompassing Montane Peatlands and Swamps EEC and Blue Mountains Swamps VEC as they support a rich diversity of fauna including many species of conservation concern that are at risk from fox predation (DECC 2007b). The predation pressure applied by foxes can impact greatly on threatened prey species, particularly when recovering from fire.

Foxes are also significant predators of domestic stock including lambs and poultry; predation by foxes has the potential to reduce lambing rates significantly.

### **Priorities for control**

Where foxes are impacting upon threatened species they are controlled as a critical priority. As part of the Fox TAP, fox control programs are carried out to protect brush-tailed rock-wallabies at a number of sites. The success of these programs is evidenced at Jenolan Karst Conservation Reserve with the continued expansion of the brush-tailed rock-wallaby colony at this site. Where threatened species recovery is evidenced, programs need to be prioritised and continued. Partnerships such as corporate sponsorship involving ongoing funding can be investigated to assist in driving these programs.

Fox control programs are also carried out to protect biodiversity in upland swamp sites containing the Temperate Highland Peat Swamps on Sandstone EEC under the EPBC Act encompassing Montane Peatlands and Swamps EEC and Blue Mountains Swamps VEC that host a diverse range of threatened and significant species such as eastern pygmy-possums. A program has commenced during the last pest strategy period on Narrow Neck Peninsula. Significant reductions in fox numbers have been recorded where fox recruitment is limited to this 'island-like' topographic landscape. The feasibility of other fox control programs can be investigated where other threatened species and/or other biodiversity indicators are measured. Fox control additionally needs to be adaptive and timely after fire where predation pressure on biodiversity and priority threatened species may increase.

### **Control**

Ongoing strategic baiting using buried 1080 baits at frequent intervals is occurring at fox control sites. Trapping, den fumigation, habitat modification, removal of food sources and shooting can additionally be used, and new registered technologies can be considered.

Where wild dog control is undertaken strategically (usually twice per year), foxes may also succumb; however, significant population control is unlikely. Where fox control is being undertaken where there are populations of feral cats and/or feral rabbits, management of these additional pest species must be considered.

Cooperative programs with neighbours, LHPAs, LGAs and other land management authorities are essential where assets cross land management boundaries. Education on fox impacts and controls are essential to successful programs as is support for broad scale systematic control programs across land tenures. Neighbours in proximity to fox programs are to be encouraged to join those programs.

## Monitoring

As part of the Fox TAP, the impact of fox predation on brush-tailed rock-wallaby populations and, conversely, the effectiveness of the fox control program are being assessed through long-term monitoring of brush-tailed rock-wallaby and fox populations. Brush-tailed rock-wallaby populations are being measured biannually via systematic scat counts. DNA research has additionally been conducted on brush-tailed rock-wallaby scats at colony sites. Fox and other medium-sized mammal populations are being measured biannually via track counts on sandpads. Fox control programs are to be recorded in PWIS.

## Wild dog (*Canis lupus* spp.)

### Distribution and abundance

Wild dog refers to any dog living in the wild in NSW, including feral dogs (*Canis lupus familiaris*), dingoes (*Canis lupus dingo*), and hybrids of the two. Populations of wild dogs mainly occur along the Great Dividing Range, coastal hinterlands and in north-western NSW. In Blue Mountains Region they occur on private and public lands and are most prevalent in areas with high macropod populations, densely timbered country and the larger valley systems. Wild dogs are present in 24 reserves in Blue Mountains Region.

### Impacts

Wild dogs can have significant impacts on livestock, especially sheep. As a result, they have been declared a pest under the RLP Act, meaning that managers of controlled land have an obligation to eradicate wild dogs by any lawful method. All land in NSW is identified as controlled land under the current Pest Control Order for Wild Dogs. Wild dog impacts are widespread along the western boundary of Blue Mountains Region, with the heaviest losses occurring where forested and valley systems interface with sheep country. Stock attacks will cause farmers to remove stock from certain areas and implement costly pest programs, which result in economic losses to rural industry. In rare cases, aggressive wild dogs in Blue Mountains Region have been known to threaten park visitors and staff.

Wild dogs can have both positive and negative impacts on the environment. Predation by wild dogs can reduce the impacts of overgrazing in arid and semi-arid ecosystems by reducing the abundance of native and exotic herbivores. Wild dogs may also suppress the abundance of goats, pigs, cats and foxes, thereby reducing the threat these introduced predators pose to a broad range of small to medium-sized ground-dwelling mammals and ground-nesting birds. It has been postulated that the presence of dingoes may assist brush-tailed rock-wallaby colonies through dingoes excluding foxes, or dingoes impacting on feral goats (DECC 2008). Conversely, under some circumstances predation by wild dogs may have significant direct impacts on threatened species, such as koalas. Wild dog dietary studies undertaken in southern Blue Mountains in 1994 and 2002 recorded the following threatened species being present in scat analysis: bandicoot, koala and spotted-tailed quoll. The most commonly detected prey remains identified in dingo scats collected in the southern Blue Mountains World Heritage Area between 2005 and 2007 were swamp wallaby, brush-tailed possum and eastern grey kangaroo. Of the remainder 25 species detected in scats, one was the threatened yellow-bellied glider (Purcell 2010). Results of this study of the ecology of the dingo potentially show the role of dingoes as a higher order predator at this site.

The dingo was introduced into Australia from Asia prior to European settlement and hence it is eligible to be listed as a threatened species under the TSC Act. Although

the dingo has not been listed as a threatened species, predation and hybridisation by feral dogs (*Canis lupus familiaris*) has been listed as a KTP under the TSC Act.

In order to balance the need for wild dog control with the conservation of dingoes, the Pest Control Order for Wild Dogs allows the general destruction obligation for lands listed under Schedule 2 of the Order to be satisfied through the preparation of a wild dog management plan with both control and conservation objectives.

### **Priorities for control**

The main objective of these programs is to minimise the impacts of wild dogs emanating from parks and reserves on livestock on adjoining lands while conserving dingo populations in reserves listed in Schedule 2.<sup>4</sup> NPWS works closely with LHPAs, wild dog control associations, other public-land managers and park neighbours to deliver cooperative control programs across tenure. This includes the development and implementation of wild dog management plans for reserves listed under Schedule 2. Oberon Wild Dog Management Plan is currently under review and will need to consider the impacts of wild dogs on park users as well as livestock on adjoining lands.

In 2010–11, NPWS undertook wild dog programs in at least 338 national parks and reserves, including 89 of the 109 reserves listed under Schedule 2. Most of the reserves in Blue Mountains Region where wild dogs are present are listed under Schedule 2 of the Wild Dog Pest Control Order. In practice, controls are targeted around the perimeter buffer areas of the Schedule 2 lands. Priorities for wild dog control on reserves in Blue Mountains Region are based primarily on the level of livestock predation reported by adjoining landholders, in accord with the relevant wild dog management plans and on a risk management assessment basis. Control is focused on areas of reserves such as the western boundary of Blue Mountains National Park, Wollemi National Park, Kanangra-Boyd National Park, Goulburn River National Park, Turon River National Park and Gardens of Stone National Park where there are current and/or historic records demonstrating significant impact on livestock from wild dogs emanating from the reserves.

Programs are also undertaken to minimise the impacts of wild dogs on park visitors and neighbours. Reports of human/dog interactions at visitor use sites or on urban fringes are monitored. Where a wild dog is identified as a danger to park visitors and neighbours it is to be destroyed.

### **Control**

A fully integrated suite of control techniques is used to manage wild dogs in Blue Mountains Region. Control programs are undertaken in partnership with LHPAs, wild dog control associations and individual landholders. Strategic control, aimed at preventing future livestock predation, will include ground baiting and trapping in accessible areas, and aerial baiting in the more rugged inaccessible areas where other control techniques may not be cost-effective.

Reactive control in response to reports of livestock predation or wild dog threats will include ground baiting and trapping using either NPWS staff or contract trappers and, to a lesser degree, shooting. Blue Mountains Region is committed to a 24-hour response to immediate wild dog threats on livestock.

The extent and type of control technique implemented in reserves of Blue Mountains Region will be governed by wild dog plans, risk management principles and economic considerations.

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<sup>4</sup> [www.environment.nsw.gov.au/resources/pestsweeds/wilddogpolicy.pdf](http://www.environment.nsw.gov.au/resources/pestsweeds/wilddogpolicy.pdf)

## Monitoring

NPWS undertakes applied research and field trials to build knowledge and test and refine control techniques for wild dogs. Research conducted in northern and southern NSW on the impacts of aerial baiting with 1080 poison on spotted-tailed quolls found that aerial baiting had little impact on the quoll populations studied. As a result of these findings, NPWS now routinely uses aerial baiting as an additional control technique where ground access is limited. Research on additional control tools such as the M44 ejector, synthetic lures and use of remote cameras for monitoring continue to enhance the capabilities of existing wild dog control programs. NPWS is a member of the Invasive Animal Cooperative Research Centre.

Stock losses by wild dogs in Blue Mountains Region are recorded by the LHPA. Wild dog abundance and activity is measured annually by Blue Mountains Region via track counts and bait takes in the various reserves. Wild dog control programs are to be recorded in PWIS.

## Other pest animal species

Other pest animal species of concern in Blue Mountains Region include plague locusts, mice and rats, European wasps, feral bird species, feral fish species (in particular, concerns regarding trout species potentially impacting upon stuttering frog populations at Werong Creek, Kanangra Area) and feral bees (in particular there are concerns regarding competition for tree hollows and competition for floral resources).

Competition from feral honeybees is listed as a KTP under the TSC Act. Where feral honey bee hives are found on national parks estate and pose a threat to people's safety or threatened species they are to be removed. Effective control methods will have to be shown to be safe both to native insect populations and not to affect commercially produced honey. Where opportunities arise, feral honey bees will be controlled in conjunction with other pest control programs. Note that feral honeybees do not include honeybees managed by beekeepers where apiary licences have been issued on NPWS managed land in line with NPWS Beekeeping Policy.

NPWS will fulfil obligations under the RLP Act when plague animal control programs are needed.

Control of these species needs to be investigated and prioritised if they are impacting on significant assets. Recording and monitoring of any new pest program is essential to measure the effectiveness of the program.

## Weed program overview

This overview outlines weed programs:

- in three major site-specific situations where various suites of weeds are impacting on different types of sites:
  - riparian and swamp site weeds (including exotic vines and scramblers)
  - other bushland weeds
  - open habitat and roadside weeds.
- as major individual weed species programs (including blackberry, Scotch broom, Cape ivy, tree of heaven, gorse, lantana, Monterey pine, prickly pear, serrated tussock, willows, berberis, sycamore, tutsan and pampas grass).



Note that individual weed species may be found in one or many of the site-specific situations listed above and may also be controlled as part of a major targeted weed program.

Where more than one weed species is present at a site, techniques are needed to ensure that the control of a weed does not result in the spread of other weeds. Targeted weed programs, however, can be successful in removing regeneration capacity of a particular weed, motivating community involvement and active control. Where individual weed species programs are undertaken, some have expanded to include the control of a host of weeds impacting on a particular area, for example the Great Grose Gorse Walk has developed into the Great Grose Weed Walk.

## Riparian and swamp weeds (including exotic vines and scramblers)

Riparian weeds are found in riparian corridors, although they may also be found in other sites. They include but are not restricted to the following weeds:

- trees: small-leaved privet (*Ligustrum sinense*), large-leaved privet (*Ligustrum lucidum*), willow (*Salix* spp.), honey locust (*Gleditzia tricanthos*), black locust (*Robinia pseudoacacia*), poplars (*Populus* spp.)
- shrubs: blackberry (*Rubus fruticosus* agg.), lantana (*Lantana camara*), deutzia (*Deutzia crenata*), butterfly bush (*Buddleja davidii*), tutsan (*Hypericum* spp.), Himalayan honeysuckle (*Leycesteria formosa*), cotoneaster (*Cotoneaster* spp.), berberis (*Berberis aristata*); English holly (*Ilex aquifolium*), radiata pine (*Pinus radiata*), Spanish (or Portuguese) heath (*Erica lusitanica*), tree heath (*Erica aborea*), *Erica glandulosa*
- vines and scramblers: Japanese honeysuckle (*Lonicera japonica*), blue periwinkle (*Vinca major*), English ivy (*Hedera helix*), balloon vine (*Cardiospermum grandiflorum*), moth vine (*Araujia sericifera*), bridal creeper (*Asparagus asparagoides*), ground asparagus (*Asparagus aethiopicus*, formerly known as asparagus fern *Asparagus densiflorus*), Cape ivy (*Delaria odorata*)
- herbaceous weeds: giant reed (*Arundo donax*), crofton weed (*Ageratina adenophora*), mist flower (*Ageratina riparia*), blue periwinkle (*Vinca major*), tradescantia (*Tradescantia fluminensis*), ginger lily (*Hedychium* spp.), seaside daisy (*Erigeron karvinskianus*), montbretia (*Crocasmia x crocosmiiflora*), hemlock (*Conium maculatum*), pampas grass (*Cortaderia selloana*), galvanized burr (*Sclerolaena birchii*), spiny burr grass (*Cenchrus* spp.), Bathurst burr (*Xanthium spinosum*), thistle species (*Cirsium* spp.), Noogoora burr (*Xanthium* spp.) and golden dodder (*Cuscuta* spp.).

Specific programs on berberis, blackberry, Cape ivy, pampas grass, tutsan and willows are described below.

### Distribution and abundance

Weed issues exist in most of the reserves that waterways dissect, with some creeks remaining relatively weed free while others are totally dominated by weeds. High density weed infestations in swamp and riparian sites are often associated with high density weed infestations on adjacent lands and upper catchment areas, such as urban and rural park neighbours. Riparian weed infestations are also high in those areas containing sewerage lines and stormwater outlets such as in Blue Mountains National Park.

## Impacts

Weeds in riparian and swamp sites can alter the shape of stream banks through the capture of sediments, transform communities by excluding virtually all natural regeneration of native species, and alter the habitat of significant fauna in waterways, in riparian vegetation, at swamp sites and on banks.

A number of exotic vines and scramblers are found in riparian areas in Blue Mountains Region. Invasion and establishment of exotic vines and scramblers is a KTP under the TSC Act. These include asparagus fern, climbing asparagus, bridal creeper, balloon vine, Cape ivy, English ivy, morning glory, Japanese honeysuckle, passion flower, potato vine, black-eyed Susan, tradescantia and blue periwinkle. Vines can cause canopy collapse while scramblers form carpets that physically suppress native plant recruitment. Both vines and scramblers can restrict the movement of fauna accessing water.

## Priorities for control

Priority programs include those where weeds are significantly impacting upon threatened species and EECs including in the following riparian and swamp sites:

- Booroolong frog habitat along the Retreat and Abercrombie rivers and creek lines in Abercrombie River National Park and Beefsteak Creek and Little River in Kanangra-Boyd National Park
- Brush-tailed rock-wallaby grazing areas on the river flats and corridors of the Wolgan River, Wollemi National Park, Upper Mountains Area and Capertee River corridor, Wollemi National Park, Mudgee Area
- *Microstrobos fitzgeraldii*, *Epacris hamiltonii*, *Acacia bynoeana* and *Pultanea glabra* with one or many of these at sites including Govetts Creek, Blue Gum Forest, Laura Cascades, Katoomba Creek, Grose River, upper catchment of Greaves and Lake Woodford catchment creeks, all in Blue Mountains National Park, Upper Mountains Area
- *Eucalyptus benthamii* in the highly restricted Burraforang River-Flat Forest in the Kedumba River, Blue Mountains National Park, Upper Mountains Area
- swamps (including Blue Mountains Swamps, Newnes Plateau Shrub Swamp, Montane Peatlands and Swamps and Temperate Highland Peat Swamps on Sandstone EECs) including those at Echo Point Precinct, upper catchment of Greaves Creek and Prince Henry Cliff Walk in Blue Mountains National Park, Upper Mountains Area, and swamps at Whitecross Road, Winmalee and Buralow in Blue Mountains National Park, Hawkesbury Area, including threatened fauna species such as giant dragonfly and Blue Mountains water skink
- *Eucalyptus parramattensis* in the Mellong Swamp Complex, Wollemi National Park, Hawkesbury Area
- Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion EEC in Yellomundee Regional Park.

Priority programs for riparian and swamp weeds additionally include those where weeds are significantly impacting upon Greater Blue Mountains World Heritage sites and the Grose, Kowmung and Colo wild rivers. Rapid assessment mapping of riparian areas to gauge current and likely weed incursion and impact is essential to ensure priorities for control in these areas. Healthy riparian areas with fewer weed incursions are to be prioritised.

## Control

Weed infestations in riparian areas generally contain a number of invasive weed species, so target weeding in such situations can cause other weeds to grow in the spaces created. Bush regeneration principles need to be adopted, where series of weeds are controlled allowing the natural regeneration of native plants to occur. Techniques that can be employed include cut and paint, stem-scrape, stem injection with herbicides (in situations where herbicides can be used) and hand removal (where banks will not be destabilised). NPWS will continue to work cooperatively with other land managers where riparian weed control programs cross tenures.

## Monitoring

Monitoring of riparian zones is to include reporting of the lengths of riparian areas treated each year, weeds treated and annual photographs of sites including pre- and post-control photographs. Pesticide treatments are to be documented in accordance with the *Pesticides Act 1999* including locations and the size of the treatment area. Programs are to be recorded in PWIS.

## Bushland weeds

Over 550 species of weeds occur on the bushland fringes of the urban areas in the Blue Mountains alone. Many of them are capable of spreading widely through NPWS reserves. Bushland weeds include those weeds listed above in the section on riparian weeds and many weeds listed below in the section on open habitat and roadside weeds. They cover environmental and noxious weeds, Weeds of National Significance (WoNS) and garden escapes (including native plants not indigenous to Blue Mountains Region). Many of these weeds are also listed under various KTPs (see Appendix 4). Significant weeds include:

- trees: tree of heaven (*Ailanthus altissima*), camphor laurel (*Cinnamomum camphora*), sycamore maple (*Acer pseudoplatanus*), African olive (*Olea europaea*), Cootamundra wattle (*Acacia baileyana*), box elder (*Acer negundo*), Mount Morgan wattle (*Acacia podalyrifolia*), silver wattle (*Acacia dealbata*)
- shrubs: gorse (*Ulex europaeus*), Scotch broom (*Cytisus scoparius*), tutsan (*Hypericum* spp.), berberis (*Berberis aristata*), Cape (or Montpellier) broom (*Genista monspessulana*), cherry laurel (*Prunus laurocerasus*), English holly (*Ilex aquifolium*), Spanish heath (*Erica lusitanica*), bamboo (*Phyllostachys* spp.)
- vines and scramblers: Cape ivy (*Delairea odorata*), Madeira vine (*Anredera cordifolia*), morning glory (*Ipomoea indica*), turkey rhubarb (*Acetosa sagittata*)
- herbaceous plants: whisky grass (*Andropogon virginicus*), pampas grass (*Cortaderia selloana*) mother-of-millions (*Bryophyllum tubiflora*), Coolatai grass (*Hyparrhenia hirta*), agapanthus (*Agapanthus praecox* subsp. *orientalis*), creeping buttercup (*Ranunculus repens*), inkweed (*Phytolacca octandra*), purple top (*Verbena bonariensis*).

Specific programs on berberis, blackberry, broom, cape ivy, gorse, lantana, Monterey pine, pampas grass, sycamore maple and tutsan are described below.

## Distribution and abundance

Bushland weeds are commonly associated with urban development due to increased nutrient levels spread by urban run-off, ornamental plants escaping from parks and gardens, dumping from neighbours and disturbance of original soil conditions. In Blue Mountains Region, bushland weeds and large-scale weed infestations are strongly associated with urban development and the major road corridors of the Great

Western Highway (Emu Plains to Mount Victoria) and Bells Line of Road (Kurrajong to Bell) transecting Blue Mountains National Park and Wollemi National Park. Extensive high-density weed occurrences are associated with decommissioned sewage treatment plants in Blue Mountains National Park.

### Impacts

Bushland weeds reduce native biodiversity by competing for light, nutrients, water, space and pollinators. They outcompete native plants filling gaps needed for the bush to regenerate. As a result they affect shelter and food sources for wildlife. Complex sites supporting hundreds of species of plants and animals can be replaced by a monoculture of weeds when active management is not undertaken. Fire systems can be altered and some weeds can even change soil chemistry so that other plants are prevented from growing. Where major infestations are being controlled, staged replacement and regeneration strategies specific to the site are needed so that any benefits that are being provided by weeds can be continued with native replacements and bush regeneration.

### Priorities for control

Priority programs include those where bushland weeds are impacting upon threatened species and EECs, including all those sites listed above in bushland weed priorities and:

- *Microstrobos fitzgeraldii* in inaccessible cliff sites in Blue Mountains National Park, Upper Mountains Area (weed control at these sites has included montbretia, English ivy, blackberry, broom and small-leaved privet)
- *Persoonia acerosa* and *Diuris aequalis* in the Grose River valley, *Isopogon fletcheri* and *Lepidosperma evansianum* in Blue Gum Forest, *Pultenaea glabra* at Links Road, Leura, all in Blue Mountains National Park, Upper Mountains Area
- Cumberland Plain Woodland EEC at Bridle Track, Old Mill, Fitzgeralds, Bike Riparian and Shaws Riparian in Yellomundee Regional Park and Blue Mountains National Park in Hawkesbury Area
- Shale/Sandstone Transition Forest EEC at Hawkesbury Lookout in Yellomundee Regional Park
- Tableland basalt forest in the Sydney Basin and South Eastern Highlands Bioregions EEC at Farrer Road, Mount Wilson in Wollemi National Park
- Sydney Sandstone Ridge Top Woodland in Yellomundee Regional Park
- Blue Mountains Shale Cap Forest in Sydney Basin Bioregion EEC at Waratah picnic area, Blue Mountains National Park, Upper Mountains Area and Blue Mountains Area, and at Bells Line of Road in Wollemi National Park in Hawkesbury Area (mostly threatened by lantana).

Priority programs for bushland weeds additionally include those where weeds are significantly impacting upon sites in the Greater Blue Mountains World Heritage Area. Healthy bushland areas with fewer weed incursions are to be prioritised. Particular sites and Bushcare groups working in such sites include:

- Carlons Creek Bushcare Group, Katoomba Creek, Lyrebird Dell/Gordon Falls, Valley of the Waters Bushcare Group, and Braeside Bush Regeneration in Upper Mountains Area
- Friends of the Colo, Willow Warriors, Colo–Meroo Bush Regeneration, Friends of Burrellow (Woods Creek), Richmond TAFE Bush Regeneration Group, Green Corp and Australian Conservation Trust Volunteers, Faulconbridge Point and Hawkesbury Dry Rainforest Network in Hawkesbury Area.

## Control

To reduce the impact of bushland and widespread weeds in proximity to urban areas control programs need to be prioritised to sites where control is both achievable and will have the greatest benefit. Bush regeneration principles need to be adopted, where series of weeds are controlled allowing the natural regeneration of native plants. Techniques such as cut and paint, stem scrape, stem injection and spraying of herbicides and hand removal can be employed. Fire (wildfire and hazard reduction burns) can also be used, taking the opportunity to exhaust seed banks when resources can be allocated to undertake comprehensive follow-up of weed seedling growth.

Bushcare groups are to be supported, contractors employed where funding allows and staff directed and supported to undertake bushland regeneration at priority sites. BPWW is incorporated into this strategy. Where fires have impacted on priority bushland sites, or upslope or upstream sites, additional priority should be given to the control of weeds. NPWS will work cooperatively with other land managers, such as Sydney Water, to rehabilitate areas associated with sewage treatment plants.

## Monitoring

Monitoring of bushland sites is to include annual photographs of sites including pre- and post-control photographs, sizes of regeneration areas treated and Bushcare groups supported. Pesticide treatments are to be documented in accordance with the Pesticides Act including locations and the size of the treatment area. Programs are to be recorded in PWIS.

## Open habitat and roadside weeds

Many grasses and agricultural weeds are found in open habitats and along roadsides, tracks and trails. Major weeds include, but are not restricted to:

- trees: African olive (*Olea europaea*), peppercorn (*Schinus molle*), fruit trees of various species, Cootamundra wattle (*Acacia baileyana*)
- shrubs: Scotch broom (*Cytisus scoparius*), gorse (*Ulex europaeus*), prickly pear species (*Opuntia* spp.), blue heliotrope (*Heliotropium amplexicaule*), sweet briar (*Rosa rubiginosa*), century plant (*Agave americana*)
- herbaceous weeds: serrated tussock (*Nassella trichotoma*), St John's wort (*Hypericum perforatum*), pampas grass (*Cortaderia selloana*), Paterson's curse (*Echium* spp.), nodding thistle (*Carduus nutans*), thistle species (*Cirsium* spp.), spear thistle (*Cirsium vulgare*), golden dodder (*Cuscuta* spp.), ox-eye daisy (*Leucanthemum vulgare*), Noogoora burr (*Xanthium* spp.), whisky grass (*Andropogon virginicus*), khaki weed (*Alternanthera pungens*), cat head burr (*Tribulus terrestris*), great mullein (*Verbascum thapsus*), Californian poppy (*Eschscholzia californica*), galvanized burr (*Sclerolaena birchii*), spiny burr grass (*Cenchrus* spp.), hemlock (*Conium maculatum*), horehound (*Marrubium vulgare*), saffron thistle (*Carthamus lanatus*), African love grass (*Eragrostis curvula*), kikuyu (*Pennisetum clandestinum*), long-style feathergrass (*Pennisetum villosum*), panic veldtgrass (*Ehrharta erecta*), Parramatta grass (*Sporobolus* spp.), phalaris (*Phalaris aquatica*), Rhodes grass (*Chloris gayana*), galvenised burr, saffron, Coolatai grass (*Hyparrhenia hirta*).

Specific programs on broom, gorse, pampas grass, prickly pear, serrated tussock, and St John's wort are described below. Coolatai grass is an emerging weed (Appendix 1).

## Distribution and abundance

Along roadsides, tracks and trails localised disturbance coupled with increased nutrient and pollutant levels favours many weed species. Sunlight favouring weed infestation is also abundant in these areas and in open habitats. Weeds found along roadsides, tracks and trails are often capable of infesting open natural habitats, campgrounds and high visitor use areas. Open habitats are also found at disturbed sites throughout Blue Mountains Region and at natural habitats such as grasslands, open woodlands and other ecological communities modified due to disturbances such as grazing.

## Impacts

Weeds infesting roadsides, tracks and trails and open habitats have a number of impacts. Disturbed, weed infested areas are often in areas that are highly visible and can influence public perceptions of park management. Many of the weeds that thrive in these areas can also impact on agricultural production and easily spread to and from neighbours.

The remnant condition of EECs, such as White Box Yellow Box Blakely's Red Gum Woodland EEC, are threatened by deterioration caused by weed invasion. Invasion of EECs by exotic perennial grasses can in turn impact on a number of declining and threatened woodland birds (DECC 2007b). A number of grasses that are found in the Blue Mountains are listed as part of the KTP invasion of native plant communities by exotic perennial grasses. These grasses include whisky grass, Rhodes grass, pampas grass, panic veldtgrass, African lovegrass, serrated tussock and giant Parramatta grass. Impacts include invading native grasslands, grassy woodlands, dry forests and rocky shrublands, promoting hotter more frequent fires due to drier plant matter with increased fuel loads and being undesirable to neighbouring pasture lands due to their low palatability to stock or low nutritional value at certain times of the year.

## Priorities for control

Priority programs occur where open habitat and roadside weeds such as whisky grass, African love grass, coreopsis and fennel are impacting on threatened species including *Eucalyptus parramattensis* in the Mellong Swamp Complex in Wollemi National Park (Hawkesbury Area). High priority programs occur where open habitat and roadside weeds are significantly impacting upon world heritage values and have the potential to spread into significant areas.

## Control

Along roadsides, programs need to be coordinated with local councils and Roads and Maritime Services, such as the successful cooperative programs along Putty Road in Hawkesbury Area.

As a number of open habitat and roadside weeds often occur together they need to be controlled together so that another weed on the site does not simply replace those controlled and regeneration of native species can occur. Where it is appropriate, direct seeding and planting to shade out weed grasses and shrubs is recommended. Where weeds are being controlled along roadsides and disturbed areas, often the most effective means of control is herbicide spraying using boom sprays and hand guns.

Where biocontrol agents programs are available, for example for Paterson's curse, NPWS is to coordinate with releases of those agents by NSW Department of Primary Industries (DPI).

Where threatened species and EECs are located, bush regeneration principles need to be adopted to allow the natural regeneration of native plants. Techniques such as cut and paint, stem scrape, stem injection and spraying of herbicides and hand removal can be employed where appropriate.

### **Monitoring**

Pesticide treatments are to be documented in accordance with the Pesticides Act including locations and the size of the treatment area. Programs are to be recorded in PWIS.

## **Blackberry (*Rubus fruticosus* agg.)**

### **Distribution and abundance**

Blackberry is found in most Blue Mountains Region reserves, with occurrences ranging from isolated patches to large populations spread throughout reserves.

### **Impacts**

Blackberry is listed as a WoNS and a Class 4 noxious weed in the Region. It readily invades grassy woodlands, bushland, roadsides, pastures and riparian areas growing well in sun and shade and tolerating frosts, drought and fire, although dense shade can curtail its growth. In Blue Mountains Region the basalt high mountain caps are particularly susceptible to colonisation. Blackberry displaces native plants and destroys animal habitats by forming thickets that also provide excellent harbour for feral animals such as rabbits, pigs and goats. In turn some feral animals can have a negative impact on water quality in the Special Areas. Blackberry thickets also exclude other vegetation along riparian areas eventually resulting in the destabilisation of banks. Blackberry can be spread large distances by birds and feral animals such as foxes, as well as along creeks. Impenetrable thickets of blackberry are the bane of bushwalkers.

Threatened flora species that are impacted by blackberry in the Region include *Microstrobos fitzgeraldii*, *Epacris hamiltonii*, *Isopogon fletcheri*, *Isopogon fletcheri* and *Pultanea glabra*, also threatened are the Tableland Basalt Forest EEC at Mount Cameron, Blue Mountains Swamps VEC, all in Blue Mountains National Park, Upper Mountains Area and White Box Yellow Box Blakely's Red Gum Woodland EEC in Keeverstone National Park and Burwood Creek Nature Reserve in Kanangra Area.

The habitat of the purple copperwing butterfly in Marangaroo National Park is impacted by blackberry. This butterfly is dependent upon nests of an ant species that protect it from predators. The ants make their nests at the base of native blackthorn (*Busaria* spp.). Weeds competing with native blackthorn (such as blackberry) are therefore a major threat to the purple copperwing butterfly. The grazing areas of the brush-tailed rock-wallaby are also impacted by blackberry.

### **Priorities for control**

Blackberry control programs are a priority where blackberry impacts EECs such as White Box Yellow Box Blakely's Red Gum Woodland EEC in Keeverstone National Park and Burwood Creek Nature Reserve in Kanangra Area, Tablelands Basalt Forest at Mount Cameron and various sites supporting Blue Mountains Swamps, *Microstrobos fitzgeraldii*, *Epacris hamiltonii*, *Isopogon fletcheri*, *Isopogon fletcheri* and *Pultanea glabra*. Sites include Braeside, Blue Gum Forest, Leura Cascades, Valley of the Waters, Katoomba Creek, Links Road Leura, Prince Henry Cliff Walk and upper catchment of Greaves Creek which are all in Blue Mountains National Park.

Blackberry control programs are a priority at the purple copperwing butterfly site in Maranagaroo National Park, and in the Wolgan River flats and corridor area of Wollemi National Park (Upper Mountains Area) and Capertee River, Wollemi National Park (Mudgee Area), where blackberry is smothering grazing areas in brush-tailed rock-wallaby habitat. Blackberry is impacting world heritage biodiversity values in areas such as St Helena Crater, Glenbrook Precinct of Blue Mountains National Park (Hawkesbury Area), Colo River and Colo Meroo in Wollemi National Park (Hawkesbury Area), and Capertee River in Wollemi National Park (Mudgee Area).

Blackberry control programs are a priority where infestations are located in the Special Areas.

### **Control**

Seedlings and small plants can be dug out when soils are moist otherwise roots are likely to fragment.

Herbicide treatments for small infestations include cut and paint through the crown (root ball) or scrape and paint all stems where this cannot be easily achieved. Aerial spot spraying, vehicle spraying, knapsack spraying and splatter gun applications can be used for larger infestations. Helicopters are used for access to remote areas. Where fire has impacted on infestations follow-up controls are needed in the following growing season as a priority. NPWS will continue to work cooperatively with other land managers where blackberry weed control programs cross tenures.

Biological control agents include the European rust *Phargmidium*. This rust has been successful in colonising and reducing the vigour of blackberry infestations at Budthingeroo, Kanangra-Boyd National Park and in the Wolgan Valley, Wollemi National Park in Upper Mountains Area. As it favours wet summers it should be harvested and distributed if a window of opportunity opens. Where rust is active, slashing stimulates new growth that is very susceptible to rust. Plants lightly affected by rust are susceptible to herbicide spraying.

### **Monitoring**

Monitoring of large infestations of blackberry is to include annual photographs of sites including pre- and post-control photographs and sizes of regeneration areas treated. The Monitoring Manual for Bitou Bush Control and Native Plant Recovery provides guidance on monitoring methodology for threatened species and ecological communities and can easily be adapted for this weed (Hughes et al. 2009). Liaison with DPI is to continue with respect to monitoring of biological control agents. Pesticide treatments are to be documented in accordance with the Pesticides Act including locations and the size of the treatment area. Programs are to be recorded in PWIS.

## **Cape ivy (*Delairea odorata*)**

### **Distribution and abundance**

Cape ivy is found in isolated populations in Yellomundee Regional Park, Blue Mountains National Park (Hawkesbury Area) and Wollemi National Park in all Areas.

### **Impacts**

Cape ivy is highly invasive in bushland, woodland, degraded areas and riparian zones in the warmer parts of the Blue Mountains as it is frost tender. It covers shrubs and trees preventing sunlight and regeneration. Being vigorous in moderate shade to



full sun it can over time spread from bushland edges and riparian zones into healthy bushland. As both regenerating stem fragments and seeds can travel down waterways Cape ivy is highly invasive in riparian zones. In Wollemi National Park (Upper Mountains Area) Cape ivy in conjunction with blackberry and tree of heaven is smothering grazing areas in brush-tailed rock-wallaby habitat.

### **Priorities for control**

Cape ivy control programs are a priority at the Wolgan River flats and corridor area of Wollemi National Park (Upper Mountains Area) and Capertee River, Wollemi National Park (Mudgee Area) where it is smothering grazing areas in brush-tailed rock-wallaby habitat, and where it is impacting world heritage biodiversity values such as with a host of other weeds at St Helena Crater in Glenbrook Precinct of Blue Mountains National Park (Hawkesbury Area), Colo River and Colo Meroo in Wollemi National Park (Hawkesbury Area) and Capertee River in Wollemi National Park (Mudgee Area).

### **Control**

Small infestations can be dug out with vines left severed in the canopy so long as the area is monitored for regrowth over the following year. Herbicide control in winter prior to flowering is successful with follow-up treatment in the subsequent couple of years. NPWS will continue to work cooperatively with other land managers where Cape ivy weed control programs cross tenures.

### **Monitoring**

Monitoring of large infestations of Cape ivy is to include annual photographs of sites including pre- and post-control photographs and sizes of regeneration areas treated. Pesticide treatments are to be documented in accordance with the Pesticides Act including locations and the size of the treatment area. Programs are to be recorded in PWIS.

## **Gorse (*Ulex europaeus*), Scotch broom (*Cytisus scoparius*) and Montpellier (Cape) broom (*Genista monspessulana*)**

### **Distribution and abundance**

Gorse, Scotch broom and Montpellier (Cape) broom are Fabaceae shrubs that are found in cool temperate regions. They are found in isolated or scattered populations in Blue Mountains National Park (Upper Mountains Area, Kanangra Area and Hawkesbury Area) and Kanangra-Boyd National Park. Scotch broom is additionally found in isolated or scattered populations in Turon National Park, Hartley Historic Site and Gardens of Stone National Park with widespread populations in Marrangaroo National Park.

### **Impacts**

Invasion and establishment of Scotch broom is listed as a KTP under the TSC Act. It is listed as a WoNS (Class 4) as are gorse (Class 2 or 3 noxious weed) and Montpellier broom (Class 2 or 4 noxious weed) in part of the Region (Appendix 5). All are characterised by seeds that can remain dormant in the soil for several decades, seedlings that take two or more years to grow to seed-producing shrubs, and adult shrubs that may live for several decades. They readily invade disturbed areas, forest margins, healthy bushland and riparian areas and can tolerate both droughts and frosts. Any disturbance around plants stimulates mass germination. They can form impenetrable thickets that exclude native vegetation and prevent regeneration

physically and through acidifying the soil. Thickets impede access, can alter fire regimes, provide habitat for rabbits and are a serious fire hazard. They can transform invaded habitats, simplifying the structure and diversity of herbs, shrubs and trees by preventing overstorey regeneration. They are common in disturbed bushland margins but can expand into undisturbed areas. After fire seedlings of these weeds will germinate en masse. Without initial and ongoing controls the regeneration of native species is threatened.

Threatened species that are impacted by these weeds in the Region include *Epacris hamiltonii*, *Lepidosperma evansianum*, *Persoonia acerosa*, *Diuris aequalis* and *Isopogon fletcheri* and the Blue Mountains Swamps VEC. Additionally, Scotch broom impacts upon *Microstrobos fitzgeraldii*, *Pultanea glabra* and the habitat of the purple copperwing butterfly in Marangaroo National Park. Weeds competing with native blackthorn (*Busaria* spp.) pose a major threat to this butterfly, which is dependent upon protection from ants that nest at the base of blackthorn.

### **Priorities for control**

Gorse and Scotch and Montpellier broom control programs are a priority where the weeds are impacting upon Blue Mountains swamps and threatened fauna species within these swamps, such as the giant dragonfly and Blue Mountains water skink. Priority programs include those targeting *Epacris hamiltonii* and *Isopogon fletcheri* at Braeside, *Isopogon fletcheri* and *Lepidosperma evansianum* at Govetts Creek, *Persoonia acerosa* and *Diuris aequalis* at the Grose River and Blue Gum Forest, Blue Mountains swamps at the upper catchment of Greaves Creek and world heritage biodiversity values of the Grose all in Blue Mountains National Park (Upper Mountains Area). Additionally, Scotch broom is a priority where it is impacting upon *Microstrobos fitzgeraldii* and *Pultanea glabra*. Threatened species sites where Scotch broom is impacting include Leura Cascades, Katoomba Creek, Links Road Leura and Prince Henry Cliff Walk all in Blue Mountains National Park (Upper Mountains Area). Scotch broom is also a priority at Ebertons in Kanangra-Boyd National Park where it impacts on world heritage biodiversity values.

Gorse and Scotch and Montpellier broom management programs need to be responsive to fires, particularly where an advantage for control could be gained or threats to a priority asset are significantly increased. Funding and partnerships can be sought both strategically and reactively.

### **Control**

Seedlings and small plants can be hand pulled and small infestations treated using the cut and paint method. Sprayed infestations must be followed up for both regrowth and seed germination. Long-term monitoring of control sites of these weeds is essential due to the longevity of the seed banks.

After extensive disturbance such as fire, follow-up controls are necessary for several years. Regrowth from mature plants requires spraying and seedlings stimulated from the fire either removed or sprayed. Known gorse and Scotch and Montpellier broom areas need to be identified post after fire events and control measures continued to prevent rapid spread of these weeds. Fire can additionally be used as a tool to exhaust seed banks where funding is allocated for ongoing controls. Infestations should only be cleared when there are sufficient resources for follow up. A long-term perspective is needed for these species, where strategies include exhausting the seed bank as well as preventing further additions. Native canopy cover should be encouraged as seedlings do not mature under shady canopies.

Three biological control agents (a twig mining moth *Leucoptera spartifoliella*, a psyllid *Arytainilla spartifoliella* and a seed eating beetle *Bruchidius villosus*) have been

released for Scotch broom in Katoomba. All three agents have been monitored by DPI and to date have not shown signs of significant impact.

The combination or integration of a number of methods of control is essential to successfully control this weed. In the planning process of any gorse control program refer to DPIW (2006).

Community groups are to be supported such as the continuation of the Great Gorse Weed Walk program. This program has been running since 1994, having developed from a targeted gorse control program. NPWS will continue to work cooperatively with other land managers where gorse and Scotch and Montpellier broom weed control programs cross tenures.

### **Monitoring**

Monitoring of large infestations of gorse and Scotch and Montpellier broom is to include annual photographs of sites including pre- and post-control photographs and sizes of regeneration areas treated. Known infestations are to be recorded and monitored due to the longevity of the seed bank. Liaison with DPI is to continue with respect to monitoring of biological control agents. Where threatened species or ecological community programs are occurring implement appropriate monitoring programs. The Monitoring Manual for Bitou Bush Control and Native Plant Recovery provides guidance on monitoring methodology for threatened species or ecological communities and can easily be adapted for these weeds (Hughes et al. 2009).

Pesticide treatments are to be documented in accordance with the Pesticides Act including locations and the size of the treatment area. Programs are to be recorded in PWIS.

## **Lantana (*Lantana camara*)**

### **Distribution and abundance**

Lantana is widespread in Yellomundee Regional Park. Isolated infestations are found in Wollemi National Park (Hawkesbury Area) and Blue Mountains National Park (Hawkesbury Area and Upper Mountains Area).

### **Impacts**

Invasion, establishment and spread of *Lantana camara* is listed as a KTP under the TSC Act, and lantana is also a WoNS. It is a Class 5 noxious weed in the Region. It readily invades disturbed areas, forest margins, healthy bushland and riparian areas in warm climates that are frost free. It can devastate bushland by shading out native vegetation and preventing regeneration by both physically and chemically altering soil chemistry and nutrient cycles. Dense mono-specific stands are impenetrable to people and can pose a fire hazard. Lantana is toxic to both humans and stock.

Threatened species and EECs that are impacted by lantana in the Region include the Shale/Sandstone Transition Forest, Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion, Cumberland Plain Woodland and Moist Shale Woodland EECs. Lantana is also impacting upon regionally significant vegetation communities in diatremes in the Region.

### **Priorities for control**

Control programs are a priority where lantana is impacting upon the Shale/Sandstone Transition Forest EEC in the Mulgoa Precinct, Blue Mountains National Park (Hawkesbury Area), Shale/Sandstone Transition Forest EEC; Cooks

River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion EEC, Cumberland Plain Woodland EEC and Moist Shale Woodland EEC at various sites in Yellomundee Regional Park. Control is also a priority to protect the world heritage biodiversity values associated with diatreme forest sites in Blue Mountains National Park (Hawkesbury Area).

### **Control**

Seedlings and small plants can be easily pulled out. Cut and paint methods can be used for individual plants and spraying used for larger infestations.

Eighteen biological control agents have become established in Australia. The latest agent released was a rust, *Prospodium tuberculatum*. Biological control alone cannot eradicate lantana, but may help to contain infestations and reduce their spread in the long term. NPWS will continue to work cooperatively with other land managers where Lantana weed control programs cross tenures.

### **Monitoring**

Pesticide treatments are to be documented in accordance with the Pesticides Act including locations and the size of the treatment area. Where biological control agents are released monitoring and assessment of the spread and impacts of the biological control agent are vital. Programs are to be recorded in PWIS. The National Plan to Protect Environmental Assets from Lantana recommends the use of the Monitoring Manual for Bitou Bush Control and Native Plant Recovery (Hughes et al. 2009), as it can easily be adapted for this weed.

## **Monterey pine (*Pinus radiata*) and other pine species**

### **Distribution and abundance**

Pines are found in mostly isolated areas of reserves across the Region.

### **Impacts**

Pines are invasive species that have the potential to become dominant trees. The vigorous nature of invasion in bushland from pines is often evident around the margins of pine plantations. Pine stands provide very little habitat for native fauna and can simplify the ecology by preventing almost all regeneration of other species. They reduce the fertility of soils and generate dense leaf litter that prevents seedling establishment of native vegetation. Mature trees can survive fires with seedlings capable of establishing en masse after fires. As pines can live in excess of a hundred years the long-term impact of the species may not yet be fully realised.

Pines are impacting on Blue Mountains swamps in the upper catchment of Greaves Creek, Blue Mountains National Park (Upper Mountains Area) and the habitat of the purple copperwing butterfly in Marangaroo National Park. Invasion of exotic species such as pines are listed as a threat to the Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion EEC found in Blue Mountains National Park and Wollemi National Park in the Upper Mountains Area. If pines are found in this EEC it is critical that management is undertaken to control these weeds.

### **Priorities for control**

Control programs are a priority where pines are impacting on purple copperwing butterfly habitat in Marangaroo National Park, Blue Mountains swamps in the upper catchment of Greaves Creek in Blue Mountains National Park (Upper Mountains Area), world heritage biodiversity values in Kanangra-Boyd National Park (Beefsteak

Creek and Little River fire trails and northern and western boundary areas), and Jenolan Karst Conservation Reserve (northern and western boundary areas) and Blue Mountains National Park (southern entrance).

### **Control**

Seedlings and small plants are easily hand pulled. Providing cuts are made to trees below any branches, herbicide treatment is not needed when felling larger trees. Selective tree felling in association with chainsaw felling courses is to be utilised. Stem injection can be used as can follow-up controls after fire. NPWS will continue to work cooperatively with other land managers where pine weed control programs cross tenures.

### **Monitoring**

Monitoring of large infestations of pines is to include annual photographs of sites including pre-and post-control photographs and sizes of regeneration areas treated. Programs are to be recorded in PWIS.

## **Prickly pear (*Opuntia* spp.)**

### **Distribution and abundance**

A number of prickly pear species are found in widespread to scattered and isolated populations in the Region. Common prickly pear (*Opuntia stricta*) is the most widespread in the Region with tiger pear (*Opuntia aurantiaca*) widespread in Goulburn River National Park.

### **Impacts**

Prickly pear became a WoNS in 2012 and is a Class 4 noxious weed in the Region. It is a significant weed in native grasslands, grassy woodlands, dry forest, roadsides and pastures. It is extremely tolerant of hot, dry conditions. While scattered plants may have only a minor impact, large infestations can thwart the regeneration of native plants. Human and animal movement can be hindered in areas with significant infestations due to the array of spiky hairs and spines covering prickly pears. At greatest risk from prickly pears are the White Box Yellow Box Blakely's Red Gum Woodland EEC at Airly Creek in Gardens of Stone National Park and the population of threatened *Kennedia retrorsa* and *Acacia dangarensis* at Mount Dangar and basalt caps of Gardens of Stone National Park.

### **Priorities for control**

Control programs are a priority where prickly pears are impacting on White Box Yellow Box Blakely's Red Gum Woodland EEC, Airly Creek in Gardens of Stone National Park; the population of threatened *Kennedia retrorsa* and *Acacia dangarensis* at Mount Dangar and basalt caps of Gardens of Stone National Park; and world heritage biodiversity values such as along the north-western boundaries of Wollemi National Park (Mudgee Area).

### **Control**

Herbicide applications whether by splatter gun or apparatus attached to quad bikes and other vehicles need to be followed-up each year until the infestation is eradicated. NPWS will continue to work cooperatively with other land managers where prickly pear weed control programs cross tenures.

The biological control agent *Cactoblastis cactorum* is present in the Region. Infected prickly pear fronds are to be distributed to non-infected infestations across the Region. The biological control agent cochineal insect (*Dactylopius* spp.) has been introduced into the Region by the Sydney Catchment Authority and continues to produce excellent results.

Other weeds that are often associated with prickly pear infestations and need to be controlled in conjunction with prickly pear include St John's wort, sweet briar and serrated tussock as well as many of the weeds additionally listed under open habitats, grasses, agricultural and roadside weeds programs.

### **Monitoring**

Pesticide treatments are to be documented in accordance with the Pesticides Act including locations and the size of the treatment area. Where biological control agents are released monitoring and assessment of the spread and impacts of the biological control agent are vital. Liaison with DPI is to continue with respect to monitoring of biological control agents. Programs are to be recorded in PWIS.

## **Serrated tussock (*Nassella trichotoma*)**

### **Distribution and abundance**

Serrated tussock is mainly found in reserves within Mudgee, Kanangra and Upper Mountains Areas, in both widespread and localised populations.

### **Impacts**

Invasion of native plant communities by exotic perennial grasses is listed as a KTP under the TSC Act; this includes serrated tussock, which is also a WoNS and a Class 3 or 4 noxious weed in part of the Region (Appendix 5). It is a highly invasive weed in native grasslands, grassy woodlands, rocky shrublands, dry forest, roadsides and pastures. It is considered one of Australia's worst pasture weeds and it is unpalatable as a fodder species. Serrated tussock grows in shade and sun and tolerates fire, frost and drought once established. At greatest risk from serrated tussock is the White Box Yellow Box Blakely's Red Gum Woodland EEC in Yerranderie State Conservation Area, Keverstone National Park, Burwood Creek Nature Reserve and Blue Mountains National Park in Kanangra Area; and the Yass daisy *Ammobium craspedioides* in Keverstone NP in Kanangra Area. Serrated tussock is also impacting on the habitat of the purple copperwing butterfly.

### **Priorities for control**

Control programs are a priority where serrated tussock is impacting on White Box Yellow Box Blakely's Red Gum Woodland EEC in Yerranderie State Conservation Area, Keverstone National Park, Burwood Creek Nature Reserve and Blue Mountains National Park in Kanangra Area; the Yass daisy *Ammobium craspedioides* and on the habitat of the purple copperwing butterfly in Marangaroo National Park.

### **Control**

Control includes ground and aerial herbicide spot spraying. Direct seeding of indigenous grasses can be trialled in appropriate areas after serrated tussock has been controlled. Seedlings of serrated tussock are susceptible to vigorous competition that can result in the exclusion of this weed (Muyt 2001).

Active involvement in cooperative programs with community groups and adjacent landholders is essential where serrated tussock is found on reserve boundaries and is being controlled off parks estate by neighbours.

Other weeds that are often associated with serrated tussock infestations and need to be controlled in conjunction with serrated tussock include St John's wort, sweet briar and prickly pear as well as many of the weeds additionally listed under open habitats, grasses, agricultural and roadside weeds programs.

### **Monitoring**

Pesticide treatments are to be documented in accordance with the Pesticides Act including locations and the size of the treatment area. Any programs involving direct seeding of indigenous grasses must be monitored and assessed. Programs are to be recorded in PWIS.

## **St John's wort (*Hypericum perforatum*) and tutsan (*Hypericum* spp.)**

### **Distribution and abundance**

Weed species from the Hypericaceae family in Blue Mountains Region include St John's wort and tutsan species. Tutsan in this Strategy refers to both *Hypericum androsaemum* and *Hypericum koutyichense*. Tutsan is found in Blue Mountains National Park (Kanangra Area and Upper Mountains Area), Kanangra-Boyd National Park and Jenolan Karst Conservation Reserve. St John's wort is mainly found in Mudgee, Kanangra and Upper Mountains Area reserves in both widespread and localised populations.

### **Impacts**

St John's wort is a Class 4 noxious weed in the Region. It is a significant weed of native grasslands, grassy woodlands and dry forest. It grows in full sun and part shade, tolerates drought and will recover from frost.

St John's wort is a major weed of grazing lands, roadsides and disturbed areas. It contains the alkaloid hypericin, which results in blisters on exposed skin of mammals that ingest it and will poison stock that continually feed on it. It can cause dermatitis in humans.

Tutsan is highly invasive in both disturbed and undisturbed cool moist bushland. It tolerates deep shade forming mono-specific stands on waterways excluding all native species. It can spread large distances through water and by birds and foxes. It is a potential threat to hanging swamps and threatened frog species habitat.

EECs at greatest risk from St John's wort include the White Box Yellow Box Blakely's Red Gum Woodland in Coolah Tops National Park, Mudgee Area and Keeverstone National Park and Burwood Creek Nature Reserve in Kanangra Area. St John's wort is impacting upon the Moolarben and Honeyeater Flat areas of Munghorn Gap Nature Reserve. This area is significant habitat for a number of threatened species including regent honeyeaters and brush-tailed rock-wallabies.

### **Priorities for control**

Control programs are a priority where St John's wort is impacting on the habitat for regent honeyeaters at Moolarben and Honeyeater Flat areas of Munghorn Gap Nature Reserve and at the EEC sites of White Box Yellow Box Blakely's Red Gum

Woodland in Coolah Tops National Park, Mudgee Area and Keverstone National Park and Burwood Creek Nature Reserve in Kanangra Area.

Control programs are a priority where tutsan is impacting on habitat for the endangered Booroolong frog and where it is significantly impacting upon world heritage values.

### **Control**

For small infestations seedlings of both St John's wort and tutsan can be hand-pulled. As tutsan is largely dormant over winter with new growth produced each spring, control is best when the plant is actively growing in spring and summer prior to fruiting. Where fires have burnt areas containing St John's wort, effective control is supported by follow-up spraying in the spring. Ongoing herbicide treatment of St John's wort is very costly for large infestations in the Region, and sustainable options of control need to be explored such as the seeding of native grasses to outcompete this weed.

Active involvement in cooperative programs with community groups and adjacent landholders is essential where these weeds are found on reserve boundaries.

Numerous biological control agents have been released across the Region for St John's wort, including *Crysilinus* beetle, spittle beetle and St John's wort mite with little or no visible effect recorded. For tutsan, given the successes of the biocontrol rust *Melampsora hypericorum* at sites in Victoria where this rust has killed entire hillsides of tutsan (McLaren et al. 1997), HNCMA has coordinated releases of this biocontrol within sites in the Region (in Kanangra Area and Upper Mountains Area).

Other weeds that are often associated with *Hypericum* spp. infestations and need to be controlled in conjunction with it include serrated tussock, sweet briar and prickly pear, as well as many of the weeds additionally listed under open habitat and roadside weeds programs.

### **Monitoring**

Monitoring of large tutsan infestations is to include sizes of regeneration areas treated and annual photographs of sites including pre- and post-control photographs. Any programs involving direct seeding of indigenous grasses must be monitored and assessed. Liaison with HNCMA and DPI is to continue with respect to monitoring of biological control agents. Pesticide treatments are to be documented in accordance with the Pesticides Act including the locations and size of the treatment area. Programs are to be recorded in PWIS.

## **Sycamore maple (*Acer pseudoplatanus*)**

### **Distribution and abundance**

Sycamore maples are found in Jenolan Karst Conservation Reserve, Kanangra-Boyd National Park and Blue Mountains National Park in both isolated and widespread populations. Spreading from ornamental specimens planted over 100 years ago, the sycamore infestation in Jenolan Karst Conservation Reserve now covers more than 50 hectares of the reserve. The main infestations are providing a source of spread to satellite infestations in moist gully areas.

### **Impacts**

Sycamore maple is found in both healthy bushland and disturbed areas, growing vigorously in sunny or lightly shaded conditions. It can form a dense canopy



preventing germination of native species, over time leading to a virtual monoculture reducing biodiversity, creating an erosion risk and reducing water quality. In Europe sycamore maple is known to live for four hundred years with germination occurring en masse in spring with no seed bank developing; however, longevity and seed bank development are not known in Australia (Muyt 2001). The fast growing rate in conjunction with the massive seed production and possible extreme longevity mean that this species may spread significantly further and its long-term impact may not yet be fully realised. Brush-tailed rock-wallaby habitat is at threat from this spreading infestation. The deciduous monoculture changes the nutrient levels of the hydrology in the area, and is also the catalyst for limestone breakdown; as a result, cave feature formation may be impacted.

### **Priorities for control**

Control programs are a priority where sycamore maples are impacting on grazing areas for brush-tailed rock-wallabies and world heritage biodiversity in Jenolan Karst Conservation Reserve, Kanangra National Park and Blue Mountains National Park (Upper Mountains Area).

### **Control**

Seedlings and small plants can be dug out. Large plants can be treated with cut and paint, basal barking or stem injection methods prior to leaves changing colour in early autumn. As plants often re-shoot follow-up treatments are necessary.

Staged removal of large stands of sycamore maples is necessary due to slope constraints. Bush regeneration principles are to be used where sycamore maples exist as islands amongst native vegetation. Satellite infestations down moist gullies are to be searched for and treated. Sycamore maples found in areas with basalt soils such as in Jenolan Karst Conservation Reserve and in Blue Mountains National Park near Mount Wilson are to be prioritised as this weed is known to spread significantly in these soils.

Building the capacity of the Jenolan Caves Landcare Group and sycamore volunteers is to be continued. Where infestations are not appropriate for volunteers to control bush regenerators are to carry out works. NPWS will continue to work cooperatively with other land managers where sycamore maple weed control programs cross tenures.

### **Monitoring**

Mapping of this weed at Jenolan Karst Conservation Reserve is to be updated as the program continues. Pesticide treatments are to be documented in accordance with the Pesticides Act including locations and the size of the treatment area. Programs are to be recorded in PWIS.

## **Tree of heaven (*Ailanthus altissima*)**

### **Distribution and abundance**

Tree of heaven is found in most Blue Mountains Region reserves from isolated occurrences to populations spread throughout reserves.

### **Impacts**

Tree of heaven is a Class 4 noxious weed in part of the Region (Appendix 5). It is an aggressive invader of disturbed areas, bushland and riparian zones tolerating drought, frost and pollution. It excludes native vegetation in the immediate area by its

profuse suckering and shading and can spread large distances via wind dispersal of the winged seed. In Wollemi National Park (Upper Mountains Area), tree of heaven in conjunction with blackberry and Cape ivy is heavily infesting grazing areas in brush-tailed rock-wallaby habitat. In Mares Forest National Park tree of heaven is compromising the structure of Slater's Hut.

### **Priorities for control**

Control programs are a priority where tree of heaven is impacting on the grazing areas for brush-tailed rock-wallabies, disturbing the Slater's Hut structure and where they are impacting on upon world heritage values such as at the Swamp Hole diatremes in Wollemi National Park (Mudgee Area).

### **Control**

Scrape and paint and injection methods are used in healthy bushland while herbicide spraying using splatter guns and foliar spraying can be used in disturbed areas. The cut and paint method of control is not recommended for tree of heaven as it kills only the above ground stems and does not allow translocation to the root system. This method results in a mass of root suckering and an extended period of control. Trials of the scrape and paint method on tree of heaven have been successful along the Colo River by Friends of the Colo volunteers. All stems (no matter how small) should be treated by injection methods. Irrespective of the technique used, follow-up is required for several years to ensure eradication of the suckers. NPWS will continue to work cooperatively with other land managers where tree of heaven weed control programs cross tenures.

### **Monitoring**

Mapping of tree of heaven infestations is to continue. Treated areas need to be monitored regularly for regrowth. Pesticide treatments are to be documented in accordance with the Pesticides Act including locations and the size of the treatment area. Programs are to be recorded in PWIS.

## **Willows (*Salix* spp.)**

### **Distribution and abundance**

Willow species in this Strategy include all willow species listed as noxious weeds in NSW. Exceptions include *Salix babylonica*, *S. x reichardtii* and *S. x calodendron*.

Willows are found in most Blue Mountains Region reserves from isolated occurrences to populations spread throughout waterways. Black willows (*Salix nigra*) have been found in Blue Mountains National Park (Upper Mountains Area). Significant control of willow species has occurred across the Region since the late 1990s through cooperative programs with the community, management committees, catchment management authorities, volunteers and neighbours. This control has been successful in reducing willow populations from high densities, scattered and isolated patches across various river systems in all Areas.

### **Impacts**

Willows are listed as a WoNS and as a Class 5 noxious weed in the Region. Black willows are listed as a Class 3 noxious weed in the Blue Mountains LGA. Along waterways they can significantly alter stream banks, hydrological cycles and habitats. Willows can cause stream bank erosion, increase and decrease flooding cycles and create a marshland environment through their prolific and shallow rooting system.

Winter leaf fall is known to significantly increase nutrient loads and decrease oxygen levels within fresh water systems. As most macroinvertebrates cannot tolerate habitats with such increased nutrient loads and decreased oxygen levels in winter and total shade in summer, larger species that prey on macroinvertebrates (such as platypus) cannot continue to use these habitats.

Threatened species of greatest concern in the Region that are most likely to be impacted by willows include the endangered Booroolong frog. The occurrence of willows in streams populated by Booroolong frogs can cause this species to decline as willow roots attach to rock cracks where tadpoles hide from predators (DEC 2006a). The Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion EEC is also impacted by willows.

### **Priorities for control**

Priority programs include those where willows are impacting upon threatened species and EECs including the Booroolong frog in Abercrombie River National Park and Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion EEC in Yellomundee Regional Park.

Willow control programs are a priority in the Greater Blue Mountains World Heritage Area and where willows are found in the Grose, Colo and Kowmung wild rivers.

### **Control**

Considerable control of willows throughout the Region has been achieved through the mobilisation of volunteer teams to access willow infestations in remote areas. Volunteer groups include the Willow Warriors, Friends of the Colo and volunteers in the Willows out of Wollemi program. These groups apply herbicide to willows through stem injection or cut and paint methods. In planning any willow control program the WoNS Willows National Best Practice Manual should be referred to.

Where the control of willows may threaten recreational uses such as on the Hawkesbury–Nepean river system in Hawkesbury Area, consideration needs to be given to the removal of timber that may wash down rivers.

The continuation of these community programs is to be encouraged. Continued public education is essential, as is undertaking cooperative programs with various catchment management authority committees and neighbouring land managers weed advisory committees. Programming of skilled staff to direct these volunteer programs is essential.

### **Monitoring**

Mapping of willow infestations is to continue. Pesticide treatments are to be documented in accordance with the Pesticides Act including the locations and the length of the treatment area. Programs are to be recorded in PWIS. Ongoing monitoring of Booroolong frog populations is to continue.

## **Bell miner associated dieback**

### **Distribution and abundance**

BMAD is found in a number of eucalypt forest types between Victoria and southern Queensland. The current spatial distribution of BMAD throughout NSW is not known in detail. Areas of BMAD are known to occur in Blue Mountains National Park (Upper Mountains Area and Hawkesbury Area) and Wollemi National Park (Hawkesbury Area).

## Impacts

Forest eucalypt dieback associated with overabundant bell miners and psyllids has been listed as a KTP under the TSC Act. The condition is associated with the establishment of bell miner colonies and an overabundance of sap-sucking psyllid insects in the forest canopy. The persistence of psyllids in the canopy leads to dieback and eventual death of the affected trees. The impacts of BMAD include loss of biodiversity, economic and recreational values. Forests affected by BMAD can become severely degraded with the loss of a significant proportion of overstorey species and in many cases subsequent invasion of the understorey by weeds, particularly lantana.

Avifauna are known to be affected by the presence of overabundant bell miners. A number of eucalypt species, such as *Eucalyptus dunnii*, *E. saligna*, *E. grandis*, *E. siderophloia*, *E. acmenoides*, *E. punctata* and *E. paniculata*, are vulnerable to BMAD. BMAD has been found in the Region in the Blue Mountains Shale Cap Forest of the Sydney Basin Bioregion EEC. Blue Mountains City Council has additional concerns regarding BMAD impacts in the Sydney Turpentine-Ironbark Forest EEC in the mid to lower Blue Mountains area. The fauna at highest risk of BMAD are the eucalypt-dependent arboreal species and large forest owls. Koalas and yellow-bellied gliders may be at risk of decline due to poor forest health.

The risk and danger of tree and limb fall is also an issue in some areas affected by dieback and in some areas the visual and recreational qualities of tourist sites are impacted by the loss of tree canopy and ecological integrity.

## Priorities for control

Control priorities are currently limited to identifying the presence of BMAD and assessing its impact at particular sites. Where the impact is significant, or could potentially become significant, site management plans will be prepared.

## Control

Control of BMAD is a difficult challenge and in the absence of empirical evidence the causes of dieback cannot be confirmed. Current operational activities to prevent spread and assist ecosystem recovery include weed control and fire management. The use of fire to manage lantana in other areas and manipulate bell miner habitat is the most useful tool available for mitigating BMAD impacts at present. Actions outlined in the Draft Statement of Intent for this KTP will be implemented by OEH. NPWS will work cooperatively with other land managers where BMAD programs cross tenures.

## Monitoring

Monitoring of the location size of BMAD affected areas and the outcomes of management actions on ecosystems will continue and will be used to assist with adapting future management. Communities at risk of BMAD and new reports of BMAD will be assessed and mapped. The BMAD Working Group will provide advice and direction for future management.

## Myrtle rust (*Uredo rangelii*)

### Distribution and abundance

Myrtle rust is a plant disease caused by the exotic fungus *Uredo rangelii*. It was first detected in Australia on 23 April 2010 on the NSW Central Coast. It has established in coastal NSW from the Clyde River north into Queensland. Myrtle rust is likely to

spread rapidly to the extent of its biological range as the spores are dispersed readily by wind. Eradication is unfeasible.

*Uredo rangelii* belongs to a group of closely-related fungi known as the guava or eucalyptus rust complex. The complex includes the fungus *Puccinia psidii* which has had severe impacts on eucalypt plantations in Brazil and has been found in other parts of the Americas, Hawaii and Japan. *P. psidii* was considered as a potential biocontrol agent in the Florida everglades for the invasive plant *Melaleuca quinquenervia*, but it has since been found to attack some native American species, including a threatened species.

Investigations are being undertaken into the location of myrtle rust in the Region.

## Impacts

Myrtle rust affects plants in the family Myrtaceae, including the genera *Eucalyptus*, *Angophora*, *Callistemon* and *Melaleuca*. Infection occurs on young growing shoots, leaves, flower buds and fruits. It produces masses of powdery bright yellow or orange-yellow spores on the infected areas. Leaves may become buckled and twisted and die as a result of infection.

The likely impacts of myrtle rust on biodiversity in Australia are unknown. Like *P. psidii*, infection with myrtle rust may cause significant mortality among younger plants and hence reduce recruitment into adult populations. This may contribute to the decline and extinction of species, which is of immediate concern for those species already at high risk: threatened species. Reduced recruitment may also have severe impacts on the structure and function of the many natural ecosystems that depend on Myrtaceae. As at 28 March 2011, myrtle rust had been detected in 68 species of Myrtaceae, spanning 27 genera. Severe infection had been observed in relatively few species (most notably scrub turpentine *Rhodamnia rubescens* and native guava *Rhodomyrtus psidoides*) but the number of species so affected may increase as new strains of rust evolve. All five threatened species of Myrtaceae exposed to myrtle rust under laboratory test conditions became infected.

Introduction and establishment of exotic rust fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae is listed as a KTP under the TSC Act.

## Priorities for control

The Management Plan for Myrtle Rust on National Parks outlines how myrtle rust will be managed on national park estate in NSW, including the potential impacts of myrtle rust on threatened species. The plan also provides guidance to managers of other bushland and threatened species sites.

The objectives of the plan are to:

- slow the establishment of myrtle rust on national park estate
- minimise the impacts of myrtle rust on threatened species and ecological communities on national park estate.

## Control

The Management Plan for Myrtle Rust on National Parks includes eight action areas to manage myrtle rust:

- identify high value assets at risk
- limit the spread of myrtle rust
- monitor the spread of myrtle rust

- manage infections
- research the impacts of myrtle rust
- training, extension and external communication
- record the incidence of myrtle rust
- liaise and report on the spread and impacts of myrtle rust.

NPWS will work cooperatively with other land managers where myrtle rust programs cross tenures.

### **Monitoring**

Presence/absence data will be entered into the Biological Survey Subsystem of the Wildlife Atlas from monitoring threatened species and sentinel sites.

If any fungicide control works are required, daily record sheets will kept for all control programs in accordance with the Pesticides Act. Before and after photos are also taken during the course of implementation of works. Where treatment is proposed, GPS locations are taken of work site locations including the extent of myrtle rust distribution and control implemented. Sites are revisited periodically for follow-up treatment and maintenance.

## **Phytophthora (*Phytophthora cinnamomi*)**

### **Distribution and abundance**

Phytophthora spores can be dispersed over relatively large distances by surface and subsurface water flows and can also be readily transported in contaminated soils. The pathogen can be transported by animals (native and feral) moving throughout the landscape. Feral pigs and other hoofed animals have proven to be very effective vectors; however, the highest risk of spread is via human activities (OEH 2012) wherever soil is carried on footwear or equipment.

Phytophthora is found throughout the Region. It is present in many of the high visitation precincts and popular access routes as well as remote areas and trails with lower levels of public use in GBMWA (OEH 2012).

### **Impacts**

Infection of native plants by *Phytophthora cinnamomi* is listed as a KTP under the TSC Act, and dieback caused by the root-rot fungus *Phytophthora cinnamomi* is listed as a KTP under the EPBC Act. Listing has resulted in a national threat abatement plan for phytophthora, and a Statement of Intent prepared for NSW.

Phytophthora is a soil-borne pathogen belonging to the water mould group. It grows best in tropical conditions and is parasitic, requiring a living host on which to feed. The most affected plant families in Australia are the Proteaceae, Epacridaceae, Fabaceae and Dilleniaceae. Several species of the Myrtaceae family, including some eucalypts, are also susceptible. Threatened species in the Region considered susceptible to phytophthora include *Isopogon fletcheri*, *Tetratheca glandulosa* and *Eucalyptus copulans* (found in proximity to Blue Mountains National Park). In 2005 Phytophthora was found to be the cause of foliage dieback in Wollemi pines (*Wollemia nobilis*) in Wollemi National Park. EECs likely to be susceptible to the pathogen include Genowlan Point *Allocasuarina nana* Heathland.

The spores of the fungus (zoospores and chlamydozoospores) spread rapidly through water and moist soil or via transfer in particles of infected soil, lodging on plant roots.

Once inside a host plant phytophthora spores can colonise the vascular tissue and restrict the uptake of water and nutrients, killing the host plant.

### **Priorities for control**

Where phytophthora is impacting on threatened species it is a critical priority for control. Phytophthora management is a high priority in the GBMWA.

As feral pigs, feral cattle and wild horses can spread phytophthora they are a priority for control where both phytophthora is present at threatened species sites and in the GBMWA.

### **Control**

Threat abatement measures and strategies for the control of phytophthora, including hygiene protocols, treatment of plants and soil, research, monitoring and information and awareness dissemination, are implemented. Strategies for the control of phytophthora are outlined in the Wollemi Pine Recovery Plan (DEC 2006b) and the management strategies for mitigating the impact of *Phytophthora cinnamomi* in the GBMWA. NPWS will work cooperatively with other land managers where *Phytophthora cinnamomi* programs cross tenures.

### **Monitoring**

Monitoring is carried out according to the detection and diagnosis recommendations in the management strategies for mitigating the impact of *Phytophthora cinnamomi* in the GBMWA including opportunistic soil sampling and annual GIS mapping.

### **Other pathogen pest species**

Other pathogen pest species of concern in Blue Mountains Region include beak and feather (*Psittacine circoviral*) disease affecting endangered *Psittacine* species and populations and amphibian chytrid causing the disease chytridiomycosis in frogs. Both of these diseases are listed as KTPs under the TSC Act and EPBC Act.

Control of these diseases needs to be investigated and prioritised if they are impacting on threatened species in Blue Mountains Region. Recording and monitoring of any new pest program is essential to measure the effectiveness of the program.

## Appendix 1 New and emerging pest species

### New pest species

Any suspected new pest species in the Region should first be reported to the Regional Operations Coordinator, who will then decide if it is necessary to alert the following groups.

Species	Contact	Website
All species	Report sightings to NSW Wildlife Atlas.	<a href="http://www.environment.nsw.gov.au/wildlifeatlas/about.htm#contribute">www.environment.nsw.gov.au/wildlifeatlas/about.htm#contribute</a>
All species	Regional Invasive Species Officer (DPI) (see website for contacts)	<a href="http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/345280/RWACs-ISO-contacts-map.pdf">www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/345280/RWACs-ISO-contacts-map.pdf</a>
Animal diseases	Emergency Animal Disease Hotline (DPI) – report unusual disease signs, abnormal behaviour or unexplained deaths in livestock. Ph. 1800 675 888	<a href="http://www.dpi.nsw.gov.au/biosecurity/animal">www.dpi.nsw.gov.au/biosecurity/animal</a>
Aquatic pests	Aquatic Pest Hotline (DPI) – report suspected aquatic pests or weeds. Ph: (02) 4916 3877	<a href="http://www.dpi.nsw.gov.au/biosecurity/aquatic">www.dpi.nsw.gov.au/biosecurity/aquatic</a>
Insects and plant pests/diseases*	Exotic Plant Pest Hotline (DPI) – report suspect exotic and emergency insects and plant pests/diseases. Ph: 1800 084 881	<a href="http://www.dpi.nsw.gov.au/biosecurity/plant">www.dpi.nsw.gov.au/biosecurity/plant</a>
Pest animals	Website form is available for the reporting of new incursions of pest animals.	<a href="http://www.dpi.nsw.gov.au/agriculture/pests-weeds/vertebrate-pests/other-vertebrate-pests2/pest-reporting/pest-reporting-form">www.dpi.nsw.gov.au/agriculture/pests-weeds/vertebrate-pests/other-vertebrate-pests2/pest-reporting/pest-reporting-form</a>
Weeds**	Notify relevant local control authority and Weeds Hotline (DPI). Ph: 1800 680 244 Email: <a href="mailto:weeds@dpi.nsw.gov.au">weeds@dpi.nsw.gov.au</a> .	<a href="http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/contacts">www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/contacts</a>

\* Certain diseases and pests are notifiable for the purposes of the *Plant Diseases Act 1924*. For example, red imported fire ant has been made notifiable under this Act. This means that you have a legal obligation to report suspected red fire ant infestations as soon as possible.

\*\* Noxious weeds in Control Classes 1, 2 and 5 are notifiable weeds under the *Noxious Weeds Act 1993* (Appendix 5). This means that you must notify the local control authority within three days of becoming aware that the notifiable weed is on the land.

### Emerging pest species

In Blue Mountains Region there are a number of pests that pose a risk of invasion and/or further spread and establishment. Those listed below are not currently known to exist in reserves, exist in small isolated infestations or are only in a small number of reserves. These species, the locations of current infestations and/or possible reserves where infestations may establish are discussed below. Any new occurrences of these pests, outside of the areas on-park mentioned below, should be



reported to the Regional Operations Coordinator, who will decide upon the appropriate course of action.

### **Aquatic weeds (alligator weed, salvinia and cabomba)**

Cabomba (*Cabomba caroliniana*) grows quickly and produces a large amount of plant material with a dense mass of underwater stems. When die off occurs, oxygen is dramatically reduced and the waterway becomes foul smelling. It is regarded as one of the worst weeds in Australia because of its invasiveness, potential for spread and its economic and environmental impacts. It is extremely persistent and can exclude native vegetation. It is listed as a WoNS and a Class 5 notifiable noxious weed. It is not known on NPWS estate in Blue Mountains Region; however, there is an infestation of cabomba in Glenbrook Lagoon within Blue Mountains City Council. There is a risk that this infestation could spread to nearby river systems through floods, boats or by helitankers spreading fragments during fire fighting operations. Operational maintenance procedures (including visual inspections of air attack equipment) are in place to reduce the likelihood of spread via NPWS operations.

Salvinia (*Salvinia molesta*) is a free-floating aquatic fern that grows in still and slow-flowing fresh water. In Australia, it predominantly occurs in streams along the east coast. It has the potential to spread throughout much of Australia where it would impact on waterways and irrigation areas. It is listed as a WoNS and a Class 2 or 3 noxious weed in Blue Mountains Region. The infestation of salvinia at Glenbrook Lagoon within Blue Mountains City Council is being controlled.

Alligator weed produces masses of creeping and layering stems over land and water. It is an aggressive invader that responds to high nutrient levels and is a major threat to wetlands, rivers and irrigation systems especially the turf industry on the Hawkesbury-Nepean floodplain. Alligator weed impacts the turf industry through reduced water flow, channel obstruction, increased maintenance and production losses.

Blue Mountains National Park and Yellomundee Regional Park are the only reserves in Blue Mountains Region that have infestations of alligator weed (*Alternanthera philoxeroides*). It occurs as 30 scattered aquatic infestations along eight kilometres of the Nepean River. NPWS manages alligator weed only in its terrestrial form.

New plants regenerate readily from plant fragments which facilitate rapid spread and increase the difficulty of control. Alligator weed is a WoNS and in Blue Mountains Region is declared Class 2 or 3 noxious weed. Alligator weed has a long history in the Sydney Basin where it is seen as a major threat in the Hawkesbury-Nepean catchment.

All infestations along the Hawkesbury-Nepean River passing through Blue Mountains National Park are a high priority for control coordinated through HNCMA. The spread and control of alligator weed on the Hawkesbury-Nepean River is a complex and contentious issue. For this reason, and because control of the aquatic form is very difficult and is undertaken in collaboration with other agencies, NPWS will not undertake any monitoring of the aquatic form of alligator weed on the river. NPWS will record and map all occurrences of the terrestrial form of alligator weed on its lands and will monitor its distribution in response to control. NPWS will liaise regularly with the local control authority, DPI and HNCMA regarding alligator weed.

### **Berberis (*Berberis aristata*)**

Berberis is a spiny deciduous shrub with yellow flowers and pearly berries. It can invade undisturbed bushland and form impenetrable thickets. It is found in isolated populations in Yerranderie Regional Park and Blue Mountains National Park in

Kanangra Area and Upper Mountains Area. *Berberis* infestations occur adjacent to the historic township of Yerranderie and along creek lines in this area. Significant impacts are occurring where *berberis* is infesting creek banks and open woodland. Mono-stands of *berberis* out-compete native shrubs and grasses. Visual amenity is marred by large impenetrable thickets. *Berberis* is impacting upon the White Box Yellow Box Blakely's Red Gum Woodland EEC in Yerranderie State Conservation Area and Blue Mountains National Park in Kanangra Area.

Volunteer groups are undertaking control with NPWS staff. Control options include bush regeneration techniques including herbicide spraying and mechanical removal. A multi agency management program with Wollondilly Shire Council and State Conservation Area is essential to control *berberis* infestations at Yerranderie along with community involvement and liaison with adjacent landholders. Any pesticide treatments are to be documented in accordance with the Pesticides Act including locations and the size of the treatment area. Programs are to be recorded in PWIS.

### **Boneseed (*Chrysanthemoides monilifera* subsp. *monilifera*)**

Boneseed is regarded as one of the worst weeds in Australia because of its invasiveness, potential for spread, and economic and environmental impacts. It is a Weed of National Significance. It is an aggressive invader of native bushland establishing in vegetation ranging from mallee scrub to eucalypt dominated forests. It has vigorous growth, an absence of natural enemies, the ability to regenerate quickly and out compete other species after fire. NPWS works with Mount Tomah Botanic Gardens, Hawkesbury River County Council, HNCMA, neighbours and volunteers as part of the annual spring 'boneseed blitz' to ensure all seedlings are controlled (as the seed bank may be viable for up to 10 years).

### **Coolatai grass (*Hyparrhenia hirta*)**

Coolatai grass grows vigorously, forming an almost complete monoculture and replacing native grass and wildflower species. It tolerates drought, heavy grazing and many herbicides. It has invaded large areas of grassy woodlands and native pastures in north-west NSW and is spreading rapidly in other regions.

Coolatai grass has been detected along the Putty Road, Mellong in Wollemi National Park (Hawkesbury Area).

Coolatai grass together with a range of exotic perennial grasses has been listed as a KTP 'Invasion of native plant communities by exotic perennial grasses' under the TSC Act. Coolatai grass can quickly invade undisturbed areas leading to a significant reduction in biodiversity. It grows vigorously, forming an almost complete monoculture and replacing native grass and wildflower species. It tolerates drought, heavy grazing and many herbicides.

Staff should be alerted to this weed and control new outbreaks as soon as practicable to reduce any further spread. Foliar spray methods are to be used. NPWS staff are to familiarise themselves with identification of this plant and investigate reports accordingly. Pesticide treatments are to be documented in accordance with the Pesticides Act including locations and the size of the treatment area. Programs are to be recorded in PWIS.

### **Horsetail (*Equisetum* spp.)**

Horsetail is a primitive, non woody, non flowering perennial plant that grows to 12 cm in height depending on the species. The risk of horsetails establishing is considered greatest in temperate regions with annual rainfall above 500 mm. They have the potential to become serious invaders in swamps and wetlands. As well as being highly invasive they are toxic to livestock. Although not known on NPWS estate in the

Region, an infestation is known adjacent to Blue Mountains National Park, Upper Mountains Area at Planet Ark Park, Wentworth Falls and at the Old Sorenson Nursery site by BMCC. This weed a Class 1 state prohibited weed under the NW Act. It is also listed on the National Environmental Alert List which has 28 weed species with limited distributions but potentially could cause significant damage.

**Red-eared slider turtle (*Trachemys scripta elegans*)**

An individual has been sighted at Glenbrook Lagoon in Hawkesbury Area. Although not listed under NSW legislation the red-eared slider turtle is a declared Class 1 pest in Queensland and has established feral populations in many other countries.

**American corn snake (*Elaphe guttata*)**

Individuals have been seen in Hawkesbury Area. Although not listed under NSW legislation the American corn snake is a declared Class 1 pest in Queensland and has established feral populations in many other countries.

**Ferret (*Mustela furo*)**

Low numbers have been seen in the Grose valley in the lower Blue Mountains. Ferrets are a significant pest in New Zealand where they are implicated in the decline of native birds. Although not listed under NSW legislation the ferret is a declared Class 1 pest in Queensland. A risk assessment conducted by the Department of Agriculture and Food in Western Australia and endorsed by the national Vertebrate Pests Committee indicates that ferrets pose an extreme threat (the highest of four categories) to Australia.

**Cane toad (*Bufo marinus*)**

Individuals have been imported to Sydney via trucks containing fresh produce from Queensland. A breeding population is being controlled in the Sutherland Shire Council. Invasion and establishment of the cane toad (*Bufo marinus*) has been listed as a KTP under the TSC Act.

## Appendix 2 Threatened species and endangered ecological communities

Asset: species or community	TSC Act	Threat	Reserve
<b>Flora</b>			
<i>Acacia bynoeana</i>	V	Various weeds	Blue Mountains NP, UMA
<i>Acacia clunies-rossiae</i>	V	Riparian weeds, pigs	Blue Mountains NP, KA, Kanangra-Boyd NP, KA
<i>Acacia dangarensis</i>	V	Prickly pear	Goulburn River NP, MA
<i>Ammobium craspedioides</i> (Yass daisy)	V	Serrated tussock	Keverstone NP, KA
<i>Baloskian longipes</i>	V	Feral pigs	Kanangra-Boyd NP, KA
<i>Boronia deanei</i> (Deane's boronia)	V	Feral pigs	Blue Mountains NP, Kanangra-Boyd NP
<i>Diuris aequalis</i> (donkey orchid)	E	Feral pigs	Kanangra-Boyd NP, KA, Mares Forest NP, KA
<i>Epacris hamiltonii</i>	E	Various weeds	Blue Mountains NP, UMA
<i>Epacris sparsa</i>	V	Gorse	Blue Mountains NP, UMA and HA
<i>Eucalyptus benthamii</i>	V	Feral pigs, various weeds	Blue Mountains NP, UMA
<i>Eucalyptus parramattensis</i>	V	Feral deer, pigs	Wollemi NP, HA
<i>Isopogon fletcheri</i>	V	Gorse, broom	Blue Mountains NP, UMA
<i>Kennedia retrorsa</i>	V	Various weeds	Goulburn River NP, MA
<i>Microstrobos fitzgeraldii</i>	E	Various weeds	Blue Mountains NP, UMA
<i>Persoonia acerosa</i> (mossy geebung)	V	Various weeds	Blue Mountains NP, UMA
<i>Pultenaea glabra</i>	V	Riparian weeds	Blue Mountains NP, UMA
<i>Trachymene saniculifolia</i>	E	Feral pigs	Kanangra-Boyd NP, KA
<i>Wollemia nobilis</i> (Wollemi pine)	E	Phytophthora, blackberry	Wollemi NP, MA
<b>Fauna</b>			
<i>Anthochaera phrygia</i> (regent honeyeater)	E	Feral goats, rabbits, various weeds	Capertee NP, MA, Munghorn Gap NR, MA
<i>Calyptorhynchus banksii samueli</i> (red-tailed black cockatoo)	V	St John's wort	Munghorn Gap NR, MA
<i>Calyptorhynchus lathami</i> (glossy black cockatoo)	V	Various weeds	Wollemi NP, MA, Munghorn Gap NR, MA
<i>Cercartetus nanus</i> (eastern pygmy-possum)	V	Fox	Blue Mountains NP, UMA
<i>Dasyurus maculatus</i> (spotted-tailed quoll)	V	Fox, wild dog, various weeds	Wollemi NP, MA, Abercrombie River NP, KA
<i>Eulamprus leuraensis</i> (Blue Mountains water skink)	E	Feral cat, pig, fox, various weeds	Blue Mountains NP, UMA, Wollemi NP, UMA
<i>Hoplocephalus bungaroides</i> (broad-headed snake)	E	Feral goat, various weeds	Gardens of Stone NP, UMA, Kanangra-Boyd NP, KA, Blue Mountains NP, KA, Wollemi NP, MA

<b>Asset: species or community</b>	<b>TSC Act</b>	<b>Threat</b>	<b>Reserve</b>
<i>Litoria booroolongensis</i> (Booroolong frog)	E	Various weeds, pig	Abercrombie River NP, KA, Kanangra-Boyd NP, KA, Wiaborough NR, KA, Nuggety SCA, KA
<i>Lophoictinia isura</i> (square-tailed kite)	V	St John's wort	Munghorn Gap NR, MA
<i>Neophema pulchella</i> (turquoise parrot)	V	Various weeds	Wollemi NP, MA
<i>Ninox strenua</i> (powerful owl)	V	Various weeds	Wollemi NP, MA Munghorn Gap NR, MA
<i>Paralucia spinifera</i> (purple copperwing butterfly)	V	Feral pigs, blackberry	Marrangaroo NP, UMA
<i>Petaurus australis</i> (yellow-bellied glider)	V	Various weeds	Wollemi NP, MA Yellomundee RP, HA
<i>Petalura gigantea</i> (giant dragonfly)	E	Feral pig, various weeds	Wollemi NP, UMA, Blue Mountains NP, UMA and HA
<i>Petrogale penicillata</i> (brush-tailed rock-wallaby)	E	Fox, feral goats, cats, wild dog, various weeds	Wollemi NP, UMA, MA and HA, Jenolan KCR, KA, Munghorn Gap NR, MA
<i>Phascolarctos cinereus</i> (koala)	V	Wild dog, various weeds	Wollemi NP, MA Yellomundee RP, HA
<b>Ecological communities</b>			
Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion	EEC	Various weeds	Blue Mountains NP, UMA Blue Mountains NP, HA, Wollemi NP, HA
Blue Mountains Swamps in the Sydney Basin Bioregion ##	VEC	Red fox, feral pigs, deer, various weeds	Blue Mountains NP, UMA and HA, Wollemi NP, UMA
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion	EEC	Various weeds	Yellomundee RP, HA
Cumberland Plain Woodland in the Sydney Basin Bioregion	CEEC	Various weeds *	Yellomundee RP, HA, Blue Mountains NP, HA
Genowlan Point <i>Allocasuarina nana</i> Heathland	EEC	Feral goats	Mugii Murum-ban SCA, MA
Moist Shale Woodland in the Sydney Basin Bioregion	EEC	Various weeds	Yellomundee RP, HA
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (previously Sydney Coastal River Flat forest)	EEC	Cattle, feral deer, lantana and various weeds	Kanangra-Boyd NP, KA, Yellomundee RP, HA
Shale/Sandstone Transition Forest	EEC	Lantana	Yellomundee RP, HA Blue Mountains NP, HA
Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	EEC	Box elder, blackberry	Wollemi NP, UMA Blue Mountains NP, UMA
Western Sydney Dry Rainforest in the Sydney Basin Bioregion	EEC	Various weeds	Blue Mountains NP, HA Wollemi NP, HA

<b>Asset: species or community</b>	<b>TSC Act</b>	<b>Threat</b>	<b>Reserve</b>
White Box Yellow Box Blakely's Red Gum Woodland	EEC	Feral goats, pigs, various weeds	Blue Mountains NP, KA, Capertee NP, MA, Wollemi NP, MA, Colah Tops NP, MA, Goulburn River NP, MA, Burwood Creek NR, KA, Keeverstone NP, KA

Notes to the table

E = endangered, V = vulnerable, CEEC = Critically Endangered Ecological Community, EEC = Endangered Ecological Community, VEC = Vulnerable Ecological Community

# Also listed under the EPBC Act.

## These swamps integrate with increasing elevation with Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion EEC and also share some characteristics with Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps Bioregions EEC. Additionally they apparently form part of Temperate Highland Peat Swamps on Sandstone which is listed as an EEC under the EPBC Act.

## Appendix 3 Key threatening processes

KTPs relevant to Blue Mountains Region are listed below.<sup>5</sup>

Key threatening process	Threatened species affected or potentially affected in Blue Mountains Region
<b>Pest animals</b>	
Competition and habitat degradation by feral goats ( <i>Capra hircus</i> )	Brush-tailed rock-wallaby, broad-headed snake
Competition and grazing by the feral European rabbit ( <i>Oryctolagus cuniculus</i> )	Brush-tailed rock-wallaby
Competition from feral honeybees ( <i>Apis mellifera</i> )	Glossy black-cockatoo, squirrel glider, yellow-bellied glider, brown treecreeper
Herbivory and environmental degradation caused by feral deer	Montane Peatlands and Swamps EEC; River-Flat Eucalypt Forest on Coastal Floodplains EEC, <i>Eucalyptus parramattensis</i> in the Mellong Swamp Complex
Predation by the European red fox ( <i>Vulpes vulpes</i> )	Brush-tailed rock-wallaby, eastern pygmy-possum, ground nesting birds, Montane Peatlands and Swamps EEC, Blue Mountains Swamps VEC
Predation by the feral cat ( <i>Felis catus</i> )	Blue Mountains water skink, brush-tailed rock-wallaby, bush-stone curlew, eastern pygmy-possum, ground nesting birds
Predation, habitat degradation, competition and disease transmission by feral pigs ( <i>Sus scrofa</i> )	Southern brown bandicoot, White Box Yellow Box Blakely's Red Gum Woodland EEC, <i>Eucalyptus parramattensis</i>
Predation and hybridisation of feral dogs ( <i>Canis lupus familiaris</i> )	Dingoes ( <i>Canis lupus dingo</i> )
<b>Weeds</b>	
Invasion, establishment and spread of <i>Lantana camara</i>	River-Flat Eucalypt Forest on Coastal Floodplains EEC, Western Sydney Dry Rainforest EEC, Sydney Turpentine-Ironbark Forest EEC
Invasion of native plant communities by exotic perennial grasses	White Box Yellow Box Blakely's Red Gum Woodland EEC
Invasion and establishment of exotic vines and scramblers	<i>Epacris hamiltonii</i> , Cumberland Plain Woodland EEC, Shale/Sandstone Transition Forest EEC, Western Sydney Dry Rainforest EEC
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	Purple copperwing butterfly ( <i>Paralucia spinifera</i> )
Invasion and establishment of Scotch broom ( <i>Cytisus scoparius</i> )	Montane Peatlands and Swamps EEC, Blue Mountains Swamps VEC
Invasion of native plant communities by African olive <i>Olea europaea</i> L. subsp. <i>cuspidata</i>	Cumberland Plain Woodland EEC

<sup>5</sup> For up-to-date listings go to [www.environment.nsw.gov.au/threatenedspecies/KeyThreateningProcessesByDoctype.htm](http://www.environment.nsw.gov.au/threatenedspecies/KeyThreateningProcessesByDoctype.htm).

Key threatening process	Threatened species affected or potentially affected in Blue Mountains Region
Invasion of native plant communities by <i>Chrysanthemoides monilifera</i> (bitou bush and boneseed)	Eradication program
<b>Pest pathogens, dieback and other threats</b>	
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	Loss of vegetation structure and composition leading to an increase in weeds and vertebrate pest impacts on threatened species
Forest eucalypt dieback associated with overabundant psyllids and bell miners	Blue Mountains Shale Cap Forest EEC
Infection by <i>Psittacine circoviral</i> (beak and feather) disease affecting endangered psittacine species and populations	Swift parrot
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	Red-crowned toadlet, Booroolong frog, giant burrowing frog, stuttering frog (other frog species may also become threatened)
Infection of native plants by <i>Phytophthora cinnamomi</i>	Wollemi pine ( <i>Wollemia nobilis</i> ), <i>Eucalyptus copulans</i> (off park), <i>Isopogon fletcheri</i> , <i>Tetrateca glandulosa</i> , Genowlan Point <i>Allocasuarina nana</i> heathland EEC
Introduction and establishment of exotic rust fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	Family Myrtaceae including genera Eucalyptus, Angophora, Callistemon and Melaleuca

Feral goats, feral pigs, feral rabbits, feral cats, European red foxes, garden escapes, phytophthora, chytrid disease and beak and feather disease have additionally been listed as a Key Threatening Process under the Commonwealth *EPBC Act*.

Feral rabbits, wild dogs and feral pigs are additionally declared pests under the RLP Act.



## Appendix 4 Noxious weeds and Weeds of National Significance as at June 2012

Thirteen local government areas (eight of which are in three county councils) are fully or partially within Blue Mountains Region. Although listed in some LGAs in Blue Mountains Region, these weeds may not necessarily be in the Region or in the NPWS parks within these LGAs.

The numbers in the table refer to the noxious weeds classes, which are described at the end of the table. As noxious weed listings change refer to the DPI website for up to date listings.<sup>6</sup>

Noxious weed	Blue Mountains LGA <sup>1</sup>	Upper Macquarie CC <sup>2</sup>	Hawkesbury River CC <sup>3</sup>	Mid Western LGA <sup>4</sup>	Upper Hunter CC <sup>5</sup>	Upper Lachlan LGA <sup>6</sup>	Warrumbungle LGA <sup>7</sup>	Wollondilly LGA <sup>8</sup>	Weed of National Significance
African boxthorn ( <i>Lycium ferocissimum</i> )	4	4	4	4	4	4	4	4	X*
African feathergrass ( <i>Pennisetum macrourum</i> )	5	5	5	5	5	5	5	5	
African lovegrass ( <i>Eragrostis curvula</i> )	-	4	-	-	-	4	-	-	
African olive ( <i>Olea europaea</i> subsp. <i>cuspidate</i> )	-	-	4	-	-	-	-	-	
African turnipweed ( <i>Sisymbrium runcinatum</i> )	5	5	5	5	5	5	5	5	
African turnipweed ( <i>Sisymbrium runcinatum</i> )	5	5	5	5	5	5	5	5	
Alligator weed ( <i>Alternanthera philoxeroides</i> )	2	2	3	2	2	2	2	3	X
Anchored water hyacinth ( <i>Eichhornia azurea</i> )	1	1	1	1	1	1	1	1	
Annual ragweed ( <i>Ambrosia artemisifolia</i> )	5	5	5	5	5	5	5	5	
Arrowhead ( <i>Sagittaria montevidensis</i> )	4	4	4	4	4	4	4	4	
Artichoke thistle ( <i>Cynara cardunculus</i> )	5	5	5	5	5	5	5	5	
Ground asparagus (or asparagus fern) ( <i>Asparagus aethiopicus</i> )	4	-	-	-	-	-	-	-	X*
Athel pine ( <i>Tamarix aphylla</i> )	5	5	5	5	5	5	5	5	X
Bathurst/Noogoora/Californian/Cockle burrs ( <i>Xanthium</i> spp.)	4	4	4	4	4	4	4	4	
Bear-skin fescue ( <i>Festuca gautieri</i> )	5	5	5	5	5	5	5	5	
Bitou bush ( <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> )	3	-	-	-	-	-	-	-	X
Black knapweed ( <i>Centaurea nigra</i> )	1	1	1	1	1	1	1	1	
Black willow ( <i>Salix nigra</i> )	3	-	-	-	-	-	-	-	

<sup>6</sup> [www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles](http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles)

Noxious weed	Blue Mountains LGA <sup>1</sup>	Upper Macquarie CC <sup>2</sup>	Hawkesbury River CC <sup>3</sup>	Mid Western LGA <sup>4</sup>	Upper Hunter CC <sup>5</sup>	Upper Lachlan LGA <sup>6</sup>	Warrumbungle LGA <sup>7</sup>	Wollondilly LGA <sup>8</sup>	Weed of National Significance
Blackberry ( <i>Rubus fruticosus</i> agg.)	4	4	4	4	4	4	4	4	X
Blue heliotrope ( <i>Heliotropium amplexicaule</i> )	-	-	-	4	-	-	4	-	
Boneseed ( <i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i> )	2	2	4	2	2	2	2	2	X
Bridal creeper ( <i>Asparagus asparagoides</i> )	4	4	4	4	4	4	4	4	X
Broomrapes (except natives) ( <i>Orobanche</i> spp.)	1	1	1	1	1	1	1	1	
Burr ragweed ( <i>Ambrosia confertiflora</i> )	5	5	5	5	5	5	5	5	
Cabomba ( <i>Cabomba caroliniana</i> )	5	5	5	5	5	5	5	5	X
Camphor laurel ( <i>Cinnamomum camphora</i> )	4	-	-	-	-	-	-	-	
Montpellier (Cape) broom ( <i>Genista monspessulana</i> )	4	2	-	2	-	-	-	-	X*
Cape tulip ( <i>Moraea species</i> )	-	-	-	-	4		-	-	
Cayeene snakeweed ( <i>Stachytarpheta cayennensis</i> )	5	5	5	5	5	5	5	5	
Chilean needle grass ( <i>Nassella neesiana</i> )	4	4	4	4	4	4	4	4	X
Chinese violet ( <i>Asystasia genetica</i> subsp.)	1	1	1	1	1	1	1	1	
Cineraria ( <i>Cineraria lyratifarmis</i> )	-	-	-	4	-	-	-	-	
Clockweed ( <i>Gaura parviflora</i> )	5	5	5	5	5	5	5	5	
Columbus grass ( <i>Sorghum x alnum</i> )	4	3	4	3	4	4	3	4	
Corn sowthistle ( <i>Sonchus arvensis</i> )	5	5	5	5	5	5	5	5	
Crofton weed ( <i>Ageratina adenophora</i> )	4	-	4	-	-	-	-	-	
Dodder ( <i>Cuscuta</i> spp.) (exceptions)	5	5	5	5	5	5	5	5	
East Indian hygrophila ( <i>Hygrophila polysperma</i> )	4	4	4	4	3	4	4	4	
Espartillo ( <i>Achnatherum brachychaetum</i> )	5	5	5	5	5	5	5	5	
Eurasian water milfoil ( <i>Myriophyllum spicatum</i> )	1	1	1	1	1	1	1	1	
Fine-bristled burregrass ( <i>Cenchrus brownie</i> )	5	5	5	5	5	5	5	5	
Fireweed ( <i>Senecio madagascariensis</i> )	-	-	-	-	-	4	-	-	X*
Flax-leaf broom ( <i>Genista linifolia</i> )	4	-	-	-	-	-	-	-	X*_
Fountain grass ( <i>Pennisetum setaceum</i> )	5	5	5	5	5	5	5	5	

Noxious weed	Blue Mountains LGA <sup>1</sup>	Upper Macquarie CC <sup>2</sup>	Hawkesbury River CC <sup>3</sup>	Mid Western LGA <sup>4</sup>	Upper Hunter CC <sup>5</sup>	Upper Lachlan LGA <sup>6</sup>	Warrumbungle LGA <sup>7</sup>	Wollondilly LGA <sup>8</sup>	Weed of National Significance
Gallon's curse ( <i>Cenchrus biflorus</i> )	5	5	5	5	5	5	5	5	
Giant Parramatta grass ( <i>Sporobolus fertilis</i> )	3	-	-	3	3		-	3	
Giant reed ( <i>Arundo donax</i> )	4	-	-	-	-	-	-	-	
Glaucous star thistle ( <i>Carthamus glaucus</i> )	5	5	5	5	5	5	5	5	
Golden dodder ( <i>Cuscuta campestris</i> )	4	4	4	4	4	4	4	4	
Golden thistle ( <i>Scolymus hispanicus</i> )	5	5	5	5	5	5	5	5	
Gorse ( <i>Ulex europaeus</i> )	3	3	3	2	2	3	-	3	X
Green cestrum ( <i>Cestrum parqui</i> )	3	3	3	3	3	3	3	3	
Grey sallow ( <i>Salix cinerea</i> )	3	-	-	-	-	-	-	-	
Harrisia cactus ( <i>Harrisia</i> spp.)	4	4	4	4	4	4	4	4	
Hawkweed ( <i>Hieracium</i> spp.)	1	1	1	1	1	1	1	1	
Hemlock ( <i>Conium maculatum</i> )	-	4	-	4	4	4	-	-	
Heteranthera ( <i>Heteranthera reniformis</i> )	1	1	1	1	1	1	1	1	
Horsetail ( <i>Equisetum</i> spp.)	1	1	1	1	1	1	1	1	
Hydrocotyl ( <i>Hydrocotyl ranunculoides</i> )	1	1	1	1	1	1	1	1	
Hygrophila ( <i>Hygrophila costata</i> )	2	-	2	-	2	2	-	2	
Hymenachne ( <i>Hymenachne amplexiculis</i> )	1	1	1	1	1	1	1	1	X
Johnson grass ( <i>Sorghum halepense</i> )	4	3	4	3	4	4	3	4	
Karoo thorn ( <i>Acacia karroo</i> )	1	1	1	1	1	1	1	1	
Kochia ( <i>Bassia scoparia</i> ) (except subspecies <i>trichophylla</i> )	1	1	1	1	1	1	1	1	
Lacy ragweed	-	-	-	4	-	-	-	-	
Kosters curse ( <i>Clidemia hirta</i> )	1	1	1	1	1	1	1	1	
Lagarosiphon ( <i>Lagarosiphon major</i> )	1	1	1	1	1	1	1	1	
Lananta ( <i>Lantana</i> spp.)	4	4	4	4	4	4	4	4	X*
Leafy elodea ( <i>Egeria densa</i> )	-	4	-	4	4	4	4	4	
Lippia ( <i>Phyla canesiensis</i> )	-	4	-	4	4	4	4	4	
Long-leaf willow primrose ( <i>Ludwigia longifolia</i> )	3	4	3	4	4	4	4	3	
Longstyle feather grass ( <i>Pennisetum villosum</i> )	-	4	-	4	-	-	-	4	
Mesquite ( <i>Prosopis</i> spp.)	-	2	-	2	2	2	2	-	X
Mexican feather grass ( <i>Nassella tenuissima</i> )	1	1	1	1	1	1	1	1	

Noxious weed	Blue Mountains LGA <sup>1</sup>	Upper Macquarie CC <sup>2</sup>	Hawkesbury River CC <sup>3</sup>	Mid Western LGA <sup>4</sup>	Upper Hunter CC <sup>5</sup>	Upper Lachlan LGA <sup>6</sup>	Warrumbungle LGA <sup>7</sup>	Wollondilly LGA <sup>8</sup>	Weed of National Significance
Mexican poppy ( <i>Argemone Mexicana</i> )	5	5	5	5	5	5	5	5	
Miconia ( <i>Miconia</i> spp.)	1	1	1	1	1	1	1	1	
Mikania ( <i>Mikania micrantha</i> )	1	1	1	1	1	1	1	1	
Mimosa ( <i>Mimosa pigra</i> )	1	1	1	1	1	1	1	1	X
Mintweed ( <i>Salvia reflexa</i> )	-	-	-	4	4	-	4	-	
Montbretia ( <i>Crocasmia crocosmiiflora</i> )	4	-	-	-	-	-	-	-	
Mossman River grass ( <i>Cenchrus echinatus</i> )	5	5	5	5	5	5	5	5	
Mother-of-millions ( <i>Bryophyllum</i> species and hybrids)	-	-	3	-	3	-	-	-	
Nodding thistle ( <i>Carduus nutans</i> )	-	4	-	4	4	4	4	-	
Pampas grass ( <i>Cortaderia</i> spp.)	3	4	3	4	4	4	4	3	
Parkinsonia ( <i>Parkinsonia aculeate</i> )	-	2	-	2	2	2	2	-	X
Parthenium weed ( <i>Parthenium hysterophorus</i> )	1	1	1	1	1	1	1	1	X
Paterson's curse, viper's bugloss, Italian bugloss ( <i>Echium</i> spp.)	4	-	4	-	4	4	-	4	
Pellitory ( <i>Parietaria judacia</i> )	-	-	4	-	-	-	-	-	
Perennial ragweed ( <i>Ambrosia psilostachya</i> )	-	-	-	4	-	-	-	-	
Pond apple ( <i>Annona glabra</i> )	1	1	1	1	1	1	1	1	X
Prairie ground cherry ( <i>Physalis uscosa</i> )	-	-	-	4	-	1	1	1	
Prickly acacia ( <i>Acacia nilotica</i> )	1	1	1	1	1	1	1	1	X
Prickly pear ( <i>Cylindropuntia</i> spp.)	4	4	4	4	4	4	4	4	X*
Prickly pear ( <i>Opuntia</i> species except <i>O. ficusindica</i> )	4	4	4	4	4	4	4	4	X*
Privet (broad-leaved) ( <i>Ligustrum lucidum</i> )	4	4	4	4	-	-	-	-	
Privet (narrow-leaved/chinese) ( <i>Ligustrum sinense</i> )	4	4	4	4	-	-	-	-	
Red rice ( <i>Oryza rufipogon</i> )	5	5	5	5	5	5	5	5	
Rhizomatous bamboo ( <i>Phyllostachys</i> spp.)	4	-	-	-	-	-	-	-	
Rhus tree ( <i>Toxicodendron succedaneum</i> )	4	4	4	4	4	4	4	4	
Rubber vine ( <i>Cryptostegia grandiflora</i> )	1	1	1	1	1	1	1	1	X
Sagittaria ( <i>Sagittaria platyphylla</i> )	5	5	5	5	5	5	5	5	X*
Salvinia ( <i>Salvinia molesta</i> )	2	2	3	2	2	2	2	3	X

Noxious weed	Blue Mountains LGA <sup>1</sup>	Upper Macquarie CC <sup>2</sup>	Hawkesbury River CC <sup>3</sup>	Mid Western LGA <sup>4</sup>	Upper Hunter CC <sup>5</sup>	Upper Lachlan LGA <sup>6</sup>	Warrumbungle LGA <sup>7</sup>	Wollondilly LGA <sup>8</sup>	Weed of National Significance
Scotch broom ( <i>Cytisus scoparius</i> )	4	4	-	4	4	4	-	-	X*
Scotch thistle, Taurian thistle ( <i>Onopordum</i> spp.)	-	4	-	4	-	4	-	-	
Senegal tea plant ( <i>Gymnocoronis spilanthoides</i> )	1	1	1	1	1	1	1	1	
Serrated tussock ( <i>Naessella trichotoma</i> )	4	4	4	4	3	4	4	4	X
Siam weed ( <i>Chromolaena odorata</i> )	1	1	1	1	1	1	1	1	
Silk forage sorghum ( <i>Sorghum</i> species hybrid cultivar)	-	-	-	3	-	-	3	-	
Silver-leaf nightshade ( <i>Solanum elaeagnifolium</i> )	-	4	-	4	-	-	4	-	X*
Smooth-stemmed turnip ( <i>Brassica barrelieri</i> subsp. <i>oxyrrhina</i> )	5	5	5	5	5	5	5	5	
Soldier thistle ( <i>Picnomon acarna</i> )	5	5	5	5	5	5	5	5	
Spiny burrgrass ( <i>Cenchrus incertus</i> )	4	4	4	4	4	4	4	4	
Spiny burrgrass ( <i>Cenchrus longispinus</i> )	4	4	4	4	4	-	4	4	
Spotted knapweed ( <i>Centaurea maculosa</i> )	1	1	1	1	1	-	1	1	
St John's wort ( <i>Hypericum perforatum</i> )	4	4	4	4	4	4	4	4	
Star thistle ( <i>Centaurea calcitropa</i> )	-	4	-	-	4	-	-	-	
Sweet briar ( <i>Rosa rubiginosa</i> )	-	4	-	4	4	4	4	4	
Texas blueweed ( <i>Helianthus ciliaris</i> )	5	5	5	5	5	5	5	5	
Tree of heaven ( <i>Allianthus altissima</i> )	-	4	-	4	4	4	-	-	
Tropical soda apple ( <i>Solanum viarum</i> )	2	2	2	2	2	2	2	2	
Water caltrop ( <i>Trapa</i> spp.)	1	1	1	1	1	1	1	1	
Water hyacinth ( <i>Eichhornia crassipes</i> )	2	2	3	2	2	2	2	3	X*
Water lettuce ( <i>Pistia stratiotes</i> )	1	1	1	1	1	1	1	1	
Water soldier ( <i>Stratiotes aloides</i> )	1	1	1	1	1	1	1	1	
Wild radish ( <i>Raphanus raphanistrum</i> )	-	4	-	-	-	-	-	-	
Willows ( <i>Salix</i> spp. except <i>S. babylonica</i> , <i>S. x reichardtii</i> , <i>S. x calodendron</i> )	5	5	5	5	5	5	5	5	X
Witchweed ( <i>Striga</i> spp. except natives and <i>S. parviflora</i> )	1	1	1	1	1	1	1	1	
Yellow burrhead ( <i>Limnorcharis flava</i> )	1	1	1	1	1	1	1	1	
Yellow nutgrass ( <i>Cyperus esculentus</i> )	5	5	5	5	5	5	5	5	

\* These weeds became WoNSs in 2012.

\*\* Only *Lantana camara*

- 1 Blue Mountains City Council (Upper Mountains and Hawkesbury Areas)
- 2 Upper Macquarie County Council control area, which includes Bathurst Regional (Kanangra Area), Lithgow City (Upper Mountains and Mudgee Areas) and Oberon councils (Kanangra Area)
- 3 Hawkesbury County Council control area, which includes Hawkesbury LGA and Penrith LGA (both in Hawkesbury Area)
- 4 Mid Western Regional Council (Mudgee Area)
- 5 Upper Hunter County Council control area, which includes Muswellbrook, Singleton and Upper Hunter Shires Council (Mudgee Area)
- 6 Upper Lachlan (Kanangra Area)
- 7 Warrumbungle Shire Council in Castlereagh–Macquarie County Council (Mudgee Area)
- 8 Wollondilly Shire Council (Kanangra, Upper Mountains and Hawkesbury Areas).

Class 1: State Prohibited Weeds – The plant must be eradicated from the land and the land must be kept free of the plant. This is an All of NSW declaration.

Class 2: Regionally Prohibited Weeds – The plant must be eradicated from the land and the land must be kept free of the plant.

Class 3: Regionally Controlled Weeds –The plant must be fully and continuously suppressed and destroyed.

Class 4: Locally Controlled Weeds –The growth and spread of the plant must be controlled according to measures specified in a management plan.

Class 5: Restricted Plants – The requirements in the *Noxious Weeds Act 1993* for a notifiable weed must be complied with. This is an All of NSW declaration.

Class 1, 2 and 5 weeds are notifiable weeds.

## References

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