



NSW **National Parks
and Wildlife Service**

Blue Mountains Region

Pest Management Strategy

2007-2011



Department of **Environment & Climate Change** NSW



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Acronyms

AKCR	Abercrombie Karst Conservation Reserve (yet to be gazetted)
ANR	Avisford Nature Reserve
ARNP	Abercrombie River National Park
BMNP	Blue Mountains National Park
BMCC	Blue Mountains City Council
CA	Conservation Area
CMA	Catchment Management Authority
CR	Conservation Reserve
CSCA	Curryall State Conservation Area
CTNP	Coolah Tops National Park
DECC	NSW Department of Environment and Climate Change (previously DEC Department of Environment and Conservation)
DSCA	Durrigere State Conservation Area
EEC	Endangered Ecological Community
<i>EPBC Act</i>	<i>Commonwealth Environment Protection and Biodiversity Conservation Act (1998)</i>
ECNR	Evans Crown Nature Reserve
GOSNP	Gardens of Stone National Park
GRNP	Goulburn River National Park
GSCA	Goodiman State Conservation Area
HA	Hawkesbury Area
HHS	Hartley Historic Site
HS	Historic Site
JKCR	Jenolan Karst Conservation Reserve
KA	Kanangra Area
KBNP	Kanangra-Boyd National Park
LGA	Local Government Area
MGNR	Munghorn Gap Nature Reserve
MA	Mudgee Area
MNP	Marrangaroo National Park (yet to be gazetted)
NP	National Park
NR	Nature Reserve
NPWS	NSW National Parks and Wildlife Service, a part of DECC
PSCA	Parr State Conservation Area
PWD	Parks and Wildlife Division, a Division of DECC
RCD	Rabbit Calicivirus Disease
RLPB	Rural Lands Protection Board
<i>RLP Act</i>	<i>Rural Lands Protection Act 1998</i>
RP	Regional Park
SCA	Sydney Catchment Authority (note where SCA follows a reserve it refers to a State Conservation Area eg Parr SCA)
TAP	Threat Abatement Plan
TNP	Turon National Park
TS	Threatened Species
<i>TSC Act</i>	<i>NSW Threatened Species Conservation Act (1995)</i>
TSCA	Turill State Conservation Area
UMA	Upper Mountains Area
WDCA	Wild Dog Control Associations
WKCR	Wombeyan Karst Conservation Reserve
WNP	Wollemi National Park
WSA	Warragamba Special Area
YarNP	Yarrobil National Park
YRP	Yellomundee Regional Park
YenNP	Yengo National Park
YSCA	Yerranderie State Conservation Area

Major Achievements

Since 1996 three consecutive Pest Strategies have directed the management of pests across the Blue Mountains Region. Over the last pest plan period of 2002 to 2006 major achievements include:

Feral cattle:

- control of all known populations of feral cattle in Blackwater Creek, Capertee Valley & Mt Pomany in WNP, Mudgee Area
- significant control across the Upper Mountains Area
- control of all known populations of feral cattle in Kowmung catchment KBNP and Wollondilly catchment YSCA, Kanangra Area

Feral deer (fallow):

- significant primary control of known populations in southern BMNP, Kanangra Area

Wild dog:

- effectively minimising wild dog attacks on stock due to ongoing biannual baiting & reactionary baiting within 24 hours of dog attack, Kanangra Area

Feral goat:

- controlled to low populations in the Kowmung catchment KBNP, Wollondilly catchment BMNP and primary control of the population in ARNP, Kanangra Area
- significant primary control in CTNP, Mudgee Area

Wild horse:

- wild horses last seen in Grose Valley BMNP 2003
- Wild Horse Management Plan, Warragamba Special Area of BMNP drafted, Upper Mountains Area
- control of all known populations in the Kowmung catchment, KBNP, Kanangra Area

Feral pig:

- effective control in remote areas of Warragamba Special Areas KBNP, Kanangra Area
- significant primary control in CTNP, Mudgee Area

Feral rabbits:

- reduced populations of rabbits following the spread of RCD and follow up controls across the Blue Mountains Region

Blackberry:

- significant control in remote areas of KBNP, Kanangra Area
- significant control in remote areas of WNP, Mudgee Area
- significant control in Grose River, Katoomba, Yosemite & Govett's Creeks, Upper Mountains Area

Broom:

- continued suppression in KBNP (managing the residual seed pool), Kanangra Area
- significant primary control and maintenance in TNP, Upper Mountains Area
- treatment of seeds germinated since the December 02 fire over 11 km of Katoomba, Yosemite and Govett's Creeks, Upper Mountains Area

Cape ivy:

- significant primary control and maintenance of accessible infestations along Wolgan River & Colo River system, WNP, Upper Mountains Area

Cooperative programs:

- successful weed control programs with the RTA, Hawkesbury Area

Deutzia:

- primary treatment completed along Jenolan River, Kanangra Area

Gorse:

- significant control across Upper Mountains Area

Lantana:

- primary control at Junction Point and population control at Moody Hill, BMNP, Kanangra Area

- significant primary control and maintenance in Erskine Creek diatreme, BMNP, Hawkesbury Area

Monterey pine:

- significant primary control in ARNP, Kanangra Area

Ox-eye daisy:

- significant primary control at Kanangra Walls Rd & Dingo Dell, KBNP, Kanangra Area

Pampas grass:

- effective management on Putty Road, Hawkesbury Area
- primary control in Grose River, Upper Mountains Area

Prickly pear:

- primary control program within YSCA, Kanangra Area
- significant control in GRNP, Mudgee Area

Serrated tussock:

- effective control in Joorilands, YSCA, Kanangra Area

St Johns wort :

- significant primary control in CTNP, Mudgee Area

Tree of heaven:

- significant primary control and maintenance at Newnes in WNP, Canobla Gap in GoSNP and in TNP, Upper Mountains Area
- significant primary knockdown and maintenance of 5 acres of high density Tree of Heaven, Blackwater Creek, WNP, Mudgee Area

Willows:

- significant primary control in the Colo River System, WNP, Hawkesbury Area
- significant primary control and maintenance in GRNP, Mudgee Area
- significant primary control within the Kowmung in KBNP, Coxes in KBNP, and Wollondilly catchment systems, BMNP, Kanangra Area
- significant control in Grose River, Katoomba, Yosemite and Govett's Creek, Upper Mountains Area

1. Introduction

Pest species are animals (including invertebrates) and plants that have negative environmental, economic and social impacts. In this document they are collectively referred to as pests. Pests are most commonly introduced species, though native species can become pests. In parks, pests may have impacts across the range of park values, including impacts on biodiversity, cultural heritage, catchment and scenic values.

Pests are among the greatest threats to biodiversity throughout Australia. In New South Wales, they have been identified as a threat to 657 of 945 (70%) species, populations and communities listed under the *Threatened Species Conservation Act 1995*; more than any other process except the destruction and disturbance of native vegetation. Minimising the impacts of pests on biodiversity is thus the main objective of NPWS pest management.

Pests can also have significant impacts on economic values of neighbouring lands. The NPWS seeks to address these impacts when setting management priorities and significant resources are committed towards landscape wide pest programs, including wild dogs.

The control of pests outside of parks is the responsibility of private landholders and other agencies such as rural lands protection boards, local councils, the Department of Primary Industries and the Department of Lands. The NSW Invasive Species Plan provides the framework for the coordinated management of weeds and pests that occur over varying land tenure. NPWS is a committed partner to the implementation of this plan.

Many pests are distributed widely across Australia and eradication is not possible in the foreseeable future. They occur in most environments and across all land tenures. Pests often spread quickly and have high reproductive rates, allowing them to re-establish rapidly following control. In recognising that eradication of widespread pests across large areas is an unrealistic goal, NPWS prioritises control effort to focus on areas where impacts are greatest. Resources can then be directed to ensure that the resultant control programs are effective in reducing these impacts. It is the responsibility of all land managers to work together to control pests where significant impacts have been identified.

In New South Wales, the main pest management priorities for the conservation of biodiversity are focussed on threatened species and endangered ecological communities (EEC's), and are identified in the Threatened Species Priorities Action Statement (PAS), individual threat abatement plans (TAPs) and reserve plans of management. Pest programs are also integrated with other park management programs such as fire management.

2. Purpose of the Strategy

The development of Regional Pest Management Strategies (RPMS) provides NPWS with a strategic approach to pest management across NSW. The Strategy developed for each region provides a tool to broadly identify pest distribution and their associated impacts across the park system. It details priorities for each Region, including actions listed in the PAS and TAPs as well as other actions such as wild dog and feral pig control to protect neighbouring properties and site-based weed control and allows resources to be allocated to high priority programs. The RPMS also identifies the requirement for other plans or strategies, such as Wild Dog Plans or Bush Regeneration Plans, that provide a more detailed approach.

New pest species continue to establish in the environment either through the importation of new species into Australia or the escape of domestic plants and animals. Prevention and early detection followed by eradication is the most cost-effective way to minimise the impacts of new pests. The NPWS works with other agencies to prevent the introduction of new pests into the wild and to respond rapidly when new incursions occur. The response of NSW government agencies to new pests will be coordinated through the NSW Invasive Species Plan.

In this strategy, the generic term "parks" is used to refer to any lands managed by NPWS including national park, nature reserve, aboriginal area, historic site, state conservation area and regional park amongst others. This strategy has a four year life span. In the final year of the strategy, it is intended that the strategy will be reviewed and updated.

3. Legislation and Policy

The NPWS has a number of statutory responsibilities in relation to pest management.

3.1 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974 (NPW Act)* vests the care, control and management of national parks, nature reserves, historic sites and Aboriginal areas with the Director-General of the NPWS. Key management objectives include conservation, provision of appropriate scientific and educational opportunities, and management of fire and pest species. These are achieved through the preparation and implementation of plans of management for each reserve, which identify pest species present, control strategies and priorities for that reserve.

3.2 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995 (TSC Act)* lists threatened species, endangered populations and endangered ecological communities. The *TSC Act* also lists key threatening processes (KTPs), which are identified as having significant impacts on the conservation of native flora and fauna. As of August 2006, 18 pests have been listed as KTPs e.g. *Predation by the Red Fox, Invasion of Native Plant Communities by Bitou Bush and Boneseed*. The NSW Threatened Species Priorities Action Statement (PAS) outlines the strategies for ameliorating threats listed under the *TSC Act* including the preparation of threat abatement plans. For each of these strategies the PAS lists one or more detailed actions which aim to protect threatened species by reducing the impact of listed threats. For a list of programs where threatened species are impacted by pests and KTP's impacting on threatened species refer to Appendix 3 and 4.

3.3 Rural Lands Protection Act 1998

The pest animal provisions of the *Rural Lands Protection Act 1998 (RLP Act)* outline the conditions under which animals, birds and insects are "declared" pests and provides for the control of such pest species. Gazettal of pest species occurs through Pest Control Orders that allow the Minister for Primary Industries to specify pest species on a state wide or local basis and the conditions or factors that apply to the control of each pest. Rabbits, wild dogs and feral pigs have been declared pest animals throughout NSW.

The *RLP Act* binds the Crown for the control of pest animals declared under the Act. Public land managers such as the NPWS are required to eradicate (continuously suppress and destroy) pest animals "... to the extent necessary to minimise the risk of

the pest causing damage to any land" using any lawful method or, if the Order specifies a method to be used, by the method specified.

An approach to balance the conservation of dingoes with the need for wild dog control has been incorporated into the *RLP Act* through the Pest Control Order for Wild Dogs. This order allows for the general destruction obligation for lands listed in Schedule 2 of the order to be satisfied through wild dog management plans with both control and conservation objectives.

3.4 Noxious Weeds Act 1993

The *Noxious Weeds Act 1993* provides for the identification, classification and control of noxious weeds in New South Wales. The Act aims to identify noxious weeds and their respective control measures, as well as the roles and responsibilities for their control for both public and private land managers/owners.

Amendments to the *Noxious Weeds Act* in 2005 repealed the *NSW Seeds Act 1982* and introduced a new classification system of weed control classes based on the degree of threat and the distribution of the introduced plant within the state. These new control classes are:

- Control Class 1* – State Prohibited Weeds
- Control Class 2* – Regionally Prohibited Weeds
- Control Class 3* – Regionally Controlled Weeds
- Control Class 4* – Locally Controlled Weeds
- Control Class 5* – Restricted Plants.

Under this new classification system, Control Classes 1, 2 and 5 noxious weeds are referred to as notifiable weeds.

For a list of noxious weeds in the Blue Mountains Region refer to Appendix 7.

3.5 Pesticides Act 1999

The *Pesticides Act 1999* and the Pesticides Regulation 1995 regulate the use of all pesticides in NSW, after point of sale, and include specific provisions for record keeping, training and notification of use.

Specific requirements have been included under the Pesticides Regulation in relation to the following:

Pesticide Record Keeping: Records must be kept by all people who use pesticides for commercial or occupational purposes such as on farm or as part of their occupation or business. There are also specific record keeping provisions for persons who aerially apply pesticides under both the Act and regulations.

Pesticides Training: People who use pesticides in their business or as part of their occupation must be trained how to use these pesticides. Any person employed or engaged by NPWS to use pesticides must also be trained.

Pesticide Notification: Notification requirements apply to pesticide applications by public authorities in public places (including NPWS managed park lands). The NPWS Pesticide Use Notification Plan sets out how the Department will notify the community about pesticide applications it makes to public places. (The plan can be located on the NPWS web site).

Pesticide Control Orders are orders that prohibit or control the use of a pesticide or a class of pesticide, or authorise the use or possession of a restricted pesticide eg. 1080.

Use of a pesticide must be in accordance with the Control Order where such exists. Current Control Orders can be found at:

www.environment.nsw.gov.au/pesticides/pco.htm.

3.6 Game and Feral Animal Control (Game) Act 2002

The major aim of the *Game and Feral Animal Control Act 2002 (Game Act)* is to promote responsible and orderly hunting of game animals and certain pest animals. The public lands that are covered by this Act do not include any national park estate land.

3.7 Other Relevant Legislation

- *Environment Protection and Biodiversity Conservation Act 2000* (Australian)
- *Agricultural and Veterinary Chemicals Code Act 1994*
- *Environmental Planning and Assessment Act 1979*
- *Firearms Act 1996*
- *Heritage Act 1977*
- *Prevention of Cruelty to Animals Act 1979*
- *Occupational Health and Safety Act 2000*
- *Wilderness Act 1987*
- *Protection of the Environment Operations Act 1997*

3.8 Park Management Program and Policies

The Park Management Program is a series of guides which are being developed to define the values and objectives for park management and to integrate park policy, planning, operations, monitoring, evaluation and reporting. The aims of the guides are to improve the way we go about park management by:

- providing clear and consistent management objectives and operational procedures; and
- introducing a system to achieve consistent standards in park management and reporting on performance.

The Park Management Program comprises a Policy Guide, a Planning Guide, an Operating Procedures Guide and a Monitoring and Evaluation Guide.

The Policy Guide describes the goals and objectives for park management and the key principles which are applied to guide the achievement of these objectives.

Some specific policies relating to the management of weeds and pest animals are mentioned below.

Policy 2.6 Wild Dogs acknowledges the complexities inherent in the need to conserve native dingoes (and their hybrids) together with the need to control wild dogs.

The NPWS Firearms Management Manual brings together the policy, procedural and technical information required for staff regarding the safety, security and legal procedures for keeping and using firearms. The manual replaced the *NPWS Firearms Policy* and provides policy and procedures for all aspects of firearms use and management including:

- possession and use of firearms by NPWS staff and other approved users;
- firearms administration and record keeping;
- location and storage of firearms;
- planning and risk management for firearms operations;
- maintenance and modification of firearms;

- animal welfare issues related to shooting pest animals and euthanasing native animals; and
- firearms training.

A statewide policy directive requires conservation risk assessments for the application of pesticides on park to ensure that an appropriate level of environmental assessment is carried out prior to application.

NPWS Horse Management is guided by the recommendations made in *A Report on the Management of Feral Horses in National Parks in NSW* (2001) including the Annex A: *Code of Practice for Capture and Transport of Feral Horses* for use by NPWS by Professor Tony English in this report to the Minister for the Environment.

3.9 Other plans and strategies

Other plans that help direct pest management may include Catchment Action Plans for each of the 13 Catchment Management Authorities, regional weed plans, state and national strategies, and reserve Plans of Management. Specific regional plans for the Blue Mountains Region include:

Region wide:

- Blue Mountains Region Strategic Bush Regeneration Plan 2001;
- Greater Blue Mountains World Heritage Area draft Strategic Plan 2005;

Kanangra Area:

- Blue Mountains National Park Plan of Management 2001;
- Kanangra-Boyd National Park Plan of Management 2001;
- Hartley Historic Site Plan of Management 1994;
- Abercrombie River National Park Plan of Management 2006;
- Wombeyan Karst Conservation Reserve Plan of Management 1999;
- Jenolan Karst Conservation Reserve *draft* Plan of Management 2006;
- Evans Crown Reserve *draft* Plan of Management 2006;
- Feral Pig Pest Species Strategy, Lake Burragorang Catchment Area 2000;
- Jenolan River Weed Assessment and strategy 2000;
- Re-establishment of Natural Habitat on a Karst Landscape at Jenolan Caves 2003;
- Review of Environmental Factors for Weed Removal and Bush Regeneration Works at Jenolan Karst Conservation Reserve 2004;
- *draft* Wild Horse management Plan for the Warragamba Special Area within Blue Mountains National Park 2006;

Upper Mountains Area:

- Katoomba Creek Weed Management Plan 2004;
- Gorse management for the Upper Mountains 2004;
- Wollemi National Park Plan of Management 2001;
- Blue Mountains National Park Plan of Management 2001;
- Gardens of Stone National Park *draft* Plan of Management 2007;
- Turon National Park *draft* Plan of Management 2007;
- Feral Pig Pest Species Strategy, Lake Burragorang Catchment Area 2000;
- Blue Mountains Urban Fox Program Resource Package 2004 (including Blue Mountains Urban Fox Program Strategy 2004, Blue Mountains Urban Fox Program Ecological Review / Discussion Paper 2004, Blue Mountains urban Fox Program Public Survey Results 2004 and Blue Mountains Urban Fox Program Workshop Summary 2004);

Mudgee Area:

- Goulburn River National Park Willow Management Plan 2004;
- Wollemi National Park Plan of Management 2001;
- Goulburn River National Park and Munghorn Gap Nature Reserve Plan of Management 2003;
- Coolah Tops National Park Plan of Management 2002;

Hawkesbury Area:

- Wollemi National Park Plan of Management 2001;
- Blue Mountains National Park Plan of Management 2001;
- Yengo National Park and Parr State Recreation Area Plan of Management 2001;
- Yellomundee Regional Park *draft* Plan of Management 2006;
- Willows out of Wollomi Project;
- Colo-meroo precinct plan – a strategy for managing its vegetation 2003;
- Yellomundee Regional Park *draft* Plan of Management 2006; and
- Blue Mountains Urban Fox Program Resource Package 2004 (including Blue Mountains Urban Fox Program Strategy 2004, Blue Mountains Urban Fox Program Ecological Review / Discussion Paper 2004, Blue Mountains urban Fox Program Public Survey Results 2004 and Blue Mountains Urban Fox Program Workshop Summary 2004).

Feral deer and wild dog management plans are currently being developed for the Blue Mountains Region with RLPB's as the lead agency for the development of these plans.

Weeds of National Significance

Australia has a list of twenty Weeds of National Significance. These weeds were identified from a list of greater than 3000 non-native naturalised plants due to their invasiveness, impact and spread. Weeds of National Significance that are significantly impacting sites in the Blue Mountains Region include alligator weed, blackberry, gorse, lantana, serrated tussock and willows (except weeping willow, pussy willow and sterile pussy willow).

World Heritage Areas

World Heritage listing is the highest level of international recognition that may be afforded to an area. Such areas have outstanding universal values. Those countries who have signed the convention recognise that the protection of World Heritage sites is the duty of the international community as a whole to cooperate. The Blue Mountains World Heritage Area is one of fifteen World Heritage Areas listed in Australia. This area was listed as it is an outstanding example representing significant on-going ecological and biological processes in the evolution of terrestrial ecosystems and communities of plants and animals and as it contains the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

4. Blue Mountains Region Overview

4.1 The Region

The Blue Mountains Region extends from Yerranderie in the south to Coolah Tops in the north and from the foothills of the Blue Mountains in the east to the west of Mudgee and Oberon. The Blue Mountains Region adjoins agricultural lands to the west, north west and south west, and urban interface to the east and along the road corridors of the Great Western Highway and Bells Line of Road. The total residential population of the Blue Mountains City Council area alone is approximately 76,000 with over 2.2 million visitors to part of the Blue Mountains (covering the area of Springwood to Lithgow and Megalong Valley only) in the year ended June 2006 (Tourism NSW 2006).

The Blue Mountains Region is divided into the four management areas of Hawkesbury, Upper Mountains, Kanangra and Mudgee Areas. The Region manages approximately 1,150,000 hectares of lands covering the whole of or part of 25 reserves including 11 national parks, 10 conservation areas, 3 nature reserves and 1 historic site (Section 4.2 Regional Map and Appendix 9). A number of reserves are divided into sections and managed by different Areas and Regions. Within the Blue Mountains Region, Blue

Mountains NP is broken into three management sections managed by Kanangra Area, Upper Mountains Area and Hawkesbury Area. Similarly, Wollemi NP is broken into three management sections managed by Upper Mountains Area, Hawkesbury Area and Mudgee Area. A further three reserves, Yengo NP, Parr SCA and Wollemi NP are managed partially in Blue Mountains Region and partially in Central Coast-Hunter Region. For ease of management operations, those NPWS reserves that are broken up into different Areas are discussed throughout this Strategy with reference to the Area they are managed under.

A significant part of the Blue Mountains World Heritage Area is encompassed by Blue Mountains Region including Wollemi NP, Blue Mountains NP, Gardens of Stone NP, Kanangra-Boyd NP, Yengo NP and Jenolan KCR. Central Coast and Sydney South Regions additionally manage part of the Blue Mountains World Heritage Area in Yengo NP, and Thirlmere Lakes NP and Nattai NP respectively. World Heritage listing is the highest level of international recognition that may be afforded to an area. In nominating this listing the Australian Government has accepted an obligation to ensure protection and conservation of this area.

Four Special Areas, being part of the water storages for Sydney and the Blue Mountains are jointly managed with Sydney Catchment Authority: Blackheath Special Area, Katoomba Special Area, Woodford Special Area and Warragamba Special Area (with the latter partially managed by Sydney South Region).

Three Wilderness Areas are declared in the Blue Mountains Region as defined under the *Wilderness Act 1987*. These include: the Grose Wilderness Area, a large part of Blue Mountains NP (52,000 ha) in Hawkesbury and Upper Mountains Areas; the Kanangra Wilderness Area, a large part of Kanangra-Boyd NP (125 000ha) and adjoining sections of Blue Mountains NP (800ha) and of Yerranderie SCA (1,400ha) in Kanangra Area; and the Wollemi Wilderness Area, most of Wollemi NP (288,340ha) in Mudgee, Upper Mountains and Hawkesbury Areas.

A wide and varied range of pests occur due to the complex nature of the natural environment. The Region represents part of a major geological feature of eastern Australia, being the dissected upland plateau of the Great Dividing Range. The Blue Mountains Region includes and is in proximity to some of the first areas in NSW cleared for agricultural purposes with an early history of European exploration and settlement, thus a wide range of plants and animals have been introduced. In addition to significant landuse changes, the geology, the altitudinal range from 30 m to 1300m, and the variation in landuse including rural, semi-rural, urban and natural areas, all contribute to there being a wide variety of pest management issues.

The number of regional pest control programs has increased over the past ten years to well over two hundred and fifty programs targeting a range of pest species. This is the third pest management strategy developed for this Region over the past 10 years, with some pest management programs continually running for 26 years such as the blackberry, wild dog and feral pig programs in Wollemi NP, Mudgee Area. Pest management achievements resulting from the last regional pest management strategy 2002-2005 have been significant. The Region has worked with neighbours to support a number of cooperative programs across the landscape, implemented a number of pest programs that protect threatened species and supported a number of community bushcare groups.

4.2 Threatened Species

A number of threatened flora and fauna species and EEC's are known to be at major threat from one or more pest species in the Blue Mountains (Appendix 3). A number of Key Threatening Processes are known in the Blue Mountains (Appendix 4). The

management of pests impacting on threatened species and communities is identified as a critical priority for the Service. Pest programs involving threatened species are further outlined in Section 11 Pest Program Overviews.

4.3 Priority Pest Programs

The most pressing pest species management issues for Blue Mountains Region are identified as critical priority control programs. These are summarised in Appendix 2. For further information on specific programs refer to the Pest Program Overview in Section 11. To effectively manage these priorities some pests can be controlled at specific sites whilst others need to be targeted across the landscape due to the movement capacity of those pests. These critical priority programs are outlined below (please note only critical priority programs, not high, medium or lower priority programs are listed below. A list of all priority operational programs can be found in Appendix 2).

Critical Pest Animal Control Programs

Feral cattle control:

- to protect the domestic water supply catchments of the Special Areas in Kanangra Area (within BMNP and YSCA); and
- to protect EEC's such as whitebox yellow box red gum woodland in Kanangra Area (within BMNP and YSCA) and river-flat forest on coastal floodplain in Kanangra Area (within KBNP).

Feral deer control:

- to protect the domestic water supply catchments of the Special Areas in Kanangra Area (within BMNP);
- to protect threatened species such as Eucalyptus sp. Howes swamp creek in Mellong swamp in Hawkesbury Area (within Wollemi NP);
- to protect park users along Putty Road and other roads in Hawkesbury Area (within WNP, YenNP and PSCA); and
- to respond to new occurrences of feral deer such as in CTNP in Mudgee Area.

Feral goat control:

- to protect the domestic water supply catchments of the Special Areas in Kanangra Area (within BMNP, KBNP and YSCA);
- to protect EEC's such as whitebox yellow box red gum woodland in Kanangra Area (within BMNP and YSCA) and in Mudgee Area (within CTNP); and
- to protect threatened species such as the broad-headed snake in Kanangra Area (within BMNP and KBNP) and Upper Mountains Area (within GOSNP), and the brush-tail rock-wallaby in Kanangra Area (within KBNP) in Hawkesbury Area (within PSCA and YenNP) and Mudgee Area (within WNP and GRNP).

Wild horse control:

- to protect the domestic water supply catchments and significant biodiversity such as dry alluvial paperbark wetlands of the Special Areas in Kanangra Area (within BMNP and KBNP), pending approval of the Wild Horse Management Plan for the Warragamba Special Area.

Feral pig control:

- to protect the domestic water supply catchments of the Special Areas in Kanangra Area (within BMNP, KBNP and YSCA);
- to protect EEC's such as whitebox yellow box red gum woodland in Kanangra Area (within BMNP and YSCA) and in Mudgee Area (within WNP, GSNP and CTNP) and Newnes Plateau shrub swamp in Upper Mountains Area (within WNP and BMNP); and
- to protect threatened species such as *Acacia clunies-rossiae*, *Diuris aequalis*, *Balioskian longipes* and *Trachymene saniculifolia* in Kanangra Area (within KBNP), *Eucalyptus* sp. Howes swamp creek in Hawkesbury Area (within WNP) and *Eucalyptus benthamii* in Upper Mountains Area (within BMNP).

Red fox control:

- to protect threatened species such as brush-tail rock-wallaby in Upper Mountains Area (within WNP), Kanangra Area (within JKCR) and Mudgee Area (within WANP and GRNP) and malleefowl in Mudgee Area (within YarNP); and
- to protect EEC's such as the various swamp communities which are habitat for a range of significant and threatened species such as eastern pygmy possums in Upper Mountains Area (within BMNP).

Wild dog control:

- to protect stock on neighbouring lands by controlling wild dogs on reserve boundary sites region wide where they abut agricultural lands in all Areas (within BMNP, WNP, GOSNP, TNP, KBNP, YSCA, ARNP, ANR, MGNP, CTNP, GRNP, TSCA, YarNP, DSCA and CSCA); and
- to protect park users at campsites in Upper Mountains Area (within WNP and BMNP).

Critical Weed Control Programs

Aquatic weed control:

- to protect industry in Hawkesbury Area (within BMNP and YRR along the Hawkesbury Nepean River System).

Riparian weed control:

- to protect threatened species such as *Epacris hamiltonii* and *Pultenaea glabra* in Upper Mountains Area (within BMNP), *Acacia clunies-rossiae* in Kanangra Area (within BMNP and KBNP) and *Epacris sparsa* in Hawkesbury Area (within BMNP); and
- to protect EEC's such as Cumberland Plain woodland, shale sandstone transition forest, Western Sydney dry rainforest, Blue Mountains swamps, Cooks River Castlereagh ironbark forest and Sydney coastal river flat forest in Hawkesbury Area (where they are threatened in BMNP, WNP and YRP).

Bushland weed control:

- to protect threatened species such as *Microstobos fitzgeraldii* and *Persoonia acerosa* in Upper Mountains Area (within BMNP); and
- to protect EEC's such as threatened swamp communities in Upper Mountains Area (within BMNP) and Cumberland Plain woodland, Blue Mountains shale cap forest, shale sandstone transition forest and Sydney sandstone ridgetop woodland in Hawkesbury Area (where they are threatened in BMNP, WNP and YRP).

Open habitat weed control:

- to protect EEC's such as whitebox yellow box red gum woodland in Kanangra Area (within BMNP and YSCA) and in Mudgee Area (within CTNP, GRNP and WNP).

Berberis control:

- to protect EEC's such as whitebox yellow box red gum woodland in Kanangra Area (within BMNP and YSCA).

Blackberry control:

- to protect the domestic water supply catchments of the Special Areas in Kanangra Area (within BMNP, KBNP and YSCA);
- to protect threatened species such as the Wollemi pine in Mudgee Area (within WNP); and
- to protect EEC's such as Blue Mountains shale cap forest and Blue Mountains swamps in Hawkesbury Area (within WNP and BMNP).

Broom control:

- to protect threatened species such as *Microstobos fitzgeraldii* and *Epacris hamiltonii* in Upper Mountains Area (within BMNP);
- to protect significant biodiversity at altitude in Kanangra Area (within KBNP); and
- to protect EEC's such as upland swamps in Upper Mountains Area (BMNP).

Gorse control:

- to protect threatened species such as *Epacris sparsa* and *Epacris hamiltonii* in Upper Mountains Area (within BMNP); and
- to protect EEC such as upland swamps in Upper Mountains Area (BMNP).

Lananta control:

- to protect EEC such as Cooks River Castlereagh ironbark forest, Blue Mountains shale cap forest and Sydney coastal river flat forest in Hawkesbury Area (where they are threatened in BMNP, WNP and YRP).

Pampas grass control:

- to protect EEC such as Western Sydney dry rainforest and Cumberland Palisades communities in Hawkesbury Area (where they are threatened in BMNP, WNP and YRP).

Prickly pear control:

- to protect threatened species such as *Kennedia retrorsa* and *Acacia dangarensis* in Mudgee Area (within GRNP); and
- to protect EEC such as whitebox yellow box red gum woodland in Kanangra Area (within BMNP and YSCA) and in Mudgee Area (within CTNP, GRNP and WNP).

Serrated Tussock control:

- to protect EEC such as whitebox yellow box red gum woodland in Kanangra Area (within BMNP and YSCA) and in Mudgee Area (within CTNP, GRNP and WNP).

St Johns wort control:

- to protect threatened species such as *Kennedia retrorsa* and *Acacia flocktoniae* in Mudgee Area (within GRNP and Yar NP respectively); and
- to protect EEC such as whitebox yellow box red gum woodland in Kanangra Area (within BMNP and YSCA) and in Mudgee Area (within CTNP, GRNP and WNP).

Willow control:

- to protect threatened species such as Booroolong frog in Kanangra Area (within ARNP), *Epacris hamiltonii* in Upper Mountains Area (within BMNP) and *Epacris sparsa* in Hawkesbury Area (within BMNP); and
- to protect EEC such as Cooks River Castlereagh ironbark forest in Hawkesbury Area (within YRP).

4.2 Blue Mountains Region

Legend

- Blue Mountains Region boundary
- Area boundaries
- World Heritage Area
- Wilderness Areas
- Major towns
- Major roads
- Major rivers

Hawkesbury Area

- 1 Blue Mountains National Park
- 2 Wollemi National Park
- 3 Parr State Conservation Area
- 4 Yengo National Park
- 5 Yellomundee Regional Park

Kanangra Area

- 1 Blue Mountains National Park
- 6 Abercrombie River National Park
- 7 Jenolan Karst Conservation Reserve
- 8 Kanangra-Boyd National Park
- 9 Yerranderie State Conservation Area
- 10 Abercrombie Karst Conservation Reserve
- 11 Wombeyan Karst Conservation Reserve
- 21 Evans Crown Nature Reserve
- 23 Hartley Historic Site

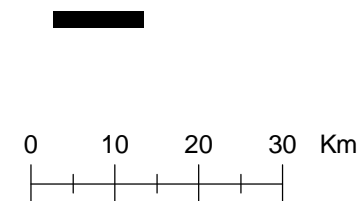
Mudgee Area

- 2 Wollemi National Park
- 12 Coolah Tops National Park
- 13 Durrigere State Conservation Area
- 14 Goulburn River National Park
- 15 Munghorn Gap Nature Reserve
- 16 Yarrobil National Park
- 17 Avisford Nature Reserve
- 18 Goodiman State Conservation Area
- 19 Turill State Conservation Area
- 20 Curryall State Conservation Area

Upper Mountains Area

- 1 Blue Mountains National Park
- 2 Wollemi National Park
- 22 Gardens of Stone National Park
- 24 Turon National Park
- 25 Marrangaroo National Park

NPWS outside of Blue Mountains Region



5. Pest Distribution Tables

The following pest distribution tables give an overview of priority pest species for each reserve within the Region. The data was derived from a combination of systematic surveys, consultation with staff and other agencies and through the planning processes. The tables are not comprehensive lists of all pest species within the Region.

- High density
 - ◉ Medium density
 - Low density
- ^{1.} the reserve is listed as part of the Blue Mountains World Heritage Area
^{2.} part of the reserve is under joint management with SCA as a Special Area
^{3.} part of the reserve is declared a Wilderness Area
^{4.} parts of the reserve are managed by different Areas
^{5.} parts of the reserve are managed by different Regions

Pest Animals

Pest Animal	Reserve	Kanangra Area								Upper Mountains Area					Hawkesbury Area					Mudgee Area										
		BMNP ^{1. 2. 4.}	KBNP ^{1. 2. 3.}	HHS	ECNR	YSCA ^{2. 3.}	ARNP	JKCR ^{1.}	WKCR	AKCR	BMNP ^{1.2.3 4.}	WNP ^{1. 3. 4. 5.}	TNP	GOSNP ^{1.}	MNP	BMNP ^{1. 4.}	WNP ^{1. 3. 4. 5.}	YenNP ^{1. 5.}	PSCA ^{5.}	YRP	WNP ^{1. 3. 4. 5.}	ANR	MGNR	CTNP	GRNP	TSCA	GSCA	YarNP	DSCA	CSCA
Feral cat		○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Feral cattle		○	○			●				○	○					○	○	○	○		○				○					
Feral deer (fallow)		●	○				○	○							○	●	●	●	●	○		○				○	○	○	○	○
Feral deer (other)		○	○						○												○			○						
Wild dog		●	●			●	○	○	○	○	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Red fox		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Feral goat		○	○			○	●	○	●	●		●	○		○	○					○	○	○	●					○	
Wild horse		○	○							○																				
Feral pig		●	●			●	●	●		○	○	○	○	○		○	○	○		○	○	○	○	○	●	●		○	○	○
Feral rabbit		○	○	○	○	○	○	○		○	○	○	○	●	○	○	○	○	○	○	○				○	○	○	○	○	○

Weeds

Weeds	Reserve	Kanangra Area								Upper Mountains Area					Hawkesbury Area					Mudgee Area												
		BMNP 1. 2. 4.	KBNP 1. 2. 3.	HHS	ECNR	YSCA 2. 3.	ARNP	JKCR 1.	WKCR	AKCR	BMNP 1.2.3 4.	WNP 1. 3. 4. 5.	TNP	GOSNP 1.	MNP	BMNP 1. 4.	WNP 1. 3. 4. 5.	YenNP 1. 5.	PSCA 5.	YRP	WNP 1. 3. 4. 5.	ANR	MGNR	CTNP	GRNP	TSCA	GSCA	YarNP	DSCA	CSCA		
Major weed groups (Note that these groups may also include major single weeds outlined further below)																																
Aquatic weeds ⁶																○				●												
Riparian weeds ⁷	⦿	⦿		⦿	⦿	⦿	●	⦿		⦿	⦿	○		○	⦿	⦿	○	○	⦿	⦿	○				⦿							
Bushland weeds ⁸							●			●	●	⦿	●	●	●	●			●			○	⦿									
Open habitat, and roadside weeds ⁹	○	○			○	○	●	○	○	⦿	○	●		●	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿					
Major weeds (major weeds targeted across the landscape in singular weed control programs)																																
Berberis <i>Berberis aristata</i>	⦿				⦿					⦿																						
Blackberry <i>Rubus fruticosus</i>	⦿	○	○	○	⦿	●	⦿	⦿		⦿	⦿	⦿	⦿	●	⦿	⦿	⦿	⦿	○	●	○	○	○	⦿	⦿	○						
Broom <i>Cytisus scoparius</i>		○	○				○			●		○		●	○																	
Cape Ivy <i>Delairea odorata</i>											⦿				⦿	⦿					○											
Gorse <i>Ulex europaeus</i>		○								⦿					○																	
Lantana <i>Lantana camara</i>	○														○	○			○													
Monterey Pine <i>Pinus radiata</i> & others	●				○	○	●			⦿	○		●			○																
Pampas Grass <i>Cortaderia selloana</i>										○					○	○	○	○	⦿													
Prickly Pear species <i>Opuntia spp</i>	⦿	⦿			⦿						○		●		○				○	○	○	○	○	○	●	⦿				●		
Serrated Tussock <i>Nassella trichotoma</i>	●	○		⦿	●	●	⦿	⦿		○		●		⦿							○	○		○	○							

Weeds	Reserve	Kanangra Area								Upper Mountains Area					Hawkesbury Area					Mudgee Area											
		BMNP 1. 2. 4.	KBNP 1. 2. 3.	HHS	ECNR	YSCA 2. 3.	ARNP	JKCR 1.	WKCR	AKCR	BMNP 1. 2. 3. 4.	WNP 1. 3. 4. 5.	TNP	GOSNP 1.	MNP	BMNP 1. 4.	WNP 1. 3. 4. 5.	YenNP 1. 5.	PSCA 5.	YRP	WNP 1. 3. 4. 5.	ANR	MGNR	CTNP	GRNP	TSCA	GSCA	YarNP	DSCA	CSCA	
St Johns Wort <i>Hypericum perforatum</i>		○	○	○	○	○				○	○	○	○	○		○	○	○	○		●	○	●	●	⊙	○			⊙		
Sycamore <i>Acer pseudoplatanus</i>							●			○																					
Tree of Heaven <i>Ailanthus altissima</i>		●	○		○	○	⊙	○		●	●	⊙	○	○	○	○	⊙			○	○	⊙	○		●			⊙			
Tutsan <i>Hypericum spp</i>		●	●				●			⊙																					
Willow Tree Species <i>Salix spp</i>		○	○		○		○			○	○	⊙		○	⊙	○				⊙	○		○	○	○						

Aquatic weeds⁶ For further information see Section 11.2.1

Riparian weeds⁷ For further information see Section 11.2.2

Bushland weeds⁸ For information see Section 11.2.3

Open habitat and roadside weeds⁹ For further information see Section 11.2.4

● High density : denotes that the pest is in a high density with the reserve, however there could be areas within the reserve where the pest is absent eg Red foxes and bushland weeds are likeliest in high densities in areas bordering urban and agricultural sites whilst may be absent in core areas of the larger reserves away from borders, tracks and trails

6. Pest Management Objectives

The overriding objective of NPWS's pest management programs is to minimise adverse impacts of pests on biodiversity and other park values whilst complying with legislative responsibilities.

Programs also aim to:

- manage pest populations to minimise their impact on neighbours;
- increase community understanding of the adverse impacts of pests on biodiversity and Aboriginal and historic cultural heritage; and
- support cooperative approaches and participation in pest management programs with the community and other agencies.

7. Pest Management Principles

Wherever possible, NPWS adopts an integrated approach to pest management, where more than one control technique is used, across the landscape. Integrated pest management is likely to be more effective because it avoids selecting for herbicide resistant weed biotypes or bait-shy animals. Targeting more than one pest species is important as the control of one species may benefit another eg. control of foxes may benefit rabbits, control of bitou bush often leads to an increase in other weeds. Also, control is usually undertaken at particular times of the year when pests are most vulnerable (eg. translocation of herbicides to growing points is usually greater when weeds are actively growing).

So that pest management undertaken by the NPWS is carried out effectively and efficiently, the following principles are generally applied.

- Pest control is targeted to species/locations where benefits will be greatest.
- Development of control priorities are set by clearly defining the problem to be addressed ie. specific impacts are identified so that the purpose of control is clear.
- Where relevant, pest control is collaborative and across tenure, that is, undertaken on a landscape approach.
- Early detection of new incursions (or threat of a significant accelerated spread) and rapid response is considered a high priority as this is the most cost-effective form of pest control.
- Priority is given to mitigating the impacts on biodiversity of a pest that has cultural significance, whilst minimising impacts on cultural values.
- The aim of most pest control programs is to minimise the adverse impacts of pests, as many exotic pests are already widespread (eg. foxes, blackberries) and for these species eradication is not possible.
- The focus of control programs is directed towards the values to be protected, because killing pests, by itself, does not necessarily minimise their impacts due to the fact that ecological processes are complex and can be affected by a range of factors.
- Risk assessments are undertaken prior to pest control, where required.
- Pest management strives to strike a balance between cost efficiency, target specificity and animal welfare.
- Where appropriate, pest control employs a combination of control methods and strategies (integrated pest management).

- Pest control programs take a holistic approach, given that the control of one pest may benefit other pests, in that they attempt to control all significant pest threats at a site.
- Pesticide use complies with relevant legislation and is employed in a manner that minimises impacts on the environment.
- Pest management programs are often integrated with other land management activities such as fire management and recreation management.
- Monitoring is being implemented, at varying levels, to demonstrate and improve the ongoing effectiveness of control programs.

8. Pest Program Priorities

NPWS prioritises its pest control programs to focus on those areas where the impacts of pests are likely to be greatest. Resources can then be directed to ensure that the resultant control programs are effective in reducing these impacts. The availability of suitable control techniques and resources (both financial and physical), as well as the practicality and cost effectiveness of control, also influence which programs can be implemented.

Where new pest incursions occur, early detection and eradication is the most cost-effective way to minimise the impacts. The NPWS will work with other agencies to prevent the introduction of new pests and to respond rapidly when new incursions occur.

The following key factors are considered when determining priorities for pest management within the Region.

Critical Priority

1. Programs targeting pests that are, or are likely to be, significantly impacting on biodiversity, as largely identified in the NSW Threatened Species Priorities Action Statement eg. undertake fox control at the Wollemi priority site for brush-tailed rock wallaby as identified in the Fox Abatement Plan.
2. Programs that target pests which impact significantly on human health or are part of a declared national emergency eg. outbreak of foot and mouth disease or control of feral pigs in the catchment area of a domestic water supply reservoir.
3. Programs targeting pests that impact significantly on agricultural production eg. wild dog control where there is potential for significant stock losses as identified in Wild Dog Management Plans; programs to control State Prohibited or Regionally Prohibited Noxious Weeds (Control Class 1 and 2 weeds).
4. Programs addressing new occurrences of highly invasive pest species with potential for significant impacts on park values (subject to risk/feasibility assessment) eg. control of serrated tussock in an area previously free of the weed.

High Priority

5. Programs that target pests (other than those covered in priorities above) that impact significantly on World Heritage or international heritage values, eg. control of deer impacting on World Heritage values of Blue Mountains NP and pest control in RAMSAR wetlands.

6. Programs targeting pests that impact significantly on important cultural heritage values eg. control of feral goats where they are inhabiting an area containing Aboriginal rock art and control of rabbits undermining an historic building.

Medium Priority

7. Programs that target pests (other than those covered in priorities above) that impact significantly on Wilderness, Wild Rivers, national heritage values or other important listed values eg. control of willows along a declared Wild River or within a Wilderness area.
8. Programs that target pests that impact significantly on recreation, landscape or aesthetic values, eg. control of blackberry on the margins of camping areas and control of weeds in an area of natural beauty that is visited frequently.
9. Community or cooperative programs targeting pests that impact significantly on park values or agricultural production and that have ongoing, proven effectiveness and participation, eg. control of willows with the assistance of an established community group and control of Regionally Controlled Noxious Weeds (Control Class 3 weeds).
10. Community or cooperative programs that are implemented as part of an endorsed state or regional plan (and not covered above in higher priorities), eg. control of bitou bush across boundaries as part of a regional control plan prepared by a regional weeds advisory committee and supported by NPWS.

Lower Priority

11. Community programs targeting pests that have localised impacts on natural ecosystems or agricultural lands and that promote community education and involvement with parks, eg. participation in a new bush regeneration project with a local community group and control of Locally Controlled and Restricted Noxious Weeds (Control Class 4 and 5 weeds).
12. Previous programs targeting pests that have localised impacts on native species and ecosystems, and that can be efficiently implemented to maintain program benefits, eg. the maintenance of areas treated previously for serrated tussock to continue keeping them weed free.

In some circumstances, new programs may be introduced, or priority programs extended to target pests where a control “window of opportunity” is identified e.g. 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.

Where factors have resulted in the significant reduction of pests (eg through the recent prolonged drought), significant resources need to focus on keeping pest numbers reduced, both under the same conditions and when factors change (eg the breaking of the drought). This will ensure limited pest damage and reduced long-term economic costs.

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.

Priority pest programs are outlined in section 11 Pest Program Overviews and summarised in Appendix 2 Summary of Priority Pest Programs. Further, emerging pest issues are outlined in Appendix 6.

9. Pest Program Recording and Monitoring

Measuring the response of biodiversity (or other values) to pest control is necessary in order to:

- demonstrate the degree of impacts and hence justify priorities for management; and
- measure the effectiveness of ongoing control and direct resources to those programs with the greatest effect.

Measuring the response of biodiversity can be difficult because populations of native species can vary in space and time for many reasons so that differentiating the effects of pest control from other sources of variation is often complex. Where populations cannot be counted directly, measurement is dependent on using indices of abundance. Rigorous attempts to measure population responses need to consider experimental design (eg. treatment and non-treatment sites, replication, time scale for measurable responses to occur), sampling design (because the entire population can rarely be measured) and standardisation of population measures to allow data to be collated across NPWS (across sites, times and land tenure where appropriate). As a result, measuring the response to pest control is expensive and can be afforded for only a small sub-set of control programs.

Where native populations are rare, cryptic or dispersed, or where a suite of species is predicted to be affected, indicator species, or other indices of relative abundance, can be used to provide an indirect measure of effectiveness. For example, while fox control may benefit a broad range of ground dwelling mammals, monitoring may focus on a particular “indicator” species which may be easy to capture.

The monitoring of response of pest species distribution and abundance provides an interim measure of effectiveness essential:

- to aid comparison between control effort and biodiversity response;
- to provide useful data where biodiversity, other park values or agricultural responses are too difficult to measure or there is insufficient resources to make proper measurement; and
- to provide an interim measure where native species may take some time to respond to pest control.

Where pest incursions have occurred recently, or where their distribution is otherwise limited, the objective of control is usually to eradicate the incursion completely or to contain its spread. In these situations, monitoring is required to confirm eradication or containment and should focus on the pest species rather than the response of native species to control. Such an approach may require methods that are capable of detecting populations at very low densities and prolonged monitoring will be required to ensure that containment or eradication has been achieved.

Where appropriate, monitoring programs should also include measures to verify the results of research being undertaken to gain a better understanding of the interaction between pests and climate change.

Systems and databases are being developed for the consistent and systematic collection, collation, storage and analysis of data as part of the Monitoring and Evaluation component of the Park Management Program.

Records are to be kept at the Area Offices and forwarded to the Region office where they are part of Region wide programs. Each Area is to use region wide monitoring sheets where they have been developed such as for pig and fox monitoring. Records

at the Region Office need to be transferred into an electronic data base, if they are not already in such a format, so that analysis can be made of each program.

Members of the public can report pest incursions in the Blue Mountains Region by contacting the appropriate Area office or emailing details on the species, location and size of infestation to: blue.mountains@environment.nsw.gov.au

10. Regional Coordination and Support

Pest control programs are coordinated by the local NPWS Area and Region in order to ensure that resources are utilised to achieve the best possible outcomes. The region will maintain a position to coordinate pest management programs.

The allocation of resources to manage pest species is crucial to the establishment of new areas. Twelve new reserves were added to the Region in the last 5 years adding 10% to the area under management (Appendix 9). Pest planning is needed for many of these new additions.

Area and Regional assistance is also required to efficiently work with neighbours, community groups and other agencies. Blue Mountains Area and Regional staff currently participate in twenty community and agency working groups/committees (Appendix 5). The Blue Mountains Region currently supports twenty seven volunteer bushcare, landcare and community pest control groups.

- Kanangra Area: Yerranderie Community/Berberis weed control group, Abercrombie River Community Willow Control Group.
- Upper Mountains Area: Carlons Creek Bushcare Group, Lyrebird Dell/Gordon Falls Bushcare Group, Valley of the Waters Bushcare Group, Braeside Bush Regeneration, Green Gully Bushcare Group, Macmasters Beach group (tree of heaven), 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.
- Hawkesbury Area: Friends of Colo (Willows out of Wollemi), Willow Warriors, Friends of Burrallow (Woods Creek), Falconbridge Point, Hawkesbury Dry Rainforest Network, Great Grose Weed Walk (with Upper Mountains Area), Richmond TAFE Bush Regeneration Group and Green Corp..
- Mudgee Area: Gurrabung Creek/Cape Ivy (Friends of Colo), Capertee Landcare group, Coolah Tops Goat Control Cooperative Program (with Department of Primary Industries, RLPB and neighbours), Wollemi NP, Goulburn River NP and Durrigere SCA Cooperative Dog Control Programs (with park neighbours and RLPB's).

It is a high priority that the current and any new volunteer groups to NPWS (including existing groups from other land managers working on lands transferred to NPWS through public lands rationalisation) receive adequate coordination and support. Additionally advice, assistance and support is required for traditional owners in joint management areas (eg the Gully Traditional Owners) to plan and coordinate rehabilitation works. For basic level support it has been identified as a high priority at the Blue Mountains Region Planning and Review Workshops in 2006 that Regional/Area Volunteer Coordinator positions are essential. These positions would coordinate volunteers undertaking NPWS programs, through developing strategic planning activities, sourcing additional/external funding, coordinating volunteer training, recruitment, recognition and retention and working with the Areas to oversee operational activities.

Education of staff and the broader community is an essential requirement in integrated pest management and is also best achieved by centralised coordination. Newsletters are sent quarterly to adjacent neighbours from Kanangra Area. Field days and

educational displays are coordinated throughout the Region on significant days at community events. Coordinated educational articles are being placed regularly in local papers with other land management agencies. Staff skills, knowledge and awareness of bush regeneration principles and practice were identified as a major issue at the Blue Mountains Region Planning and Review Workshops 2006. It is a high priority that relevant Pest Management training opportunities are planned for personnel within the Region (eg bush regeneration at various levels, chemical user, weed identification, vertebrate pest control, fire arms and 1080 authorisation).

11. Pest Program Overview

11.1 Vertebrate Pest Animal Program Overview

11.1.1 Feral cat *Felis catus*

Distribution and abundance:

Feral cats are the same species as stray cats and domestic cats. However, only predation by feral cats has been identified as a Key Threatening Process under the *TSC Act*. Feral cat populations are mostly located far from human habitation, and do not depend on stray/domestic cats to keep their numbers sustained. They have minimal or no reliance on humans for their survival whereas stray cats rely partly on humans and domestic cats live with people and have their requirements intentionally provided by their carers.

Low densities of feral cats are found in all reserves in the Blue Mountains Region.

Medium and high densities of feral and stray cats are found in areas associated with urban fringes, rubbish dumps, high visitor uses and some camp grounds (eg in Wolgan Valley, Wollemi NP in Upper Mountains Area, Dunns Swamp, Wollemi NP in Mudgee Area, Jenolan KCR, Euroka, Blue Mountains NP in Hawkesbury Area).

Impacts:

Feral cats prey upon native species, compete for food with native predators and act as a reservoir for diseases and parasites (eg toxoplasmosis) which can be transferred to native fauna, domestic stock and humans. They can kill vertebrates up to 3kg however, at particular risk of cat predation are small sized mammals weighing less than 220g and birds less than 200g (NPWS 2000c). Reptiles, amphibians and invertebrates are also eaten. Cats may directly prey upon threatened species. Concerns about the impacts of feral cats has led to the NSW Scientific Committee listing predation by feral cats as a key threatening process listed under the *TSC Act*. Feral cats are additionally listed as a Key Threatening Process 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 (predation on juveniles), blue mountains water skinks, southern brown bandicoots, bush-stone curlews and eastern pygmy possums.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No.1) programs include those where feral cats are impacting on threatened species. Education for park neighbours where domestic cats may be impacting upon threatened species eg neighbours adjoining Blue Mountains water skink habitat areas is a priority.

Medium priority (No. 8) programs include those where medium/high density of feral/stray cat populations are impacting on recreation and aesthetic values (eg in camping areas such as in the Wolgan Valley, Wollemi NP in Upper Mountains Area and high visitor use areas in Jenolan KCR).

Lower priority (No 11) programs include those where domestic/stray cats are impacting upon reserve fringes. The management of pets needs to focus on education.

Due to relatively ineffective control measures for feral cats across the landscape, feral cat control in other areas of Blue Mountains Region is a low priority for control.

Control:

Control methods include public education, 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.

Community education and liaison and coordination with LGAs is necessary. Education regarding responsible cat ownership as outlined on the NPWS website (NPWS 2006) and through the NPWS 'Backyard Buddies' program 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. Where feral cats are being controlled to protect threatened species, fauna surveys are needed to monitor the effectiveness of the program on indicator species. All sightings of feral cats are to be recorded in an Area log, including all animals controlled, the date, the location and the number of animals sighted. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.1.2 Feral cattle *Bos taurus***Distribution and abundance:**

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

Low densities of feral cattle are found in:

Kanangra Area: Blue Mountains NP, Kanangra-Boyd NP;

Upper Mountains Area: Grose and Mount Cameron in Blue Mountains NP, Wolgan and Capertee in Wollemi NP;

Hawkesbury Area: Wollemi NP, Yengo NP, Parr SCA; and

Mudgee Area: Wollemi NP, Goulburn River NP.

Medium densities of feral cattle are found in:

Kanangra Area: Yerranderie SCA.

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 that can spread to farmed cattle. They can additionally present a potential risk to humans health through attacks and the spread of pathogens such as *Cryptosporidium sp* via contaminated drinking water.

Threats that jeopardise the viability of EEC's such as white box yellow box Blakely's red gum woodland include the deterioration of the remnant condition caused by grazing. Cattle are additionally identified as damaging historic structures at important cultural sites such as at Joorilands Sheep Station Heritage precinct.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where feral cattle are impacting upon EEC's including:

- cattle in white box yellow box Blakely's red gum woodland in Yerranderie SCA and Blue Mountains NP, Kanangra Area, and
- River-flat Forest of the Coastal Floodplain in Kanangra-Boyd NP.

Feral cattle in areas adjacent to above mentioned EEC's are to be treated as a high priority.

Critical priority (No. 2) programs include those where feral cattle are impacting upon Special Areas such as Warragamba Special Area including Yerranderie SCA and Blue Mountains NP. Feral cattle in areas adjacent to the above mentioned Special Areas are to be treated as a high priority.

High priority (No. 5) programs include those where feral cattle are impacting upon World Heritage values eg cattle in Wollemi NP in all Areas, Kanangra-Boyd NP, Blue Mountains NP in Upper Mountains and Kanangra Areas, Yengo NP. In particular dams are to be assessed for removal that are sustaining feral cattle numbers but cannot be accessed for firefighting purposed. Feral cattle in areas adjacent to the above mentioned World Heritage Areas are to be treated as a high priority.

High priority (No 6) programs include those where feral cattle are impacting on regionally important cultural heritage values eg at Joorilands Sheep Station Heritage precinct in Blue Mountains NP, Kanangra Area through damaging the historic structures.

Medium priority (No. 7) programs include those where feral cattle are impacting upon Wilderness Areas within Kanangra Wilderness in parts of Yerranderie SCA (programs are already occurring within Kanangra Wilderness in Kanangra-Boyd NP, Blue Mountains NP, Grose Wilderness in Blue Mountains NP in Upper Mountains Area and Wollemi Wilderness in Wollemi NP in Upper Mountains, Hawkesbury and Mudgee Areas).

Lower priority (No.12) programs include those where feral cattle have been previously controlled (in other areas not mentioned as a higher priority), to maintain program benefits such as in Goulburn River NP and Parr SCA.

Control:

Prior to control, there is a need to identify if the animal(s) are wild or have strayed from neighbouring lands. Where strays are involved, liaison with the RLPB is to be undertaken and the owners are to be notified to remove the animals in a DECC determined timeframe.

Current control methods include mustering and ground and aerial shooting. Dams that are sustaining feral cattle populations and are surrounded by heavy vegetation and as a result cannot be accessed for firefighting should be assessed for removal.

Monitoring:

All sightings of feral cattle are to be recorded in an Area log, including all animals controlled, the date, the location and the number of animals sighted. Significant movement pads and feral cattle affected erosion sites are to be monitored twice a year, recording information on the size of the affected area and feral cattle induced impacts. Photographs are to be used to show changes over time. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.1.3 Feral deer (fallow deer *Dama dama* and red deer *Cervus elaphus*)

Distribution and abundance:

Fallow deer and red deer have been released in the Blue Mountains Region. They have a patchy distribution. Rusa deer are known to occur in proximity to the Region with this species being controlled at Grose Vale, adjacent to Wollemi NP's eastern border in Central Coast Region.

Low densities of red deer are found in:

Kanangra Area: Parliament Hill in Blue Mountains NP, Tuglow Hole Creek in Kanangra-Boyd NP; and

Mudgee Area: Nullo Mountain and Widden Valley in Wollemi NP, Coolah Tops NP.

Low densities of fallow deer are found in:

Kanangra Area: north western and western edge, Hollanders River and north of Batsch Camp in Kanangra-Boyd NP, eastern edge Abercrombie River NP, Jenolan KCR, Abercrombie KCR;

Hawkesbury Area: Hawkesbury heights and Kurrajong Heights in Blue Mountains NP, Yellomundee NP, East Kurrajong in Wollemi NP; and

Mudgee Area: Turril SCA, Goodiman SCA, Yarrobil NP, Duurridgere SCA, Curryall SCA, Avisford NR.

Upper Mountains Area: Blue Mountains NP

Medium densities of fallow deer are found in:

Kanangra Area: around Bindook highlands in Blue Mountains NP; and

Hawkesbury Area: Mellong Swamp in Wollemi NP, Yengo NP, Parr SCA.

Impacts:

Feral deer have been identified as one of the most important emerging pest animal threat in NSW. Feral deer will browse 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, erosion and resulting degradation of water quality.

Feral deer are known to cause economic damage to wineries by damaging grape vines.

Male red deer are territorial and can be very dangerous if approached at close range, especially during breeding season. They can additionally present a potential risk to humans health through the spread of pathogens such as *Cryptosporidium sp* via contaminated drinking water.

Concerns about the impacts of feral deer has led to the NSW Scientific Committee listing herbivory and environmental degradation caused by feral deer as a key threatening process listed under the *TSC Act*. In particular feral deer are a threat to montane peatlands and swamps through herbivory and environmental degradation and are impacting on the endangered *Eucalyptus sp*. Howes swamp creek. If feral deer are found in proximity to montane peatlands and swamps, management of any impacts would need to be undertaken.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where feral deer are impacting upon threatened species and EEC's including:

- *Eucalyptus sp.* Howes swamp creek occurring on alluvium in the Mellong Area of Wollemi NP, Hawkesbury Area.

Feral deer in areas adjacent to above mentioned EEC is to be treated as a high priority. Any feral deer impacts in the montane peatlands and swamps within the Bindook Highlands in Blue Mountains NP and Kanangra-Boyd NP are additionally to be monitored and controls undertaken if deemed necessary.

Critical priority (No. 2) programs include those where feral deer are impacting upon Special Areas eg Warragamba Special Area including Bindook Highlands in Blue Mountains NP, Kanangra Area. Feral deer in areas adjacent to the above mentioned Special Area are to be treated as a high priority.

Critical priority (No. 2) programs include those where feral deer become likely to cause car accidents (eg if feral deer populations increase at high visitor use areas such as Glenbrook, Blue Mountains NP, Hawkesbury Area and along the Putty Road in Wollemi NP, Hawkesbury Area, Yengo NP and Parr State Conservation Area where deer are a known traffic hazard).

Critical Priority (No.4) programs include those where new occurrences of feral deer have the potential for significant impacts on park values, subject to a risk/feasibility such as Widden Valley in Wollemi NP, Mudgee Area and Coolah Top NP.

High priority (No. 5) programs include those where feral deer are impacting upon World Heritage values such as feral deer in Wollemi NP in Hawkesbury Area, Blue Mountains NP in Kanangra and Hawkesbury Areas, Kanangra-Boyd NP, Yengo NP, Jenolan KCR. In particular feral deer in the Mellong swamp communities of Wollemi NP in Hawkesbury Area are of significant concern due to their impact upon the unusual mix of species in heath and woodland communities. Feral deer in areas adjacent to the above mentioned World Heritage Areas are to be treated as a high priority.

Medium priority (No. 7) programs include those where feral deer are impacting upon Wilderness Areas (such as Kanangra Wilderness in sections of Kanangra-Boyd NP and Blue Mountains NP in Kanangra Area, Grose Wilderness in Blue Mountains NP in Hawkesbury Area and Wollemi Wilderness in Wollemi NP in Hawkesbury Area where programs are already occurring for World Heritage values).

Medium priority (No. 9) programs include those where feral deer are significantly impacting on the agricultural production of neighbouring lands such as wine growing neighbours to national parks reserves in the Mudgee Area.

Lower priority (No.12) programs include those where feral deer have been previously controlled (in areas not listed as a higher priority), to maintain program benefits such as Abercrombie River NP, Abercrombie KCR, Parr SCA, Yellomundee RP, Avisford NR, Turill SCA, Goodiman SCA, Yarrobil NP, Durrigere SCA and Curryall SCA.

Control:

Shooting is currently used as a control method. New control options for the Region need to be investigated such as the feasibility and effectiveness of judas collars and trapping. As fallow deer do not look up, platform shooting at congregation points is a possible option. Cooperative programs are needed where deer move across reserve borders.

Monitoring:

All sightings of feral deer are to be recorded in an Area log, including all animals controlled, the date, the location and the number of animals sighted. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened

Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.1.4 Feral goat *Capra hircus*

Distribution and abundance:

Feral goats are found in twelve reserves in the Blue Mountains Region. They are often found in remote areas and can inhabit steep rocky escarpment. Significant primary control of feral goats has occurred in Kanangra and Mudgee Area reserves over the past five years resulting in low populations across many of these reserves.

Low densities of feral goats are found in:

Kanangra Area: Blue Mountains NP and Kanangra-Boyd NP, Yerranderie SCA, Jenolan KCR;

Upper Mountains Area: Wollemi NP, Gardens of Stone NP;

Hawkesbury Area: Blue Mountains NP ; and

Mudgee Area: Munghorn Gap NR, Wollemi NP, Durridgere SCA.

Medium densities of feral goats are found in:

Kanangra Area: Abercrombie River NP, Wombeyan KCR, Abercrombie KCR;

Upper Mountains Area: Turon NP; and

Mudgee Area: Avisford NR, Coolah Tops NP.

Impacts:

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 can not 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. Feral goats have the potential to affect neighbouring livestock (including sheep) properties through spreading foot rot and Johne's disease.

Concerns about the impacts of feral goats has led to the NSW Scientific Committee listing competition and habitat degradation by feral goats as a key threatening process under the *TSC Act*. Competition and land degradation by Feral Goats is additionally listed as a key threatening process under the Commonwealth *EPBC Act*. Threatened species of greatest concern in the Blue Mountains Region that are most likely to be impacted by feral goats include damage to the habitat of the broad-headed snake, damage to rock overhangs housing large-eared pied bat colonies and competition with the brush-tail rock wallaby. Concerns are greatest for brush-tail rock wallabies following times of drought when improved seasonal conditions may be reduced by the impact of feral goats. If feral goats spread into Yarrobil NP Mudgee Area, management of potential impacts on malleefowl would need to be undertaken. If feral goats are found in proximity to large-eared pied bat colonies, management of any impacts would need to be undertaken.

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 can additionally present a potential risk to humans health through the spread of pathogens such as *Cryptosporidium sp* via contaminated drinking water.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No 1) programs include those where feral goats are impacting upon threatened species and EEC's such as:

- feral goats in white box yellow box Blakely's red gum woodland in Coolah Tops NP, Yerranderie SCA and Blue Mountains NP in Kanangra Area;
- feral goats need to be controlled in sandstone escarpment, habitat areas for the broad-headed snake such as two areas in Kanangra-Boyd NP and the Millnigang/Bullnigang area in Blue Mountains NP, Kanangra Area and Gardens of Stone NP; and
- feral goats must additionally be controlled where they are found in proximity to brush-tail rock-wallaby colonies/habitat such as in the north west section (along the Bylong River and Myrtle Creek in Wollemi NP, Mudgee Area, Goulburn River NP, Kanangra-Boyd NP, Parr SRA, and Yengo NP).

Critical priority (No. 2) programs include those where feral goats are impacting upon Special Areas such as Warragamba Special Area including Blue Mountains NP, Kanangra-Boyd NP and Yerranderie SCA. Feral goats in areas adjacent to the above mentioned Special Area are to be treated as a high priority.

High priority (No 5) programs include those where feral goats are impacting the Blue Mountains World Heritage Area (eg in Blue Mountains NP in Kanangra and Hawkesbury Areas, Wollemi NP in Upper Mountains Area and Hawkesbury Area Gardens of Stone NP, Kanangra-Boyd NP and Jenolan KCR). Feral goats in areas adjacent to the above mentioned World Heritage Areas are to be treated as a high priority. Note that feral goat control is additionally occurring in these reserves to protect important Aboriginal cultural heritage sites as outlined below.

High priority (No 6) programs include those where feral goats are impacting upon important cultural heritage sites such as Aboriginal rock art sites and Aboriginal shelters in all reserves across the Region where goats are found including Blue Mountains NP in Kanangra Area and Hawkesbury Area, Kanangra-Boyd NP, Yerranderie SCA, Jenolan KCR, Wombeyan KCR, Abercrombie KCR, Abercrombie River NP, Wollemi NP in Upper Mountains and Hawkesbury Areas, Turon NP, Gardens of Stone NP and Avisford NR, Munghorn Gap NR and Coolah Tops NP.

Medium priority (No 7) programs include those where feral goats are impacting the Wilderness Areas in Yerranderie SCA in Kanangra Wilderness (programs area already occurring in Kanangra Wilderness in Kananagra-Boyd NP and Blue Mountains NP in Kanangra Area, Grose Wilderness in Hawkesbury Area and Wollemi Wilderness in Wollemi NP, Upper Mountains Area and Hawkesbury Area due to World Heritage values and to protect important Aboriginal cultural heritage sites as outlined above).

Control:

Prior to control, there is a need to identify if the animal(s) are feral or have strayed from neighbouring lands. Where strays are involved, immediate liaison with the local RLPB is necessary and the owners need to be notified to remove the animals in a DECC determined timeframe. Continued Liaison with goat owners and producers neighbouring park estate is essential eg around Abercrombie River NP, Kanangra Area. Education packages can be distributed to goat owners in relation to industry standards for goat fencing. Where inappropriate fencing/management is occurring resulting in goats being able to stray, liaison needs to occur with the RLPB and the landholder(s) to ensure better goat management and the cessation of animals straying onto the NPWS reserves.

Current management of feral goats involves an integrated approach across the landscape where possible (ensuring that threat abatement is undertaken at priority

sites whilst goats are controlled across the landscape resulting in less movement back to priority sites). Current control methods for feral goats include aerial and ground shooting, mustering and trapping. Cooperative programs with neighbours and other land management agencies are essential to the success of programs especially where populations are transient and numbers are sustained by populations on neighbouring lands.

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

Monitoring:

All sightings of feral goats are to be recorded in an Area log, including all animals controlled, the date, the location and the number of animals sighted. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.1.5 Wild horse *Equus caballus*

Distribution and abundance:

Wild horses are found in two reserves in the Blue Mountains Region, potentially within two management Areas. The control of wild horses has not occurred since 2002. In the fourteen years prior to this 304 horses were controlled by aerial shooting programs in the Warragamba Special Areas.

Low densities of wild horses are found in:

Kanangra Area: Warragamba SA of Blue Mountains NP and Kanangra-Boyd NP (from ground and aerial surveys it is estimated that between 30 and 50 wild horses are present in the Warragamba Special Area); and

Upper Mountains Area: Warragamba SA and Grose Valley in Blue Mountains NP (with those in the Grose Valley potentially very low or absent with the last sighted horses prior to the fires of 2002).

Impacts:

Wild horses compete with native animals for food, water and shelter. They disturb soil, accelerating erosion and sedimentation through the establishment of trails. They damage plants through grazing, trampling and wallowing. Wet and steep areas are highly susceptible to damage by trampling, with wetlands potential being drained through trampling. Weed invasion through seed dispersal by wild horse movement and dung is exacerbated by wild horse soil disturbance. Horses have been observed eating the bark of Melaleuca trees in the dry alluvial paperbark woodlands on the Warragamba Special Areas, a regionally significant vegetation community, not recorded from outside this area (NPWS 2006b).

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 spread pathogens to humans such as *Cryptosporidium* sp via contaminated drinking water. Stallions have additionally been known to act aggressively toward reserve users (NPWS 2006b).

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No 1) programs include those where wild horses are impacting upon significant communities (eg wild horses impacting of regionally significant dry alluvial paperbark woodlands in Warragamba SA in Blue Mountains NP, Kanangra Area).

Critical priority (No. 2) programs include those where wild horses are impacting upon Special Areas (Warragamba Special Area including Kanangra-Boyd NP and Blue Mountains NP, Kanangra Area).

High priority (No 5) programs include those where wild horses are impacting the Blue Mountains World Heritage Area (eg Blue Mountains NP in Kanangra and Upper Mountains Areas).

Medium priority (No 7) programs include those where wild horses are impacting Wilderness Areas (eg in Kananagra-Boyd NP and Blue Mountains NP in Kanangra Wilderness, Kanangra Area and Blue Mountains National Park in the Grose Wilderness, Upper Mountains Area where programs are already occurring due to World Heritage values).

Control:

Implement control methods as outlined in an adopted horse management plan. At the time of writing this Strategy *The Draft Wild Horse Management Plan for the Warragamba Special Area within Blue Mountains National Park* was on public display (public comments accepted until 15/12/06).

Monitoring:

All sightings of wild horses are to be recorded in an Area log, including all animals controlled, the date, the location and the number of animals sighted. Monitoring as outlined in an adopted horse management plan is to be undertaken. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.1.6 Feral pig *Sus scrofa*

Distribution and abundance:

Feral pigs are found in almost all of the reserves in the Blue Mountains Region. They are found in a range of habitats from open ex-pasture improved lands, riparian and swamp areas to upper gully bushland areas.

Low densities of feral pigs are found in:

Kanangra Area: Abercrombie KCR;

Upper Mountains Area: Blue Mountains NP, Wollemi NP, Turon NP, Gardens of Stone NP, Marrangaroo NP;

Hawkesbury Area: Wollemi NP, Yengo NP, Yellomundee RP; and

Mudgee Area: Wollemi NP, Avisford NP, Munghorn Gap NR, Goodiman SCA, Yarrobil NP, Durrigere SCA, Curryall SCA.

Medium densities of feral pigs are found in:

Kanangra Area: Yerranderie SCA, Abercrombie River NP, Jenolan KCR; and

Mudgee Area: Goulburn River NP.

High densities of feral pigs are found in:

Kanangra Area: Blue Mountains NP, Kanangra-Boyd NP.

Impacts:

Feral pigs compete with native animals for food, water and shelter and they actively predate upon native birds, reptiles, frogs and soil invertebrates. Feral pigs threaten native species and ecological communities as a direct result of their behaviour and feeding habits.

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 foot-and-mouth disease and can present a potential risk to human health through attacks and the spread of pathogens such as *Cryptosporidium* sp via contaminated drinking water. They have been implicated in the spread of *Phytophthora cinnamoni* that is known to cause dieback in native vegetation.

Concerns about the impacts of feral pigs has led to the NSW Scientific Committee listing *Predation, habitat degradation, competition and disease transmission by Feral Pigs* as a Key Threatening Process under the *TSC Act*. Feral pigs are additionally listed as a Key Threatening Process under the *EPBC Act* and as a declared pest species throughout NSW under the *RLP Act*. Threatened species of greatest concern that are most likely to be impacted by feral pigs in the Blue Mountains Region include the Donkey Orchid *Diuris aequalis*, *Trachymene saniculifolia*, *Acacia clunies-rossiae*, *Baloskion longipes*, *Eucalyptus* sp. Howes swamp creek and *Eucalyptus benthamii*. EEC's of greatest concern that are most likely to be impacted by feral pigs include white box yellow box Blakely's red gum woodland, montaine 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 within the Newnes Plateau shrub swamp EEC and are susceptible to habitat disturbance. The Blue Mountains water skink would additionally be susceptible to predation by feral pigs. Giant dragonfly is additionally 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.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No 1) programs include those where feral pigs are impacting upon threatened species and EEC's including feral pigs in:

- White box yellow box Blakely's red gum woodland in Yerranderie SCA and in Blue Mountains NP in Kanangra Area, Goulburn River NP, Coolah Tops NP and Wollemi NP in Mudgee Area;
- Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion in Blue Mountains NP and Wollemi NP in Upper Mountains Area where pig damage can be catastrophic for hanging wetlands;
- Montaine peatlands and swamps located on the Boyd Plateau in Kanangra Boyd NP
- Blue Mountains Water Skink in the Newnes Plateau shrub swamp, Wollemi NP in Upper Mountains Area
- Giant Dragonfly located in the Newnes Plateau shrub swamp, Wollemi NP in Upper Mountains Area and the montaine peatlands and swamps on Boyd Plateau, Kanangra Boyd NP
- *Diuris aequalis* in Kanangra-Boyd NP;
- *Trachymene saniculifolia* in Kanangra-Boyd NP;
- *Baloskion longipes* on the Boyd Plateau in Kanangra-Boyd NP;
- *Acacia clunies-rossiae* in riparian areas such as on the Kowmung River, Church Creek and Billys Creek in Kanangra-Boyd NP and the Coxs in Blue Mountains in Kanangra Area;

- *Eucalyptus benthamii* in the Kedumba Valley in Blue Mountains NP in Upper Mountains Area; and
- *Eucalyptus* sp. Howes swamp creek in the Mellong Area of Wollemi NP in Hawkesbury Area.

Feral pigs must additionally be controlled if populations of Southern Brown Bandicoots are rediscovered in the Region.

Critical priority (No. 2) programs include those where feral pigs are impacting upon the Special Areas (Warragamba Special Area including Blue Mountains NP in Kanangra Area, Kanangra-Boyd NP and Yerranderie SCA). Feral pigs in areas adjacent to the above mentioned Special Area are to be treated as a high priority.

High priority (No 5) programs include those where feral pigs are impacting upon the Blue Mountains World Heritage Area eg in Blue Mountains NP in Kanangra and Upper Mountains Area, Wollemi NP in all Areas, Gardens of Stone NP, Kanangra-Boyd NP, Yengo NP and Jenolan KCR. In particular dams are to be assessed for removal that are sustaining feral pig numbers but cannot be accessed for firefighting purposes. Feral pigs in areas adjacent to the above mentioned World Heritage Areas are to be treated as a medium priority.

High priority (No 6) programs include those where feral pigs are impacting on regionally important cultural heritage values such as Joorilands Sheep Station Heritage precinct, Blue Mountains NP in Kanangra Area.

Medium priority (No 7) programs include those where feral pigs are impacting upon the Wilderness Areas including Kanangra Wilderness incorporating parts of Yerranderie SCA (programs are already occurring in Kanangra Wilderness in Kanangra-Boyd NP and Blue Mountains NP in Kanangra Area, Grose Wilderness incorporating the section of Blue Mountains NP in Upper Mountains Area and Wollemi Wilderness of Wollemi NP in all Areas due to World Heritage values).

Lower priority (No 12) programs include those maintenance programs where feral pigs are impacting on local ecosystems, and their control is part of an ongoing program such as in Abercrombie KCR, Abercrombie River NP, Turon NP, Marrangaroo NP, Yellomundee RP, Avisford NR, Munghorn Gap NR, Goodiman SCA, Yarrobil NP, Durrigere SCA and Curryall SCA.

Control:

Current management of feral pigs involves an integrated approach across the landscape where possible (ensuring that threat abatement is undertaken at priority sites whilst pigs are controlled across the landscape resulting in less movement back to priority sites). Control methods include aerial and ground shooting, baiting and trapping. Integrated control should be used for all control sites along with the best management practice guidelines for feral pig control as outlined in the *Feral Pig Plan for the Lake Burragorang Catchment Area 2000*. When new target specific registered baiting substances/methods are available they can be trialed. Additionally feral pig programs need to be considered where wild dog control is being undertaken as this may result in an increase in the numbers of feral pigs.

Cooperative programs with neighbours, Rural Lands Protection Boards 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.

Dams that are sustaining feral pig populations and are surrounded by heavy vegetation and as a result cannot be accessed for firefighting should be assessed for removal.

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 recreational pig dog activities.

Monitoring:

Habitat preferences, seasonal movements and home ranges of feral pigs are currently being studied in the Warragamba SA by NPWS through a jointly managed program with SCA. The aim of this Pest Management Research Project is to understand feral pig ecology in the region so that feral pig management may be improved. Gaps in knowledge that are being addressed include the extent of the environmental impacts caused by feral pigs, whether populations of feral pigs are declining as a result of controls and the genetic make-up of the feral pig populations.

All sightings of feral pigs are to be recorded in an Area log, including all animals controlled, the date, the location and the number of animals sighted. Region wide pig monitoring sheets are to be used and stored at both Area and Region offices. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.1.7 Feral rabbit *Oryctolagus cuniculus*

Distribution and abundance:

Feral rabbits are found in low densities throughout most of the Blue Mountains Region reserves. 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. The feral rabbit population in the Blue Mountains Region has significantly decreased since the releases and spread of RCD in late 1990's and the implementation of follow up controls. Previously high densities of rabbits were found at Canobla Gap and the north eastern margins of Gardens of Stone NP adjacent to rural lands, Hartley Historic Site, Whalans clearing in Kanangra-Boyd NP, McKeons Valley in Jenolan KCR, Wollemi NP in Hawkesbury Area. Medium densities were found around the campground at Newnes, Wolgan Valley, Wollemi NP in Upper Mountains Area.

Low densities of feral rabbits are found in:

Kanangra Area: Blue Mountains NP, Kanangra-Boyd NP, Hartley HH, Evans Crown NR, Yerranderie SCA, Abercrombie River NP, Jenolan KCR;

Upper Mountains Area: Blue Mountains NP, Turon NP;

Hawkesbury Area: Blue Mountains NP, McKewins in Wollemi NP, Yengo RP, Parr SCA;

Mudgee Area: Goodiman SCA, Yarrobil NP, Durrigere SCA, Curryall SCA, Turill SCA, Goulburn River NP; and

Upper Mountains Area: Wollemi NP, Gardens of Stone NP.

Medium densities of feral rabbits are found in parts of:

Upper Mountains Area: Marrangaroo NP; and

Hawkesbury Area: Yellomundee RP.

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. 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. If

rabbit numbers decline then introduced predators place significantly more pressure on native animal populations.

As rabbits need deep, fertile soil types supporting rich food sources in the form of grasses to sustain large populations they do not proliferate and cause significant damage in undisturbed and rugged sandstone plateau areas.

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

Concerns about the impacts of feral rabbits has led to the NSW Scientific Committee listing *competition and grazing by the feral European rabbit* as a Key Threatening Process under the *TSC Act*. Feral rabbits are additionally listed as a Key Threatening Process under the *EPBC Act* and declared a pest species throughout NSW under the *RLP Act*. Threatened species of greatest concern that are most likely to be impacted by feral rabbits in the Blue Mountains Region include the brush-tailed rock-wallaby through dietary competition and the malleefowl through dietary competition and/or alteration of suitable habitat (NPWS 2006c).

Priorities for Control (refer to Section 8 Pest Program Priorities):

High priority (No 6) programs include those where rabbits are significantly impacting on regionally important cultural heritage values such as the historic buildings at Hartley Historic Site.

Medium priority (No 9) programs include those where rabbits are significantly impacting on the agricultural production of neighbouring lands such as neighbours adjacent to Wollemi NP in Upper Mountains Area and Mudgee Area.

Lower priority (No 12) programs include those where feral rabbits are impacting upon Newnes Camp ground in Wolgan Valley, Wollemi NP and the reserve fringes of most Blue Mountains Region reserves including Evans Grown NR, Yerranderie SCA, Gardens of Stone NP, Wollemi NP in Upper Mountains Area, Abercrombie River NP, Marrangaroo NP, Jenolan KCR, Wollemi NP in Hawkesbury Area, BMNP in Kanangra, Upper Mountains and Hawkesbury Areas, Yengo NP, Parr SCA, Kanangra-Boyd NP, Turon NP, Goulburn River NP, Avisford NR, Munghorn Gap NR, Coolah Tops NP, Turill SCA, Goodiman SCA, Durrigere SCA and Curryall SCA.

Control:

Integrated pest management techniques are essential for the control of feral rabbits. Current control methods include the use of biological controls such as Rabbit Calicivirus Disease (RCD). New methods of RCD baiting are to be investigated where rabbit populations are maintaining numbers or increasing. Other methods to be employed include mechanical controls such as warren destruction and poisoning, trapping, shooting and fumigation. Rehabilitation of degraded sites further lessens the foothold rabbits can have on a landscape. Where revegetation is being undertaken tree guards must be employed to lessen grazing impacts.

Cooperative programs with neighbours, Rural Lands Protection Boards, Local Government Authorities 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.

Where priority management programs are occurring and rabbit numbers are low, the maintenance of the program must include regular monitoring and checking. If feral rabbit numbers and/or damage are increasing, control must be implemented.

Monitoring:

All sightings of feral rabbits are to be recorded in an Area log, including all animals controlled, the date, the location and the number of animals sighted. Monitoring of damage is essential and can include information on the size of the affected area and feral rabbit induced impacts. Photographs are to be used to show changes over time. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.1.8 Red fox *Vulpes vulpes*

Distribution and abundance:

Foxes occur in most environments in Australia, with highest densities likely in agricultural areas that have patches of uncleared vegetation and urban fringe areas. These areas provide abundant food, cover and den sites. In contrast, foxes appear to be rare in closed forest distant from cleared land. Foxes occur throughout the Blue Mountains Region, in both urban fringe areas and the NPWS reserve systems.

High densities of foxes are likely in fringe areas bordering urban zones and agricultural lands.

Lower densities of foxes would be found within the core closed forest sections of the larger reserves furthest away from tracks, trails and borders with other lands eg within sections of Blue Mountains NP and Wollemi NP.

Impacts:

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

Predation by the fox is a major threat to the survival of native Australian fauna with fox impacts appearing greatest on medium-sized (450-5000g) ground dwelling and semi-arboreal mammals, ground-nesting birds and chelid tortoises. 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. Concerns about the impacts of foxes has led the NSW Scientific Committee listing predation by the European red fox as a key threatening process listed under the *TSC Act*. The fox is additionally listed as a Key Threatening Process under the *EPBC Act*. The subsequent NSW Threat Abatement Plan for Predation by the Red Fox (*Vulpes vulpes*) (Fox TAP) outlines a number of priority sites to measure the response of priority species to fox control. In the Blue Mountains Region these include brush-tailed rock-wallabies at Jenolan KCR (captive population) and Wolgan River and Capertee, Wollemi NP in Upper Mountains Area. A breeding colony of brush-tailed rock-wallabies at Myrtle Creek in the north west section of Wollemi NP, only recently discovered (DEC 2006) needs to be protected from predator impacts. Other colonies are present at Goulburn River NP and Widden Valley in Wollemi NP, Mudgee Area.

Other threatened species identified as medium and high priority species under the Fox TAP that are present in the Blue Mountains Region include the koala, spotted-tailed

quoll, bush stone curlew and malleefowl. 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 the 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 (DEC 2005b). Sites supporting bush stone-curlews need to be targeted for feral predator control.

Since the finalisation of the Fox TAP eastern pygmy possums have been listed as threatened species under the *TSC Act*. Using the criteria set out in the Fox TAP it is likely that eastern pygmy possums would have additionally been listed as a priority species for fox control.

Recent studies on the fauna of the Greater Southern Sydney Region recommend that fox control be undertaken in upland swamps as they support a rich diversity of fauna including many species of conservation concern that are at risk from fox predation (DEC 2005).

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No.1) programs include those where foxes are impacting on significant species and ecological communities.

- Under the Fox TAP, control and monitoring of foxes and their impacts is continuing at brush-tail rock wallaby colonies in Jenolan KCR and Wollemi NP in Upper Mountains Area. Control is additionally needed for the recently discovered colony of brush-tail rock wallabies in the north west corner of Wollemi NP in Mudgee Area and the colonies at Goulburn River NP and Widden Valley in Wollemi NP, Mudgee Area;
- Fox control has recently commenced to protect malleefowl in the newly gazetted Yarrobil NP; and
- Fox control is planned for upland swamp sites containing the EEC, Temperate highland peat swamps on sandstone under the Commonwealth *EP&BC Act* encompassing montane peatlands and swamps (listed as an EEC) and Blue Mountains Swamps listed as a Vulnerable Ecological Community under the *TSC Act* that host a diverse range of significant species eg eastern pygmy possums, such as on Narrow Neck Peninsula and Kings Tableland, Blue Mountains NP in the Upper Mountains Area. Depending upon an assessment of the effectiveness of this new program, it can be expanded to similar sites in the Blue Mountains Region.

High priority (No. 5) programs include those where foxes are impacting on World Heritage Areas including Blue Mountains NP and Wollemi NP in all Areas, Gardens of Stone NP, Kanangra-Boyd NP, Yengo NP and Jenolan KCR. Foxes in areas adjacent to the above mentioned World Heritage Areas are to be treated as a high priority. Currently fox control is only occurring within some of these areas as part of the brush-tail rock-wallaby Fox TAP program and as a result of the wild dog control programs on the edges of some of these reserves (see section 11.1.9). The logistics of effectively controlling foxes across the landscape of the above sites is dependent on a significant input of additional resources.

Medium priority (No. 7) programs include those where foxes are impacting on Wilderness Areas including parts of Yerranderie SCA (programs are already occurring in Kanangra Wilderness in Kanangra-Boyd NP and Blue Mountains NP in Kanangra

Area, Blue Mountains NP in Upper Mountains Area and Wollemi NP in all Areas due to World Heritage values).

Medium priority (No. 9) programs include those where community/cooperative programs have been set up to manage fox impacts across land management agencies eg the Blue Mountains Urban Fox Program. This program involves a stakeholder committee (with representatives from the community, Blue Mountains World Heritage Institute, Blue Mountains Conservation Society, a local Veterinarian and land management agencies), community education and interagency agency cooperation (between BMCC, SCA, RLPB and NPWS). In the event that any of the other agencies in the Program undertakes on-ground fox control in urban bushland at significant sites such as upland swamps and sites with populations of eastern pygmy possums, NPWS is to support such initiatives and work cooperatively to control foxes on adjoining reserves.

Control:

Current strategic and effective population level control methods incorporate poisoning using buried 1080 baits at frequent intervals eg four times or more per year over large areas. Where controls are being undertaken to protect a population of significant species at a particular site, fox control needs to be undertaken on a larger scale to reduce migration to the specific site. Best practice use of 1080 where quolls are present is to be adhered to, to negate population level impacts on spotted-tailed quolls. Trapping, den fumigation, harbour destruction, removal of food sources and shooting can additionally be utilised as can new registered technologies be considered for utilisation.

Where wild dog control is undertaken strategically (usually at intervals of 2 times per year), foxes may also succumb, however significant population control is unlikely.

Where fox control is being undertaken where populations of feral cats and/or feral rabbits are occurring, management of these additional pest species must be addressed.

Cooperative programs with neighbours, Rural Lands Protection Boards, Local Government Authorities and other land management authorities are essential to the success of programs as foxes are in high densities across the landscape and particularly on edge areas between reserves and adjoining urban and agricultural lands. 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 encourage to join those programs eg those programmed for the recovery of brush-tail rock-wallaby colonies.

Monitoring:

The impact of fox predation on brush-tail rock-wallaby populations and conversely, the effectiveness of the fox control program are being assessed through long-term monitoring of brush-tail rock-wallaby and fox populations. Brush-tail rock-wallaby populations are being measured biannually via systematic scat counts. DNA research has additionally been conducted on brush-tail rock-wallaby scats at colony sites. Fox and other medium-sized mammal populations are being measured biannually via track counts on sandpads. Data is analysed by the Pest Management Unit and published periodically as part of the review of the Fox Threat Abatement Plan.

Where other threatened species/ecological community programs are occurring such as with malleefowl and eastern pygmy possums liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities. Measures of predator and biodiversity response over

space (with treatment and non-treatment sites) and time are needed for the assessment of program effectiveness.

11.1.9 Wild dog *Canis lupus*

Distribution and abundance:

Populations of wild dogs (including dingoes) occur along the Great Dividing Range, coastal hinterlands, north-western NSW and far 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 23 reserves within Blue Mountains Region from Coolah Tops in the North through Goulbourn River NP, Wollemi NP, Gardens of Stone NP to Blue Mountains NP in the South. Most of these reserves are included under Schedule 2 of the Wild Dog Pest Control Order.

Low densities of wild dogs are found in:

Kanangra Area: Abercrombie River NP, Jenolan KCR, Wombeyan KCR, Abercrombie KCR; and

Upper Mountains Area: Marrangaroo NP.

Medium densities of wild dogs are found in:

Kanangra Area: Blue Mountains NP, Kanangra-Boyd NP;

Upper Mountains Area: Blue Mountains NP, Wollemi NP, Turon NP, Gardens of Stone NP;

Hawkesbury Area: Blue Mountains NP, Wollemi NP, Yengo NP, Parr SCA, Yellomundee RP; and

Mudgee Area: Avisford NR, Munghorn Gap NR, Coolah Tops NP, Goulburn River NP, Turill SCA, Goodiman SCA, Yarrobil NP, Durrigere SCA, Curryall SCA.

High densities of wild dogs are found in:

Kanangra Area: Yerranderie SCA; and

Mudgee Area: Wollemi NP.

Impacts:

Wild dogs, including dingoes, can cause substantial losses to livestock enterprises, especially sheep and goat grazing operations. These impacts are widespread along the Western boundary of BMR, with the heaviest losses occurring where forested and valley systems interface with sheep country. Three localities have had consistent reoccurrences of stock attack within Blue Mountains Region over the last ten years: Ben Bullen and Cullen Bullen areas adjacent to Gardens of Stone NP; Jerong Road and Jerong Creek areas adjacent to Blue Mountains NP; and the Nile Valley and Glen Alice areas adjacent to Wollemi NP. 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.

The impacts of wild dogs on native species appear to be greater on large animals, such as kangaroos and swamp wallabies and large ground dwelling birds, such as emus and terrestrial wetland birds. Regulation of large herbivores by wild dogs in fragile arid and semi arid environments may benefit biodiversity by reducing the impacts of overgrazing. Wild dogs also have the potential to suppress populations of pest species such as feral goats, pigs and foxes, although quantitative evidence is limited. It has been postulated that the presence of dingoes may assist brush-tail rock wallaby

colonies through dingoes excluding foxes or dingoes impacting on feral goats (DEC 2005d).

In contrast, predation by wild dogs may have negative impacts on some threatened species. For example, dog predation can be a high source of mortality in koala populations and when combined with habitat fragmentation has the potential to cause local extinctions. Wild dog dietary studies undertaken in southern Blue Mountains in 1994 and 2002 recorded the following endangered species being present in scat analysis: bandicoot, koala and spotted tailed quoll.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Wild dogs, including dingoes, have been declared as a pest animal under the *Rural Lands Protection Act 1998*, which means public and private land managers must control them. Although the dingo is unprotected under schedule 11 of the *National Parks and Wildlife Act 1974*, it is regarded as a native animal, and there is a requirement for it to be conserved both on DECC managed lands and within NSW generally. To balance these conflicting objectives, the general obligation to destroy wild dogs under the *RLP Act* can be met by implementing Wild Dog Management Plans for certain publicly managed lands listed in Schedule 2 of the Pest Control Order for Wild Dogs. Under these plans, wild dogs are controlled where necessary in order to minimise agricultural impacts, usually on the periphery of these lands, while allowing dingo populations to be maintained in core areas. Schedule 2 lists the areas considered important for the survival of dingoes in NSW, and currently lists 113 reserves managed by DECC, as well as several State Forests and other public areas. Schedule 2 lands in the Blue Mountains Region are significant and likely to be important for the survival of dingos in NSW.

Wild dog management plans are prepared in conjunction with the local Rural Lands Protection Boards (RLPB's) and Wild Dog Control Associations (WDCA). The plans must include the dual aims of minimising livestock predation and the conservation of the dingo in core areas of all reserve listed under Schedule 2 of the Pest Control Order. While the overarching management plans are developed by the RLPB's, operational plans are negotiated with individual WDCA,s on an Association basis.

Priorities for wild dog control on reserves in the 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 NP, Wollemi NP, Kanangra Boyd NP, Goulburn River NP, Turon River NP and Gardens of Stone NP where there are current and/or historic records demonstrating significant impact on livestock from wild dogs emanating from the reserves.

Historically Blue Mountains Region has been proactive in the management of wild dogs. Close liaison with WDCA's and landholders has occurred over a twenty year period. The regional "24 hour baiting response policy" in response to immediate wild dog threats has also been extremely effective at minimising public criticism.

Critical priority (No. 2) programs include those where wild dogs are being attracted to campsites and high visitor use areas. Park signage is to be erected at identified camp sites encouraging campers not to feed animals such as Rocky Creek, Wolgan, Newnes and Murphys Flat in Wollemi NP and Acacia Flat and Blue Gum in Blue Mountains NP, Upper Mountains Area. Education on wild dogs is to be targeted to park users prior to park users camping in reserves. In the event that wild dogs are taking food from or behaving aggressively towards campers/park visitors immediate investigation is to take place. Any reports of human/dog interactions at visitor use sites or on urban fringes

needs to be monitored. Where a wild dog is identified as a danger to park users it is to be destroyed.

Critical priority (No. 3) programs include those where there is a potential for significant stock losses on neighbouring lands. Minimising dog attacks on stock and reacting to neighbour concerns promptly are essential. Pro-active and strategic wild dog control in proximity to park boundaries is undertaken two times per year at Mellong Precinct, Wollemi NP in Hawkesbury Area, boundary sites in Kanangra-Boyd NP, Yerranderie SCA, Abercrombie River NP and Blue Mountains NP in Kanangra Area, boundary sites in Gardens of Stone NP, Turon NP, Green Gully in Blue Mountains NP and Wollemi NP in Upper Mountains Area and sites in all ten reserves in Mudgee Area. Reactionary control will occur within 24 hours of a report of a wild dog attacking neighbouring properties stock. Continued cooperation through wild dog committees and liaison with RLPB's and park neighbours is essential.

High priority (No. 5) programs include those preventing illegal pig hunting in World Heritage as it often leads to the release or escape of hunting dogs. These dogs are then reliant on predation for survival and can potentially breed with dingos. Stringent law enforcement at known pig hunting sites is to occur and liaison with park neighbours and NSW Police is essential. Prevention of pig dog activities and releases of pig dogs in proximity to threatened species that may be impacted such koalas colonies and dingo strongholds is of a higher priority (Critical Priority No. 1).

Medium priority (No. 7) programs include those preventing illegal pig hunting in Wilderness Areas (due to reasons outlined above regarding World Heritage Areas)

Lower priority (No. 12) programs include those preventing illegal pig hunting in reserves (not already outlined as a higher priority) causing localised impacts.

Control:

A fully integrated suite of control techniques are used to manage wild dogs within Blue Mountains Region. Control programs are undertaken in partnership with local RLPB's, WDCA's and individual landholders. Strategic control, aimed at preventing future livestock predation, will include:

1. Ground/mound baiting and trapping in accessible areas.
2. 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 dog activity will include.

1. Ground or mound baiting.
2. Trapping using either DECC staff or contract trappers.

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

Monitoring:

Stock losses by wild dogs in Blue Mountains Region are recorded by Oberon Vertebrate Pest Association, Moss vale RLPB, Central Tablelands RLPB and Mudgee RLPB. Such measures are essential in planning and evaluating the effectiveness of control programs included in wild dog management plans. Wild dog abundance and activity is measured annually by Blue Mountains Region via track counts and bait takes from mound bait stations in the various reserves. This data is used by Blue Mountains

Region to refine wild dog control programs. Landholder surveys for each Area should be undertaken to gauge perceptions of the success of NPWS wild dog programs.

Wild dogs/dingoes of the Southern Blue Mountains are currently being studied through genetic testing, radio tracking and predator analysis by Brad Purcell, a University of Western Sydney PhD Student. Findings from this research project will further assist the development of Blue Mountains Region wild dog programs.

11.1.10 Feral birds (various species)

Major feral birds:

These include, but are not restricted to the following feral birds: common myna *Acridotheres tristis*, common starling *Sturnus vulgaris*, Eurasian blackbird *Turdus merula*, red-whiskered bulbul *Pycnonotus jocosus* and spotted turtle-dove *Streptopelia chinensis*.

Distribution and abundance:

Feral birds are generally found in association with human habitation with medium to high densities in urban and rural areas, and those fringing reserves. Undisturbed sandstone vegetation is not suitable for the above feral birds species. Eurasian blackbird, however are known to extend into moist native forests (DEC 2005). Common mynas and common starlings are known to occur in the semi-cleared woodlands.

Impacts:

Impacts of feral birds includes competition for hollow nesting sites of birds, bats and mammals, spread of weed species such as African olive, privet and bridal creeper and competition for food resources. Common starlings additionally contaminate nesting sites by filling hollows with deep linings that attract parasites and become unusable for other species that use little lining. There are concerns that common mynas and common starlings are spreading into the grassy box woodlands high conservation areas of the Burragorang, Wollondilly, Cox's River and Kedumba Valleys in Blue Mountains NP, Kanangra Area. The major concern is for populations of declining woodland birds species including the threatened hollow-nesting Brown Treecreeper *Climacteris picumnus* and Superb Parrot *Polytelis swainsonii* (DEC 2005).

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs may include those where feral birds are impacting on significant species within EEC's. To date no significant incursions of feral birds are known in the white box yellow box Blakely's red gum woodland in Blue Mountains NP and Yerranderie SCA, however there are concerns if adjacent feral birds migrate into these Communities.

Medium priority (No. 8) programs include those where medium/high density of feral birds are impacting on recreation and aesthetic values (eg in camping areas such as Euroka in Blue Mountains NP, Hawkesbury Area).

Control:

Feral bird population control is dependent on an effective target specific control measure being available. NPWS is to liaise with local councils undertaking urban feral bird control programs and experts, such as the NSW Agriculture Vertebrate Pest Unit, Orange to assess new technologies and methods of bird control. Coordinated feral bird control programs can be trialed along the southern edges of the Warragamba Special Area to prevent further expansions into this area.

Monitoring:

Monitoring of any new programs to NPWS are essential. Monitoring of the control program, the response of the feral birds and their impacts is necessary upon a program commencing. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.1.11 Other pest animal species

Other pest animal species of concern in the Blue Mountains Region include: plague locusts, mice and rats, European wasps, 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 Key Threatening Process under the TSC Act. Where feral honey bee hives are found on National Parks estate, that pose a threat to people's safety or threatened species they are to be removed. Further research to identify species most at risk from competition from honeybees is likely to be one of the key objectives of the Threat Abatement Plan. Effective control methods will have to be shown to be safe both to native insect populations and not to affect the commercially produced honey. NPWS will give training to staff in regard to identifying, reporting and management of feral honeybees. Where opportunities arise, feral honey bees will be controlled in conjunction with other pest control programs. Note feral honeybees do not include managed honeybees by beekeepers where apiary licences have been issued on Service 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 these species are impacting on significant values as outlined in Section 8. Recording and monitoring of any new pest program is essential to measure the effectiveness of the program.

11.2 Weed Program Overview

This overview outlines weed programs:

- in four major site specific situations where different suites of weeds are impacting on different types of sites:
 1. Aquatic Weeds;
 2. Riparian Weeds;
 3. Bushland Weeds;
 4. Open Habitat and Roadside Weeds; and
- as major individual weed species programs (including Blackberry, Broom, Cape Ivy, Tree of Heaven, Gorse, Lantana, Monterey Pine, Prickly Pear, Serrated Tussock, Willows, Berberis, Sycamore, Tutsan and Pampas Grass) where these species are targeted across landscapes within the Blue Mountains Region.

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 a host of weeds impacting on a particular area eg the *Great Grose Gorse Walk* has developed into the *Great Grose Weed Walk*.

11.2.1 Aquatic Weeds

Major Weeds:

These include, but are not restricted to the following weeds: alligator weed (*Alternanthera philoxeroides*), water hyacinth (*Eichhornia crassipes*) and salvinia (*Salvinia molesta*).

Distribution and abundance:

In the Blue Mountains Region, alligator weed only occurs in Blue Mountains NP and Yellomundee RP. Within Blue Mountains NP, alligator weed occurs as a scattered infestation, within 30 sites along 8 kilometres of the Nepean River. Adjacent to Yellomundee RP, alligator weed and water hyacinth are a major concern to Nepean River.

Impacts:

Both alligator weed and salvinia are listed as *Weeds of National Significance* that are both declared Class 2 or Class 3 under the *Noxious Weeds Act*. They can clog waterways. Alligator weed, in particular 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. New plants regenerate readily from plant fragments which facilitates rapid spread and increases the difficulty of control. Alligator weed has a long history in the Sydney Basin where it is seen as a major threat in the Hawkesbury-Nepean catchment.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No 3) programs include those where Control Class 1 Noxious Weeds such as alligator weed and water hyacinth are impacting on the turf industry along the Hawkesbury-Nepean River with alligator weed passing

through sections of Blue Mountains NP and Yellomundee RP. Due to the ease of spread of this weed through the riparian system, all outbreaks of Alligator Weed in the region are a high priority for control.

Critical priority (No. 4) programs include those where any new incursions of highly invasive aquatic weeds are detected in the region.

Control:

Weed control authorities are undertaking the control of Alligator Weed through the application of carefully timed herbicide use, mechanical harvesting (where small outbreaks occur) and biological control (where large outbreaks occur) with the flea beetle (*Agasicles hygrophila*). NPWS will continue to work with local control authorities, Department of Planning and Infrastructure and the Hawkesbury-Nepean CMA to control aquatic weeds as part of a collaborative control program.

Monitoring:

The aquatic form of Alligator Weed is being monitored by Hawkesbury-Nepean Catchment Management Authority. Where occurrences of the terrestrial form of alligator weed is located on NPWS land it is to be mapped and recorded and its control monitored. Inspections need to take place 2 months after spraying occurs. NPWS will liaise regularly with the local control authority, Department of Planning and Infrastructure and the Hawkesbury-Nepean CMA regarding the status of alligator weed in the Region.

11.2.2 Riparian weeds

Major Weeds:

These include, but are not restricted to the following weeds:

Trees: small leaf privet (*Ligustrum sinense*), large-leaf privet (*Ligustrum lucidum*), willow (*Salix* sp), honey locust (*Gleditzia tricanthos*), black locust (*Robinia pseudoacacia*), poplars (*Populus* spp);

Shrubs: blackberry (*Rubus fruticosus*), lantana (*Lantana camara*), deutzia (*Deutzia crenata*), butterfly bush (*Buddleja davidii*), tutsan (*Hypericum* spp), Himalayan honeysuckle (*Leycesteria formosa*), cotoneaster (*Cotoneaster* sp), berberis (*Berberis aristata*);

Vines and scramblers: Japanese honeysuckle (*Lonicera japonica*), English ivy (*Hedera helix*), balloon vine (*Cardiospermum grandiflorum*), moth vine (*Araujia sericifera*), bridal creeper (*Asparagus asparagoides*), asparagus fern (*Asparagus densiflorus*), cape ivy (*Delaria odorata*); and

Herbaceous: giant reed (*Arundo donax*), crofton weed (*Ageratina adenophora*), mist flower (*Ageratina riparia*), blue periwinkle (*Vinca major*), tradescantia (*Tradescantia fluminensis*), ginger lily (*Hedychium* sp), seaside daisy (*Erigeron karvinskianus*), montbretia (*Crocasmia x crocosmiiflora*), hemlock (*Conium maculatum*) and pampas grass (*Cortaderia selloana*).

Note: many of these riparian weeds listed above are additionally found outside of the riparian zone eg on bushland slopes.

For specific programs on target weeds see the following sections: 11.2.5 berberis, 11.2.6 blackberry, 11.2.8 cape ivy, 11.2.12 pampas grass, 11.2.18 tutsan and 11.2.19 willows.

Distribution and abundance:

Riparian weed issues exist in most of the reserves that waterways dissect, with some creeks remaining relatively weed free whilst others are totally dominated by weeds.

High density weed infestations in riparian areas are often associated with high density weed infestations on adjacent lands and upper catchment areas such as weeds on urban and rural park neighbours. Riparian weed infestations are high in those areas containing sewerage lines and stormwater outlets such as in Blue Mountains NP.

Impacts:

Riparian weeds can alter the shape of stream banks through the capture of sediments, transform communities excluding virtually all natural regeneration of native species and alter the habitat of significant fauna both in waterways, in riparian vegetation and on banks.

A number of exotic vines and scramblers are found in riparian areas in the Blue Mountains Region. Concerns about the impacts of these particular group of weeds has led the NSW Scientific Committee listing *invasion and establishment of exotic vines and scramblers* as a Key Threatening Process under the *TSC Act*. Specifically in the Region and this KTP are 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 whilst scramblers form carpets that physically suppress native plant recruitment. Both vines and scramblers can restrict the movements of fauna accessing water. Threatened species and EEC's of greatest concern in the Region that are most likely to be impacted by exotic vines and scramblers include *Microstrobos fitzgeraldii* and *Epacris hamiltonii*, Cumberland Plain woodland, Shale-sandstone Transition Forest and Western Sydney Dry Rainforest in the Sydney Basin Bioregion (NPWS 2006e).

Weeds invading areas with of Cooks River/Castlereagh ironbark forest in the Sydney Basin Bioregion and Sydney Coastal River Flat Forest are of concern. Other threatened species found in riparian areas of the Region impacted or potentially impacted by riparian weeds include Smooth Bush Pea *Pultenaea glabra*, *Epacris sparsa* and *Acacia clunies-rossiae*.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where riparian weeds may threaten or are impacting threatened species and EEC's including:

- *Epacris hamiltonii* in perennial creeks and seepage areas in Blue Mountains NP in Upper Mountains Area;
- Smooth Bush Pea *Pultenaea glabra* in creek-banks and swamp margins in Blue Mountains NP in Upper Mountains Area;
- *Epacris sparsa* in riparian areas between Vale of Avoca and Faulconbridge Point in Blue Mountains NP in Hawkesbury Area;
- *Acacia clunies-rossiae* in riparian areas such as on the Kowmung River and Church Creek in Kanangra-Boyd NP and the Coxs in Blue Mountains in Kanangra Area;
- Cumberland Plain woodland both within the riparian areas and close to them in Blue Mountains NP, Hawkesbury Area and Yellomundee RP;
- Shale-sandstone Transition Forest in Blue Mountains NP, Hawkesbury Area and Yellomundee RP;
- Western Sydney Dry Rainforest in the Sydney Basin Bioregion in Blue Mountains NP and Wollemi NP, Hawkesbury Area;
- Swamps (including Blue Mountains Swamps, Newnes Plateau Shrub Swamp, Montane Peatlands and Swamps and Temperate Highland Peat Swamps on Sandstone) in Blue Mountains NP and Wollemi NP, Hawkesbury Area; and
- Cooks River/Castlereagh ironbark forest in the Sydney Basin Bioregion and Sydney Coastal River Flat Forest in Yellomundee RP.

Where threatened species and EEC's are known in riparian areas an assessment of current and likely weed incursion and impact is essential to ensure priorities for control are made.

High priority (No. 5) programs include those where riparian weeds are significantly impacting upon World Heritage values such as in Wollemi NP in Upper Mountains, Hawkesbury and Mudgee Areas, Blue Mountains NP in Kanangra, Upper Mountains and Hawkesbury Areas, Gardens of Stone NP, Turon NP, Marrangaroo NP, Kanangra-Boyd NP, Yengo NP and Jenolan KCR. Riparian zones to be mapped and treated during the life of this plan include:

- Upper Mountains Area: Blue Mountains NP (including Bedford Creek, Coxs River, Braeside, Katoomba Creek and Leura Creeks, Hensen Glen, Govetts Creek, Cedar Creek, Gordon Falls, upstream of Hat Hill, Blackwall Glen, Greaves Creek), Wollemi NP (including Wolgan River, Capertee River) Gardens of Stone NP (including Coco Creek), Turon NP (Turon River), Marrangaroo NP (Cox's River).
- Hawkesbury Area: Blue Mountains NP (including Nepean River, (Lower) Grose River, Erskine Creek, Glenbrook Creek) and Wollemi NP (including Colo River and catchment area, Wheeny Creek);
- Kanangra Area: Blue Mountains NP (crofton weed control on Butchers Creek), Kanangra-Boyd NP (including high densities of moth vine on Cox, Kowmung and Wollondilly River systems and high densities of crofton weed control on Jenolan River), Jenolan KCR (including Bulls Creek and the Jenolan River sub-catchments upstream from the Commercial Precinct); and
- Mudgee Area: Wollemi NP (including Capertee River, Widden Brook and its tributaries, Lee Creek, Bylong River, Cudgegong River and its tributaries).

Rapid assessment mapping of riparian areas to assess current and likely weed incursion and impact is essential to ensure priorities for control in the World Heritage and Wilderness areas. Healthy riparian areas with fewer weed incursions are to be prioritised. Within Blue Mountains City Council area the Blue Space mapping program can be used to assist in these assessments.

Medium priority (No. 7) programs include those where riparian weeds are significantly impacting upon Wilderness values such as Yerranderie SCA (programs area already occurring in the Grose Wilderness in Blue Mountains NP in Upper Mountains and Hawkesbury Areas, Kanangra Wilderness in Kanangra-Boyd NP, Blue Mountains NP and in Kanangra Area and Wollemi Wilderness in Wollemi NP in Upper Mountains, Hawkesbury and Mudgee Areas as they are all within World Heritage Areas as outlined above).

Lower priority (No. 12) programs include those where riparian weed control needs to continue to maintain program benefits of previous controls such as in Evans Crown NR, Abercrombie River NP, Wombeyan KCR, Turon NP, Marrangaroo NP, Parr SCA and Goulburn River NP.

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 pesticides can be used) and hand removal (where banks will not be destabilised).

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. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.2.3 Bushland Weeds

Major 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 section 11.2.2 Riparian Weeds** and many weeds listed below in section 11.2.4 Open Habitat and Roadside Weeds. Many other significant ones 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*), Mt Morgan wattle, Silver wattle;

Shrubs: gorse (*Ulex europaeus*), Scotch broom (*Cytisus scoparius*), tutsan (*Hypericum spp.*), berberis (*Berberis aristata*), cape 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*); and

Herbaceous: whisky grass (*Andropogon virginicus*), pampas grass (*Cortaderia selloana*) mother of millions (*Bryophyllum tubiflora*), Coolatai grass (*Hyparrhenia hirta*), agapanthus (*Agapanthus praecox ssp. orientalis*), creeping buttercup (*Ranunculus repens*), ink weed (*Phytolacca octandra*), purple top (*Verbena bonariensis*).

For specific programs on target weeds see the following sections: 11.2.5 berberis, 11.2.6 blackberry, 11.2.7 broom, 11.2.8 cape ivy, 11.2.9 gorse, 11.2.10 lantana, 11.2.11 monterey pine, 11.2.12 pampas grass, 11.2.16 sycamore maple and 11.2.18 tutsan.

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 the 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 Mt Victoria) and Bells Line of Road (Kurrajong to Bell) transecting BMNP and WNP. Extensive high density weed occurrences are associated with sewerage treatment plants in Blue Mountains NP.

Impacts:

Bushland weeds reduce native biodiversity by competing for light, nutrients, water, space and pollinators. They out-compete 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 at a site. 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 (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where bushland weeds are impacting upon threatened species and EEC's such as:

- *Microstrobos fitzgeraldii* in inaccessible cliff sites in Blue Mountains NP Upper Mountains Area (weed control at these sites has included montbretia, English Ivy, blackberry, broom and small leaf privet);

- *Persoonia acerosa* along ridge tops and fire trails near the boundary of urban areas in Blue Mountains NP in Upper Mountains Area;
- Cumberland Plain woodland EEC's in Yellomundee RP and Blue Mountains NP in Hawkesbury Area;
- Shale/sandstone transition forest in Yellomundee RP;
- Sydney sandstone ridgetop woodland in Yellomundee RP;
- Blue Mountains shale cap forest in Sydney Basin Bioregion in Blue Mountains NP and Wollemi NP in Hawkesbury Area (mostly threatened by Lantana); and
- Temperate highland peat swamps, in particular threatened by the movement of Himalayan honeysuckle and Spanish heath into this community in Blue Mountains NP, Upper Mountains Area,

Where threatened species and EEC's are known in bushland areas an assessment of current and likely weed incursion and impact is essential to ensure priorities for control are made.

High priority (No. 5) programs include those where bushland weeds are significantly impacting upon World Heritage values such as in Wollemi NP in Upper Mountains, Hawkesbury, Blue Mountains NP in Upper Mountains and Hawkesbury Areas, Gardens of Stone NP, Yellomundee RP and Jenolan KCR. Particular bushcare groups working in World Heritage Areas include:

- Carltons 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 Colo, Willow Warriors, Colo-Meroo Bush Regeneration, Friends of Burrallow (Woods Creek), Richmond Tafe Bush Regeneration Group, Green Corp and Australian Conservation Trust Volunteers, Falconbridge Point and Hawkesbury Dry Rainforest Network in Hawkesbury Area.

Additional priority bushland sites to be treated include:

- Upper Mountains Area: Blue Mountains NP (including Mountview Avenue, back of Holland's Mt Wilson, Radio Tower Mt Tomah, Echo Point, SCA catchment, Greaves Creek, Farrer Rd Mt Wilson, Windborne Road, Kedumba, Heritage Centre, Wentworth Street, Gladstone Road, Carlton road, Olympian Rock, West Street, Pool of Siloam, Elysian Rock, Van Lookout Road, Govetts Leap)
- Hawkesbury Area: Blue Mountains NP (including sites at Springwood, Glenbrook and Euroka, White Cross Road, Blue Gum Swamp, Woodford, Woods Creek, Mulgoa, Burrallow, St Georges Crescent, Vale of Avoca, Erskine Creek and Railway Parade in Falconbridge), Wollemi NP (Wheeny Creek, Mellong Precinct and Colo Meroo) and Yellomundee RP (Emu Plains Road), bilpin Ex motor cross circuit and St Helena's Craters; and
- Kanangra Area: Jenolan KCR.

Healthy bushland areas with fewer weed incursions are to be prioritised. Within Blue Mountains City Council area the Blue Space mapping program can be used to assist in assessments.

Medium priority (No. 8) programs include those where bushland weeds are significantly impacting upon recreation areas such as in camp grounds and scenic areas such as Govetts Leap and Evans Lookouts, Wentworth Fall Picnic Area and the Conservation Hut in Blue Mountains NP, Upper Mountains Area.

Lower priority (No. 12) programs include those where bushland weed control needs to continue to maintain program benefits of previous controls such as in Munghorn Gap NR, Turon NP and Marrangaroo NP. A bush regeneration plan is needed for downstream of Redbank Dam in Avisford NR.

Control:

Bushland in proximity to urban areas generally contains 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 such as cut and paint, stem-scrape, stem injection and spraying of herbicides and hand removal can be employed. Fire (wildfire and control burns) can additionally be used as a tool, 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. Principles and practices covered in *Recovering bushland on the Cumberland Plain best practice guidelines for the management and restoration of bushland* (DEC 2005c) are to be followed for those communities in Hawkesbury Area. Where fires have impacted on priority bushland sites or upslope/upstream additional priority should be given to the control of weeds at these sites.

The Service will work cooperatively with other land managers such as Sydney Water to rehabilitate areas associated with sewerage 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 numbers of bushcare groups supported. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.2.4 Open Habitat and Roadside Weeds

Major Weeds:

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

Trees: African olive (*Olea europaea*), peppercorn (*Schinus molle*), fruit trees various species, Cootamundra wattle (*Acacia baileyana*);

Shrubs: broom (*Cytisus scoparius*), gorse (*Ulex europaeus*), prickly pear species (*Opuntia* spp), blue heliotrope (*Heliotropium amplexicaule*), sweet briar (*Rosa rubiginosa*), century plant (*Agave americana*); and

Herbaceous: serrated tussock (*Nassella trichotoma*), St Johns 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* sp.), phalaris (*Phalaris aquatica*), Rhodes grass (*Chloris gayana*), galvenised burr, safron.

For specific programs on target weeds see the following sections: 11.2.7 broom, 11.2.9 gorse, 11.2.12 pampas grass, 11.2.13 prickly pear, 11.2.14 serrated tussock, 11.2.15 and St Johns wort.

Distribution and abundance:

Along roadsides, tracks and trails localised disturbance coupled with increased nutrient and pollutant levels favours many weed species. Weeds found along roadsides, tracks and trails are often capable of additionally infesting open natural habitats, camp grounds and high visitor use areas. Along both roadsides, track and trails and in open habitats sunlight is abundant. Open habitats are found at both disturbed sites throughout the Blue Mountains Region and naturally open 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 as such may influence public perceptions of general park management. Many of the weeds that thrive in these areas additionally impact upon agricultural production and can easily spread to and from neighbours.

Threats that jeopardise the viability of EEC's such as white box yellow box Blakely's red gum woodland include the deterioration of the remnant condition caused by weed invasion. Invasion of such communities by exotic perennial grasses can in turn impact on a number of declining and threatened woodland birds (DEC 2005). A number of grasses that are found in the Blue Mountains are listed as part of the Key Threatening Process *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 (check listing with Areas to include those relevant species). 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 (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where open habitat and roadside weeds such as St Johns wort, sweet briar, serrated tussock and prickly pear are impacting upon EEC's such as white box yellow box Blakely's red gum woodland in Yerranderie SCA and Blue Mountains NP in Kanangra Area, Coolah Tops NP, Goulburn River NP and Wollemi NP in Mudgee Area. Where threatened species and EEC's are known in open habitats an assessment of current and likely weed incursion and impact is essential to ensure priorities for control are made.

High priority (No. 5) programs include those where open habitat and roadside weeds are significantly impacting upon World Heritage values such as the potential spread of whisky grass into the woodland system in Mellong Swamp in Wollemi NP, Hawkesbury Area. Whisky grass in particular needs to be controlled along the road into this area. Programs also include pastoral weeds in Green Gully, Blue Mountains NP in Upper Mountains Area. Other open habitat and roadside weed issues in World Heritage areas include Bells Line of Road in Hawkesbury Area.

Medium priority (No. 8) programs include those where open habitat and roadside weeds are significantly impacting upon recreation areas such as Paterson's Curse in recreational areas of Abercrombie River NP. Revegetation programs are to occur at appropriate sites such as at the Beach camping site in Abercrombie River NP. Other open habitat and roadside weed issues in camp grounds include whisky Grass incursions into Burralow Camping Ground, Blue Mountains NP in Hawkesbury Area.

Lower priority (No. 11) programs include those where open habitat and roadside weeds are impacting upon agricultural production of neighbouring properties such as the

nodding thistle coordinated spray program with neighbours on the boundary of Kanangra-Boyd NP.

Lower priority (No. 12) programs include those where open habitat and roadside weed control programs need to continue to maintain program benefits of previous controls such as ox-eye daisy control along Kanangra Wall Road and Dingo Dell road verges in Kanangra-Boyd NP, Bells Line of Road, Mt Wilson and Mt Irvine in Blue Mountains NP, Upper Mountains Area.

Control:

Along roadsides, programs need to be coordinated with local councils and the Roads and Traffic Authority 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 eg for Paterson's curse, NPWS is to coordinate with NSW Agriculture releases of those agents.

Where threatened species and EEC's are located bush regeneration principles need to be adopted, where series of weeds are controlled allowing the natural regeneration of native plants to occur. Techniques such as cut and paint, stem-scraper, stem injection and spraying of herbicides and hand removal can be employed where appropriate.

Monitoring:

Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.2.5 Berberis *Berberis aristata*

Distribution and abundance:

Medium densities of berberis are found in:
Kanangra Area: Blue Mountains NP, Yerranderie SCA; and
Upper Mountains Area: Blue Mountains NP.

Impacts:

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.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where berberis is impacting upon the upon EEC's including white box yellow box Blakely's red gum woodland in Yerranderie SCA and Blue Mountains NP in Kanangra Area.

Lower priority (No. 11 & 12) programs include those promoting community involvement whilst targeting berberis that is having localised impacts on amenity and areas adjacent to the township of Yerranderie.

Control:

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 SCA is essential for this berberis infestations at Yerranderie along with community involvement and liaison with adjacent landholders.

Monitoring:

Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.2.6 Blackberry *Rubus fruticosus*

Distribution and abundance:

Low densities of blackberry are found in:

Kanangra Area: Kanangra-Boyd NP, Hartley HS, Evans Crown NR;

Hawkesbury Area: Yellomundee RP; and

Mudgee Area: Avisford NR, Munghorn Gap NR, Turill SCA.

Medium densities of blackberry are found in:

Kanangra Area: Blue Mountains NP, Yerranderie SCA, Jenolan KCR, Wombeyan KCR;

Upper Mountains Area: Wollemi NP, Turon NP, Blue Mountains NP, Gardens of Stone NP;

Hawkesbury Area: Blue Mountains NP, Wollemi NP, Yengo NP, Parr SCA; and

Mudgee Area: Coolah Tops NP, Goulburn River NP.

High densities of blackberry are found in:

Kanangra Area: Abercrombie River NP;

Upper Mountains Area: Marrangaroo NP; and

Mudgee Area: Wollemi NP.

Impacts:

Blackberry is listed as a *Weed of National Significance* 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 providing excellent harbour for feral animals such as rabbits, pigs and goats. Blackberry thicket can 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. Forming impenetrable thickets blackberry is the bane of bushwalkers.

By removing blackberry in Warragamba SA (of Blue Mountains NP, Kanangra-Boyd NP and Yerranderie SCA), feral animals such as pigs become more visible. Natural regeneration of habitat for diamond firetails and turquoise parrots occurs with the removal of blackberry in these areas.

Other threatened species that are at most risk from blackberry invasion include Wollemi Pines in Wollemi NP, Mudgee Area, Blue Mountains shale cap forest in Sydney Basin Bioregion in Blue Mountains and Wollemi NP and Hanging Swamps in the Blue Mountains.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where blackberry is impacting upon threatened species such as:

- in the catchment area of the Wollemi Pine, Wollemi NP, Mudgee Area. Annual monitoring of blackberry and associated weed incursion are to be carried out. Treatment of any infestations will occur in consultation with the Wollemi Pine Recovery Team. Treatments are to use best practice low impact methods;
- Blue Mountains shale cap forest in Sydney Basin Bioregion in Blue Mountains and Wollemi NP (especially near Mt Tootie) in Hawkesbury Area; and
- Swamps (including Blue Mountains Swamps and Temperate Highland Peat Swamps on Sandstone) in Blue Mountains NP and Wollemi NP, Hawkesbury Area; and in Blue Mountains and Wollemi NP in Hawkesbury Area.

Critical priority (No. 2) programs include those where blackberry is harbouring feral animals and intern impacting upon water quality in Special Areas such as in Warragamba Special Area (including Kanangra-Boyd NP, Yerranderie SCA and Blue Mountains NP, Kanangra Area).

High priority (No. 5) programs include those where blackberry is significantly impacting upon World Heritage values such as in Wollemi NP in Upper Mountains, Hawkesbury and Mudgee Areas, Blue Mountains NP in Kanangra, Upper Mountains and Hawkesbury Areas, Gardens of Stone NP, Kanangra-Boyd NP, Yengo NP and Jenolan KCR.

Medium priority (No. 7) programs include those where blackberry is significantly impacting upon Wilderness values such as in the Kanangra Wilderness in Yerranderie SCA (high priority programs are already in the Grose Wilderness in Blue Mountains NP in Upper Mountains and Hawkesbury Areas, Kanangra Wilderness in Kanangra-Boyd NP and Blue Mountains NP in Kanangra Area and Wollemi Wilderness in Wollemi NP in Upper Mountains, Hawkesbury and Mudgee Areas due to World Heritage Values).

Medium priority (No. 8) programs include those where blackberry is significantly impacting upon recreation areas such as in camp grounds and scenic areas such as Euroka in Blue Mountains NP, Hawkesbury Area.

Lower priority (No. 11) programs include those where Control Class 4 and 5 Noxious Weeds such as blackberry are impacting upon agricultural production of neighbouring properties, where those neighbours are continually suppressing blackberry. Control programs include those on the boundaries of Avisford NR, Coolah Tops NP, Goulbourn River NP and Wollemi NP in Mudgee Area.

Lower priority (No. 12) programs include those where programs need to continue to maintain program benefits of previous controls such as in Hartley HS, Wombeyan KCR, Evans Crown NR, Abercrombie River NP, Turon NP, Marrangaroo NP, Parr SCA, Yellomundee RP, Munghorn Gap NR, Turill SCA, Goodiman SCA, Yarrobil NP, Durridgere SCA and Curryall SCA.

Control:

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

Herbicide treatments include scrape and paint methods for small infestations where the cut can be made either on the plant or through the root ball. Aerial spot spraying, vehicle spraying, knapsack spraying and splatter gun applications can be used for larger infestations. Horses and 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.

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 NP and in the Wolgan Valley, Wollemi NP in Upper Mountains Area. As it favours wet summers it should be harvested and distributed if such a window of opportunity exists. 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 are to include annual photographs of sites including pre and post control photographs and sizes of regeneration areas treated. Liaison with the Department of Agriculture is to continue in respect to monitoring of biological control agents. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.2.7 Broom *Cytisus scoparius*

Distribution and abundance:

Low densities of broom are found in:

Kanangra Area: Kanangra-Boyd NP, Hartley Historic Site, Jenolan KCR;

Upper Mountains Area: Turon NP; and

Hawkesbury Area: Blue Mountains NP.

High densities of broom are found in:

Upper Mountains Area: Blue Mountains NP, Marrangaroo NP.

Impacts:

Scotch broom is listed as a *Weed of National Significance and a Class 4 Noxious Weed in part of the Region* (Appendix7). Broom is highly invasive in the cool high rainfall areas of the Blue Mountains. It occurs in bushland, woodlands, and riparian areas where it can grow in partial shade to full sun. Broom tolerates frosts and droughts. Seeds may persist in the soil for several decades and are stimulated by fire and soil disturbance. Broom can transform invaded habitats as it simplifies the structure and diversity of herbs, shrubs and trees by preventing overstorey regeneration. It is common in disturbed bushland margins but can expand into undisturbed areas. Forming thickets it impedes access and can alter fire regimes.

Threatened species and EEC at most risk from broom infestations include the *Epacris hamiltonii*, *Microstrobos fitzgeraldii* and the EEC encompassing upland swamps. Dense and scattered infestations of Scotch broom in conjunction with various other woody weeds have been controlled in purple copperwing butterfly habitat at Hermitage Flat, Lithgow outside of NPWS estate since 2003. If further populations of this butterfly are discovered on NPWS estate an assessment of weed incursion into it's habitat would be needed.

The spread of broom is additionally a significant concern in areas with similar soil types, altitude and vegetation to Barrington Tops where broom has become a major threatening species. The Boyd Plateau in Kanangra-Boyd NP is one area of concern.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where broom is impacting upon biodiversity, threatened species and EEC's such as:

- Communities on the Boyd Plateau of Kanangra-Boyd NP;
- *Microstrobos fitzgeraldii* in inaccessible cliff sites in Blue Mountains NP Upper Mountains Area;
- *Epacris hamiltonii* in Blue Mountains NP Upper Mountains Area; and
- Uplands swamps (including Blue Mountains swamps and Temperate Highland Peat Swamps on Sandstone) in Blue Mountains NP Upper Mountains Area.

High priority (No. 5) programs include those where broom is significantly impacting upon World Heritage values such as in Kanangra-Boyd NP, Jenolan KCR and Blue Mountains NP in Upper Mountains Area and Hawkesbury Area.

Lower priority (No. 12) programs include those where broom control programs need to continue to maintain program benefits of previous controls such as in Hartley HS, Turon NP and Marangaroo NP.

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. Due to the longevity of the broom seed bank (with seeds longevity likely ranging from 20 to 50 years depending on altitude, different soil and vegetation types being present, different disturbance regimes and genetic variability), long term monitoring of control sites of this weed is essential. In particular after extensive disturbance such as fire, follow-up controls are necessary, with re-growth from mature plants requiring spraying and seedlings stimulated from the fire controlled for several years. Known broom areas need to be identified post fire events and control measures continued to ensure rapid spread of this weed does not occur. Infestations should only be cleared when there are sufficient resources for follow up. A long-term perspective is needed for this species, where strategies include exhausting the seed bank as well as preventing further additions. As seedlings do not mature under shady canopies, where appropriate native canopy cover should be encouraged.

Three biological control agents (a twig mining moth *Leucoptera spartifoliella*, a psyllid *Arytainilla spartifoliella* and a seed eating beetle *Bruchidius villosus*) were released at Bonnie Doon reserve, Katoomba in 1996. All three agents have been monitored by the Department of Agriculture and to date have not shown signs of significant impact.

Monitoring:

Monitoring of large infestations of broom is to include annual photographs of sites including pre and post control photographs and sizes of regeneration areas treated. Liaison with the Department of Agriculture is to continue in respect to monitoring of biological control agents. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.2.8 Cape Ivy *Delairea odorata*

Of the major infestations of cape ivy occurring in the Wolgan Valley, the main Wolgan Valley infestation has been reduced from 120 to 40ha since 1997.

Distribution and abundance:

Low densities of cape ivy are found in:
Mudgee Area: Wollemi NP.

Medium densities of cape ivy are found in:

Upper Mountains Area: Wollemi NP; and
Hawkesbury Area: Wollemi NP, Blue Mountains NP.

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 overtime 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.

Priorities for Control (refer to Section 8 Pest Program Priorities):

High priority (No. 5) programs include those where cape ivy is significantly impacting upon World Heritage values such as in Blue Mountains NP in Hawkesbury Area, Wollemi NP in Upper Mountains Area, Hawkesbury Area and Mudgee Area. For the Colo Meroo site in Wollemi NP, Hawkesbury Area access issues need to be arranged prior to controls being undertaken. Support needs to continue for Friends of Colo volunteers targeting cape ivy in the Colo, Caperty, Wolgan and Wollemi Creek catchment areas of Wollemi NP, Hawkesbury Area.

Medium priority (No. 8) programs additionally include those where cape ivy is significantly impacting upon recreation areas such as upstream of the Colo Meroo camping area on the lower Colo associated with the riparian zone.

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 following up treatment in the following couple of years.

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.

11.2.9 Gorse *Ulex europaeus*

Distribution and abundance:

Low densities of gorse are found in:

Kanangra Area: Kanangra-Boyd NP; and
Hawkesbury Area: (lower) Grose River in Blue Mountains NP.

Medium densities of gorse are found in:

Upper Mountains Area: Blue Mountains NP.

Impacts:

Gorse is listed as a *Weed of National Significance* and a Class 3 Noxious Weed in part of the Region (Appendix 7). It readily invades disturbed areas, forest margins, healthy bushland and riparian areas and it can tolerate both droughts and frosts. Any disturbance around plants stimulates mass germination from seeds that can remain dormant in the soil for up to 25 years. Gorse forms impenetrable thickets that exclude native vegetation and prevent regeneration physically and through acidifying the soil. Thickets provide habitat for rabbits and are a serious fire hazard.

Threatened species at most risk from gorse infestations include *Epacris hamiltonii*, *Epacris sparsa*, *Isopogon fletcheri* and the EEC of upland swamps.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where gorse is impacting upon threatened species and EEC's such as:

- *Epacris sparsa* in Blue Mountains NP Upper Mountains Area;
- *Epacris hamiltonii* in Blue Mountains NP Upper Mountains Area; and
- *Isopogon fletcheri* in in the Braeside and Govett's Leap areas of Blue Mountains NP Upper Mountains Area;
- Uplands swamps (including Blue Mountains swamps and Temperate Highland Peat Swamps on Sandstone) in Blue Mountains NP Upper Mountains Area.

High priority (No. 5) programs include those where gorse is significantly impacting upon World Heritage values such as in Blue Mountains NP in Upper Mountains Area and Hawkesbury Area.

Medium priority (No. 9) programs additionally include community programs targeting gorse that have significant impacts on park values and have ongoing, proven effectiveness and participation such as the Great Grose Weed Walk in Blue Mountains NP in Upper Mountains Area and Hawkesbury Area.

Control:

Small infestations can be dug out or treated with the cut and paint method. Due to the longevity of the gorse seed bank long term monitoring of control sites of this weed is essential. In particular after extensive disturbance such as fire, follow-up controls are necessary, with re-growth from mature plants requiring spraying and seedlings stimulated from the fire controlled for several years. Known gorse areas need to be identified post fire events and control measures continued to ensure rapid spread of this weed does not occur. 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 the Department of Primary Industries and Water (2006) *Gorse National Best Practice Manual, Managing Gorse (Ulex europaeus L.) in Australia* should be referred to.

Community groups are to be supported such as the continuation of the Great Grose Weed Walk program. This program has been running for 11 years developing from a targeted gorse control program.

Monitoring:

All known infestations of gorse need to be recorded and monitored for at least 80 years due to the longevity of the seed bank.

Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.2.10 Lantana *Lantana camara*

Distribution and abundance:

Low densities of lantana are found in:

Kanangra Area: Blue Mountains NP; and

Hawkesbury Area: Blue Mountains NP, Wollemi NP, Yellomundee NP.

Impacts:

Lananta is listed as a *Weed of National Significance and 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 occurring both physically and chemically by 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.

Concern about the impacts of lantana has led the NSW Scientific Committee listing *invasion, establishment and spread of Lantana* as a Key Threatening Process under the TSC Act. Threatened species and EEC's of greatest concern in the Region that are most likely to be impacted by lantana include Blue Mountains shale cap forest in the Sydney Basin Bioregion, Cooks River/Castlereagh ironbark forest in the Sydney Basin Bioregion, Sydney coastal river flat forest. Lantana is additionally impacting upon regionally significant vegetation communities in diatremes in the Region.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where lantana is impacting upon threatened species and EEC's including:

- Blue Mountains shale cap forest in the Sydney Basin Bioregion such as at Kurrajong Heights, Blue Mountains NP in Hawkesbury Area;
- Cooks River/Castlereagh ironbark forest in the Sydney Basin Bioregion in Yellomundee RP;
- Sydney Coastal River Flat Forest in Yellomundee RP;
- the regionally significant diatremes such as Erskine Creek diatreme in Blue Mountains NP in Hawkesbury Area.

High priority (No. 5) programs include those where lantana is significantly impacting upon World Heritage values such as in Blue Mountains NP in Kanangra Area and Hawkesbury Area and Wollemi NP in Hawkesbury Area.

Medium priority (No. 8) programs include those where lantana is significantly impacting upon recreation areas such as Colo Meroo Camping Ground in Wollemi NP and Erskine Creek in Blue Mountains NP both in Hawkesbury Area.

Control:

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

Biological control agents released in the Region include a leaf eating beetle *Charidotus pygmatea* and a leaf mining moth *Ectarga garcia* on the Nepean River near Euroka clearing in 1999. These releases were a cooperative effort between, NPWS, BMCC and the Department of Agriculture. Both agents to date have not established viable populations.

Monitoring:

Monitoring of large infestations of lantana is to include annual photographs of sites including pre and post control photographs and sizes of regeneration areas treated. Liaison with the Department of Agriculture is to continue in respect to monitoring of biological control agents. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.2.11 Monterey Pine *Pinus radiata* & other spp

Distribution and abundance:

Low densities of pines are found in:

Kanangra Area: Yerranderie SCA, Abercrombie River NP;

Upper Mountains Area: Wollemi NP (Newnes Plateau); and
Hawkesbury Area: Wollemi NP.

Medium densities of pines are found in:
Upper Mountains Area: Blue Mountains NP.

High densities of pines are found in:
Kanangra Area: Blue Mountains NP, (along the Oberon Colong Stock Route and Mt Werong) Jenolan KCR (large interface with forestry plantations); and
Upper Mountains Area: Marrangaroo NP (large interface with forestry plantations).

Impacts:

Pines are invasive species that have the potential to become a dominating tree. 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.

Invasion of exotic species such as pines are listed as a threat to the EEC Newnes Plateau shrub swamp in the Sydney Basin Bioregion found in Blue Mountains NP and Wollemi NP in the Upper Mountains Area. If pines are found within this EEC it is critical that management is undertaken to control these weeds.

Priorities for Control (refer to Section 8 Pest Program Priorities):

High priority (No. 5) programs include those where pines are significantly impacting upon World Heritage values such as in Blue Mountains NP in Kanangra Area and Upper Mountains Area, Jenolan KCR, Kanangra-Boyd NP, Wollemi NP in Upper Mountains Area and Hawkesbury Area (such as at Colo Meroo).

Medium priority (No. 7) programs include those where pines are significantly impacting upon Wilderness values such as the Kanangra Wilderness in Yerranderie SCA (programs are already occurring in the Kanangra Wilderness in Kanangra-Boyd NP, the Grose Wilderness in Blue Mountains NP in Upper Mountains Area and the Wollemi Wilderness in Wollemi NP, Upper Mountains Area and Hawkesbury Area due to World Heritage values).

Lower priority (No. 12) programs include those where pine control programs need to continue to maintain program benefits of previous controls such as in Marrangaroo NP and Abercrombie River NP.

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 utilised as can follow up controls after fire.

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.

11.2.12 Pampas Grass *Cortaderia selloana*

Distribution and abundance:

Pampas grass has significantly expanded in the last five period across the Hawkesbury Area.

Low densities of pampas grass are found in:

Upper Mountains Area: Blue Mountains NP; and

Hawkesbury Area: Blue Mountains NP, Wollemi NP, Yengo NP, Parr SCA.

Medium densities of pampas grass are found in:

Hawkesbury Area: Yellomundee RP.

Impacts:

Pampas grass is a class 3 or 4 Noxious Weed in the Region (Appendix 7). It readily invades disturbed areas, healthy bushland and riparian areas tolerating full sunlight shade, frost, drought and grazing when mature. It can form dense infestations completely devastating the communities it infests. Dense infestations are impenetrable to people with pampas grass leaves cutting skin and causing skin irritations with contact. It can pose a fire hazard as the large volume of dried leaf matter can dramatically increase fuel loads. It is however very palatable to stock.

Concerns about the impacts of pampas grass and other exotic perennial grasses has led the NSW Scientific Committee listing *Invasion of native plant communities by exotic perennial grasses* as a Key Threatening Process under the *TSC Act*. Threatened species and EEC's of greatest concern in the Region that are most likely to be impacted by pampas grass include western Sydney dry rainforest in the Sydney Basin bioregion and Cumberland Plain woodland communities. Pampas grass is additionally impacting upon regionally significant vegetation communities such as the diatreme vegetation communities.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where pampas grass is impacting upon threatened species and EEC's including:

- Western Sydney Dry Rainforest in the Sydney Basin bioregion in Blue Mountains NP and Wollemi NP in Hawkesbury Area;
- Cumberland Plain woodland communities in Blue Mountains NP and Yellomundee RP in Hawkesbury Area; and
- the regionally significant Erskine Creek diatreme in Blue Mountains NP, Hawkesbury Area.

High priority (No. 5) programs include those where pampas grass is significantly impacting upon World Heritage values such as in Blue Mountains NP and Wollemi NP in Hawkesbury Area, and Yengo NP. This includes pampas grass spreading from roadsides in the World Heritage Areas such as along Putty Road and Bells Line of Road.

Medium priority (No. 9) programs include those where programs controlling Control Class 3 Noxious Weeds such as pampas grass in Parr SCA and Yellomundee RP.

Control:

Seedlings and small plants can be easily pulled out ensuring that the rhizomes are removed. As each flower plume can produce 100 000 seeds which can be blown 40 km they need to be removed and bagged when mature plants cannot be treated immediately. Spraying successfully controls plants, as does the cut and paint method and slashing and spraying of regrowth.

Monitoring:

Monitoring of large infestations of pampas grass is to include annual photographs of sites including pre and post control photographs and sizes of regeneration areas treated. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.2.13 Prickly Pear *Opuntia spp***Distribution and abundance:**

A number of prickly pear species are found in the Region. Common prickly pear *Opuntia stricta* is the most widespread in the Region with Tiger Pear *Opuntia aurantiaca* widespread in Goulburn River NP.

Low densities of prickly pear are found in:

Upper Mountains Area: Wollemi NP;

Hawkesbury Area: Blue Mountains NP (Tree Pear), Yellomundee RP (Tiger Pear); and

Mudgee Area: Wollemi NP, Avisford NR, Munghorn Gap NR, Coolah Tops NP.

Medium densities of prickly pear are found in:

Kanangra Area: Blue Mountains NP, Wollemi NP, Yerranderie SCA; and

Mudgee Area: Turill SCA.

High densities of prickly pear are found in:

Upper Mountains Area: Gardens of Stone NP; and

Mudgee Area: Goulburn River NP (*Opuntia aurantiaca*), Durridgere SCA.

Impacts:

Prickly pear is a Class 4 Noxious Weed 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.

EEC's at greatest risk from prickly pears include the white box yellow box Blakely's red gum woodland in Yerranderie SCA and Blue Mountains NP in Kanangra Area, Coolah Tops NP, Goulburn River NP and Wollemi NP in Mudgee Area. Threatened species at most risk include *Kennedia retrorsa* and *Acacia dangarensis*.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where prickly pear is impacting upon threatened species and EEC's and threatened species such as:

- White box yellow box Blakely's red gum woodland in Yerranderie SCA and Blue Mountains NP in Kanangra Area, Coolah Tops NP, Goulburn River NP and Wollemi NP in Mudgee Area; and
- *Kennedia retrorsa* and *Acacia dangarensis* at Mt Dangar in Goulburn River NP.

High priority (No. 5) programs include those where prickly pear is significantly impacting upon World Heritage values such as in Blue Mountains NP in Kanangra Area and Hawkesbury Area, Jenolan KCR, Gardens of Stone NP, Wollemi NP in Upper Mountains Area and Mudgee Area.

Medium priority (No. 7) programs include those where prickly pear is significantly impacting upon Wilderness values such as the Kanangra Wilderness in Yerranderie

SCA (and Kanangra Wilderness in Kanangra-Boyd NP and the Wollemi Wilderness in Wollemi NP, Upper Mountains Area and Mudgee Area where programs are occurring due to World Heritage values).

Medium priority (No. 8) programs include those where prickly pear is significantly impacting upon recreation areas such as tiger pear infestations in Goulburn River NP at various locations along the river flats.

Lower priority (No. 12) programs include those where prickly pear control programs need to continue to maintain program benefits of previous controls such as in Avisford NR, Munghorn Gap NR, Turill SCA and Yarrobil NP.

Control:

Successful treatments have occurred in the Region with 90% of the Goulburn River NP infestation destroyed on the first herbicide application. However, herbicide applications whether by splatter gun or apparatus attached to quad bikes and other vehicles need to be followed-up, with controls required each year until the entire infestation is destroyed.

The biological control agent *Cactoblastis cactorum* is present in the Region. Infected pear fronds are to be distributed to non infected infestations across the Region.

Monitoring:

Continue to record and map the abundance and density of all infestations of prickly pear, with records to be kept at both Area and Regional offices. Site assessments for new populations and re-infestations are to be carried out on a biannual basis for those localities with a high probability for colonisation such as all previously infected areas. Treated areas need to be monitored regularly for re-growth.

Where biological control agents are released monitoring and assessment of the spread and impacts of the biological control agent are vital. Liaison with the Department of Agriculture is to continue in respect to monitoring of biological control agents.

Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.2.14 Serrated Tussock *Nassella trichotoma*

Distribution and abundance:

Low densities of serrated tussock are found in:

Kanangra Area: Kanangra-Boyd NP;

Mudgee Area: Wollemi NP, Avisford NR, Coolah Tops NP, Goulburn River NP; and

Upper Mountains Area: Blue Mountains NP.

Medium densities of serrated tussock are found in:

Kanangra Area: Evans Crown NR, Jenolan KCR, Wombeyan KCR; and

Upper Mountains Area: Marrangaroo NP.

High densities of serrated tussock are found in:

Kanangra Area: Blue Mountains NP, Yerranderie SCA, Abercrombie River NP; and

Upper Mountains Area: Turon NP.

Impacts:

Serrated tussock is listed as a *Weed of National Significance* and a Class 3 or 4 Noxious Weed in part of the Region (Appendix 7). It is highly invasive weed in native

grasslands, grassy woodlands, rocky shrub lands, dry forest, roadsides and pastures. It is considered one of Australia's worst pasture weeds and it is unpalatable to fodder species. Serrated tussock grows in shade and sun and tolerates fire, frost and drought periods once established.

EEC's at greatest risk from serrated tussock include the white box yellow box Blakely's red gum woodland in Yerranderie SCA and Blue Mountains NP in Kanangra Area, Coolah Tops NP, Goulburn River NP and Wollemi NP in Mudgee Area.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where serrated tussock is impacting upon threatened species and EEC's including serrated tussock in

- White box yellow box Blakely's red gum woodland in Yerranderie SCA and Blue Mountains NP in Kanangra Area, Coolah Tops NP, Goulburn River NP and Wollemi NP in Mudgee Area.

High priority (No.5) programs include those where serrated tussock is significantly impacting upon World Heritage values such as in the Millnigang area in Blue Mountains NP, Kanangra Area.

High priority (No. 6) programs include those where serrated tussock is impacting on regionally important cultural heritage values such as serrated tussock invading Joorilands Sheep Station Heritage precinct in Blue Mountains NP in Kanangra Area.

Medium priority (No. 9) programs include those where serrated tussock is significantly impacting upon agricultural production of neighbouring properties, where those neighbours are continually suppressing serrated tussock. Control programs include those on the boundary and fence lines of Abercrombie River NP, Yerranderie SCA and Blue Mountains NP in Kanangra Area.

Medium priority (No. 8) programs include those where serrated tussock is significantly impacting upon recreation areas such as in camp grounds in Abercrombie River NP.

Lower priority (No. 12) programs include those where serrated tussock control programs need to continue to maintain program benefits of previous controls such as in Blue Mountains NP in Upper Mountains Area, the northern section of Evans Crown NR, Jenolan KCR, Turon NP, Marrangaroo NP and Avisford NR.

Control:

Control includes ground and aerial herbicide spot spraying. Direct seeding of indigenous grasses is to be trialed 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).

Where serrated tussock is found on reserve boundaries active involvement in cooperative programs with community groups and adjacent landholders is essential where it is also being controlled off parks estates 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:

Continue to record and map the abundance and density of all infestations of serrated tussock, with records to be kept at both Area and Regional offices. Site assessments for new populations and re-infestations are to be carried out on a biannual basis for

those localities with a high probability for colonisation such as previous control sites. Treated areas need to be monitored regularly for re-growth.

Where direct seeding of indigenous grasses is employed it must be monitored and assessed. Comparisons between serrated tussock control with and without direct seeding will help formulate management strategies for this species.

Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.2.15 St Johns Wort *Hypericum perforatum*

Distribution and abundance:

Low densities of St Johns wort are found in:

Kanangra Area: Blue Mountains NP, Kanangra-Boyd NP, Hartley HS, Evans Crown NR, Yerranderie SCA, Abercrombie River NP;

Hawkesbury Area: Wollemi NP, Yengo NP, Parr SCA;

Mudgee Area: Avisford NR, Turill SCA; and

Upper Mountains Area: Blue Mountains NP, Wollemi NP, Turon NP, Gardens of Stone NP, Marrangaroo NP.

Medium densities of St Johns wort are found in:

Mudgee Area: Goulburn River NP, Yarrobil NP.

High densities of St Johns wort are found in:

Mudgee Area: Wollemi NP, Munghorn Gap NP, Coolah Tops NP.

Impacts:

St Johns 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 and tolerates drought periods and will recover from frost.

St Johns 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 this weed and will poison stock that continually feed on it. It can additionally cause dermatitis in humans.

EEC's at greatest risk from St Johns wort include the white box yellow box Blakely's red gum woodland in Yerranderie SCA and Blue Mountains NP in Kanangra Area, Coolah Tops NP, Goulburn River NP and Wollemi NP in Mudgee Area. Threatened species at most risk include *Kennedia retrorsa* and *Acacia flocktoniae*.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where St Johns wort is impacting upon threatened species and EEC's and threatened species including:

- White box yellow box Blakely's red gum woodland in Yerranderie SCA and Blue Mountains NP in Kanangra Area, Coolah Tops NP, Goulburn River NP and Wollemi NP in Mudgee Area;
- *Kennedia retrorsa* at Mt Dangar in Goulburn River NP; and
- *Acacia flocktoniae* in Yarrobil National Park.

High priority (No. 6) programs include those where St Johns wort is impacting on regionally important cultural heritage values such as infestations impacting on Hartley Historic Site.

Medium priority (No. 8) programs include those where St Johns wort is significantly impacting upon recreation areas such as in camp grounds, scenic areas in Goulburn River NP.

Lower priority (No. 11) programs include those where Class 4 and 5 Noxious Weeds such as St Johns wort is significantly impacting upon agricultural production of neighbouring properties, where those neighbours are continually suppressing St Johns wort. Control programs include targeting St Johns wort on the southern boundary of Evans Crown NR and most of the reserve boundaries in Mudgee Area including Wollemi NP, Avisford NR, Munghorn Gap NR, Coolah Tops NP, Goulbourn River NP, Turill SCA and Yarrobil NP.

Lower priority (No. 12) programs include those where St Johns wort control programs need to continue to maintain program benefits of previous controls such as in Kanangra-Boyd NP, Evans Crown NR, Abercrombie River NP, Wollemi NP in Hawkesbury Area, Yengo NP, Parr and SCA.

Control:

For small infestations seedlings can be hand pulled. Where fires have burnt areas containing St Johns wort, effective control can be made by follow up spraying in the spring. As ongoing herbicide treatment of St Johns wort is very costly for large infestations in the region, sustainable options of control need to be explored such as the seeding of native grasses to out-compete this weed. Active involvement in cooperative programs with community groups and adjacent landholders is essential especially where St Johns wort is being controlled on adjacent lands.

Numerous biological control agents have been released across the Region including *Crysilinus* beetle, spittle beetle and St Johns wort mite with little or no visible effect having been recorded.

Other weeds that are often associated with St Johns wort 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:

Continue to record and map the abundance and density of all infestations of serrated tussock, with records to be kept at both Area and Regional offices. Site assessments for new populations and re-infestations are to be carried out on a biannual basis for those localities with a high probability for colonisation such as previous control sites. Treated areas need to be monitored regularly for re-growth.

Where biological control agents are released monitoring and assessment of the spread and impacts of the biological control agent are vital.

Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.2.16 Sycamore Maple *Acer pseudoplatanus*

Distribution and abundance:

High densities of sycamore maple are found in:
Kanangra Area: Jenolan KCR.

Low densities of sycamore maple are found in:
Upper Mountains Area: Blue Mountains NP.

Impacts:

Sycamore maple is found in both healthy bushland and disturbed areas, growing vigorously in sunny or lightly shaded conditions. 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 leaf drop in autumn can impede native vegetation growth. The fast growing rates 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 yet be fully realised.

In Jenolan KCR a one square km sycamore maple stand is providing a source of spread of this species to satellite infestations into moist gully areas.

Priorities for Control (refer to Section 8 Pest Program Priorities):

High priority (No. 5) programs include those where large stands of sycamore maple are significantly impacting upon the World Heritage values in Jenolan KCR.

Medium priority (8) programs include those where large stands of sycamore maple are significantly impacting upon recreational values in Jenolan KCR (programs are already occurring due to World Heritage values).

Control:

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

Staged removal of the large stand of sycamore maples is necessary due to slope constraints. Bush regeneration principles are to be used where sycamore maples can be controlled from the islands of native vegetation that still exist in amongst the stand. Satellite infestations down the moist gullies are to be searched for and treated (using mapping of this weed at Jenolan KCR completed in January 2007). Sycamore maples found in areas with basalt soils such as in Jenolan KCR and in Blue Mountains NP near Mt Wilson are to be prioritised as this weed is identified as spreading significantly these soils.

Monitoring:

Continue to record and map the abundance and density of all infestations of sycamore maple, with records to be kept at both Area and Regional offices. Treated areas need to be monitored regularly for re-growth.

11.2.17 Tree of Heaven *Ailanthus altissima*

Distribution and abundance:

Low densities of tree of heaven are found in:

Kanangra Area: Kanangra-Boyd NP, Yerranderie SCA, Evans Crown NR, Wombeyan KCR;

Upper Mountains Area: Gardens of Stone NP, Marrangaroo NP;

Hawkesbury Area: Blue Mountains NP, Yellomundee RP, Wollemi NP; and

Mudgee Area: Wollemi NP, Munghorn Gap NR.

Medium densities of tree of heaven are found in:

Kanangra Area: Jenolan KCR
Mudgee Area: Avisford NR, Yarrobil NP;
Upper Mountains Area: Turon NP; and
Hawkesbury Area: Wollemi NP.

High densities of tree of heaven are found in:

Kanangra Area: Blue Mountains NP;
Upper Mountains Area: Blue Mountains NP, Wollemi NP; and
Mudgee Area: Goulburn River NP.

Impacts:

Tree of heaven is a Class 4 Noxious Weed in part of the Region (Appendix 7). 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.

Priorities for Control (refer to Section 8 Pest Program Priorities):

High priority (No. 5) programs include those where tree of heaven is significantly impacting upon World Heritage values such as in Wollemi NP in Hawkesbury, Upper Mountains and Mudgee Areas, Blue Mountains NP in Kanangra, Upper Mountains and Hawkesbury Areas, Gardens of Stone NP. Support needs to continue for the 'Friends of the Colo' volunteers tackling tree of heaven along the Colo River, Wollemi NP, Hawkesbury Area.

High priority (No. 6) programs include those where tree of heaven is impacting on regionally important cultural heritage values such as the large clumps impacting on the historic Newnes shale mine ruins through disturbance to built structures in Wollemi NP, Upper Mountains Area.

Medium priority (No. 7) programs include those where tree of heaven is significantly impacting upon Wilderness values such as in the Kanangra Wilderness in Yerranderie SCA (programs are already occurring in the Grose Wilderness in Blue Mountains NP in Upper Mountains and Hawkesbury Areas, Kanangra Wilderness in Kanangra-Boyd NP and Blue Mountains NP in Kanangra Area and Wollemi Wilderness in Wollemi NP in Upper Mountains and Mudgee Areas due to World Heritage values).

Medium priority (No. 8) programs include those where tree of heaven is significantly impacting upon recreation areas such as in Newnes camp ground in Wollemi NP, Upper Mountains Area.

Lower priority (No. 11) programs include those where Control Class 4 Noxious Weeds such as tree of heaven is significantly impacting upon agricultural production of neighbouring properties, where those neighbours are continually suppressing tree of heaven. Control programs include those on the boundaries of Avisford NR, Coolah Tops NP, Goulbourn River NP and Wollemi NP in Mudgee Area.

Lower priority (No. 12) programs include those where tree of heaven control programs need to continue to maintain program benefits of previous controls such as in Turon NP, Munghorn Gap NR and Yarrobil NP.

Control:

Seedlings and small plants can be hand pulled. Cut/scrape and paint, injection methods and basal bark techniques are used in healthy bushland whilst herbicide spraying using splatter guns and foliar spraying are used in disturbed areas. Trials of the cut and paint method on tree of heaven have been successful along the Colo River

by the Friends of Colo volunteers. Irrespective of the technique used, follow-up is required for several years to ensure eradication of the suckers.

Monitoring:

Continue to record and map the abundance and density of all infestations of tree of heaven, with records to be kept at both Area and Regional offices. Site assessments for new populations and re-infestations are to be carried out on a biannual basis for those localities with a high probability for colonisation such as previous treatment sites. Treated areas need to be monitored regularly for re-growth.

11.2.18 Tutsan *Hypericum spp*

Tutsan species in this Strategy refers to both *Hypericum androsaemum* and *Hypericum koutyense* which are both impacting on natural environments in the Region.

Distribution and abundance:

Medium densities of tutsan are found in:
Upper Mountains Area: Blue Mountains NP.

High densities of tutsan are found in:
Kanangra Area: Blue Mountains NP, Jenolan River and the Cox's River to Lake Burrangora in Kanangra-Boyd NP, Jenolan KCR.

Impacts:

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.

Priorities for Control (refer to Section 8 Pest Program Priorities):

High priority (No. 5) programs include those where tutsan is significantly impacting upon World Heritage values such as Kanangra-Boyd NP, Jenolan KCR and Blue Mountains NP in Kanangra and Upper Mountains Areas.

Control:

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. Small plants can be hand pulled ensuring that the root is removed. Both the cut and paint method and spraying are successful for this plant.

A rust fungus biocontrol agent has been released during in the infestations of Tutsan in Kanangra Area during the previous planning period. This release was not successful however as climatic factors and genetic variations amongst both rust and Tutsan affect the impact of this biocontrol agent. Several releases of different batches of the biocontrol agent at various times of the year are more likely to prove successful.

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. Liaison with the Department of Agriculture is to continue in respect to monitoring of biological control agents.

11.2.19 Willows *Salix spp*

Willow species in this Strategy refers to all willow species listed as Noxious Weeds in NSW. Exceptions include *S babylonica*, *S x reichardtii* and *S x calodendron*.

Distribution and abundance:

Significant control of willow species has occurred across the Region over the past 10 years 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 to medium and low densities across various river systems in all Areas.

Low densities of willow are found in:

Kanangra Area: Blue Mountains NP, Kowmung River and Budthingeroo Creek in Kanangra-Boyd NP, Fish River system in Evans Crown NR, Retreat River system and Felled Timber Creek in Abercrombie River NP, Jenolan KCR (and off park estate in Hollanders and Tuglow Rivers);

Upper Mountains Area: Grose River, Govetts Creek, Katoomba Creek and Jamison Creek in Blue Mountains NP, Colo and Wolgan River systems in Wollemi NP, Marrangaroo NP;

Hawkesbury Area: Colo River system in Wollemi NP, (lower) Grose River in Blue Mountains NP; and

Mudgee Area: Colo River system in Wollemi NP, Munghorn Gap NR, Coolah Tops NP, entire length of riparian areas in Goulburn River NP.

Medium densities of willow are found in:

Upper Mountains Area: Turon NP; and

Hawkesbury Area: Blue Mountains NP, Yellomundee RP.

Impacts:

Willows are listed as a *Weed of National Significance* and are listed as a Class 5 Noxious Weed in the Region. 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 macro invertebrates cannot tolerate habitats with such an increased nutrient loads and decreased oxygen levels in winter and total shade in summer, those species that prey on macro invertebrates such as platypus cannot continue to utilise these habitats.

Threatened species of greatest concerns in the Region that are most likely to be impacted by willows include the endangered booroolong frog *Litoria booroolongensis*. Recent studies have found that 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 2006b). Other threatened species and EEC's at risk include *Epacris hamiltonii*, *Epacris sparsa* and Cooks River/Castlereagh ironbark forest in the Sydney Basin Bioregion.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where willows are impacting upon threatened species and EEC's such as:

- booroolong frog in Abercrombie River NP;
- *Epacris hamiltonii* in perennial creeks and seepage areas in Blue Mountains NP in Upper Mountains Area;
- *Epacris sparsa* in riparian areas between Vale of Avoca and Faulconbridge Point in Blue Mountains NP in Hawkesbury Area; and

- Cooks River/Castlereagh ironbark forest in the Sydney Basin Bioregion in Yellomundee RP.

High priority (No.5) programs include those where willows are significantly impacting upon World Heritage values such as in Wollemi NP in all Areas, Blue Mountains NP in all Areas (eg the middle Grose and Brown Creek in Blue Mountains NP, Hawkesbury Area), Kanangra-Boyd NP and Jenolan KCR.

Medium priority (No. 7) programs include those where willows are significantly impacting upon Wilderness values such as in the Kanangra Wilderness in Yerranderie SCA (programs are already occurring in the Grose Wilderness in Blue Mountains NP, Kanangra Wilderness in Kanangra-Boyd NP and Blue Mountains NP and Wollemi Wilderness in all Areas due to World Heritage values).

Medium priority (No. 9) programs include those where willows are significantly impacting upon park values and community programs have ongoing proven effectiveness and participation such as in Evans Crown Nature Reserve, Abercrombie River NP, Turon NP, Marrangaroo NP, Yellomundee RP, Munghorn Gap NR, Coolah Tops NP and Goulburn River NP.

Control:

Considerable control of willows throughout the Region has been achieved through the mobilisation and supervision of volunteer teams to access willow infestations in remote areas. Volunteer groups include the *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 the planning process of any willow control program the Department of Primary Industries and Water *Willows National Best Practice Manual*, should be referred to.

Where the control of willows may threaten recreation 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 committees and weed advisory committees. Programming of skilled staff to direct these volunteer programs is essential. Kanangra Area is currently coordinating a grant from Lachlan Catchment Management Authority to control willows along Abercrombie River, within both the World Heritage Area and on neighbouring private properties.

Monitoring:

Continue to record and map the abundance and density of all infestations of willows, with records to be kept at both Area and Regional offices. Site assessments for new populations and re-infestations are to be carried out on a biannual basis for those localities with a high probability for colonisation such as previous treatment sites.

Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.3 Pathogen Pest Species Program Overview

11.3.1 Phytophthora *Phytophthora cinnamomi*

Distribution and abundance:

Phytophthora is found throughout the region. As it can spread by water flow, pig disturbance and movement, and infected soil on footwear or clothing it can reach the most remote parts of the region.

Impacts:

Infection of native plants by Phytophthora cinnamomi is listed as a Key Threatening Process under *TSC Act* and *Dieback caused by the root-rot fungus Phytophthora cinnamomi* is listed as a Key Threatening Process under the *EPBC Act*. It infects a large range of species, which can display a range of symptoms from no apparent symptoms to damage and death. Wollemi Pines are known to be affected by Phytophthora. Other threatened species such as Mossy Geebungs are known to occur in the vicinity of phytophthora infestations. This species may be adversely affected by phytophthora through direct infestation.

Priorities for Control (refer to Section 8 Pest Program Priorities):

Critical priority (No. 1) programs include those where phytophthora is impacting upon threatened species including:

- Wollemi pines in Wollemi NP, Mudgee Area; and
- Mossy geebungs in Blue Mountains NP in Kanangra and Upper Mountains Areas.

Control:

Visitation to the Wollemi pine site for research, monitoring and management purposes has been restricted to minimise the risk of pathogen introduction. All authorised researchers and visitors need to comply with the strict hygiene protocol as outlined in the Wollemi Pine Recovery Plan (DEC 2006c). Unauthorised visitation to Wollemi Pine sites need constant investigation and active management. The discovery of phytophthora at one of the Wollemi Pine sites in October 2005 has resulted in ongoing implementation of control measures at this site.

Controls of phytophthora include both soil sterilants and systemic fungicides. Pig control is needed where both phytophthora and threatened species impacted by this pathogen are present. Where phytophthora is known to occur hygiene measures (such as those outlined in the Wollemi Pine Recovery Plan) are to be practiced to minimise its spread from one area to another.

Monitoring:

Soil sampling needs to occur annually where susceptible threatening species are located. Where threatened species/ecological community programs are occurring liaise with NPWS Threatened Species Unit to implement appropriate monitoring programs for those threatened species/ecological communities.

11.3.2 Other pathogen pest species

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

Control of these diseases needs to be investigated and prioritised if they are impacting on threatened species within the Blue Mountains Region as outlined in Section 8. Recording and monitoring of any new pest program is essential to measure the effectiveness of the program.

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Appendices

Appendix 1 Consultation process

Internal consultation

Relevant NPWS staff have been involved in the development of this Strategy. The process has involved:

Review of existing strategies

The Blue Mountains Region Pest Management Strategy 2002 – 2005 and local plans were reviewed.

Area workshops

Relevant staff (including Area Managers) were involved in the preparation of this Strategy through: an Area workshop; review comments; and comments on the earlier draft of this Strategy.

The workshops reviewed pest animal and weed programs within each Area. The status of each pest and weed program was discussed and Area-wide priorities identified.

Preparation of an initial draft strategy

After completion of the workshops, a draft strategy based on the state-wide template and the priorities outlined at the workshops was developed. Copies of the initial draft regional strategy were circulated to all Area Managers, the Regional Operations Coordinator and the Regional Manager for comment.

Public consultation

Release of draft Regional Pest Management Strategy for public comment

A copy of the draft strategy is being made available for public comment for a period of six weeks. The consultation will include:

- posting on the NPWS web site;
- public notices in local newspapers; and
- copies sent to stakeholders (for example Rural Lands Protection Boards, local councils, relevant government agencies and key community groups).

Revise and prepare final Regional Pest Management Strategy

Prepare the final strategy taking into consideration comments made during the public consultation process.

Final copies are to be approved by the DECC Parks and Wildlife Division Branch Director.

Distribution of copies

Hard copies of the final plan are to be forwarded to: Branch Director; Regional Manager; All Area Managers in the region; all Rangers in the region; Regional Operations Coordinator; Regional Pest Management Officer; each library within the region; PWD library in Hurstville; Pest Management Unit in RWC Branch at Hurstville; each member of the NPWS Regional Advisory Committee; one copy to each local council in the region; one copy to each RLPB in the region; one copy to each CMA in the region; and copies to other key stakeholder groups.

Appendix 2 Summary of Priority Pest Programs

Priority Regional Coordination Programs

Item	Priority Summary	Program Status	Section Ref
Critical internal and external liaison	Coordination with NPWS Threatened Species Unit and other agencies to ensure critical priority programs are undertaken including those identified under the NSW Threatened Species Priorities Action Statement, where new occurrences of highly invasive species are spreading and where pests may significantly impact on human health.	Continuing	8
Reporting structures	Systems and databases are to be developed as part of the Monitoring and Evaluation component of the Park Management Program. Records at the Region Office need to be transferred into an electronic data base to allow analysis of each program.	New	9
Volunteer Coordinators	Recruitment and support for a new position to coordinate volunteers within the Region.	New	10
Regional Coordination	Senior Ranger, Pest Management position to be filled.		10
Training	Opportunities for all operational staff to undertake pest management training eg various levels of bush regeneration.	Continuing	10

Critical Priority Control Programs – Pest Animals

Pest	Area	Reserve	Location	Prio rity	Threat / program	Program Status	Section Reference
Cat	UMA	BMNP	TS sites	1	blue mountains water skink	With BMCC	11.1.1
Cattle	KA	BMNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	11.1.2
Cattle	KA	BMNP	WSA	2	Special Areas	Continuing	
Cattle	KA	YSCA	EEC sites	1	W/box y/box r/gum woodland	Continuing	
Cattle	KA	YSCA	WSA	2	Special Areas	Continuing	
Cattle	KA	KBNP	EEC sites	1	River-flat forest on coastal f/plain	Continuing	
Deer	KA	BMNP	WSA	2	Special Areas	Continuing	11.1.3
Deer	HA	YenNP	roads	2	Park users	Continuing	
Deer	HA	PSCA	roads	2	Park users	Continuing	
Deer	HA	WNP	Putty Road	2	Park users	Continuing	
Deer	HA	WNP	Mellong	1	<i>Eucalyptus</i> sp. Howes swamp ck	Continuing	
Deer	MA	WNP	Widden V	4	new occurrences	New	
Deer	MA	CTNP		4	new occurrences	New	
Goat	KA	YSCA	WSA	2	Special Areas	Continuing	11.1.4
Goat	KA	YSCA	EEC sites	1	W/box y/box r/gum woodland	Continuing	
Goat	KA	BMNP	Millnigang/Bull'g	1	broad-headed snake	Continuing	
Goat	KA	BMNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
Goat	KA	BMNP	WSA	2	Special Areas	Continuing	
Goat	KA	KBNP	TS sites	1	brush-tail rock-wallaby	Continuing	
Goat	KA	KBNP	TS sites	1	broad-headed snake	Continuing	
Goat	KA	KBNP	WSA	2	Special Areas	Continuing	
Goat	UMA	GOSNP	S/s escarpment	1	broad-headed snake	Continuing	
Goat	HA	PSCA	TS sites	1	brush-tail rock-wallaby	Continuing	
Goat	HA	YenNP	TS sites	1	brush-tail rock-wallaby	Continuing	
Goat	MA	CTNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
Goat	MA	WNP	Bylong & Myrtle	1	brush-tail rock-wallaby	New	
Goat	MA	GRNP	TS sites	1	brush-tail rock-wallaby	Continuing	
Horse	KA	BMNP	WSA	1	Dry alluvial paperbark w/lands	Needs plan	11.1.5
Horse	KA	BMNP	WSA	2	Special Areas	approval	
Horse	KA	KBNP	WSA	2	Special Areas	As above	
Pig	KA	BMNP	WSA	2	Special Areas	Continuing	11.1.6
Pig	KA	BMNP	EEC	1	W/box y/box r/gum woodland	Continuing	
Pig	KA	KBNP	Church/Billys Ck	2	Special Areas	Continuing	
Pig	KA	KBNP	Boyd Plateau	1	<i>Acacia clunies-rossiae</i>	Continuing	
Pig	KA	KBNP	Boyd Plateau	1	<i>Diuris aequalis</i>	Continuing	
Pig	KA	KBNP	Boyd Plateau	1	<i>Baloskian longipes</i>	Continuing	
Pig	KA	KBNP	Boyd Plateau	1	<i>Montaine peatlandsand swamps</i>	Continuing	
Pig	KA	KBNP	Boyd River	1	<i>Trachymene saniculifolia</i>	Continuing	
Pig	KA	YSCA	EEC	1	W/box y/box r/gum woodland	Continuing	
Pig	KA	YSCA	WSA	2	Special Areas	Continuing	
Pig	MA	WNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
Pig	MA	GRNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
Pig	MA	CTNP	EEC sites		W/box y/box r/gum woodland	Continuing	
Pig	HA	WNP	Mellong	1	<i>Eucalyptus</i> sp. Howes swamp creek	Continuing	
Pig	UMA	BMNP	EEC sites	1	Newnes Plateau shrub swamp	Continuing	
Pig	UMA	BMNP	Kedumba	1	<i>Eucalyptus benthamii</i>	Continuing	

Pest	Area	Reserve	Location	Priority	Threat / program	Program Status	Section Reference
Pig	UMA	WNP	EEC sites	1	Giant dragonfly	Continuing	
Pig	UMA	WNP	EEC sites	1	Blue Mountains water skink	Continuing	
Pig	UMA	WNP	EEC sites	1	Newnes Plateau shrub swamp	Continuing	
Fox	UMA	WNP	Wolgan	1	Brush-tail rock-wallaby	Continuing	11.1.8
Fox	KA	JKCR	Colony sites	1	Bush-tail rock-wallaby	Continuing	
Fox	MA	WNP	Myrtle Creek	1	Brush-tail rock-wallaby	New	
Fox	MA	WNP	Widden	1	Brush-tail rock-wallaby	New	
Fox	MA	GRNP	Colony sites	1	Brush-tail rock-wallaby	New	
Fox	MA	YarNP	TS sites	1	Malleefowl	New Park	
Fox	UMA	BMNP	Narrowneck	1	EEC swamp communities, eastern pygmy possum	New	
Dog	UMA	BMNP	Various camps	2	park visitors at campsites	New	11.1.9
Dog *	UMA	BMNP	Green Valley	3	Neighbouring stock	Continuing	
Dog	UMA	WNP	Various camps	2	park visitors at campsites	New	
Dog *	UMA	WNP	Boundaries	3	Neighbouring stock	Continuing	
Dog *	UMA	GOSNP	Boundaries	3	Neighbouring stock	Continuing	
Dog *	UMA	TNP	Boundaries	3	Neighbouring stock	Continuing	
Dog *	KA	KBNP	Boundaries	3	Neighbouring stock	Continuing	11.1.9
Dog *	KA	YSCA	Boundaries	3	Neighbouring stock	Continuing	
Dog *	KA	ARNP	Boundaries	3	Neighbouring stock	Continuing	
Dog *	KA	BMNP	Boundaries	3	Neighbouring stock	Continuing	
Dog *	MA	WNP	Boundaries	3	Neighbouring stock	Continuing	
Dog *	MA	ANR	Boundaries	3	Neighbouring stock	Continuing	
Dog *	MA	MGNP	Boundaries	3	Neighbouring stock	Continuing	
Dog *	MA	CTNP	Boundaries	3	Neighbouring stock	Continuing	
Dog *	MA	GRNP	Boundaries	3	Neighbouring stock	Continuing	
Dog *	MA	TSCA	Boundaries	3	Neighbouring stock	New Park	
Dog *	MA	GSCA	Boundaries	3	Neighbouring stock	New Park	
Dog *	MA	YarNP	Boundaries	3	Neighbouring stock	New Park	
Dog *	MA	DSCA	Boundaries	3	Neighbouring stock	New Park	
Dog *	MA	CSCA	Boundaries	3	Neighbouring stock	New Park	
Dog *	HA	WNP	Mellong Precinct	3	Neighbouring stock	Continuing	
Bird	KA	BMNP	EEC sites	1	W/box y/box r/gum woodland, threatened woodland birds	Monitoring	11.1.10

Critical Priority Control Programs – Weeds

Weeds	Area	Reserve	Location	Priority	Threat / program	Program Status	Section Reference
Aquatic	HA	BMNP	Hawkesbury-Nepean River	3	Turf industry	Continuing	11.2.1
Aquatic	HA	YRP	Hawkesbury-Nepean River	3	Turf industry	Continuing	
Aquatic			Waterways	4	New incursion	As needed	11.2.1
Riparian	UMA	BMNP	TS sites	1	<i>Epacris hamiltonii</i>	Continuing	11.2.2
Riparian	UMA	BMNP	TS sites	1	<i>Pultenaea glabra</i>	Continuing	
Riparian	KA	BMNP	Coxs	1	<i>Acacia clunies-rossiae</i>	Continuing	
Riparian	KA	KBNP	Kowmung	1	<i>Acacia clunies-rossiae</i>	Continuing	
Riparian	HA	BMNP	Vale of Avoca	1	<i>Epacris sparsa</i>	Continuing	
Riparian	HA	BMNP	Faulconbridge	1	Cumberland Plain woodland	New	
Riparian	HA	BMNP	EEC sites	1	Shale-s/stone transition forest	New	
Riparian	HA	BMNP	EEC sites	1	Western Sydney dry rainforest	New	
Riparian	HA	BMNP	EEC sites	1	Blue Mountains swamp	New	
Riparian	HA	WNP	EEC sites	1	Western Sydney dry rainforest	New	
Riparian	HA	WNP	EEC sites	1	Blue Mountains swamp	New	
Riparian	HA	YRP	EEC sites	1	Cumberland Plain woodland	New	
Riparian	HA	YRP	EEC sites	1	Shale-s/stone transition forest	New	
Riparian	HA	YRP	EEC sites	1	Cooks R/Castlereagh ironbark f	Continuing	
Riparian	HA	YRP	EEC sites	1	Sydney coastal river flat forest	Continuing	
Bush	UMA	BMNP	TS cliff sites	1	<i>Microstrobos fitzgeraldii</i>	Continuing	11.2.3
Bush	UMA	BMNP	TS sites	1	<i>Persoonia acerosa</i>	Continuing	
Bush	UMA	BMNP	EEC sites	1	Upland swamps	Continuing	
Bush	HA	BMNP	EEC sites	1	Cumberland Plain communities		
Bush	HA	BMNP	EEC sites	1	Blue Mountains shale cap forest		
Bush	HA	YRP	EEC sites	1	Cumberland Plain communities		
Bush	HA	YRP	EEC sites	1	Shale-s/stone transition forest		
Bush	HA	YRP	EEC sites	1	Sydney-s/stone ridgetop woodl		
Bush	HA	WNP	EEC sites	1	Blue Mountains shale cap forest		
Open	KA	BMNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	11.2.4
Open	KA	YSCA	EEC sites	1	W/box y/box r/gum woodland	Continuing	
Open	MA	CTNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
Open	MA	GRNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	

Weeds	Area	Reserve	Location	Prio rity	Threat / program	Program Status	Section Reference
Open	MA	WNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
Berberis	KA	YSCA	TS sites	1	W/box y/box r/gum woodland	Continuing	12.2.5
Berberis	KA	BMNP	TS sites	1	W/box y/box r/gum woodland	Continuing	
B/berry	MA	WNP	TS sites	1	Wollemi pine (catchment area)	Continuing	11.2.6
B/berry	HA	WNP	Mt Tootie	1	Blue Mountains shale cap forest	Continuing	
B/berry	HA	WNP	TS sites	1	Blue Mountains swamps	Continuing	
B/berry	HA	BMNP	TS sites	1	Blue Mountains shale cap forest	Continuing	
B/berry	HA	BMNP	TS sites	1	Blue Mountains swamps	Continuing	
B/berry	KA	BMNP	WSA	2	Special Areas	Continuing	
B/berry	KA	KBNP	WSA	2	Special Areas	Continuing	
B/berry	KA	YSCA	WSA	2	Special Areas	Continuing	
Broom	KA	KBNP	Boyd Plateau	1	<i>Biodiversity at altitude</i>	Continuing	11.2.7
Broom	UMA	BMNP	TS sites	1	<i>Microstrobos fitzgeraldii</i>	Continuing	11.2.7
Broom	UMA	BMNP	TS sites	1	<i>Epacris hamiltonii</i>	Continuing	
Broom	UMA	BMNP	EEC sites	1	Upland swamps	Continuing	
Gorse	UMA	BMNP	TS sites	1	<i>Epacris sparsa</i>	Continuing	11.2.9
Gorse	UMA	BMNP	TS sites	1	<i>Epacris hamiltonii</i>	Continuing	
Gorse	UMA	BMNP	Braeside and Govett's Leap	1	<i>Isopogon fletcheri</i>	Continuing	
Gorse	UMA	BMNP	EEC sites	1	Upland swamps	Continuing	
Lantana	HA	BMNP	Kurrajong	1	Blue Mountains shale cap forest	Continuing	11.2.10
Lantana	HA	YRP	EEC sites	1	Cooks R/Castlereagh Ironbark f	Continuing	
Lantana	HA	YRP	EEC sites	1	Sydney coastal river flat forest	Continuing	
Lantana	HA	BMNP	Regionally signif	1	Erskine Creek diatrema	Continuing	
Pampas	HA	BMNP	EEC sites	1	Western Sydney dry rainforest	Continuing	11.2.12
Pampas	HA	BMNP	Regionally signif	1	Erskine Creek diatrema	Continuing	
Pampas	HA	BMNP	EEC sites	1	Cumberland Plain communities	Continuing	
Pampas	HA	WNP	EEC sites	1	Western Sydney dry rainforest	Continuing	
Pampas	HA	YRP	EEC sites	1	Cumberland Plain communities	Continuing	
P/pear	KA	YSCA	EEC sites	1	W/box y/box r/gum woodland	Continuing	11.2.13
P/pear	KA	BMNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
P/pear	MA	CTNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
P/pear	MA	GRNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
P/pear	MA	GRNP	Mt Dangar	1	<i>Kennedia retrorsa</i>	Continuing	
P/pear	MA	GRNP	Mt Dangar	1	<i>Acacia dangarensis</i>	Continuing	
P/pear	MA	WNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
Tussock	KA	YSCA	EEC sites	1	W/box y/box r/gum woodland	Continuing	11.2.14
Tussock	KA	BMNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
Tussock	MA	CTNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
Tussock	MA	GRNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
Tussock	MA	WNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
St John	KA	YSCA	EEC sites	1	W/box y/box r/gum woodland	Continuing	11.2.13
St John	KA	BMNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
St John	MA	CTNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
St John	MA	GRNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
St John	MA	GRNP	Mt Dangar	1	<i>Kennedia retrorsa</i>	Continuing	
St John	MA	YarNP		1	<i>Acacia flocktoniae</i>	New Park	
St John	MA	WNP	EEC sites	1	W/box y/box r/gum woodland	Continuing	
Willows	KA	ARNP	TS sites	1	Booroolong frog	Continuing	11.2.19
Willows	HA	YRP	EEC sites	1	Cooks R/Castlereagh ironbark f	Continuing	
Willows	UMA	BMNP	TS sites	1	<i>Epacris hamiltonii</i>	Continuing	
Willows	HA	BMNP	TS sites	1	<i>Epacris sparsa</i>	Continuing	

Critical Priority Control Programs – Pathogens

Pathog en	Area	Reserve	Location	Prio rity	Threat / program	Program Status	Section Reference
Phytoph thora	MA	WNP	TS sites	1	Wollemi pines	Continuing	11.3.1

Critical Priority 1: targeting pests threatening significant species and communities programs

Critical Priority 2: targeting pests significantly impacting on human health programs

Critical Priority 3: targeting pests significantly impacting on agricultural production; Control Class 1 & 2

Noxious Weeds

Critical Priority 4: targeting new occurrences of highly invasive species

Dog*: this program additionally culls foxes

High Priority Control Programs – Pest Animals

Pest	Area	Reserve	Location	Prio rity	Threat / program	Program Status	Section Reference
Cattle	KA	KBNP	World Heritage	5	World Heritage values	Continuing	11.1.2
Cattle	KA	BMNP	World Heritage	5	World Heritage values	Continuing	
Cattle #	KA	BMNP	Joorilands	6	cultural heritage	Continuing	

Pest	Area	Reserve	Location	Priority	Threat / program	Program Status	Section Reference
Cattle	UMA	WNP	World Heritage	5	World Heritage values	Continuing	
Cattle	UMA	BMNP	World Heritage	5	World Heritage values	Continuing	
Cattle	HA	WNP	World Heritage	5	World Heritage values	Continuing	
Cattle	HA	Yen NP	World Heritage	5	World Heritage values	Continuing	
Cattle	MA	WNP	World Heritage	5	World Heritage values	Continuing	
Deer	KA	BMNP	World Heritage	5	World Heritage values	Continuing	11.1.3
Deer	KA	KBNP	World Heritage	5	World Heritage values	New	
Deer	KA	JKCR	World Heritage	5	World Heritage values	New Park	
Deer	HA	WNP	World Heritage	5	World Heritage values	New	
Deer	HA	BMNP	World Heritage	5	World Heritage values	New	
Deer	HA	Yen NP	World Heritage	5	World Heritage values	New	
Goat #	KA	BMNP	World Heritage	5	World Heritage values	Continuing	11.1.4
Goat	KA	BMNP	Aboriginal sites	6	important cultural heritage	continuing	
Goat	KA	KBNP	Aboriginal sites	6	important cultural heritage	continuing	
Goat #	KA	KBNP	World Heritage	5	World Heritage values	Continuing	
Goat	KA	JKCR	World Heritage	5	World Heritage values	New Park	
Goat	KA	JKCR	Aboriginal sites	6	important cultural heritage	New Park	
Goat	KA	YSCA	Aboriginal sites	6	important cultural heritage	continuing	
Goat	KA	WKRC	Aboriginal sites	6	important cultural heritage	New Park	
Goat	KA	AKCR	Aboriginal sites	6	important cultural heritage	New Park	
Goat	KA	ARNP	Aboriginal sites	6	important cultural heritage	Continuing	
Goat #	UMA	WNP	World Heritage	5	World Heritage values	Not programmed	
Goat	UMA	WNP	Aboriginal sites	6	important cultural heritage	Not programmed	
Goat	UMA	TNP	Aboriginal sites	6	important cultural heritage	Continuing	
Goat	UMA	GOSNP	Aboriginal sites	6	important cultural heritage	Continuing	
Goat #	UMA	GOSNP	World Heritage	5	World Heritage values	Continuing	
Goat	HA	BMNP	Aboriginal sites	6	important cultural heritage	continuing	11.1.4
Goat #	HA	BMNP	World Heritage	5	World Heritage values	Continuing	
Goat	HA	WNP	Aboriginal sites	6	important cultural heritage	continuing	
Goat #	HA	WNP	World Heritage	5	World Heritage values	Continuing	
Goat	MA	MGNP	Aboriginal sites	6	important cultural heritage	Continuing	
Goat	MA	CTNP	Aboriginal sites	6	important cultural heritage	Continuing	
Goat	MA	ANR	Aboriginal sites	6	important cultural heritage	Continuing	
Horse	KA	BMNP	World Heritage	5	World Heritage values	On approval	11.1.5
Horse	UMA	BMNP	World Heritage	5	World Heritage values	On approval	
Pig	KA	BMNP	World Heritage	5	World Heritage values	Continuing	11.1.6
Pig #	KA	BMNP	Joorilands	6	cultural heritage	Continuing	11.1.2
Pig	KA	KBNP	World Heritage	5	World Heritage values	Continuing	
Pig	KA	JKCR	World Heritage	5	World Heritage values	New Park	
Pig	UMA	BMNP	World Heritage	5	World Heritage values	Continuing	
Pig	UMA	WNP	World Heritage	5	World Heritage values	Continuing	
Pig	UMA	GOSNP	World Heritage	5	World Heritage values	Continuing	
Pig	HA	WNP	World Heritage	5	World Heritage values	Continuing	
Pig	HA	Yen NP	World Heritage	5	World Heritage values	Continuing	
Pig	MA	WNP	World Heritage	5	World Heritage values	Continuing	
Rabbit	KA	HHS		6	cultural heritage		11.1.7
Fox	KA	BMNP	World Heritage	5	World Heritage values	Not funded	11.1.8
Fox	KA	KBNP	World Heritage	5	World Heritage values	Not funded	
Fox	KA	JKCR	World Heritage	5	World Heritage values	TS program	
Fox	UMA	BMNP	World Heritage	5	World Heritage values	Not funded	
Fox	UMA	WNP	World Heritage	5	World Heritage values	Not funded	
Fox	UMA	GOSNP	World Heritage	5	World Heritage values	Not funded	
Fox	HA	BMNP	World Heritage	5	World Heritage values	Not funded	
Fox	HA	WNP	World Heritage	5	World Heritage values	Not funded	
Fox	HA	Yen NP	World Heritage	5	World Heritage values	Not funded	
Fox	MA	WNP	World Heritage	5	World Heritage values	Not funded	
Dog	All		World Heritage	5	prevention of illegal pig hunting	Continuing	11.1.9

control is already occurring over much of the location due to the higher priority program.

High Priority Control Programs – Weeds

Weeds	Area	Reserve	Location	Priority	Threat / program	Program Status	Section Reference
Riparian	UMA	WNP	World Heritage	5	World Heritage values	Continuing	11.2.2
Riparian	UMA	BMNP	World Heritage	5	World Heritage values	Continuing	
Riparian	UMA	GoSNP	World Heritage	5	World Heritage values	Continuing	
Riparian	UMA	MNP	World Heritage	5	World Heritage values	New park	
Riparian	UMA	TNP	World Heritage	5	World Heritage values	Continuing	
Riparian	HA	WNP	World Heritage	5	World Heritage values	Continuing	
Riparian	HA	BMNP	World Heritage	5	World Heritage values	Continuing	
Riparian	HA	Yen NP	World Heritage	5	World Heritage values	Continuing	

Weeds	Area	Reserve	Location	Priority	Threat / program	Program Status	Section Reference
Riparian	KA	BMNP	World Heritage	5	World Heritage values	Continuing	
Riparian	KA	KBNP	World Heritage	5	World Heritage values	Continuing	
Riparian	KA	JKCR	World Heritage	5	World Heritage values	New Park	
Riparian	MA	WNP	World Heritage	5	World Heritage values	Continuing	
Bush	UMA	WNP	World Heritage	5	World Heritage values	Continuing	11.2.3
Bush	UMA	BMNP	World Heritage	5	World Heritage values	Continuing	
Bush	UMA	GoSNP	World Heritage	5	World Heritage values	Continuing	
Bush	HA	WNP	World Heritage	5	World Heritage values	Continuing	
Bush	HA	BMNP	World Heritage	5	World Heritage values	Continuing	
Bush	HA	YRP	World Heritage	5	World Heritage values	Continuing	
Bush	KA	JKCR	World Heritage	5	World Heritage values	New Park	
Open	HA	WNP	Mellong Swamp	5	World Heritage values	Continuing	11.2.4
Open	HA	BMNP/ WNP	Bells line of Road	5	World Heritage values	Continuing	
Open	UMA	BMNP	Green Gully	5	World Heritage values	Continuing	
B/berry	UMA	WNP	World Heritage	5	World Heritage values	Continuing	11.2.6
B/berry	UMA	BMNP	World Heritage	5	World Heritage values	Continuing	
B/berry	UMA	GoSNP	World Heritage	5	World Heritage values	Continuing	
B/berry	HA	WNP	World Heritage	5	World Heritage values	Continuing	
B/berry	HA	YenNP	World Heritage	5	World Heritage values	Continuing	
B/berry	HA	BMNP	World Heritage	5	World Heritage values	Continuing	
B/berry	KA	BMNP	World Heritage	5	World Heritage values	Continuing	
B/berry	KA	KBNP	World Heritage	5	World Heritage values	Continuing	
B/berry	KA	JKCR	World Heritage	5	World Heritage values	New Park	
B/berry	MA	WNP	World Heritage	5	World Heritage values	Continuing	
Broom	KA	KBNP	World Heritage	5	World Heritage values	Continuing	11.2.7
Broom	KA	JKCR	World Heritage	5	World Heritage values	New Park	
Broom	UMA	BMNP	World Heritage	5	World Heritage values	Continuing	
Broom	HA	BMNP	World Heritage	5	World Heritage values	Continuing	
C/ivy	UMA	WNP	World Heritage	5	World Heritage values	Continuing	11.2.8
C/ivy	MA	WNP	World Heritage	5	World Heritage values	Continuing	
C/ivy	HA	BMNP	World Heritage	5	World Heritage values	Continuing	
C/ivy	HA	WNP	World Heritage	5	World Heritage values	Continuing	
Gorse	UMA	BMNP	World Heritage	5	World Heritage values	Continuing	
Gorse	HA	BMNP	World Heritage	5	World Heritage values	Continuing	
Lantana	KA	BMNP	World Heritage	5	World Heritage values	Continuing	10.2.10
Lantana	HA	BMNP	World Heritage	5	World Heritage values	Continuing	
Lantana	HA	WNP	World Heritage	5	World Heritage values	Continuing	
Pines	UMA	WNP	World Heritage	5	World Heritage values	Continuing	11.2.11
Pines	UMA	BMNP	World Heritage	5	World Heritage values	Continuing	
Pines	HA	WNP	World Heritage	5	World Heritage values	Continuing	
Pines	KA	BMNP	World Heritage	5	World Heritage values	Continuing	
Pines	KA	KBNP	World Heritage	5	World Heritage values	Continuing	
Pines	KA	JKCR	World Heritage	5	World Heritage values	New Park	
Pampas	HA	BMNP	World Heritage	5	World Heritage values	Continuing	11.2.12
Pampas	HA	WNP	World Heritage	5	World Heritage values	Continuing	
Pampas	HA	YenNP	World Heritage	5	World Heritage values	Continuing	
P/pear	UMA	WNP	World Heritage	5	World Heritage values	Continuing	11.2.13
P/pear	UMA	GOSNP	World Heritage	5	World Heritage values	Continuing	
P/pear	KA	BMNP	World Heritage	5	World Heritage values	Continuing	
P/pear	KA	JKCR	World Heritage	5	World Heritage values	New Park	
P/pear	HA	BMNP	World Heritage	5	World Heritage values	Continuing	
P/pear	MA	WNP	World Heritage	5	World Heritage values	Continuing	
Tussock	KA	BMNP	Millnigang	5	World Heritage values	Continuing	11.2.14
Tussock	KA	BMNP	Joorilands	6	Cultural heritage values	Continuing	
St John	KA	HHS		6	Cultural heritage values	Continuing	11.2.15
S/Maple	KA	JKCR	World Heritage	5	World Heritage values	New Park	11.2.16
Tree of	HA	WNP	World Heritage	5	World Heritage values	Continuing	11.2.17
Tree of	HA	BMNP	World Heritage	5	World Heritage values	Continuing	
Tree of	UMA	BMNP	World Heritage	5	World Heritage values	Continuing	
Tree of	UMA	GoSNP	World Heritage	5	World Heritage values	Continuing	
Tree of	UMA	WNP	World Heritage	5	World Heritage values	Continuing	
Tree of	UMA	WNP	Historic Newnes	6	Cultural heritage values	Continuing	
Tree of	KA	BMNP	World Heritage	5	World Heritage values	Continuing	
Tree of	MA	WNP	World Heritage	5	World Heritage values	Continuing	
Tutsan	KA	KBNP	World Heritage	5	World Heritage values	Continuing	11.2.18
Tutsan	KA	JKRC	World Heritage	5	World Heritage values	New Park	
Tutsan	KA	BMNP	World Heritage	5	World Heritage values	Continuing	
Tutsan	UMA	BMNP	World Heritage	5	World Heritage values	Continuing	
Willows	UMA	WNP	World Heritage	5	World Heritage values	Continuing	11.2.19
Willows	UMA	BMNP	World Heritage	5	World Heritage values	Continuing	

Weeds	Area	Reserve	Location	Priority	Threat / program	Program Status	Section Reference
Willows	HA	WNP	World Heritage	5	World Heritage values	Continuing	
Willows	HA	BMNP	World Heritage	5	World Heritage values	Continuing	
Willows	KA	BMNP	World Heritage	5	World Heritage values	Continuing	
Willows	KA	KBNP	World Heritage	5	World Heritage values	Continuing	
Willows	KA	JKCR	World Heritage	5	World Heritage values	New Park	
Willows	MA	WNP	World Heritage	5	World Heritage values	Continuing	

High Priority 5: targeting pests impacting on World Heritage values

High Priority 6: targeting pests significantly impacting on cultural heritage values

Medium Priority Control Programs – Pest Animals

Pest	Area	Reserve	Location	Priority	Threat / program	Program Status	Section Ref
Cat	UMA	WNP	Wolgan Valley	8	impacts on camping areas	Continuing	11.1.1
Cat	KA	JKCR	High visitor sites	8	impacts on recreation sites	New Park	
Cattle	KA	YSCA	Kanangra W	7	Wilderness values	Continuing	11.1.2
Goat #	KA	YSCA	Kanangra W	7	Wilderness values	Continuing	11.1.4
Horse	KA	BMNP	Kanangra W	7	Wilderness values	On approval	11.1.5
Horse	KA	KBNP	Kanangra W	7	Wilderness values	On approval	
Horse	UMA	BMNP	Kanangra W	7	Wilderness values	On approval	
Pig	KA	YSCA	Kanangra W	7	Wilderness values	Continuing	11.1.6
Rabbit	MA	WNP	boundaries	9	Neighbouring production		11.1.7
Rabbit	UMA	WNP	boundaries	9	Neighbouring production		
Fox	KA	YSCA	Kanangra W	7	Wilderness values	Not funded	11.1.8
Fox	UMA	BMNP	Urban fringes	9	community/cooperative program	Committee	
Fox	HA	BMNP	Urban fringes	9	community/cooperative program	Committee	
Dog	KA	various	Wilderness	7	prevention of illegal pig hunting	Continuing	
Bird	HA	BMNP	Euroka	8	recreation/camping	Monitoring	11.1.10

control is already occurring over much of the reserve due to a higher priority program.

Medium Priority Control Programs – Weeds

Weeds	Area	Reserve	Location	Priority	Threat / program	Program Status	Section Reference
Riparian	KA	YSCA	Kanangra W	7	Wilderness values	Continuing	11.1.2
Bush	UMA	BMNP	Govetts, Evans, WWFPicnic, Hut	8	Scenic & recreational values	Continuing	11.2.3
Open	KA	ARNP	Camping sites	8	Recreational values	Continuing	11.2.4
Open	HA	BMNP	Burralow Camp	8	Recreational values	Continuing	
B/berry	KA	YSCA	Kanangra W	7	Wilderness values	Continuing	11.2.6
B/berry	HA	BMNP	Euroka	8	Recreational values	Continuing	
C/ivy	HA	WNP	Colo Merroo	8	Recreational values	Continuing	11.2.8
Gorse	UMA	BMNP	Grose	9	Great Grose Weed Walk	Continuing	11.2.9
Gorse	HA	BMNP	Grose	9	Great Grose Weed Walk	Continuing	
Lantana	HA	BMNP	Erskine Creek	8	Recreational values	Continuing	11.2.10
Lantana	HA	WNP	Colo Merroo	8	Recreational values	Continuing	
Pines	KA	YSCA	Kanangra W	7	Wilderness values	Continuing	11.2.11
Pampas	HA	PSCA		9	Class 3 Noxious Weed	Continuing	11.2.12
Pampas	HA	YRP		9	Class 3 Noxious Weed	Continuing	
P/pear	KA	YSCA	Kanangra W	7	Wilderness values	Continuing	11.2.13
T/pear	MA	GRNP	River flats	8	Recreational values	Continuing	
Tussock	KA	ARNP	Camp grounds	8	Recreational values	Continuing	11.2.14
Tussock	KA	ARNP	Boundaries	9	Neighbouring production	Continuing	11.2.14
Tussock	KA	YSCA	Boundaries	9	Neighbouring production	Continuing	
Tussock	KA	BMNP	Boundaries	9	Neighbouring production	Continuing	
St John	MA	GRNP	Camp grounds	8	Recreational values	Continuing	11.2.15
S/Maple	KA	JKCR	Visitor use	8	Recreational values	New Park	11.2.16
Tree of	UMA	WNP	Newnes camp	8	Recreational values	Continuing	11.2.18
Tree of	KA	YSCA	Kanangra W	7	Wilderness values	Continuing	
Willows	KA	YSCA	Kanangra W	7	Wilderness values	Continuing	11.2.19
Willows	KA	ECNR	Rivers & creeks	9	Community Willow removal	Continuing	
Willows	KA	ARNP	Rivers & creeks	9	Community Willow removal	Continuing	
Willows	UMA	TNP	Rivers & creeks	9	Community Willow removal	Continuing	
Willows	UMA	MNP	Rivers & creeks	9	Community Willow removal	New Park	
Willows	MA	YRP	Rivers & creeks	9	Community Willow removal	Continuing	
Willows	MA	MGNR	Rivers & creeks	9	Community Willow removal	Continuing	
Willows	MA	CTNP	Rivers & creeks	9	Community Willow removal	Continuing	
Willows	MA	GRNP	Rivers & creeks	9	Community Willow removal	Continuing	

Kanangra W: Kanangra Wilderness

Medium Priority 7: targeting pests impacting on Wilderness values

Medium Priority 8: targeting pests impacting on recreation values

Medium Priority 9: community cooperative programs targeting pests with significant impacts on park values; Control Class 3 Noxious Weeds

Lower Priority Control Programs – Pest Animals

Pest	Area	Reserve	Location	Prio rity	Threat / program	Program Status	Section Reference
Cat	UMA		urban fringe	11	reserve fringes	Continuing	11.1.1
Cat	HA		urban fringe	11	reserve fringes	Continuing	
Cattle	MA	GRNP		12	Local maintenance program	Continuing	11.1.2
Cattle	HA	PSCA		12	Local maintenance program	Continuing	
Deer	KA	ARNP		12	Local maintenance program	Continuing	11.1.3
Deer	KA	AKCR		12	Local maintenance program	New Park	11.1.3
Deer	HA	PSCA		12	Local maintenance program	Continuing	
Deer	HA	YRP		12	Local maintenance program	Continuing	
Deer	MA	ANR		12	Local maintenance program	Continuing	
Deer	MA	TSCA		12	Local maintenance program	New Park	
Deer	MA	GSCA		12	Local maintenance program	New Park	
Deer	MA	YarNP		12	Local maintenance program	New Park	
Deer	MA	DSCA		12	Local maintenance program	New Park	
Deer	MA	CSCA		12	Local maintenance program	New Park	
Pig	KA	AKCR		12	Local maintenance program	New Park	11.1.6
Pig	KA	ARNP		12	Local maintenance program	Continuing	
Pig	UMA	TNP		12	Local maintenance program	Continuing	
Pig	UMA	MNP		12	Local maintenance program	New Park	
Pig	HA	YRP		12	Local maintenance program	Continuing	
Pig	MA	ANR		12	Local maintenance program	Continuing	
Pig	MA	MGNR		12	Local maintenance program	Continuing	
Pig	MA	GSCA		12	Local maintenance program	New Park	
Pig	MA	YarNP		12	Local maintenance program	New Park	
Pig	MA	DSCA		12	Local maintenance program	New Park	
Pig	MA	CSCA		12	Local maintenance program	New Park	
Rabbit	UMA	WNP	Newnes	12	Local maintenance program at campground	Monitoring	11.1.7
Rabbit	KA	BMNP	Boundaries	12	Local maintenance program	Monitoring	11.1.7
Rabbit	KA	KBNP	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	KA	ECNR	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	KA	YSCA	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	KA	ARNP	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	KA	JKCR	Boundaries	12	Local maintenance program	New Park	
Rabbit	UMA	WNP	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	UMA	BMNP	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	UMA	TNP	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	UMA	GOSNP	Boundaries	12	Local maintenance program	Continuing	
Rabbit	UMA	MNP	Boundaries	12	Local maintenance program	New Park	
Rabbit	HA	BMNP	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	HA	WNP	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	HA	YenNP	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	HA	PSCA	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	MA	WNP	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	MA	ANR	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	MA	GRNP	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	MA	MGNR	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	MA	CTNP	Boundaries	12	Local maintenance program	Monitoring	
Rabbit	MA	TSCA	Boundaries	12	Local maintenance program	New Park	
Rabbit	MA	GSCA	Boundaries	12	Local maintenance program	New Park	
Rabbit	MA	DSCA	Boundaries	12	Local maintenance program	New Park	
Rabbit	MA	CSCA	Boundaries	12	Local maintenance program	New Park	
Dog	All	various	various	12	prevention of illegal pig hunting	Continuing	11.1.9

Lower Priority Control Programs - Weeds

Weeds	Area	Reserve	Location	Prio rity	Threat / program	Program Status	Section Reference
Riparian	KA	ECNR	Rivers & creeks	12	Local maintenance program	Continuing	11.2.2
Riparian	KA	ARNP	Rivers & creeks	12	Local maintenance program	Continuing	
Riparian	KA	WKCR	Rivers & creeks	12	Local maintenance program	New Park	
Riparian	UMA	TNP	Rivers & creeks	12	Local maintenance program	Continuing	
Riparian	UMA	MNP	Rivers & creeks	12	Local maintenance program	New Park	
Riparian	HA	PSCA	Rivers & creeks	12	Local maintenance program	Continuing	
Riparian	MA	GRNP	Rivers & creeks	12	Local maintenance program	Continuing	
Bush	MA	MGNR	Rivers & creeks	12	Local maintenance program	Continuing	11.2.3
Bush	UMA	TNP	Rivers & creeks	12	Local maintenance program	Continuing	
Bush	UMA	MNP	Rivers & creeks	12	Local maintenance program	New Park	
Bush	MA	ANR	Redbank Dam	12	Bush regeneration plan	New	

Weeds	Area	Reserve	Location	Priority	Threat / program	Program Status	Section Reference
Open	KA	KBNP	Roadsides	12	Local maintenance program	Continuing	11.2.4
Open	KA	KBNP	Boundaries	11	Neighbouring production	Continuing	11.2.4
Open	UMA	BMNP	Roadsides	12	Local maintenance program	Continuing	
Berberis	KA	KBNP	Yerranderie	11,12	Community & maintenance	Continuing	11.2.5
B/berry	MA	ANR	Boundaries	11	Neighbouring production	Continuing	11.2.6
B/berry	MA	WNP	Boundaries	11	Neighbouring production	Continuing	
B/berry	MA	CTNP	Boundaries	11	Neighbouring production	Continuing	
B/berry	MA	GRNP	Boundaries	11	Neighbouring production	Continuing	
B/berry	KA	HHS		12	Local maintenance program	Continuing	11.2.6
B/berry	KA	ECNR		12	Local maintenance program	Continuing	
B/berry	KA	ARNP		12	Local maintenance program	Continuing	
B/berry	KA	WKCR		12	Local maintenance program	New Park	
B/berry	UMA	TNP		12	Local maintenance program	Continuing	
B/berry	UMA	MNP		12	Local maintenance program	New Park	
B/berry	HA	PSCA		12	Local maintenance program	Continuing	
B/berry	HA	YRP		12	Local maintenance program	Continuing	
B/berry	MA	MGNR		12	Local maintenance program	Continuing	
B/berry	MA	TSCA		12	Local maintenance program	New Park	
B/berry	MA	GSCA		12	Local maintenance program	New Park	
B/berry	MA	YarNP		12	Local maintenance program	New Park	
B/berry	MA	DSCA		12	Local maintenance program	New Park	
B/berry	MA	CSCA		12	Local maintenance program	New Park	
Broom	UMA	TNP		12	Local maintenance program	Continuing	11.2.7
Broom	UMA	HHS		12	Local maintenance program	Continuing	
Broom	UMA	MNP		12	Local maintenance program	New Park	
Pines	UMA	MNP		12	Local maintenance program	New Park	11.2.11
Pines	KA	ARNP		12	Local maintenance program	Continuing	
P/pear	MA	ANR		12	Local maintenance program	Continuing	11.2.13
P/pear	MA	MGNP		12	Local maintenance program	Continuing	
P/pear	MA	TSCA		12	Local maintenance program	New Park	
P/pear	MA	YarNP		12	Local maintenance program	New Park	
Tussock	KA	ECNR		12	Local maintenance program	Continuing	11.2.14
Tussock	KA	JKCR		12	Local maintenance program	New Park	
Tussock	UMA	TNP		12	Local maintenance program	Continuing	
Tussock	UMA	BMNP		12	Local maintenance program	Continuing	
Tussock	UMA	MNP		12	Local maintenance program	New Park	
Tussock	MA	ANR		12	Local maintenance program	Continuing	
St John	KA	KBNP		12	Local maintenance program	Continuing	11.2.15
St John	KA	ARNP		12	Local maintenance program	Continuing	
St John	KA	ECNR		12	Local maintenance program	Continuing	
St John	KA	ECNR	Sthn Boundaries	11	Neighbouring production	Continuing	
St John	HA	WNP		12	Local maintenance program	Continuing	
St John	HA	YenNP		12	Local maintenance program	Continuing	
St John	HA	PSCA		12	Local maintenance program	Continuing	
St John	MA	WNP	Boundaries	11	Neighbouring production	Continuing	11.2.15
St John	MA	ANR	Boundaries	11	Neighbouring production	Continuing	
St John	MA	MGNR	Boundaries	11	Neighbouring production	Continuing	
St John	MA	CTNP	Boundaries	11	Neighbouring production	Continuing	
St John	MA	GRNP	Boundaries	11	Neighbouring production	Continuing	
St John	MA	TSCA	Boundaries	11	Neighbouring production	New Park	
St John	MA	YarNP	Boundaries	11	Neighbouring production	New Park	
Tree of	MA	ANR	Boundaries	11	Neighbouring production	Continuing	11.2.17
Tree of	MA	WNP	Boundaries	11	Neighbouring production	Continuing	
Tree of	MA	CTNP	Boundaries	11	Neighbouring production	Continuing	
Tree of	MA	GRNP	Boundaries	11	Neighbouring production	Continuing	
Tree of	UMA	TNP		12	Local maintenance program	Continuing	11.2.17
Tree of	MA	MGNP		12	Local maintenance program	Continuing	
Tree of	MA	YarNP		12	Local maintenance program	New Park	

Lower Priority 11: community programs targeting pests with localised impacts, control class 4 and 5
Noxious Weeds

Lower Priority 12: maintenance programs targeting pests that have localised impacts

Appendix 3 Significant Species

The following table shows the distribution of threatened/regionally significant species and communities under threat from pest species

Threatened flora species

Endangered	Kanangra Area	Upper Mountains	Hawkesbury Area	Mudgee Area
<i>Acacia flocktoniae</i> Mudgee Area				St Johns Wort YarNP
<i>Epacris hamiltonii</i>		Various weeds BMNP		
<i>Eucalyptus</i> sp. Howes swamp Creek			Feral deer, pigs WNP	
Donkey orchid <i>Diuris aequalis</i>	Feral pigs KBNP			
<i>Microstrobos fitzgeraldii</i>		Various weeds BMNP		
<i>Trachymene saniculifolia</i>	Feral pigs KBNP			
Wollemi Pine <i>Wollemia nobilis</i>				Phytophthora Blackberry WNP
Vulnerable				
<i>Acacia clunies-rossiae</i>	Riparian weeds, pigs BMNP, KBNP			
<i>Acacia dangarensis</i> Mudgee Area				Prickly pear GRNP
<i>Baloskian longipes</i>	Feral pigs KBNP			
<i>Epacris sparsa</i>		Gorse BMNP	Various weeds BMNP	
<i>Isopogon fletcheri</i>		Gorse BMNP		
<i>Eucalyptus benthamii</i>		Feral pigs weeds BMNP		
<i>Kennedia retrorsa</i>				Various weeds GRNP
Mossy geebung <i>Persoonia acerosa</i>		Various weeds BMNP		
<i>Pultenaea glabra</i>		riparian weeds BMNP		

Threatened fauna species

Endangered	Kanangra	Upper Mountains	Hawkesbury	Mudgee
Blue Mountains Water Skink <i>Eulamprus leuraensis</i>		Feral cat BMNP		
Blue Mountains Water Skink <i>Eulamprus leuraensis</i>		Feral pig WNP		
Giant Dragonfly <i>Petalura gigantea</i>		Feral pig WNP		
Booroolong frog <i>Litoria booroolongensis</i>	Willow ARNP			
Brush tail rock wallaby <i>Petrogale penicillata</i>	Red fox, goats JKCR	Red fox, goats WNP	Feral goats WNP	Red fox, goats WNP
Broad headed snake <i>Hoplocephalus bungaroides</i>	Feral goat KBNP, BMNP	Feral goat GOSNP		
Malleefowl <i>Leipoa ocellata</i>				Red fox YarNP

Ecological Communities

Endangered Ecological Communities	Kanangra	Upper Mountains	Hawkesbury	Mudgee
Blue Mountains shale cap forest in the Sydney Basin Bioregion			Various weeds * BMNP, WNP	
Cooks River/Castlereagh ironbark forest			Various weeds YRP	
Cumberland Plain woodland (including 10 EEC)			Various weeds * YRP, BMNP	
Newnes plateau shrub swamp ##		Feral pigs, BMNP, WNP		
River-flat forest of the coastal Floodplain	Cattle KBNP			
Shale sandstone transition forest			Various weeds BMNP, YRP	
Sydney coastal river flat forest			Various weeds YRP	
Upland swamps: Montane peatlands and swamps / Temperate highland peat swamps on sandstone (+ various threatened fauna) /		Red fox, Feral pigs, deer, various weeds BMNP, WNP		
Western Sydney dry rainforest			Various weeds BMNP, WNP	
White box yellow box Blakely's red gum woodland	Feral goats, pigs, cattle, various weeds BMNP, YSCA			Feral goats, pigs, various weeds WNP, CTNP, GRNP
Regionally Significant (not listed)				
Diatreme vegetation communities			Lantana, Pampas BMNP	
Dry alluvial paperbark woodlands	Wild horse # WSA			
Biodiversity at altitude	Broom KBNP			
Vulnerable Ecological Communities				
Blue Mountains swamps#		Red fox, Feral pigs, deer, various weeds BMNP, WNP		

Threat reserve	New or continuing pest management program
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* program dependent on funding

program dependent on approval of a plan

Blue Mountains swamps. These swamps integrate with increasing elevation with EEC Newnes Plateau shrub swamp in the Sydney Basin bioregion and also shares some characteristics with EEC montane peatlands and swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern highlands and Australian Alps bioregions. Additionally they apparently form part of temperate highland peat swamps on sandstone which is listed as an EEC under the Commonwealth EPBC Act.
Please note this table is not a comprehensive list of all threatened species and Endangered Ecological Communities in the Blue Mountains Region.

Appendix 4 Key Threatening Processes

The following table lists Key Threatening Processes under the *TSC Act* that affect that affect threatened species and Endangered Ecological Communities in the Blue Mountains Region.

Key Threatening Process	Threatened species affected or potentially affected in the Blue Mountains Region	Reference
Pest Animals		
Competition and habitat degradation by Feral goats , <i>Capra hircus</i> Linnaeus 1758	Brush-tailed rock-wallaby, broad-headed Snake, malleefowl	Final determination
Competition and grazing by the feral European rabbit <i>Oryctolagus cuniculus</i> (L.)	Brush-tail rock wallaby	DEC 2005b
Competition from feral honeybees	Glossy black-cockatoo, squirrel glider, yellow-bellied glider, brown treecreeper	DEC 2005b
Herbivory and environmental degradation caused by feral deer	Southern brown bandicoot, montane peatlands and swamps, river-flat eucalypt forest on coastal floodplains	DEC 2005b Final determination
Predation by the European red fox <i>Vulpes vulpes</i> (Linnaeus, 1758)	Upland swamps, brush-tail rock-wallaby, southern brown bandicoot, ground nesting birds	DEC 2005 DEC 2005b
Predation by the feral cat <i>Felis catus</i> (Linnaeus, 1758)	blue mountains water skink, brush-tail rock-wallabies, bush-stone curlew, eastern pygmy possums, ground nesting birds, southern brown bandicoot	Recovery Plans, DEC 2005b
Predation, habitat degradation, competition and disease transmission by feral pigs , <i>Sus scrofa</i> Linnaeus 1758	Southern brown bandicoot, white box yellow box Blakely's red gum woodland	DEC 2005b, Final determination
Weeds		
Invasion, establishment and spread of Lantana (<i>Lantana camara</i> L. sens. Lat)	River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregion, Western Sydney dry rainforest, Sydney turpentine-ironbark forest	Final determination
Invasion of native plant communities by exotic perennial grasses	grassy box woodlands	DEC 2005
Invasion and establishment of exotic vines and scramblers	<i>Epacris hamiltonii</i> , Cumberland Plain woodland, Shale-sandstone transition forest, Western Sydney dry rainforest in the Sydney Basin Bioregion	Final determination NPWS 2006e
Pest Pathogens		
Infection by Psittacine <i>circoviral</i> (beak and feather) disease affecting endangered psittacine species and populations	Swift parrot	NPWS 2006e Final determination
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)	NPWS 2006d Final determination
Infection of native plants by Phytophthora <i>cinnamomi</i>	Wollemi pine, mossy geebung, southern brown bandicoot	Final determination,

Feral goats, feral pigs, feral rabbits, feral cats, European red foxes, 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 5 Community groups and committee representation

Representatives from the following Areas or Region are to attend the following groups/committees:

Group/Committee	Areas				Region Rep
	UMA	KA	HA	MA	
Blue Mountains Noxious Weed and Environmental Advisory Committee	√				
Blue Mountains Bushcare Network	√				
SCA Joint Management working meetings	√	√			√
Coxes River Catchment Management Committee	√				√
Katoomba Creek Weed Management Committee	√				
Oberon Vertebrate Pest Group		√			√
Upper Macquarie County Council		√			
Yerranderie Management Committee		√			
Lachlan Catchment Management Committee		√			
Hawkesbury Nepean CMA		√	√		
Central Tablelands Rural Lands Protection Board		√			
Goulburn Rural Lands Protection Board		√			
Rylstone Wild Dog Advisory committee				√	
Feral Animal Advisory Council				√	
Mudgee, Merriwa Rural Lands Protection Board Dog Steering Committee				√	
Upper Hunter Community Advisory Committee CMA				√	
Goulburn River Wild Dog Association				√	
Blue Mountains Urban Fox Committee					√
Central Branch Pest Management Officer meeting					√
Blue Mountains Western Sydney Noxious Weed Committee			√		√
Hawkesbury Rainforest Network			√		

Appendix 6 Emerging pest issues

Pest Species	Issue
Horsetail <i>Equisetum sp</i>	Although not known on NPWS estate, it is currently being controlled adjacent to Blue Mountains National Park, Upper Mountains Area at Planet Ark Park, Wentworth Falls. This weed is a Class 1 weed under the <i>NSW Noxious Weed Act</i>
Red-eared slider turtle <i>Trachemys scripta elegans</i>	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 snakes <i>Elaphe guttata</i>	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.
Coolatai grass <i>Hyparrhenia hirta</i>	Coolatai grass is listed as a Key Threatening Process under the TSCA through Invasion of native plant communities by exotic perennial grasses. BMCC has identified two small populations of this weed along the Great Western Highway at Blackheath and Hazelbrook. It could present a significant threat to undisturbed bushland and pastures.
Ferrets <i>Mustela furo</i>	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.
Cane toads <i>Bufo marinus</i>	Individuals have been recorded to be imported to Sydney via trucks containing fresh produce from Queensland. Invasion and establishment of the Cane Toad <i>Bufo marinus</i> has been listed as a Key Threatening Process under the <i>TSC Act</i> .
Fire Ants <i>Solenopsis invicta</i>	They are currently not known in NSW however they are an issue of national significance where an emergency control plan has been declared. They are a Notifiable pest in NSW under the <i>Plant Diseases Act 1924</i> . Fire Ants have been detected in Queensland and may spread interstate in nursery materials.

Other pests raised as species of concern at the Mountains Region Planning and Review Workshops in 2006 as they are significantly spreading to new sites within the region include:

Kanangra Area: moth vine, blue periwinkle, sycamore, St Johns wort, tutsan.

Upper Mountains Area: Spanish heath, seaside daisy, montbretia, English holly, honey locust, box elder, agapanthus.

Hawkesbury Area: whisky grass, African olive, mother of millions, turkey rhubarb, balloon vine, moth vine, madeira vine, Mt Morgan wattle, poplars, honey locust, giant reed, silver wattle, Cootamundra wattle

Mudgee Area: cotoneaster, peppercorn, fruit trees, bridal creeper, Cootamundra wattle, khaki weed, cat head burr, great mullein, California poppy, galvanised burr, blue heliotrope, spiny burr grass, sweet briar, hemlock, century plant, saffron, olives.

Appendix 7 Noxious Weeds

Thirteen Local Government Areas (LGA), incorporating three County Councils encompassing a number of council areas, are fully or partially within the NPWS Blue Mountains Region. Noxious Weeds lists vary for each of these LGAs or County Council as outlined below.

Noxious Weed	Blue Mountains LGA ¹	Upper Macquarie CC ²	Hawkesbury CC ³	Mid Western LGA ⁴	Upper Hunter CC ⁵	Upper Lachlan LGA ⁶	Warrumbungle LGA ⁷	Wollondilly LGA ⁸
African boxthorn <i>Lycium ferocissimum</i>	4	4	4	4	4	4	4	4
African feathergrass <i>Pennisetum macrourum</i>	5	5	5	5	5	5	5	5
African lovegrass <i>Eragrostis curvula</i>	-	4	-	-	-	-	-	-
African turnipweed <i>Sisymbrium runcinatum</i>	5	5	5	5	5	5	5	5
African turnipweed <i>Sisymbrium runcinatuam</i>	5	5	5	5	5	5	5	5
Alligator weed <i>Alternanthera philoxeroides</i>	2	2	3	2	2	2	2	3
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>	5	5	5	5	5	5	5	5
Artichoke thistle <i>Cynara cardunculus</i>	5	5	5	5	5	5	5	5
Asparagus fern <i>Asparagus aethiopicus</i>	4	-	-	-	-	-	-	-
Athel tree <i>Tamarix aphylla</i>	5	5	5	5	5	5	5	5
Bathurst/Noogoora/Californian/Cockle burrs <i>Xanthium sp.</i>	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 subsp. rotunda</i>	3	-	-	-	-	-	-	-
Black Knapweed <i>Centaurea nigra</i>	1	1	1	1	1	1	1	1
Black willow <i>Salix nigra</i>	3	-	-	-	-	-	-	-
Blackberry <i>Rubus fruticosus aggregate sp</i>	4	4	4	4	4	4	4	4
Blue heliotrope <i>Heliotropium amplexicaule</i>	-	-	-	4	-	-	4	-
Boneseed <i>Chrysanthemoides monilifera subsp. monilifera</i>	3	-	-	-	-	-	-	-
Bridal creeper <i>Asparagus asparagoides</i>	5	5	5	5	5	5	5	5
Broomrapes (except natives) <i>Orobanche species</i>	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
Camphor laurel <i>Cinnamomum camphora</i>	4	-	-	-	-	-	-	-
Cape broom <i>Genista monspessulana</i>	4	-	-	-	-	-	-	-
Cape Tulip <i>Moraea species</i>	-	-	-	-	4	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
Chinese violet <i>Asystasia genetica subsp</i>	1	1	1	1	1	1	1	1
Cineraria <i>Cineraria lyratifarmis</i>	-	-	-	4	-	-	-	-
Clockweed <i>Gaura lindheimeri</i>	5	5	5	5	5	5	5	5
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 species</i> (exceptions)	5	5	5	5	5	5	5	5
East Indian hygrophila <i>Hygrophila polysperma</i>	1	1	1	1	1	1	1	1
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 burr grass <i>Cenchrus brownii</i>	5	5	5	5	5	5	5	5
Flax-leaf broom <i>Genista linifolia</i>	4	-	-	-	-	-	-	-
Fountain grass <i>Pennisetum setaceum</i>	5	5	5	5	5	5	5	5
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	-	-	-	-	-	-	-

	Blue Mountains LGA ¹	Upper Macquarie CC ²	Hawkesbury CC ³	Mid Western LGA ⁴	Upper Hunter CC ⁵	Upper Lachlan LGA ⁶	Warrumbungle LGA ⁷	Wollondilly LGA ⁸
Noxious Weed								
Glaucous starthistle <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
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 species</i>	4	4	4	4	4	4	4	4
Hawkweed <i>Hieracium species</i>	1	1	1	1	1	1	1	1
Hemlock <i>Conium maculatum</i>	-	4	-	4	4	4	-	-
Horsetail <i>Equisetum species</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
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 trichophylla)	1	1	1	1	1	1	1	1
Lacy ragweed	-	-	-	4	-	-	-	-
Lagarosiphon <i>Lagarosiphon major</i>	1	1	1	1	1	1	1	1
Lananta <i>Lantana species</i>	5	5	5	5	5	5	5	5
Long-leaf willow primrose <i>Ludwigia longifolia</i>	3/5	5	5	5	5	5	5	3/5
Longstyle feather grass <i>Pennisetum villosum</i>	-	4	-	4	-	-	-	4
Mesquite <i>Prosopis species</i>	-	2	-	2	-	-	-	-
Mexican feather grass <i>Nassella tenuissima</i>	1	1	1	1	1	1	1	1
Mexican poppy <i>Argemone mexicana</i>	5	5	5	5	5	5	5	5
Miconia <i>Miconia species</i>	1	1	1	1	1	1	1	1
Mimosa <i>Mimosa pigra</i>	1	1	1	1	1	1	1	1
Mintweed <i>Salvia reflexa</i>	-	-	-	4	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 sp</i> and hybrids	-	-	5	-	3	-	-	-
Nodding thistle <i>Carduus nutans</i>	-	4	-	4	4	4	4	-
Onion grass <i>Romulea species</i> (exceptions)	5	5	5	5	5	5	5	5
Oxalis <i>Oxalis species</i> and varieties (exceptions)	5	5	5	5	5	5	5	5
Pampas Grass <i>Cortaderia species</i>	3	4	3	4	4	-	2	-
Parkinsonia <i>Parkinsonia aculeata</i>	-	4	-	2	-	-	2	-
Parthenium weed <i>Parthenium hysterophorus</i>	1	1	1	1	1	1	1	1
Paterson's curse, Vipers bugloss, Italian bugloss <i>Echium sp</i>	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
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
Prickly pear <i>Cylindropuntia species</i>	4	4	4	4	4	4	4	4
Prickly pear <i>Opuntia species</i> except <i>O. ficusindica</i>	4	4	4	4	4	4	4	4
Privet (Broad-leaf) <i>Ligustrum lucidum</i>	4	4	4	-	-	-	-	-
Privet (Narrow-leaf/chinese) <i>Ligustrum sinense</i>	4	4	4	-	-	-	-	-
Red rice <i>Oryza rufipogon</i>	5	5	5	5	5	5	5	5
Rhizomatous bamboo <i>Phyllostachys species</i>	4	-	-	-	-	-	-	-
Rhus tree <i>Toxicodendron succedaneum</i>	4	4	4	4	4	4	4	4
Rubervine <i>Cryptostegia grandiflora</i>	1	1	1	1	1	1	1	1
Sagittaria <i>Sagittaria platyphylla</i>	5	5	5	5	5	5	5	5
Salvinia <i>Salvinia molesta</i>	2	2	3	2	2	2	2	3
Sand oat <i>Avena strigosa</i>	5	5	5	5	5	5	5	5
Scotch broom <i>Cytisus scoparius</i>	4	4	-	4	4	4	-	-
Scotch thistle Taurian thistle.... <i>Onopordum sp</i>	-	4	-	4	-	-	-	-

Noxious Weed	Blue Mountains LGA ¹	Upper Macquarie CC ²	Hawkesbury CC ³	Mid Western LGA ⁴	Upper Hunter CC ⁵	Upper Lachlan LGA ⁶	Warrumbungle LGA ⁷	Wollondilly LGA ⁸
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
Siam weed <i>Chromolaena odorata</i>	1	1	1	1	1	1	1	1
Silk forage sorghum <i>Sorghum species</i> hybrid cultivar	-	-	-	3	-	-	3	-
Silver-leaf nightshade <i>solanum elaeagnifolium</i>	-	4	-	4	-	4	4	-
Smooth-stemmed turnip <i>Brassica barrelieri</i> subspecies <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 burgrass <i>Cenchrus incertus</i>	4	4	4	4	4	4	4	4
Spiny burgrass <i>Cenchrus longispinus</i>	4	4	4	4	4	4	4	4
Spotted knapweed <i>Centaurea maculosa</i>	1	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	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	-	-
Water caltrop <i>Trapa species</i>	1	1	1	1	1	1	1	1
Water hyacinth <i>Eichhornia crassipes</i>	2	2	3	2	2	2	2	3
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 species</i> (except <i>S. babylonica</i> , <i>S. x reichardtii</i> , <i>S. x calodendron</i>)	5	5	5	5	5	5	5	5
Witchweed <i>Striga species</i> (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

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 are notifiable weeds.

* Hawkesbury County Council manages noxious weeds for the areas of Hawkesbury LGA and Penrith LGA within the Blue Mountains Region

¹ Blue Mountains City Council (is in Upper Mountains and Hawkesbury Areas)

² Upper Macquarie County Council control area includes Bathurst Regional (in Kanangra Area), Lithgow City (in Upper Mountains and Mudgee Areas) and Oberon Councils (in Kanangra Area)

³ Hawkesbury County Council control area includes Hawkesbury LGA and Penrith LGA (both in Hawkesbury Area)

⁴ Mid Western Regional Council (is in Mudgee Area)

⁵ Upper Hunter County Council control area includes Muswellbrook, Singleton and Upper Hunter Shire Council (which are all in Mudgee Area)

⁶ Upper Lachlan (is in Kanangra Area)

⁷ Warrumbungle Shire Council is in Castlereagh-Macquarie County Council (in Mudgee Area)

⁸ Wollondilly Shire Council (is in Kanangra, Upper Mountains and Hawkesbury Areas)

Appendix 8 Timing of Current Control Techniques

The tables below indicate the most appropriate times for the current techniques utilised for the control of pest animals and plants. Reproduction of these pests in the Blue Mountains Region is also noted. As technology progresses, new techniques of pest control may be preferential outside the times indicated below. These tables should be used as guides only to maximise effective pest management.

Preventing reproduction of pests lessens the amounts of follow up required. Pest control programs will in most cases be more likely to have the optimum effect if they are planned prior to reproduction. Where control is just as effective, pest animal control timing needs to be prioritised to those periods when young are less likely to be suckling due to animal welfare concerns. When controls are being undertaken on weeds that are seeding special care needs to be taken to ensure that the control operators are not spreading the plant on site or off site.

This is not comprehensive list of region wide pests.

	Effective/optimum control period (note seasonal changes will affect these periods)
X	young being born / flowering and seeding

	Summer			Autumn			Winter			Spring			
Pest Animals	Dec	Jan	Feb	Marc	April	May	June	July	Aug	Sept	Oct	Nov	Comment
Feral cat	X	X	X							X	X	X	Can breed 2 x per year (usually summer breeding)
Feral cattle													
Feral deer (Red & Fallow)	X			X								X	4 control times per year, single young born
Wild dog							X	X	X				2 control times per year & reactive
Fox										X	X	X	4 to 6 control times a year, den destruction Aug to Sept
Feral goat	X	X	X	X	X	X	X	X	X	X	X	X	2 control times per year, reduced breeding, early spring & drought
Feral horse													
Feral pig	X	X	X	X	X	X	X	X	X	X	X	X	Breeding under favourable conditions (peek = May to Oct)
Feral rabbit	X	X	X	X	X	X	X	X	X	X	X	X	Numerous control times per yr, up to 5 litters in good times.

	Summer			Autumn			Winter			Spring			
Weeds	Dec	Jan	Feb	Marc	April	May	June	July	Aug	Sept	Oct	Nov	Comment
Blackberry			X										
Broom <i>Cytisus</i>													
English broom <i>Cytisus scoparius</i>													
Cape ivy <i>Delairea odorata</i>													
Tree of heaven <i>Ailanthus altissima</i>													Do not treat when dormant
Gorse <i>Ulex europaeus</i>	X			X	X	X				X	X	X	Seeds 2 x per year
Lantana <i>Lantana camara</i>													Avoid drought periods
Monterey pine <i>Pinus radiata</i> & spp													
Prickly Pear spp <i>Opuntia spp</i>													Will grow from segments
Serrated tussock <i>Nassella trichotoma</i>	X	X										X	Do not treat during frost
Willow tree Species <i>Salix spp</i>										X	X	X	
Berberis <i>Berberis aristata</i>													
Tutsan <i>Hypericum spp</i>											X	X	
St Johns wort <i>Hypericum perforatum</i>													
Patersons curse <i>Echium spp</i>													Die back spring/summer
Thistle spp <i>Cirsium spp</i>													
Nodding thistle <i>Carduus nutans</i>													
Crofton weed <i>Eupatorium adenophorum</i>	X	X	X							X			
Pampas grass <i>Cortaderia selloana</i>			X										
Deutzia crenata													
Butterfly bush <i>Buddleia davidii</i>													
Ox-eye daisy <i>Leucanthemums vulgare</i>													
Golden dodder <i>Cuscuta spp</i>													

	Summer			Autumn			Winter			Spring			
Weeds	Dec	Jan	Feb	Marc	April	May	June	July	Aug	Sept	Oct	Nov	Comment
<i>Xanthium spp</i>													
<i>Ligustrum spp</i>						X	X	X	X				
Holly													Cut/paint, frill spring and summer
Montbretia													Herbicide spraying in summer
Honey locust													
Fruit trees													
Peppercorn													
Horehound/blue heliotrope													
Mother of millions						X	X	X	X				
Bridal creeper													
Moth vine	X	X	X	X	X	X							
Noogoora burr													Control prior to seeding
Sweet briar									X	X	X	X	
Poplar													Do not treat when dormant

Appendix 9 Blue Mountains Region Reserves (size and 'listed' values)

		Blue Mountains Region managed estate (ha)				
Reserve		Kanangra Area	Upper Mts Area	Hawkesbury	Mudgee Area	Size in BMR
Blue Mountains National Park ^{1. 2. 3. 4.}	BMNP	88,253	117,115	79,811		427,000
Kanangra-Boyd National Park ^{1. 2. 3.}	KBNP	65,545				65,545
Hartley Historic Site	HHS	12				12
Evans Crown Nature Reserve	ECNR	433				433
Yerranderie State Conservation Area ^{2. 3.}	YSCA	12,192				12,192
Abercrombie River National Park	ARNP	19,000				19,000
Jenolan Karst Conservation Reserve ^{1.} , Wombeyan Karst Conservation Reserve & Abercrombie Karst Conservation Reserve (yet to be gazetted)	JKCR WKCR AKCR	2,694 800 1434				2,694 800 1434
Wollemi National Park ^{1. 3. 4. 5.}	WNP		80,983	42,131	184,325	488,620
Turon National Park	TNP		2,985			2,985
Gardens of Stone National Park ^{1.}	GOSNP		15,059			15,059
Marrangaroo National Park (yet to be gazetted)	MNP		1,640			1,640
Yengo National Park ^{1. 5.}	YenNP			2,398		2,398
Parr State Conservation Area ^{5.}	PSCA			4,329		4,329
Yellomundee Regional Park	YRP			417		417
Avisford Nature Reserve	ANR				2,598	2,598
Munghorn Gap Nature Reserve	MGNR				6,158	6,158
Coolah Tops National Park	CTNP				13,469	13,469
<i>Warung additions (to Coolah Tops National Park)</i>					2763	2763
Goulburn River National Park	GRNP				72,592	72,592
<i>Munmurra additions (to Goulburn River NP)</i>					1,313	1,313
Turill State Conservation Area	TSCA				1,052	1,052
Goodiman State Conservation Area	GSCA				570	570
Yarrobil National Park	YarNP				1,776	1,776
Durrigere State Conservation Area	DSCA				3,938	3,938
Curryall State Conservation Area	CSCA				1,120	1,120
Total no. of reserves () & total size		(9) 188,359	(5) 217,782	(5) 129,087	(10) 291,674	(25) 1,151,907

^{1.} All of the reserve is listed as part of the Blue Mountains World Heritage Area

^{2.} Part of the reserve is under joint management with SCA as a Special Area

^{3.} Part of the reserve is declared a Wilderness Area

^{4.} Part of the reserve is also managed by another Area in Blue Mountains Region

^{5.} Part of the reserve is also managed by Central Coast Region (ha not included in the above table)

New reserve to Blue Mountains Region since the last Blue Mountains Region Pest Management Strategy