



Regional Pest Management Strategy 2012–17: Northern Plains Region

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

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For further information contact:

Northern Plains Region
Western Branch
National Parks and Wildlife Service
Office of Environment and Heritage
Department of Premier and Cabinet
PO Box 848
Narrabri NSW 2390
Phone: 02 6792 7350

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Office of Environment and Heritage
59–61 Goulburn Street, Sydney, NSW 2000
PO Box A290, Sydney South, NSW 1232
Phone: (02) 9995 5000 (switchboard)
Phone: 131 555 (environment information and publications requests)
Phone: 1300 361 967 (national parks, climate change and energy efficiency information and publications requests)
Fax: (02) 9995 5999
TTY: (02) 9211 4723
Email: info@environment.nsw.gov.au
Website: www.environment.nsw.gov.au

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Summary

The Northern Plains Region of the National Parks and Wildlife Service manages over 540,000 hectares of protected area reserve system in central north New South Wales. In partnership with the community, the Region manages a total of 71 reserves comprising national parks, nature reserves, Aboriginal areas and state conservation areas.

The reserve network within the Region includes a diversity of landscapes that support a number of threatened animals, plants and communities, important cultural heritage, wilderness areas and Ramsar wetlands. This suite of habitats enables a wide and varied range of pest species to occur. The known distribution within reserves is provided in this document.

Under the previous regional pest management strategy some of the major achievements included:

- ongoing involvement in the coordinated Goonoo fox control program
- involvement in the coordinated Macquarie Marshes pig control program
- integrated pest control programs targeting feral goats and foxes in order to protect brush-tailed rock-wallaby colonies in Warrumbungle and Mount Kaputar national parks
- long-term blackberry control programs in Warrumbungle National Park.

The priorities for management of pest species across the Region are ranked according to the criteria outlined in this strategy. They have been identified and informed through consultation with key stakeholders, staff and the community.

Highest priority (critical) is given to programs which target:

- new and emerging threats
- pest species which impact significantly on threatened species, populations and communities
- pest species associated with health and disease risks
- pest species impacting substantially on economic enterprises.

In Northern Plains Region, critical priority programs have been largely identified from the NSW Fox Threat Abatement Plan, the Priority Action Statement and the Biodiversity Priorities for Widespread Weeds. In total, there have been 50 critical priority programs, five high priority programs, 31 medium priority programs and 46 low priority programs identified and listed in this strategy. In addition, a number of specific and emerging pest species threats have also been identified.

Management programs to address the priorities that have been identified in this strategy will be listed in the annual Regional Operations Plan and Regional Pest Operations Plan. The Region will continue to work with neighbours, Livestock Health and Pest Authorities, local control authorities and other departments to implement and promote cooperative pest control programs.

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Abbreviations

AA	Aboriginal Area
BPWW	Biodiversity Priorities for Widespread Weeds (BPWW CC1-6 refers to control categories within BPWW Statewide Framework ¹)
CCA	community conservation area
EEC	endangered ecological community
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
KTP	key threatening process
LCA	local control authority
LHPA	Livestock Health and Pest Authority
NP	national park
NPWS	NSW National Parks and Wildlife Service
NR	nature reserve
SCA	state conservation area
TAP	threat abatement plan
TSC Act	<i>Threatened Species Conservation Act 1995</i>
WDCA	wild dog control association
WoNS	Weed of National Significance

¹ http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/publications/emas/cma_statewide-framework-web.pdf

1. Introduction

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

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

NSW Invasive Species Plan provides specific goals, objectives and actions in relation to invasive species management.

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

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

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

2. Regional overview

Location

The Northern Plains Region of NPWS has responsibility for managing over 550,000 hectares of the protected area reserve system in central north NSW. The Region stretches from Geurie and Peak Hill in the south-west to Gunnedah in the east, north to the Queensland border near Yetman, and west to the Narran River and the townships of Warren and Narromine.

Regional context

The Region is divided into three management Areas with work centres based at Narrabri, Coonabarabran, and Baradine. In partnership with the community, these Areas manage a combined total of 540,000 hectares in 71 reserves comprising 21 national parks, 23 nature reserves, 21 state conservation areas and six Aboriginal areas. The Region assumed management responsibility of 39 of these reserves in December 2005 following the dedication of approximately 295,000 hectares as a result of the Brigalow Belt South and Nandewar Bioregional assessment process. These reserves are collectively known as community conservation areas (CCAs) and are dedicated under the *Brigalow and Nandewar Community Conservation Area Act 2005* (NSW) and the *National Parks and Wildlife Act 1974* (NSW). The CCAs are in three zones according to their reserve category and management intent – Zone 1 National Park, Zone 2 Aboriginal Area and Zone 3 State Conservation Area.

In 2011, several former state forests were gazetted as conservation reserves under the *National Parks Estate (South West Cypress) Reservations Act 2010*. Additionally at this time, several small areas of Crown land within the Brigalow and Nandewar Bioregions were added to the reserve system to complete the reservation components of the *Brigalow and Nandewar Community Conservation Act 2005*.

Park management

A wide and varied range of pests occur due to the diversity of landscapes within the Region. The reserve system includes subalpine mountain ranges, gorges, woodlands, floodplains, native grasslands and wetlands. Within these there are a number of threatened species, including malleefowl, brush-tailed rock-wallabies and black-striped wallabies, as well as significant Aboriginal and non-Aboriginal cultural heritage, wilderness areas and Ramsar wetlands.

Pest control programs continue to be an integrated management priority for all reserves within the Region, with significant investment of staff time and operating funding.

The highest priority pest control programs within Northern Plains Region are specifically aimed at protecting species, populations and communities declared under the NSW *Threatened Species Conservation Act 1995* (TSC Act). Examples of such programs include reducing the impact of:

- feral goats and foxes on populations of brush-tailed rock-wallabies
- foxes on malleefowl
- foxes and feral pigs on ground nesting birds in wetland reserves
- weeds in endangered ecological communities (EECs) and where they impact on threatened species.

Community engagement

The Region will continue to work with neighbours, Livestock Health and Pest Authorities (LHPAs), local control authorities and other agencies to promote and increase the number of cooperative control programs carried out. Over recent years these have been very successful, particularly around Goonoo National Park and State Conservation Area, Macquarie Marshes Nature Reserve, Narran Lake Nature Reserves, Gwydir Wetlands State Conservation Area, Planchonella Nature Reserve and Mount Kaputar National Park.

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

Pest management highlights

Major achievements in pest management within Northern Plains Region include:

- ongoing involvement in the coordinated Goonoo fox control program that includes participation from LHPAs, Forests NSW, NPWS and private landholders in cooperative biannual control programs aimed at protecting malleefowl and lambs from predation by foxes. On average 120 landholders participate in each cooperative program which complements the continuous integrated program on NPWS estate to protect malleefowl.
- involvement in the coordinated Macquarie Marshes pig control program that includes participation from LPHA, Central West Catchment Management Authority, Invasive Animals CRC, NPWS and private landholders in cooperative biannual control programs aimed at protecting Ramsar values, ground-nesting waterbirds and agricultural values from the impacts of feral pigs. This program saw the control of over 8000 feral pigs in the Macquarie Marshes landscape in 2011.
- integrated pest control programs targeting feral goats and foxes in order to protect brush-tailed rock-wallaby colonies in Warrumbungle and Mount Kaputar national parks. Some specific cooperative programs involving LHPAs, Namoi Catchment Management Authority and private landholders have been undertaken within these landscapes to further alleviate the threats posed by feral goats and foxes to BTRW populations.
- long-term blackberry control programs in Warrumbungle National Park which have seen a significant decline in blackberry distribution. Core infestations are now restricted to more remote and inaccessible areas which continue to be treated to further enhance the outcomes of the program.



3. Regional prioritisation

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

Critical priority

C-TSC (Threatened Species Conservation)

Programs targeting pests which are, or are likely to be, significantly impacting on threatened species, populations or communities. These include the highest priorities identified in the threat abatement plans (TAPs), Priorities Action Statements (PAS) and Biodiversity Priorities for Widespread Weeds (BPWW). For example, undertake fox control at the Warrumbungle priority site for brush-tailed rock-wallabies as identified in the Fox TAP.

C-HD (Health and Disease)

Programs that target pests which impact significantly on human health or are part of a declared national emergency, for example outbreak of foot and mouth disease or control of feral pigs in the catchment area of a domestic water supply reservoir.

C-EC (Economic)

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

C-NE (New and Emerging)

Programs addressing new occurrences or suppressed populations of highly invasive pest species with potential for significant impacts on park values (subject to risk/feasibility assessment), and programs to control Class 1 and 2 noxious weeds.

High priority

H-IH (International Heritage)

Programs that target pests that impact significantly on world heritage or international heritage values, for example control of rabbits impacting on World Heritage values of Mungo NP, and pest control in Ramsar wetlands;

H-CH (Cultural Heritage)

Programs targeting pests that impact significantly on important cultural heritage values, for example control of feral goats where they inhabit an area containing Aboriginal rock art or control of rabbits undermining an historic building.

Medium priority

M-WNH (Wilderness and National Heritage)

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

M-RA (Recreation and Aesthetic values)

Programs that target pests that impact significantly on recreation, landscape or aesthetic values, for example control of blackberry on the margins of camping areas, or control of weeds in an area of natural beauty that is visited frequently.

M-CP (Cooperative Programs)

Cooperative programs (not covered in higher priorities above) targeting pests that impact significantly on park values or agricultural production (including the control of Class 3 noxious weeds or implementation of other endorsed state or regional plan), for example control of bitou bush across boundaries as part of a regional control plan prepared by a regional weeds advisory committee and supported by NPWS.

M-II (Isolated Infestations)

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

Lower priority

L-LP (Localised Programs)

Programs targeting pests that have localised impacts on natural ecosystems or agricultural lands that promote community skills, awareness and involvement with parks, for example participation in a new bush regeneration project with a local community group for control of Class 4 noxious weeds.

L-PP (Previous Programs)

Previous programs targeting pests that have localised impacts on native species and ecosystems, and that can be efficiently implemented to maintain program benefits, for example the maintenance of 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. These may arise where burnt areas become more accessible for ground control of weeds, where drought makes control of feral pigs and feral goats more efficient because they congregate in areas where water is available, or when a new biocontrol agent becomes available.

Future priorities for pest control will need to reflect changes in the distribution, abundance or impacts of pests that may occur in response to environmental changes, including climate change. NPWS is supporting research to understand the interaction between climate change, pests and biodiversity.

4. Prioritised regional pest programs

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

Area	Reserves	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Baradine	Pilliga West State Conservation Area	1281 – Baradine Creek	African boxthorn, tiger pear	Box Gum Woodland EEC (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Baradine	Yarragin National Park	117 – Box Gum Woodland	Bathurst burr, Noogoora burr, prickly pear	Box Gum Woodland EEC (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Baradine	Macquarie Marshes Nature Reserve	Macquarie Marshes NR	Feral pig	Ground nesting waterbirds	Asset protection	Aerial shooting, trapping, baiting	C-TSC
Baradine	Pilliga National Park	Gilgai area	Feral pig	<i>Myriophyllum implicatum</i>	Asset protection	Baiting, trapping	C-TSC
Baradine	Macquarie Marshes Nature Reserve	Macquarie Marshes	Fox	Ground nesting waterbirds	Asset protection	Baiting, M44 ejectors	C-TSC
Baradine	Pilliga National Park	2616 - Gilgais	Mother-of-millions	<i>Myriophyllum implicatum</i> (TSC-ce) (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Baradine	Willala Aboriginal Area	1483 - Willala Knobs	Prickly pear	Semi-evergreen Vine Thicket EEC (BPWW – CC2)	Asset protection	Foliar spraying	C-TSC
Baradine	Yarragin NP	1449 - The Duke	St Johns wort, blackberry, prickly pear	Fuzzy Box EEC, Box Gum Woodland EEC (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Baradine	Pilliga State Conservation Area	1453 - Tinegie Creek	Tiger pear	Box Gum Woodland EEC, Koala (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Baradine	Timmallallie National Park	1314 - Bugaldie Creek	Tiger pear, Noogoora burr	Box Gum Woodland EEC, Pilliga Mouse, Koala (BPWW – CC2)	Asset protection	Foliar spraying	C-TSC

Area	Reserves	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Baradine	Pilliga State Conservation Area	1438 - Talluba Creek	Tiger pear, prickly pear	Box Gum Woodland EEC, Koala (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Baradine	Pilliga National Park	1337 - Quegobla / Etoo Creek	Tiger pear, prickly pear, Noogoora burr	Box Gum Woodland EEC, Koala (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Baradine	Merriwindi State Conservation Area	116 – Box Gum Woodland	Tiger Pear, spiny burrgrass	Box Gum Woodland EEC (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Coonabarabran	Warrumbungle National Park	81 - Hells Hole	Blackberry	White box, Ironbark, Black pine woodland and Warrumbungle star bush (BPWW – CC1)	Asset protection	Foliar spraying	C-TSC
Coonabarabran	Ukerbarley Aboriginal Area	2615 - Carex sedgeland	Blackberry, tree of heaven, St Johns wort	Carex Sedgeland EEC (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Coonabarabran	Wongarbon Nature Reserve	103 - Wongarbon NR	Coolatai grass	Box Gum Woodland EEC (BPWW – CC3)	Asset protection	Foliar spraying	C-TSC
Coonabarabran	Warrumbungle National Park	Warrumbungle NP	Feral goat	Brush-tailed rock-wallaby	Asset protection	Aerial shooting	C-TSC
Coonabarabran	Goonoo National Park, Goonoo State Conservation Area, Coolbaggie Nature Reserve, Cobbora State Conservation Area, Breelong National Park	Goonoo	Fox	Malleefowl	Asset protection	Baiting, M44 ejectors	C-TSC
Coonabarabran	Warrumbungle National Park	Warrumbungle	Fox	Brush-tailed rock-wallaby	Asset protection	Baiting, M44 ejectors, ground shooting	C-TSC
Coonabarabran	Yarrobil National Park	2619 - <i>Acacia ausfeldii</i>	St John's wort	<i>Acacia ausfeldii</i> (BPWW – CC3)	Asset protection	Foliar spraying	C-TSC
Coonabarabran	Boonalla Aboriginal Area	1332 - east boundary/firetrails	Tiger pear, prickly pear	Koala (BPWW – CC3)	Asset protection	Foliar spraying	C-TSC

Area	Reserves	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Narrabri	Bullala National Park	2617 - Carbeen Open Forest	African boxthorn, prickly pear	Carbeen Open Forest EEC (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Narrabri	Terry Hie Hie Aboriginal Area (Campbell and Montrose sections)	2618 - Campbell and Montrose – Bluegrass	Coolatai grass	Bluegrass EEC (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Narrabri	Gunyerwarildi National Park	1266 – Box Gum Woodland	Coolatai grass, African boxthorn, prickly pear	Box Gum Woodland EEC (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Narrabri	Planchonella Nature Reserve	36 – Semi-evergreen Vine Thicket	Coolatai grass, prickly pear, African boxthorn	Semi-evergreen Vine Thicket EEC (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Narrabri	Mount Kaputar National Park	Mount Kaputar NP	Feral goat	Brush-tailed rock-wallaby, Border thick-tailed gecko, little bentwing-bat	Asset protection	Aerial shooting	C-TSC
Narrabri	Bobbiwaa State Conservation Area	Bobbiwaa SCA	Feral pig	Spiny peppergrass	Asset protection	Baiting, trapping	C-TSC
Narrabri	Brigalow Park Nature Reserve and Brigalow State Conservation Area	Brigalow Park NR and Brigalow SCA	Feral pig	Spiny peppergrass	Asset protection	Aerial shooting, trapping	C-TSC
Narrabri	Mount Kaputar National Park	Mount Kaputar NP	Feral pig	Ground nesting waterbirds	Asset protection	Aerial shooting, baiting, trapping	C-TSC
Narrabri	Narran Lake Nature Reserve	Narran Lake NR	Feral pig	Ground nesting waterbirds, winged peppergrass	Asset protection	Aerial shooting, trapping	C-TSC
Narrabri	Brigalow Park Nature Reserve, Brigalow State Conservation Area	Brigalow Park	Fox	Black striped wallaby	Asset protection	Monitoring	C-TSC
Narrabri	Mount Kaputar National Park, Deriah AA	Mount Kaputar	Fox	Brush-tailed rock-wallaby	Asset protection	Baiting, M44 ejectors, ground shooting	C-TSC

Area	Reserves	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Narrabri	Narran Lake Nature Reserve	Narran Lake	Fox	Ground nesting waterbirds	Asset protection	Baiting, M44 ejectors, ground shooting	C-TSC
Narrabri	Mount Kaputar National Park	1338 - Ningadoo	Green cestrum, prickly pear, mother-of-millions, white cedar	<i>Cadellia pentastylis</i> , Ooline EEC, riparian vegetation (BPWW – CC3)	Asset protection	Foliar spraying	C-TSC
Narrabri	Terry Hie Hie Aboriginal Area	39 - Cap and Bonnett Creek	Green cestrum, prickly pear, Noogoora burr	Box Gum Woodland EEC, Brigalow EEC (BPWW – CC1)	Asset protection	Foliar spraying	C-TSC
Narrabri	Kirramingly Nature Reserve	26 - Kirramingly NR	Lippia, African boxthorn, Noogoora burr, Bathurst burr, prickly pear.	Bluegrass EEC (BPWW – CC2)	Asset protection	Foliar spraying	C-TSC
Narrabri	Narran Lake Nature Reserve	2602 – Wetland area	Lippia, Bathurst burr, Noogoora burr, prickly pear	Ramsar wetland (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Narrabri	Mount Kaputar National Park	1289 - Beresford Park	Mother-of-millions, African boxthorn, cotton bush, white cedar	Semi-evergreen Vine Thicket EEC (BPWW – CC1)	Asset protection	Foliar spraying	C-TSC
Narrabri	Bobbiwaa State Conservation Area	1299 - Bobbiwaa SCA	Mother-of-millions, prickly pear, Bathurst burr, Noogoora burr	Spiny peppergrass (BPWW – CC4)	Asset protection	Foliar spraying	C-TSC
Narrabri	Gamilaroi Nature Reserve	19 – Ooline	Prickly pear	<i>Cadellia pentastylis</i> , Ooline EEC (BPWW – CC1)	Asset protection	Foliar spraying	C-TSC
Narrabri	Budelah Nature Reserve	12 - Coolibah-Black Box Woodland	Prickly pear, lippia, mimosa bush	Coolibah-Black Box Woodland EEC (BPWW – CC1)	Asset protection	Foliar spraying	C-TSC

Area	Reserves	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Narrabri	Boomi Nature Reserve	8 – Carbeen Open Forest	Spiny burrgrass, buffel grass, prickly pear	Carbeen Open Forest EEC (BPWW – CC1)	Asset protection	Foliar spraying	C-TSC
Narrabri	Boomi West Nature Reserve	9 – Carbeen Open Forest	Spiny burrgrass, buffel grass, prickly pear	Carbeen Open Forest EEC (BPWW – CC1)	Asset protection	Foliar spraying	C-TSC
Narrabri	Borong Nature Reserve	10 – Carbeen Open Forest	Spiny burrgrass, buffel grass, prickly pear	Carbeen Open Forest EEC (BPWW – CC1)	Asset protection	Foliar spraying	C-TSC
Narrabri	Budelah Nature Reserve	11 - Carbeen Open Forest and sandhills	Spiny burrgrass, buffel grass, prickly pear	Carbeen Open Forest EEC (BPWW – CC1)	Asset protection	Foliar spraying	C-TSC
All Areas	All reserves	Northern Plains	Wild dog	Neighbours' livestock	Asset protection	Trapping, baiting	C-EC
Narrabri	Budelah Nature Reserve	Budelah NR	Feral pig	Neighbours' crops	Asset protection	Aerial shooting, trapping	C-EC
Narrabri	Gunyerwarildi National Park	Gunyerwarildi NP	Feral pig	Neighbours' crops	Asset protection	Aerial shooting, baiting	C-EC
Narrabri	Planchonella Nature Reserve	Planchonella NR	Feral pig	Neighbours' crops	Asset protection	Aerial shooting, baiting	C-EC
Baradine	Pilliga National Park	Gilgais	<i>Orbea variegata</i> (carrion flower)		Eradication	Foliar spraying	C-NE
Baradine	Dandry Gorge Aboriginal Area	Dandry Gorge AA	Feral goat	Aboriginal Cultural Heritage Sites	Asset protection	Mustering	H-CH
Baradine	Pilliga Nature Reserve	Pilliga NR	Feral goat	Aboriginal Cultural Heritage Sites	Asset protection	Mustering	H-CH
Baradine	Willala Aboriginal Area	Willala AA	Feral goat	Aboriginal Cultural Heritage Sites	Asset protection	Mustering	H-CH
Coonabarabran	Boonalla Aboriginal Area	Boonalla AA	Feral goat	Aboriginal Cultural Heritage Sites	Asset protection	Aerial shooting, mustering	H-CH
Coonabarabran	Ukerbarley State Conservation Area and Aboriginal Area	Ukerbarley SCA and AA	Feral goat	Aboriginal Cultural Heritage Sites	Asset protection	Aerial shooting, mustering	H-CH

Area	Reserves	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Coonabarabran	Warrumbungle National Park	Warrumbungle NP (Central Valley)	Blue heliotrope, Paterson's curse, St John's wort, blackberry, prickly pear, khaki weed	Campgrounds, picnic areas, car parks and road verges	Asset protection	Foliar spraying	M-RA
Coonabarabran	Warrumbungle National Park	Warrumbungle NP	Feral pig	Visitor aesthetics, neighbours' crops	Asset protection	Trapping	M-RA
Narrabri	Mount Kaputar National Park	Mount Kaputar NP	Feral pig	Visitor aesthetics, neighbours' crops	Asset protection	Trapping	M-RA
Narrabri	Mount Kaputar National Park	Upper Bullawa Creek	Green cestrum, Noogoora burr, white cedar	Visitor aesthetics, neighbours' livestock	Asset protection	Foliar spraying	M-RA
Baradine	Ginghet Nature Reserve	Ginghet NR	Feral pig	Neighbours' livestock	Asset protection	Baiting	M-CP
Baradine	Pilliga Nature Reserve	Salisbury Waterhole	Feral pig	Lowland Catchment of Darling River EEC (Fisheries Act), neighbours' crops and livestock	Asset protection	Baiting, trapping	M-CP
Baradine	Pilliga State Conservation Area	Pilliga SCA	Feral pig	Neighbours' crops and livestock	Asset protection	Baiting, Trapping	M-CP
Baradine	Pilliga West National Park and State Conservation Area	Pilliga West NP and SCA	Feral pig	Neighbours' crops and livestock	Asset protection	Baiting, Trapping	M-CP
Baradine	Timmallallie National Park	Timmallallie NP	Feral pig	Neighbours' crops and livestock	Asset protection	Baiting, Trapping	M-CP
Baradine	Pilliga National Park	Pilliga NP	Fox	Neighbours' livestock	Asset protection	Baiting	M-CP

Area	Reserves	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Baradine	Pilliga National Park, Pilliga State Conservation Area, Pilliga Nature Reserve, Timallallie National Park, Pilliga East State Conservation Area, Willala Aboriginal Area	Pilliga	Fox	Pilliga mouse	Asset protection	Baiting, M44 ejectors	M-CP
Baradine	Pilliga West National Park and State Conservation Area	Pilliga West NP and SCA	Fox	Neighbours' livestock	Asset protection	Baiting	M-CP
Coonabarabran	Somerton National Park	Somerton NP	Feral pig	Neighbours' crops	Asset protection	Baiting, Trapping	M-CP
Coonabarabran	Trinkey State Conservation Area	Trinkey SCA	Feral pig	Neighbours' crops	Asset protection	Baiting	M-CP
Coonabarabran	Ukerbarley AA	Ukerbarley SCA and AA	Feral pig	Permanent spring, Carex Sedgeland	Asset protection	Trapping, baiting	M-CP
Coonabarabran	Dapper Nature Reserve	Dapper NR	Fox	Neighbours' livestock	Asset protection	Baiting	M-CP
Coonabarabran	Drillwarrina National Park	Drillwarrina NP	Fox	Neighbours' livestock	Asset protection	Baiting	M-CP
Coonabarabran	Goodiman State Conservation Area	Goodiman SCA	Fox	Neighbours' livestock	Asset protection	Baiting	M-CP
Coonabarabran	Yarrobil National Park	Yarrobil NP	Fox	Neighbours' livestock	Asset protection	Baiting	M-CP
Coonabarabran	Warrumbungle National Park	Warrumbungle NP	Green cestrum	Neighbours' livestock	Asset protection	Foliar spraying	M-CP
Narrabri	Barwon Nature Reserve and State Conservation Area	Barwon NR and SCA	Feral pig	Neighbours' crops and livestock	Asset protection	Aerial shooting, Baiting	M-CP
Narrabri	Bullala National Park	Bullala NP	Feral pig	Neighbours' crops and livestock	Asset protection	Baiting	M-CP
Narrabri	Couradda National Park	Couradda NP	Feral pig	Neighbours' crops	Asset protection	Baiting, Trapping	M-CP

Area	Reserves	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Narrabri	Moema National Park	Moema NP	Feral pig	Neighbours' crops	Asset protection	Baiting, Trapping	M-CP
Narrabri	Terry Hie Hie Aboriginal Area (Terry Hie Hie, Berrygil, Campbell and Montrose sections)	Terry Hie Hie, Berrygil, Campbell, Montrose	Feral pig	Neighbours' crops and livestock	Asset protection	Baiting	M-CP
Narrabri	Warrambool State Conservation Area	Warrambool SCA	Feral pig	Neighbours' livestock	Asset protection	Baiting	M-CP
Narrabri	Barwon State Conservation Area	Barwon SCA	Fox	Neighbours livestock	Asset protection	Baiting	M-CP
Narrabri	Mount Kaputar National Park	Mount Kaputar NP	Fox	Border thick-tailed gecko, Australian brush-turkey (population)	Asset protection	Baiting	M-CP
Narrabri	Terry Hie Hie Aboriginal Area	Terry Hie Hie section	Fox	Border thick-tailed gecko, five-clawed worm-skink	Asset protection	Baiting	M-CP
Narrabri	Warrambool State Conservation Area	Warrambool SCA	Fox	Neighbours' livestock	Asset protection	Baiting	M-CP
Coonabarabran	Wongarbon Nature Reserve	Northern boundary	Mother-of-millions		Containment	Foliar spraying	M-II
Coonabarabran	Goonoo National Park, Goonoo State Conservation Area	Riley's Dam, No.2 Bore	Blue heliotrope, prickly pear, Paterson's curse, Bathurst burr, Noogoora burr	Visitor area	Asset protection	Foliar spraying	L-LP
Baradine	Pilliga West National Park, Pilliga West State Conservation Area	Brumby road	African boxthorn, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Baradine	Pilliga East State Conservation Area	Airlands and Yamborah	Blue heliotrope, spiny burrgrass, thistles	Neighbour relations	Asset protection	Foliar spraying	L-PP
Baradine	Pilliga West National Park, Pilliga West State Conservation Area	Pilliga to Coonamble road	Mother-of-millions, tiger pear, tree pear, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP

Area	Reserves	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Baradine	Timmallalie National Park	1485 - Wittenbra Spring	Noogoora burr	Natural springs and riparian vegetation	Asset protection	Foliar spraying	L-PP
Baradine	Pilliga East State Conservation Area, Timallalie National Park, Pilliga Nature Reserve	No.1 Break / Delwood / Scratch	Prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Baradine	Pilliga East State Conservation Area, Pilliga Nature Reserve	Borah Creek	Rabbit	Native flora	Asset protection	Fumigation	L-PP
Coonabarabran	Beni State Conservation Area	Beni SCA	African boxthorn, mother-of-millions, Paterson's curse, Bathurst burr, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Coonabarabran	Breelong National Park	Breelong NP	African boxthorn, Noogoora burr, prickly pear, rope pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Coonabarabran	Drillwarrina National Park	Drillwarrina NP	African boxthorn, Paterson's curse, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Coonabarabran	Mogriguy National Park	Mogriguy NP	African boxthorn, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Coonabarabran	Cobbora State Conservation Area	Cobbora SCA	African boxthorn, spiny burgrass, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Coonabarabran	Somerton National Park	Somerton NP	Bathurst burr, Noogoora burr, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Coonabarabran	Sappa Bulga National Park	Sappa Bulga NP	Bridal creeper, African boxthorn, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP

Area	Reserves	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Coonabarabran	Binnaway Nature Reserve, Weetalibah Nature Reserve, Tinkrameanah National Park, Garrawilla National Park	Coonabarabran small reserves	Feral pig	Neighbour relations	Asset protection	Baiting, trapping	L-PP
Coonabarabran	Breelong National Park, Mogriguy National Park, Drillwarrina National Park	Breelong, Mogriguy, Drillwarrina	Feral pig	Neighbour relations	Asset protection	Trapping	L-PP
Coonabarabran	Biddon State Conservation Area	Biddon SCA	Fox	Neighbours livestock and native fauna	Asset protection	Baiting	L-PP
Coonabarabran	Boonalla Aboriginal Area	Boonalla AA	Fox	Neighbours livestock and native fauna	Asset protection	Baiting	L-PP
Coonabarabran	Somerton National Park	Somerton NP	Fox	Neighbours livestock and native fauna	Asset protection	Baiting	L-PP
Coonabarabran	Trinkey State Conservation Area	Trinkey SCA	Fox	Neighbours livestock and native fauna	Asset protection	Baiting	L-PP
Coonabarabran	Ukerbarley AA	Ukerbarley SCA and AA	Fox	Native fauna	Asset protection	Baiting	L-PP
Coonabarabran	Warrumbungle National Park	Warrumbungle NP (non Fox TAP area)	Fox	Native fauna	Asset protection	Baiting	L-PP
Coonabarabran	Wondoba State Conservation Area	Wondoba SCA	Fox	Neighbours livestock and native fauna	Asset protection	Baiting	L-PP
Coonabarabran	Trinkey State Conservation Area	Trinkey SCA	Mother-of-millions, tiger pear, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Coonabarabran	Goonoo State Conservation Area	Northern Boundary	Prickly pear	Box Woodland	Asset protection	Foliar spraying	L-PP
Coonabarabran	Wondoba State Conservation Area	Wondoba SCA	Prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP

Area	Reserves	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Coonabarabran	Biddon State Conservation Area	Biddon SCA	Prickly pear, blue heliotrope	Neighbour relations	Asset protection	Foliar spraying	L-PP
Coonabarabran	Coolbaggie Nature Reserve	Coobaggie NR	Prickly pear, century plant	Neighbour relations	Asset protection	Foliar spraying	L-PP
Coonabarabran	Dowe National Park	Dowe NP	Prickly pear, tiger pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Coonabarabran	Goonoo National Park, Goonoo State Conservation Area	Goonoo	Rabbit	Native flora	Asset protection	Fumigation	L-PP
Coonabarabran	Small reserves in previous Dubbo Area	Small reserves in previous Dubbo Area	Rabbit	Native flora	Asset protection	Fumigation	L-PP
Coonabarabran	Warrumbungle National Park	Central Valley	Rabbit	Native flora	Asset protection	Fumigation, warren ripping, biological control	L-PP
Coonabarabran	Warrumbungle National Park	Warrumbungle NP (Non visitor areas)	Spiny burrgrass, St Johns wort, blackberry, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Coonabarabran	Adelyne State Conservation Area	Adelyne SCA	St Johns wort, African boxthorn, prickly pear, wandering jew	Neighbour relations	Asset protection	Foliar spraying	L-PP
Narrabri	Moema National Park	Moema NP	African boxthorn, Noogoora burr, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Narrabri	Killarney State Conservation Area	Killarney SCA	African boxthorn, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Narrabri	Leard State Conservation Area	Leard SCA	African boxthorn, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Narrabri	Leard State Conservation Area	Leard SCA	Feral pig	Neighbour relations	Asset protection	Baiting	L-PP

Area	Reserves	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Narrabri	Gwydir Wetlands State Conservation Area	Gwydir Wetlands SCA	Fox	Native fauna, waterbirds	Asset protection	Baiting	L-PP
Narrabri	Killarney State Conservation Area, Bobbiwaa State Conservation Area, Couradda National Park, Moema National Park	Bobbiwaa group	Fox	Neighbour relations	Asset protection	Baiting	L-PP
Narrabri	Gwydir Wetlands State Conservation Area	Gwydir Wetlands SCA	Mimosa bush, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Narrabri	Bullawa Creek State Conservation Area	Bullawa Creek SCA	Mother-of-millions, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Narrabri	Couradda National Park	Couradda NP	Mother-of-millions, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Narrabri	Brigalow Park Nature Reserve and Brigalow State Conservation Area	Brigalow Park NR and Brigalow SCA	Noogoora burr, Bathurst burr, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP
Narrabri	Terry Hie Hie AA – Berrygil section	Berrygil section visitor area	Noogoora burr, prickly pear	Visitor area	Asset protection	Foliar spraying	L-LP
Narrabri	Mount Kaputar National Park	Eastern boundary	Sweet briar, prickly pear	Neighbour relations	Asset protection	Foliar spraying	L-PP

5. Consultation

The Northern Plains regional pest management strategy was developed through consultation with key stakeholders, staff and the community. This included a stakeholder consultation forum, internal consultation and public exhibition of the draft strategy. The public exhibition invited feedback from the community, other government agencies and stakeholder groups.

The Northern Plains Region stakeholder consultation forum was held in Coonabarabran on Wednesday 7 September 2011. The forum was attended by 33 key private and government stakeholders from LHPAs, local government, Forests NSW, Department of Primary Industries, catchment management authorities, NPWS advisory committees and private landholders.

A number of the issues identified were general landscape pest species issues and broad pest management issues not specific to reserves in Northern Plains Region. These are not addressed in the pest management strategy because specific threats within reserves have not been identified, efficient and effective management techniques do not exist or management of such issues is not within the scope of NPWS. Examples of such issues included starlings, gambusia, honey bees, carp, Indian myna, farming or harvesting of goats, issues relating to hunting of pest species and reintroductions of dingoes.

A number of emerging issues where specific pest species are not yet present but threaten to establish in reserves within the Region were identified including Hudson pear, mesquite, parkinsonia, parthenium weed, tropical soda apple, fireweed, water lettuce, salvinia and hymenachnie. These, along with other emerging threats, and some key reserves for surveillance have been identified and discussed in Appendix 1.

A number of emerging pest issues where there are infestations in reserves, or key issues relating to widespread pest species, were identified by participants at the forum. These included:

- feral deer
- horses
- lippia in wetlands
- Coolatai grass in reserves south of Coonabarabran
- blackberry in reserves around Coonabarabran
- pigs in wetlands and where they have an economic impact on adjoining enterprises
- boxthorn in Carbeen and Coolibah – Black Box communities
- foxes where they threaten brush-tailed rock-wallabies and malleefowl
- bridal creeper
- carnivore pests (foxes and wild dogs) where they impact on adjoining enterprises.

Key management strategies raised during the forum, with reference to the state strategy, included:

- the need for cooperative management with neighbours and other agencies (Goal 2 Objective 2.2)
- management to include planning and prioritisation (refer to Section 3)
- recording, monitoring and evaluation of pest control programs (refer to state strategy)

- adoption of integrated pest management (Goal 2 Objective 2.2)
- use of volunteers to assist with pest management programs (Goal 3 Objective 3.2)
- education of staff to recognise and report new weed incursions (Goal 1 Objective 1.1).

Internal consultation involved liaison with key local Area staff to accurately identify and prioritise pest distribution and management programs. Comment was also sought from local staff on the draft strategy.

Ongoing stakeholder engagement during the implementation of this strategy will include discussion of issues and information relating to pest management plans and programs at advisory committee meetings. NPWS staff will report to and attend meetings of regional pest animal and weeds advisory committees that comprise of local government and LHPA delegates.

In addition, ongoing stakeholder engagement will occur through regular informal consultation with organisations such as local government, LHPAs, catchment management authorities and neighbours in relation to specific issues that arise and programs that are undertaken.

6. Pest species overviews

Information about high profile pests for this region is summarised below. More details regarding the distribution, impacts and management options for these and other pest species can be found in other reference documents and on the internet.²

Red fox (*Vulpes vulpes*)

Distribution and abundance

Foxes occur in most environments in Australia; however, they are probably most abundant in agricultural areas with patches of uncleared vegetation, because these areas provide abundant food, cover and denning sites. In contrast, foxes appear to be rare in closed forest distant from cleared land.

Foxes occur in all reserves throughout Northern Plains Region in varying densities.

Impacts

The introduction of foxes into Australia has had a devastating impact on native fauna. Studies have shown that predation by foxes continues to suppress remnant populations of many species. Predation by foxes was the first key threatening process (KTP) to be listed under the TSC Act. Foxes are an agent for the dispersal of several species of weeds and are a potential carrier of disease. They are also significant predators of domestic stock including lambs and poultry; predation by foxes has the potential to reduce lambing rates significantly (NSW NPWS 2001).

The NSW Fox TAP identifies foxes as a threat to a number of species in reserves in Northern Plains Region, including brush-tailed rock-wallabies, black-striped wallabies, malleefowl and brolgas. Additionally, because foxes pose a threat to domestic stock, they are a problem where neighbours have sheep breeding enterprises near a number of reserves in the Region.

Priorities for control

Brigalow Park (Brigalow Park NR and Brigalow SCA – black-striped wallaby), Mount Kaputar (Mount Kaputar NP and Deriah AA – brush-tailed rock-wallaby), Warrumbungle NP (brush-tailed rock-wallaby), Goonoo (Goonoo NP and SCA, Coolbaggie NR, Cobbora SCA and Breelong NP – malleefowl), Macquarie Marshes NR (brolga) and Narran Lake NR (brolga) have been identified as priority sites for fox control in the Fox TAP.

In addition, Mount Kaputar NP (Border thick-tailed gecko and Australian brush-turkey population), Terry Hie Hie AA (Border thick-tailed gecko and five-clawed worm-skink), Pilliga NP, SCA and NR, Timallallie NP, Pilliga East SCA and Willala AA (Pilliga mouse) are medium priority.

² www.dpi.nsw.gov.au/agriculture/pests-weeds/vertebrate-pests/general-information/pest-animal-survey
www.environment.gov.au/biodiversity/invasive/publications/humane-control.html
www.invasiveanimals.com/
www.environment.gov.au/biodiversity/invasive/ferals/index.html
www.environment.nsw.gov.au/threatenedspecies/KeyThreateningProcessesByDoctype.htm
www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles
www.weeds.org.au/WoNS/
www.rirdc.gov.au/programs/national-rural-issues/weeds/weeds_home.cfm
www.weeds.gov.au/

Fox control in Warrambool SCA, Barwon SCA, Pilliga NP, Pilliga West NP and SCA, Dapper NR, Yarrobil NP, Drillwarrina NP and Goodiman SCA, in conjunction with cooperative group fox baiting programs, is a medium priority.

Fox control may be carried out in a number of other reserves within the Region for the protection of neighbouring livestock. Where this is not a coordinated cooperative program, it will be a lower priority.

Control

Under the Fox TAP each priority site will have a site plan outlining the type and level of control that will be undertaken. In Northern Plains Region, control at Fox TAP sites will include a combination of control techniques implemented as specified in the site plan.

Where fox control has been identified as a priority for Northern Plains Region reserves to protect native fauna at non-Fox TAP sites, control will be implemented 2–3 times per year between March and September, targeting foxes during the peak dispersal period (autumn), when nutritional stresses are greatest (winter) and when common non-target species such as goannas are least active.

Fox control programs implemented in conjunction with local groups and/or to protect neighbouring livestock will be timed to coincide with cooperative efforts.

Where possible, control programs will be coordinated and implemented in collaboration with neighbours, LHPAs and other agencies. In addition, control programs will be implemented using a variety of bait types and/or a combination of control techniques including baiting, M44 ejectors and ground shooting.

Monitoring

Recording of control effort and results, such as mapping locations of bait stations and M44 ejectors, and recording bait uptake, M44 ejector activations and ground shooting effort and results will be undertaken for all programs.

In addition, specific monitoring as outlined in each Fox TAP site plan will be implemented at Northern Plains Region Fox TAP sites. This monitoring will include sand pad or camera monitoring of relative fox abundance, brush-tailed rock-wallaby population monitoring, black-striped wallaby population monitoring, monitoring of malleefowl nests and monitoring of waterbird breeding events.

Some of this data will be analysed by the Pest and Ecological Management Unit and published periodically as part of the review of the Fox TAP. Additionally, this data will provide information for Northern Plains Region on the effectiveness of specific high priority control programs and act as an indicator for other control sites.

Feral goat (*Capra hircus*)

Distribution and abundance

Feral goats occur in varying densities in all states of Australia. The most extensive populations live in semi-arid pastoral areas where the construction of permanent water supplies and the control of predators have modified natural habitat to suit feral goats. Significant populations also exist in higher rainfall agricultural areas where patches of scrub or forest offer protection from control (Parkes et al. 1996).

In Northern Plains Region, the most extensive populations are in Mount Kaputar and Warrumbungle national parks, Narran Lake Nature Reserve, Boonalla Aboriginal Area and areas of Pilliga Nature Reserve and Community Conservation Areas. Smaller, more isolated populations occur at varying densities in Kirramingly, Macquarie Marshes and Weetalibah nature reserves, Deriah Aboriginal Area, Killarney State Conservation Area and Garrawilla National Park.

Impacts

Feral goats compete with native animals for food, water and shelter. They contribute to soil erosion and can degrade cultural heritage sites. They can have substantial impacts on vegetation through eating established plants and preventing regeneration of seedlings, particularly in sensitive areas such as rocky outcrops. They are also potential carriers of a number of endemic and exotic parasites and diseases. Competition and habitat degradation by feral goats is listed as a KTP under the TSC Act.

Endangered brush-tailed rock-wallabies are the most significant species in Northern Plains Region to be impacted by feral goats through competition for food and shelter. Other vulnerable species in the Region that are impacted by feral goats through habitat destruction or competition include the Border thick-tailed gecko and little bentwing-bat.

Feral goats inhabit rocky outcrops and caves and pose a threat to a number of important Aboriginal cultural heritage sites in several nature reserves and community conservation areas in the Region.

Priorities for control

Control of feral goats to protect brush-tailed rock-wallabies (Warrumbungle and Mount Kaputar NPs) has been identified as a priority in this regional pest management strategy.

Feral goat management to minimise damage to Aboriginal cultural heritage sites, in particular etchings found in a number of sandstone caves in Pilliga Nature Reserve and Dandry Gorge, Willala and Ukerbarley Aboriginal Areas will be a high priority. Similarly, feral goat control to minimise damage to Aboriginal cultural heritage sites in Boonalla AA will be a high priority.

Feral goat control may be carried out in a number of other reserves within the Region to minimise impacts on native vegetation. These programs will be a lower priority.

Control

Due to the remoteness, limited accessibility and abundance of natural watering points within Mount Kaputar and Warrumbungle NP and Boonalla AA, efficient and effective feral goat control has been, and will continue to be, carried out via aerial culling when funding permits. In recent years programs in Mount Kaputar NP have at times been carried out in collaboration with LHPA programs on adjoining private and vacant Crown land. Participation of stakeholders provides a greater control effort and minimises the extent of reinvasion of feral goats from non-controlled land. The ongoing participation from these stakeholders will be encouraged but is dependent on funding attracted by LHPAs.

Feral goat management around Aboriginal cultural heritage sites in Pilliga NR and, Dandry Gorge, Willala, Ukerbarley and Boonalla Aboriginal Areas will be undertaken through a combination of physical site protection and other feral goat control techniques.

Feral goat control techniques that may be used in the Region include contract mustering, ground shooting and aerial shooting. In addition, research trials aim to identify a suitable baiting toxin and technique that could assist with control in some reserves.

Monitoring

Scat surveys, camera monitoring and visual sightings around brush-tailed rock-wallaby colonies will provide an indicator of feral goat presence and abundance.

Recording of control effort and results, such as mapping flight paths and controlled animals, and recording mustering or ground shooting will be undertaken for all programs.

Information from staff, neighbours and visitors regarding sightings of feral goats and identified impacts will also provide indications of feral goat abundance and the general population change following control programs.

Feral pig (*Sus scofra*)

Distribution and abundance

Feral pigs are widely distributed in Queensland, the Northern Territory, NSW and the ACT, with isolated populations in the other states. The most critical factors affecting their distribution are the need for daily water and dense shelter. Provided these requirements are met, the density of populations is largely dependent on the availability of preferred foods (Choquenot et al. 1996).

In Northern Plains Region, feral pigs can occur in varying densities in almost all reserves. The most extensive populations are in and around the Macquarie Marshes and Narran Lake nature reserves and Gwydir Wetland SCA. High density populations are also in and around Planchonella NR, Gunyerwarildi NP, Budelah NR, Barwon NR and SCA, Warrambool SCA, Couradda NP, Moema NP, Bobbiwaa SCA, Brigalow Park NR, Brigalow SCA, Terry Hie Hie AA, Trinkey SCA, Somerton NP and Ginghet NR. Moderate populations occur in and around areas of Mount Kaputar and Warrumbungle national parks, Boomi, Boomi West, Midkin and Careunga NRs, Pilliga NR and CCAs, Bullala NP, Killarney SCA and Biddon SCA.

Impacts

Feral pigs cause habitat degradation through selective feeding and trampling damage, and rooting for invertebrates and underground parts of plants. They can also impact on a number of native species through either predation or aggressive competition. They eat newborn lambs, reduce crop yields, damage fences, foul water sources and compete with stock for feed. Feral pigs are potential carriers of a number of endemic and exotic parasites and diseases (Choquenot et al. 1996). Predation, habitat degradation, competition and disease transmission by feral pigs is listed as a KTP under the TSC Act.

The most significant threats posed by feral pigs in Northern Plains Region are associated with predation and habitat destruction in the wetlands at Macquarie Marshes and Narran Lake NRs and Gwydir Wetlands SCA. These internationally recognised wetlands are Ramsar listed and provide important habitat for ground nesting waterbirds and other aquatic species. Feral pig control in Macquarie Marshes and Narran Lake NRs is listed in the priorities action statement for the protection of several species of waterbirds.

Populations of feral pigs in and around Planchonella and Budelah NRs and Gunyerwarildi NP can cause extremely high losses in terms of damage to neighbours' crops in the high-yielding cropping areas. Similarly, they pose a high risk to crops adjoining Barwon NR and SCA, Couradda NP, Moema NP, Bobbiwaa SCA, Brigalow Park NR, Brigalow SCA, Terry Hie Hie AA, Trinkey SCA and Somerton NP. Moderate populations in a number of other reserves have the potential to cause significant damage to neighbouring crops if left uncontrolled.

Feral pigs are a declared pest under the Rural Lands Protection Act 1998. This binds all land managers to control (continuously suppress and destroy) declared pest animals to the extent necessary to minimise the risk of the pest causing damage to any land.

Priorities for control

Macquarie Marshes NR (ground-nesting waterbirds), Narran Lake NR (ground-nesting waterbirds and winged peppercress), Brigalow Park NR, Brigalow SCA, and Bobbiwaa SCA (spiny peppercress) are critical priorities for feral pig control. Given that Gwydir Wetlands SCA is also a Ramsar-listed wetland and provides important habitat for waterbirds and other aquatic species it is also considered to be a critical priority for feral pig control.

In addition, in Pilliga National Park (Gilgai area), *Myriophyllum implicatum* (listed as critically endangered) grows around the low-lying wet areas where pigs sometimes disturb the soil. Control in this area is a critical priority to minimise impacts on soil disturbance and damage to this species.

Due to the very high level of damage to crops and subsequent economic loss that feral pigs in Planchonella and Budelah NRs and Gunyerwarildi NP can cause, participation in cooperative control programs in and around these reserves is a critical priority.

Feral pigs also pose a risk to crops and livestock adjoining Pilliga West NP and SCA, Pilliga SCA, Timallallie NP, Barwon NR and SCA, Warrambool SCA, Couradda NP, Moema NP, Bullala NP, Terry Hie Hie AA, Ginghet NR, Trinkey SCA and Somerton NP. These programs and other programs targeting feral pigs in Mount Kaputar and Warrumbungle national parks (to minimise the impacts on park values and neighbours) are a medium priority.

In Pilliga NR, Salisbury Waterhole (listed as Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Darling River) is considered an important permanent waterhole in the eastern Pilliga. Similarly, the permanent spring and associated *Carex* Sedgeland EEC in Ukerbarley SCA and AA is an important aquatic habitat. Feral pig control at these sites in order to minimise disturbance is a medium priority.

Periodically, LHPAs and/or landholder groups carry out cooperative feral pig control programs across areas that encompass Northern Plains Region reserves. Participation in these cooperative control programs surrounding reserves in the Region is important in terms of obtaining the greatest control, minimising reinvasion and maintaining and promoting good neighbour relationships. Participation in such programs will be a medium priority.

Feral pig control may be carried out in a number of other reserves within the Region to minimise impacts on other reserve values or neighbours. These programs will be a lower priority.

Control

Due to the limited access in the wetlands at Narran Lake and Macquarie Marshes NRs and Gwydir Wetlands SCA, control programs will be carried out primarily via aerial shooting. Where possible, this will be complemented by trapping or baiting programs. During significant flooding and subsequent waterbird breeding the control effort may increase in these reserves to afford greater protection during critical nesting periods.

All other control programs will be carried out using one or more of the following control methods: aerial shooting, baiting or trapping.

Programs aimed at protecting neighbours' crops will be timed to control feral pigs to give greatest protection to crops. Where possible, these programs will be implemented in conjunction with local groups.

Where possible, all control programs will be coordinated and implemented in collaboration with neighbours, LHPAs and other agencies.

Monitoring

During waterbird breeding, mapping and recording of colonies and nest counts is undertaken to measure breeding success. Evidence of feral pig predation and disturbance should also be recorded.

Recording of control effort and results, such as mapping flight paths and controlled animals, and recording trapping and baiting effort and results will be undertaken for all programs.

Information from staff, neighbours and visitors on sightings and damage from feral pigs will also provide indications of abundance and the general population change following control programs.

Wild dog (*Canis lupus* spp.)

Distribution and abundance

Wild dog refers to any dog living in the wild, including feral dogs (*Canis lupus familiaris*), dingoes (*Canis lupus dingo*) and their hybrids. Populations of wild dogs (including dingoes) occur mainly along the Great Dividing Range, coastal hinterlands and in north-western NSW.

In Northern Plains Region, wild dogs are known to occur as isolated or scattered populations in Mount Kaputar NP, Deriah AA, Bullala NP, Warrumbungle NP, Macquarie Marshes NR and SCA, Ginghet NR, Binnaway NR, Trinkey SCA, Bidson SCA, Tinkrameanah NP, Ukerbarley AA and SCA, Goonoo NP and SCA, Drillwarrina NP, Yarrobil NP and Goodiman SCA, as well as within the collective Community Conservation Areas and Nature Reserve of the Pilliga.

Impacts

Wild dogs can have significant impacts on livestock, especially sheep. As a result, wild dogs have been declared as a pest under the Rural Lands Protection Act 1998. Under the Act, managers of controlled land have an obligation to eradicate wild dogs by any lawful method. All land in NSW is identified as controlled land under the Pest Control Order for Wild Dogs.³

Wild dogs can have both positive and negative impacts on biodiversity. Predation by wild dogs can suppress the abundance of herbivores (both native and exotic) which may be important in reducing overgrazing across much of arid and semi-arid Australia. Wild dogs may also suppress smaller exotic predators (cats and foxes) with potential benefits for a broad suite of small- to medium-sized ground-dwelling mammals and ground-nesting birds. Conversely, predation by wild dogs may have significant direct impacts on threatened species (e.g. koalas).

The dingo was introduced into Australia from Asia prior to European settlement and hence it is eligible to be listed as a threatened species under the TSC Act. Although the dingo has not been listed as a threatened species, predation and hybridisation by feral dogs (*Canis lupus familiaris*) has been listed as a KTP under the TSC Act.

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

³ www.gazette.nsw.gov.au/pdfs/2009/11th_September.pdf

Priorities for control

In those areas of the state where wild dog attacks are common, wild dog control associations comprised of relevant stakeholders develop wild dog management plans that identify priorities for control across various land tenures, giving consideration to minimising livestock predation and conservation of dingoes in reserves listed under Schedule 2 of the Wild Dog Pest Control Order.

Because wild dogs and the associated attacks to livestock are uncommon in Northern Plains Region, the development of wild dog control associations and the subsequent management plans have not and will not occur. However, in recent years, there have been 1–2 reports of wild dog attacks to livestock adjoining NPWS reserves in Northern Plains Region each year. In response to these attacks, NPWS has implemented targeted control programs in conjunction with adjoining landholders. Within Northern Plains Region, five wild dogs have been removed from NPWS reserves or nearby adjoining land since 2008. As a result, attacks on livestock have ceased in all areas.

Control programs implemented in response to stock attacks on properties adjoining Northern Plains Region reserves will be a critical priority.

Control

Due to the very low abundance of wild dogs and very sporadic incidence of stock attacks, ongoing strategic control aimed at preventing livestock predation would be neither efficient nor effective. Reactive control targeting a wild dog that is attacking stock will be implemented in response to reports of livestock predation. The success of such control will be dependent upon prompt notification of attacks and the cooperation of all stakeholders including LHPAs, landholders and NPWS.

Control techniques may include trapping, baiting, ground shooting or opportunistic aerial shooting.

Monitoring

Monitoring of wild dogs will occur through recording of reports from neighbours regarding stock attacks. Wild dog presence will also be recorded in reserves where remote camera or sand pad monitoring programs are undertaken.

Control of other pest animals

Infestations of rabbits, feral cats, deer, horses and feral cattle occur in some reserves in Northern Plains Region. Generally, populations of these species are isolated and restricted in their distribution. Control programs targeting populations of these species have been identified as a lower priority than the control programs discussed above. Some opportunistic control of these species may be carried out during higher priority programs. Specific control programs targeting these species will be planned and implemented where problems arise.

Several pest fish species, including European carp and plague minnow, have been identified within a number of reserves. Control of such species is limited and has not been identified as a priority.

Green cestrum (*Cestrum parqui*)

Distribution and abundance

Green cestrum originated in Chile and Peru. It was planted widely in Australia as a garden ornamental and hedge plant. It is most commonly found in parts of Victoria, NSW and south-eastern Queensland (Parsons and Cuthbertson 1992).

In Northern Plains Region it occurs as isolated infestations along several creek lines in Warrumbungle NP, Mount Kaputar NP and Terry Hie Hie AA. In Warrumbungle NP, the infestation is found along Honeymoon Creek near the junction of Bugaldie Creek and in Bugaldie Creek below this junction. In Mount Kaputar NP, it is found at Ningadoo at the head of Eulah Creek and around Foggy Dell, along the upper reaches of Bullawa Creek. In Terry Hie Hie Aboriginal Area there are infestations along Cap and Bonnet Creek.

Impacts

Green cestrum is an invasive plant that grows well on alluvial creek flats, often to the exclusion of other vegetation. It is toxic to domestic animals including cattle, sheep, horses, pigs and poultry and is also thought to be toxic to birds and bees that feed on the fruit and flowers (Parsons and Cuthbertson 1992). The plant produces a large seed bank from which it readily re-establishes following treatment.

All incursions in Northern Plains Region are in Narrabri Shire Council, Castlereagh Macquarie County Council and Moree Plains Shire Council areas. Green cestrum has been declared a Class 3 weed under the Noxious Weeds Act in these areas.

Priorities for control

Cap and Bonnet Creek (Terry Hie Hie AA – Box Gum Woodland EEC) and Ningadoo (Mount Kaputar NP – riparian area) have been identified as priority sites in BPWW. Green cestrum control at these sites is a critical priority.

Green cestrum control in Warrumbungle NP and Mount Kaputar NP has been an ongoing program for a number of years. As a result of past control efforts, the infestation has been reduced to a level that requires only follow-up control of plants that are missed and new germinations. In addition, the Noxious Weeds Act requires that all Class 3 weeds are fully and continuously suppressed and destroyed. For these reasons, this program will be a medium priority.

Control

Control can be carried out either via physical removal or herbicide application. Physical removal requires careful attention to remove the entire plant as persistent regrowth from roots can be common. A number of herbicides are registered for control. The application may include cut stump, basal bark or as an overall spray thoroughly wetting the plant in the active growth stage prior to flowering. Flowering occurs over several months during summer and autumn.

Monitoring

All infestations within Northern Plains Region will be mapped and recorded. Photo points have been established at Cap and Bonnet Creek and Eulah Creek to monitor changes in understorey vegetation before and after treatment. These will continue to be periodically recorded.

Recording of control programs that are implemented each season will provide information on change in control effort and level of infestation at each site. Ground inspections will continue to monitor the effectiveness of control programs and identify any new incursions.

Coolatai grass (*Hyparrhenia hirta*)

Distribution and abundance

Coolatai grass is native to Africa and the Mediterranean region. It was introduced to north-west NSW to stabilise soil in the 1940s. It is now known to occur in all states of Australia except Tasmania (Harden 1993).

In Northern Plains Region, it occurs as restricted infestations in Mount Kaputar NP, Planchonella NR, Bullala NP and SCA, Gunyerwarildi NP and small isolated infestations in Campbell/Montrose AAs (part of the Terry Hie Hie AA) and Wongarbron NR (southern entrance).

Impacts

Coolatai grass is a particularly invasive perennial tussock grass that establishes in dense swards and displaces native ground cover preventing the germination and establishment of trees and shrubs. It spreads well by seeds that readily adhere to animals and vehicles and, where the plant becomes established, it will withstand considerable grazing, drought and fire pressures. When it dries off, the biomass of grass creates a higher fuel load than native species, resulting in more intense fires (Hunter 2009). Invasion of native plant communities by exotic perennial grasses is listed as a KTP under the TSC Act.

In Northern Plains Region, the infestation at Wongarbron NR is within Dubbo City Council area where Coolatai grass has been declared a Class 3 weed under the Noxious Weeds Act. All other infestations are in Gwydir, Moree Plains and Narrabri shire council areas where Coolatai grass has been declared a Class 4 weed under the Noxious Weeds Act.

Priorities for control

Wongarbron NR (Inland Grey Box woodland EEC), Gunyerwarildi NP (Box Gum Woodland EEC), Planchonella NR (Semi-evergreen Vine Thicket EEC) and Terry Hie Hie AA (Campbell and Montrose sections – Bluegrass EEC) have been identified as priority sites in BPWW. Coolatai grass control at these sites is listed as a critical priority for control.

Coolatai grass is continuing to spread throughout Northern Plains Region. Any new infestations that are identified within reserves that were previously free from Coolatai grass will be treated as a critical priority.

Control

Control can be undertaken via either physical removal or chemical treatment. Physical removal requires pulling out individual tussocks where infestations are small. These should be collected and burnt. Chemical treatment is carried out under permit number PER9792 which allows boom, spot spray or wiper applications.

Monitoring

Mapping and recording of control programs that are implemented each season will provide information on change in control effort and extent of infestation at each site. Ground inspections will continue to monitor the effectiveness of control programs and identify any new incursions. Where new infestations are detected and treated, follow-up checks in subsequent growing seasons will ensure the infestation has been eradicated.

Blackberry (*Rubus fruticosus* agg.)

Distribution and abundance

Different species of blackberry originate from Europe and America. In Australia, it was promoted for planting as a source of edible fruit, for the control of erosion along creeklines and as a hedge plant. It occurs in all states except the Northern Territory (Parsons and Cuthbertson 1992).

In Northern Plains Region, it is in Warrumbungle NP, Ukerbarley AA and SCA, Pilliga West SCA and Timallallie NP. Several isolated bushes have also been treated in Mount Kaputar NP in recent years.

Impacts

Blackberry is particularly invasive and can cover large areas with dense foliage, excluding most native species. It establishes readily in disturbed areas and along creek banks. The dense thickets create impenetrable barriers and provide harbour for pest animals such as feral pigs, foxes and rabbits. When dry, thickets can also present an increased fire hazard. Blackberry fruit is readily consumed by birds and other animals which further promote the spread (Parsons and Cuthbertson 1992).

Blackberry is listed as a Weed of National Significance (WoNS). In Northern Plains Region, all infestations occur in Castlereagh Macquarie County Council and Narrabri Shire Council areas where blackberry has been declared a Class 4 weed under the *Noxious Weeds Act 1993*.

Priorities for control

Hells Hole (Warrumbungle NP – box ironbark woodland), Ukerbarley SCA and AA (Carex Sedgeland EEC) and The Duke (Timallallie NP – Box Gum Woodland EEC) have been identified as priority sites in the BPWW. Blackberry control at these sites is a critical priority.

Blackberry has been treated in other areas of Warrumbungle NP and Pilliga West SCA as an ongoing program for a number of years. As a result of past control efforts, the infestations are limited to several smaller areas at each of these sites. Ongoing control of each of these infestations will be undertaken as a lower priority.

Control

Control can be carried out via cut stump, stem injection, cut and scrape or overall spraying. Cut stump, stem injection and cut and scrape methods are best suited to smaller infestations or where overall spraying cannot be used as these methods are very labour intensive. Overall spraying is the most efficient control technique for larger infestations with a number of herbicides registered which cover a variety of control situations. Generally, control is undertaken between late spring and early autumn when bushes are actively growing. Follow up control is often required.

There are several biological control agents for blackberry. While these inhibit growth and spread, they cannot be relied upon for control.

Monitoring

Mapping and recording of control programs that are implemented each season will provide information on change in control effort and extent of infestation at each site. Ground inspections will continue to monitor the effectiveness of control programs and for any new incursions. Where new infestations are detected and treated, follow-up checks in subsequent growing seasons will ensure control of the infestation.

St John's wort (*Hypericum perforatum*)

Distribution and abundance

St John's wort originated in Europe, western Asia and North Africa. How or why it was introduced to Australia is unclear. Currently, it is known everywhere except Queensland and Northern Territory, with the largest areas of infestation in Victoria and NSW (Parsons and Cuthbertson 1992).

In Northern Plains Region, it occurs as several isolated infestations in Warrumbungle NP (Beloungery Flats and Yahringerie), an isolated infestation in Ukerbarley SCA and AA, and scattered infestations in Timallallie NP (The Duke), Yarrobil NP and Adelyne SCA.

Impacts

St John's wort competes with native species for light and nutrients. When infestations become well established it can dominate ground cover removing almost all other species. It is toxic to livestock although it is rarely consumed if other feed is available. Each plant produces a large amount of seed which spreads by sticking to animal fur and wool or in the movement of mud (Parsons and Cuthbertson 1992).

In Northern Plains Region, all infestations are in Castlereagh Macquarie County Council and Mid Western Regional Council areas where it has been declared a Class 4 weed under the *Noxious Weeds Act 1993*.

Priorities for control

The Duke (Timallallie NP – Box Gum Woodland EEC), Ukerbarley SCA and AA (Carex Sedgeland EEC) and Yarrobil NP (*Acacia ausfeldii*) have been identified as priority sites in BPWW. St John's Wort control at these sites is a critical priority.

St John's wort control in Warrumbungle NP has been ongoing for a number of years. As a result of past control efforts, the infestations are limited to several small isolated patches that only require follow-up control of plants that are missed and new germinations. Control of the Warrumbungle NP and Adelyne SCA infestations will be a lower priority.

Control

Control can be either via physical removal or herbicide application. Physical removal requires careful attention to remove the entire plant as regrowth from roots can occur. A number of herbicides are registered for control as an overall spray, thoroughly wetting the plant in the active growth stage during spring and summer.

Monitoring

All infestations in Northern Plains Region will be mapped and recorded. Recording of control programs that are implemented each season will provide information on change in control effort and level of infestation at each site. Ground inspections will continue to monitor the effectiveness of control programs and for any new incursions.

African boxthorn (*Lycium ferocissimum*)

Distribution and abundance

African boxthorn is native to the southern coast of Africa. It was introduced into Australia as a hedge plant and is now one of the country's most widespread weeds, being found in all states and territories (Parsons and Cuthbertson 1992).

In Northern Plains Region it occurs in varying densities in most Narrabri and southern Coonabarabran Area reserves. It also occurs in Macquarie Marshes NR, Pilliga West NP and SCA and Merriwindi SCA in Coonabarabran and Baradine Areas.

Impacts

African boxthorn can grow to 5 m high and 3 m wide, often in dense thickets along watercourses and under trees. It provides ideal habitat for feral pigs, rabbits, foxes and feral cats and it outcompetes and displaces native vegetation. It spreads mostly as a result of the fruit being eaten by birds and foxes which excrete viable seeds (Parsons and Cuthbertson 1992).

African boxthorn is declared a Class 4 weed under the *Noxious Weeds Act 1993* in Northern Plains Region and in 2012 it was listed as a WoNS.

Priorities for control

Beresford Park precinct (Mount Kaputar NP – semi-evergreen vine thicket), Planchonella NR (semi-evergreen vine thicket), Kirramingly NR (Bluegrass EEC), Gunyerwarildi NP (Box Gum Woodland EEC), Bullala NP (Carbeen Open Forest EEC) and Baradine Creek (Pilliga West SCA – Box Gum Woodland EEC) have been identified as priority sites in BPWW. African Boxthorn control at these sites is listed as critical priority.

Control of African boxthorn has been undertaken in a number of other reserves within Northern Plains Region. Further control to maintain the benefits of previous programs is a lower priority.

Control

African boxthorn can be controlled via cut stump, basal bark treatment or overall spraying.

There are a number of chemicals registered for overall spraying of African boxthorn which should be undertaken when bushes are actively growing and have good leaf cover (no leaf fall). Control of African Boxthorn often requires follow up to treat regrowth and/or newly germinated seedlings.

Monitoring

All infestations in critical priority areas will be mapped and recorded. Recording and ongoing mapping of control programs that are implemented each season will provide information on the effectiveness of control as well as increases or decreases in the area of infestations. Ground inspections will continue to monitor the effectiveness of control programs, requirements for follow-up control and for any new incursions.

Mother-of-millions (*Bryophyllum delagoense*) and hybrids

Distribution and abundance

Mother-of-millions originated in Madagascar and was introduced into Australia as a garden plant. It is most commonly found in Queensland and NSW where it has spread into many rural areas (North West Weeds 2011).

In Northern Plains Region it occurs as small isolated infestations in Mount Kaputar NP, Boomi West NR, Boronga NR, Couradda NP, Trinkey SCA, Timallallie NP, Beni SCA and Wongarbon NR. It is also in Bobbiwaa SCA, Bullawa Creek SCA and Pilliga West NP and SCA as scattered infestations.

Impacts

Mother-of-millions is a drought resistant succulent that grows well on lighter soils. It establishes into dense mats that compete with and displace native species. It reproduces both from seed and vegetatively, with each leaf producing a large number of plantlets. It is toxic to stock, particularly when flowering. It continues to cause deaths in cattle (North West Weeds 2011).

Infestations in Northern Plains Region occur within Moree Plains, Narrabri and Gunnedah Shire Council areas, as well as Dubbo City Council and Castlereagh Macquarie County Council areas. In all these areas mother-of-millions has been declared a Class 4 weed under the *Noxious Weeds Act 1993*.

Priorities for control

Mount Kaputar NP (Beresford Park precinct – semi-evergreen vine thicket), Mount Kaputar NP (Ningadoo – riparian vegetation), Bobbiwaa SCA (spiny peppergrass) and Pilliga NP (Gilgais – *Myriophyllum implicatum*) have been identified as priority sites in the BPWW. Mother-of-millions control at these sites is listed as critical priority.

In Wongarbon NR, mother-of-millions occurs as an isolated infestation. Control programs will aim to remove this infestation from the reserve. This program is a medium priority.

Control of mother-of-millions has also been previously undertaken in other areas of Mount Kaputar NP, Couradda NP, Timallallie NP, Pilliga West NP, Pilliga NP and SCA, Bullawa Creek SCA, Beni SCA and Trinkey SCA. Further control to maintain the benefits of these previous programs has been prioritised as a lower priority.

Control

Control can be carried out either via physical removal or herbicide application. Following physical removal, plants must be burnt or kept off the ground, otherwise they will readily regrow. A number of herbicides are registered for control as an overall spray thoroughly wetting the plant. It can be sprayed at any time of the year provided plant condition is suitable. It has bright red flowers during winter–spring, making it easy to identify. Follow-up control of new seedlings and missed plants in subsequent growing season is often required.

Monitoring

All infestations that are treated will be mapped and recorded. Recording and ongoing mapping of control programs that are implemented each season will provide information on the effectiveness of control as well as increases or decreases in the area of infestations. Ground inspections will continue to monitor the effectiveness of control programs and for any new incursions within new areas.

Spiny burrgrass (*Cenchrus incertus* and *C. longispinus*)

Distribution and abundance

Spiny burrgrass originated in North and Central America. Its early history in Australia is unknown; however, it now occurs in South Australia, Victoria, Western Australia, Northern Territory and NSW (Parsons and Cuthbertson 1992).

In Northern Plains Region it is in Budelah NR, Boomi NR, Boomi West NR, Boronga NR, Bobbiwaa SCA, Bullala NP, Irragappa AA (part of the Terry Hie Hie AA), Warrumbungle NP, Pilliga West NP and SCA, Merriwindi SCA, Pilliga East SCA and Cobbora SCA. In all these reserves it is most commonly found on sandy rises.

Impacts

Spiny burrgrass is an annual grass that grows well on low-fertility, sandy, well-drained soils where it competes with and displaces native species. It readily establishes on disturbed sites and each plant can yield up to 1000 seeds. The seeds are encased in burrs with barbed spines. These burrs readily attach to vehicles, machinery and animals. They contaminate wool and can degrade visitor areas (Parsons and Cuthbertson 1992).

Spiny burrgrass establishes successfully on the sandy ridges of Carbeen Open Forest EECs.

All infestations in Northern Plains Region are within Moree Plains, Gwydir and Narrabri shire councils and Castlereagh Macquarie County Council where this species has been declared a Class 4 weed under the *Noxious Weeds Act 1993*.

Priorities for control

Budelah NR (Carbeen Open Forest EEC), Boronga NR (Carbeen Open Forest EEC), Boomi West NR (Carbeen Open Forest EEC), Boomi NR (Carbeen Open Forest EEC) and Merriwindi SCA (Box Gum Woodland EEC) have been identified as priority sites in the BPWW. Spiny burrgrass control at these sites is listed as critical priority.

Control of spiny burrgrass has been previously undertaken in Warrumbungle NP and Pilliga West NP. Further control to maintain the benefits of previous programs is a lower priority.

Control

Due to the extent of infestations of spiny burrgrass, the most efficient and effective method of control is herbicide application. Chemicals available for this are effective but non-selective. Chemicals should be applied to actively growing plants (late spring – early summer) prior to establishment of seed.

Monitoring

All infestations in critical priority areas will be mapped and recorded. Recording and ongoing mapping of control programs that are implemented each season will provide information on the effectiveness of control as well as increases or decreases in the area of infestations. Ground inspections will continue to monitor the effectiveness of control programs and for any new incursions within new areas and Carbeen Open Forest EECs.

Buffel grass (*Cenchrus ciliaris*)

Distribution and abundance

Buffel grass originated in North Africa and the Middle East. It was accidentally introduced into Australia in the 1860s, carried in by camel trains. It has since been widely planted as a pasture grass and a stabiliser to minimise erosion. It is now in every part of Australia except Victoria (CSIRO Sustainable Ecosystems).

Buffel grass is not a declared weed in any part of Northern Plains Region. It occurs in a number of reserves; however, the greatest concern is in Budelah Nature Reserve where it is established on a number of the ridges in Carbeen Open Forest EEC.

Impacts

Buffel grass is a perennial tussock grass that prefers sandy and sandy loam soils. It readily spreads in semi-arid areas displacing native species and reducing species diversity. It will often outcompete other pasture grasses planted with it. In many

situations it will dominate to a point that all other species are removed. It spreads well by seed and, where it is established, will withstand considerable grazing, drought and fire pressure. When it dries off, it produces a higher fuel load than native species, which has made wildfires more frequent in some areas of northern Australia and has resulted in a reduction in some native shrubs (CSIRO Sustainable Ecosystems).

Spiny burrgrass establishes successfully on sandy ridges in Carbeen Open Forest EECs. Invasion of native plant communities by exotic perennial grasses is listed as a KTP under the TSC Act.

Priorities for control

Budelah NR, Boronga NR, Boomi West NR and Boomi NR (Carbeen Open Forest EEC) have been identified as priority sites in the BPWW. Buffel grass control at these sites is listed as critical priority.

Control

Due to the extent of infestations of buffel grass, the most efficient and effective method of control is herbicide application. Chemicals available for this are effective but non-selective. Chemicals should be applied to actively growing plants (late spring – early summer) prior to establishment of seed.

Monitoring

All weed infestations in areas of Carbeen Open Forest EECs in Northern Plains Region will be mapped and recorded. Recording and ongoing mapping of control programs that are implemented each season will provide information on the effectiveness of control as well as increases or decreases in area of infestations. Ground inspections will continue to monitor the effectiveness of control programs and for any new incursions within these EECs.

Prickly pears (*Opuntia stricta*, *O. aurantiaca* and *O. tomentosa*)

Distribution and abundance

Prickly pears in reserves in Northern Plains Region include common prickly pear (*Opuntia stricta*), tiger pear (*Opuntia aurantiaca*) and velvet tree pear (*Opuntia tomentosa*).

Common prickly pear and velvet tree pear were introduced into Australia in the early days of settlement, possibly as ornamental shrubs, hedge plants, fodder crops or food plants for cochineal insects. They now occur widely across Australia; however the most extensive infestations are in Queensland and NSW (Parsons and Cuthbertson 1992).

In Northern Plains Region, prickly pears are in all reserves and velvet tree pears are in most reserves at varying densities.

The origin of tiger pear in Australia is unclear. It was once widely distributed across areas of Queensland and NSW; however, biological control using cochineal has been effective in reducing its distribution, particularly in Queensland. It is also in several isolated areas in Victoria (Parsons and Cuthbertson 1992).

In Northern Plains Region, tiger pears are found in Midkin NR, Bobbiwaa SCA, Killarney SCA, Bullalla NP and SCA, Boonalla AA, Breelong NP, Pilliga West NP and SCA, Pilliga NP and SCA, Merriwindi SCA and Timallallie NP.

Impacts

Prickly pears grow well in both exposed and semi-shaded situations. Before the introduction of biological control agents, common prickly pear was the most serious weed in Australia and capable of growing in most parts of the continent. Patches of prickly pears grow densely forming an impenetrable barrier and can provide harbour for pest animals such as rabbits. They can spread short distances when segments and fruit drop to the ground and take root; however, birds passing viable seed, segments being moved after attaching to animals, and human movement of plant parts have caused spread over larger areas (Parsons and Cuthbertson 1992).

Tiger pear is lower-growing than the other species. Its small segments and large sharp spines readily detach from the plant, and then attach to passing animals or vehicle tyres. The segments also have barbed bristles that readily penetrate skin, are difficult to remove and cause severe irritation (Parsons and Cuthbertson 1992). Tiger pear is of particular concern in areas inhabited by koalas and smaller ground-dwelling mammals because of the injuries it can cause to these species.

Infestations of prickly pears occur within all local control areas (LCAs) across Northern Plains Region. These species are declared Class 4 weeds under the *Noxious Weeds Act (1993)* in all these LCAs. In 2012, all *Opuntia* species were listed as WoNSs.

Priorities for control

Prickly pears (mostly common prickly pear) are in most EECs in Northern Plains Region. However, the following sites have been identified as priority sites in BPWW: Bobbiwaa SCA (spiny peppergrass), Gamilaroi NR (Ooline EEC), Boronga NR (Carbeen Open Forest EEC), Budelah NR (Carbeen Open Forest and Coolibah Black-Box EECs), Boomi West NR (Carbeen Open Forest EEC), Boomi NR (Carbeen Open Forest EEC), Kirramingly NR (Bluegrass EEC), Planchonella NR (Semi-evergreen Vine Thicket EEC), Gunyerwarildi NP (Box Gum Woodland EEC), Bullala NP (Carbeen Open Forest EEC), Terry Hie Hie AA (Box Gum Woodland and Brigalow EECs) Mount Kaputar NP (Ningadoo – riparian vegetation), Narran Lake NR (wetland area), Timallallie NP (Bugaldie Creek – Box Gum Woodland EEC, Pilliga mouse and koala), Timallallie NP (The Duke – Box Gum Woodland EEC), Pilliga NP (Quegobla, Etoo Creek – Box Gum Woodland EEC and koala), Pilliga SCA (Talluba Creek and Tinegie Creek – Box Gum Woodland EEC and koala), Merriwindi SCA (Box Gum Woodland EEC), Yarragin NP (South Yarragin – Box Gum Woodland EEC), Pilliga West SCA (Baradine Creek – Box Gum Woodland EEC), Willalla AA (semi-evergreen vine thicket) and Boonalla AA (eastern boundary and area bounded by firetrails – koala). Control of prickly pears at these sites is listed as critical priority.

Control of prickly pears has been undertaken in a number of other reserves within the Region. Further control to maintain the benefits of previous programs is a lower priority.

Control

Prickly pears are constantly being impacted by biological control agents including cochineal and cactoblastis. The impact of these control agents is increased by moving infected pear segments into areas where there are uninfected plants. In addition, chemical control will continue to be used. Generally, chemical control is via an overall foliar spray applied when plants are in a healthy condition. Follow-up control is often necessary.

Monitoring

All infestations that are treated in critical priority areas will be mapped and recorded. Recording and ongoing mapping of control programs that are implemented each

season will provide information on the effectiveness of control as well as increases or decreases in the area of infestations in treated areas.

Bathurst and Noogoora burr (*Xanthium spinosum* and *X. strumarium*)

Distribution and abundance

Bathurst burr (*Xanthium spinosum*) and Noogoora burr (*Xanthium strumarium*) originated in South America and North America respectively. The distribution of both species across Australia is similar, being found predominantly in Queensland, NSW and Victoria, but occurring in all mainland states. Bathurst burr has also been found in Tasmania (Parsons and Cuthbertson 1992).

In Northern Plains Region they are patchily distributed. The largest infestations are in the Macquarie Marshes and Narran Lake nature reserves and Gwydir Wetlands State Conservation Area after inundation of the wetlands.

Impacts

Noogoora burr is highly invasive in floodout areas, growing in a range of soil types from sandy clay loams to heavy self-mulching clays. Masses of seedlings establish after rain in late spring to summer, crowding out other species. Bathurst burr is very similar, growing on high fertility disturbed soils often associated with watercourses, dam banks and floodplains. Both species compete vigorously with native species (Parsons and Cuthbertson 1992).

The seeds of both species are encased in burrs covered in spines that readily attach to wool, animal fur, clothing and any fibrous material. They are major contaminants of wool and can reduce its selling price. The burrs float in water, enabling movement along watercourses (Parsons and Cuthbertson 1992).

Noogoora and Bathurst burrs have been declared a Class 4 weed under the *Noxious Weeds Act (1993)* in all LCAs across Northern Plains Region.

Priorities for control

Terry Hie Hie AA (Cap and Bonnet Creek – Box Gum Woodland EEC), Kirramingly NR (Bluegrass EEC), Bobbiwaa SCA (spiny peppergrass) Narran Lake NR (wetland area), Timallallie NP (Bugaldie Creek – Box Gum Woodland EEC), Pilliga NP (Etoo Creek – Box Gum Woodland EEC) and Yarragin NP (South Yarragin – Box Gum Woodland EEC) have been identified as priority sites in BPWW. Bathurst and Noogoora burr control at these sites is listed as critical priority.

Control of Bathurst and Noogoora burrs has also been undertaken in a number of other reserves within the Region. Further control to maintain the benefits of previous programs has been prioritised as a lower priority.

Control

Noogoora and Bathurst burrs are affected by several insects and fungal diseases. While these may account for controlling some infestations or individual plants they cannot be relied upon for control. Small infestations can be controlled via hoeing and hand removal; however spot spraying using selective broadleaf chemicals will be used on larger infestations within the Region. These species will be controlled prior to seed set in late spring and early summer when they are actively growing.

Monitoring

All infestations that are treated in critical priority areas will be mapped and recorded. Recording and ongoing mapping of control programs that are implemented each season will provide information on the effectiveness of control as well as increases or decreases in the area of infestations in treated areas.

Lippia (*Phyla canscesans*)

Distribution and abundance

Lippia is thought to be native to South America; however, as it has been widely cultivated and is considered naturalised in a number of other areas, its exact origin is not clear (Leigh and Walton 2004). Within Australia it is considered a weed and occurs in Western Australia, NSW, Queensland, Victoria and South Australia, and is estimated to infest 5.3 million ha in the Murray–Darling Basin (Earl 2003).

In Northern Plains Region, Lippia occurs as extensive infestations in Macquarie Marshes NR and Gwydir Wetlands SCA. It also occurs as smaller, isolated infestations in Narran Lake, Budelah, Boomi, Boomi West, Boronga, Careunga, Midkin and Kirramingly NRs and Macquarie Marshes SCA.

Impacts

Lippia is a broadleaf perennial herb that grows well on clay soils associated with wetland and floodplain areas. It forms a dense mat-like ground cover with a deep root system that dries out the soil. It is suspected to be allelopathic, thus suppressing the growth of other plants. These characteristics mean that lippia significantly increases the potential of erosion and becomes dominant, outcompeting native species, and greatly reducing biodiversity in riparian areas. Where it establishes, it dramatically reduces stocking capacity, having considerable impact on grazing enterprises. It spreads both vegetatively and via seed primarily moved by floodwater (Earl 2003).

All infestations in Northern Plains Region are in the Moree Plains Shire Council and Castlereagh Macquarie County Council areas. Lippia is declared a Class 4 weed under the Noxious Weeds Act in the Moree Plains Shire Council area. It is not a declared weed in the Castlereagh Macquarie County Council area.

Priorities for control

Narran Lake NR (wetland area), Budelah NR (Coolibah – Black Box Woodland EEC) and Kirramingly NR (Bluegrass EEC) have been identified as priority sites in the BPWW. Lippia control at these sites is listed as critical priority.

Control

The most effective form of control for lippia involves a cultivation regime. This is not desirable in any of the reserves in Northern Plains Region. Herbicide control is limited in its effectiveness, only suppressing the growth of plants for a short period of time. Multiple applications throughout a season are more effective in controlling infestations. Selective broadleaf products with 2,4-D Amine (e.g. Amicide 625) as the active constituent are approved for lippia control under permit PER10917. Using the broadleaf selective product will avoid removing native grass species that will compete with lippia and help prevent its re-establishment.

Monitoring

All infestations that are treated in critical priority areas will be mapped and recorded. Recording and ongoing mapping of control programs that are implemented each

season will provide information on the effectiveness of control as well as increases or decreases in the area of infestations in treated areas.

Mimosa bush (*Vachellia farnesiana*)

Distribution and abundance

Mimosa bush is native to tropical America but is thought to have been introduced into Australia prior to European settlement (Harden 2002). Within Australia this species is considered naturalised; however, there is some conjecture over this determination. It occurs in NSW, Queensland, Northern Territory, South Australia and Western Australia.

In Northern Plains Region, mimosa bush has been identified as a possible issue in a number of reserves including Kirramingly and Budelah NRs and Gwydir Wetlands SCA. It does occur in a number of other reserves within the Region.

Impacts

Mimosa bush is a spreading shrub, 1–4 m tall that grows well on loam and clay soils. It grows in woodlands, shrublands and grasslands, on open plains and near watercourses. It is invasive, particularly where there is little or no shrub competition, forming dense thickets and displacing native species. It provides ideal habitat for feral pigs, foxes and feral cats and limits the movement of stock. It spreads by seeds which are encased in pods that are palatable to sheep, cattle and some bird species. After consuming the pods these species excrete viable seed (Harden 2002).

In Northern Plains Region, mimosa bush is listed as an invasive native species in some catchment management authority areas, in recognition of its invasiveness and possible cause for control by private landholders under native vegetation legislation.

Priorities for control

Mimosa bush control at Kirramingly NR (Bluegrass EEC) and Budelah NR (Coolibah-Black Box Woodland EEC) have been identified as priority sites in BPWW.

Trial chemical treatment of mimosa bush was undertaken in Kirramingly NR in March 2011. While previous trials had been completed by LCAs and the Department of Primary Industry to identify effective chemicals for control, the purposes of the NPWS trial was to determine what would efficiently and effectively control mimosa bush while having little effect on surrounding native species. Prior to treatment, vegetation surveys were undertaken in the trial areas to gather baseline information. Follow-up vegetation surveys are being undertaken to identify the impacts of control. Further control in Kirramingly NR or other reserves will not be undertaken until these evaluations are completed. Dependent upon the outcomes, further control may or may not be implemented.

Control

Mimosa bush is a difficult plant to control. Chemical treatment has been approved by off-label permit (PER11638 and PER10040) for use as an overall spray and pellet treatment. Triclopyr + picloram (e.g. Access) mixed with diesel is also registered for basal bark application. Plants must be actively growing with good leaf coverage for effective control. This species closes down over winter, making the control window late spring, summer and early autumn, provided there has been sufficient rainfall. Desirable species may be temporarily removed from areas under treated bushes (overall spray and pellet treatment) as a result of the sustained action of residual chemicals. Follow up control of mimosa bush is necessary.

Monitoring

All infestations that are treated will be mapped and recorded. Recording and ongoing mapping of control programs that are implemented each season will provide information on the effectiveness of control as well as increases or decreases in the area of infestations in treated areas.

Blue heliotrope (*Heliotropium amplexicaule*)

Distribution and abundance

Blue heliotrope is native to South America. It was originally introduced into Australia as an ornamental plant and is now widespread in parts of Queensland and NSW. It is a coloniser of roadsides, old cultivations and degraded pastures (Parsons and Cuthbertson 1992).

In Northern Plains Region, blue heliotrope generally occurs on previously cultivated or highly disturbed areas within reserves. There are widespread infestations in the central valley of the Warrumbungle NP and isolated infestations in Biddon SCA, Pilliga East SCA, Timallallie NP, Yarragin NP, Dandry Gorge NP and Goonoo NP and SCA.

Impacts

Blue heliotrope proliferates aggressively due to high seed output and regeneration from root buds. It outcompetes and displaces most other species. It is known to kill cattle by poisoning and is also poisonous to humans (Parsons and Cuthbertson 1992).

In Northern Plains Region, there are infestations of blue heliotrope within the Narrabri Shire Council, Dubbo City Council and Castlereagh Macquarie County Council areas. Blue heliotrope is declared a Class 4 weed under the Noxious Weeds Act (1993) in all of these areas.

Priorities for control

Weed control along roadsides, campgrounds, picnic areas and other visitor areas in the central valley of Warrumbungle NP is a medium priority. Blue heliotrope control at this site is included in this priority.

Control of blue heliotrope has also been previously undertaken in other reserves within the Region. Further control to maintain the benefits of these previous programs is a lower priority.

Control

Physical removal of very small infestations can be undertaken.

Several chemicals are available for control. Using a broadleaf selective herbicide encourages the recruitment of grasses which compete against the re-establishment of blue heliotrope and other broadleaf colonising weeds.

Several biological control agents specific to blue heliotrope have been released in Australia. Blue heliotrope leaf-feeding beetle (*Deuterocampta quadrijuga*) was released on 10 October 2001) at two sites along Wombelong Creek in the central valley of Warrumbungle NP. To date, its impact on the overall infestation has been minimal.

Revegetation programs have also been undertaken in old cultivation areas within Warrumbungle NP. This was done to speed up succession and establish native species competition to colonising weeds such as blue heliotrope and Paterson's curse.

Monitoring

All infestations that are treated will be mapped and recorded. Recording and ongoing mapping of control programs that are implemented each season will provide information on the effectiveness of control as well as increases or decreases in the area of infestations. Ground inspections will continue to monitor the effectiveness of control programs and for any new incursions within new areas.

Bridal creeper (*Asparagus asparagoides*)

Distribution and abundance

Bridal creeper is a native of South Africa. Introduced as an ornamental, it now occurs in Victoria, South Australia, NSW and Western Australia. It grows in warm-temperate to tropical regions and favours fertile, well-drained soils, commonly on roadsides, vacant land and disturbed bushland close to habitation (Parsons and Cuthbertson 1992).

In Northern Plains Region it is only known in small isolated infestations in Coonabarabran Area in Beni SCA, Sappa Bulga NP and Wongarbron NR.

Impacts

Bridal creeper is a climbing perennial herb that grows to 3 m high and produces underground tubers and sticky red berries. The movement of tubers from earthworks and birds consuming berries and excreting viable seed are causes of spread. The dense canopy of climbing stems and foliage that it develops outcompetes other vegetation including native species. The underground tubers become a dense mat that limit root growth of other vegetation and can also prevent seedling establishment (Parsons and Cuthbertson 1992). Invasion and establishment of exotic vines and scramblers is listed as a KTP under the TSC Act.

Bridal creeper is listed as a WoNS. All known incursions within Northern Plains Region are in Dubbo City Council area where it has been declared a Class 4 weed under the *Noxious Weeds Act (1993)*.

Priorities for control

Control of bridal creeper has been previously undertaken in reserves in Coonabarabran Area. Further control to maintain the benefits of previous programs is a lower priority.

Control

Physical removal is rarely effective as all tubers must be dug up and destroyed. Several bridal creeper-specific biological control agents, including rust fungus, leaf hopper and leaf beetle, have been released to assist in management of the weed. However, for smaller infestations, including those in Northern Plains Region, chemical treatment using either glyphosate or metsulfuron methyl are the best control option. Follow-up treatment in the subsequent growing season is often required.

Monitoring

All infestations that are treated will be mapped and recorded. Recording and ongoing mapping of control programs that are implemented each season will provide information on the effectiveness of control as well as increases or decreases in the area of infestations. Ground inspections will continue to monitor the effectiveness of control programs and for any new incursions within new areas.

Sweet briar (*Rosa rubiginosa*)

Distribution and abundance

Sweet briar originated in Europe and Western Asia. It was originally planted in Australia as an ornamental or hedge plant and now occurs in all parts of the country except Northern Territory. It mostly occurs on well drained areas of moderate to high fertility receiving more than 600 mm annual rainfall. However, it does tolerate a range of conditions and extends into more arid areas (Parsons and Cuthbertson 1992).

Within Northern Plains Region, extensive control programs have greatly reduced its distribution and currently it only occurs as isolated infestations along the lower altitude disturbed areas of Warrumbungle National Park and in Mount Kaputar National Park, most predominantly along the Horton River, Second Water Creek and Horsearm Creek around Scutt's Hut.

Impacts

Sweet briar can be a fast-spreading weed, particularly in areas where there is little competition. It is most commonly spread by birds and other animals eating the fruit and excreting the seed. In agricultural situations it can cause significant losses to production because of competition with and reduced space for palatable species. In bushland situations it competes with and reduces space for native species. Dense patches provide harbour for pest animals, particularly rabbits and feral pigs (Parsons and Cuthbertson 1992).

Incursions within Northern Plains Region are in Narrabri Shire Council and Castlereagh Macquarie County Council areas. Sweet briar has been declared a Class 4 weed under the *Noxious Weeds Act (1993)* in both of these areas.

Priorities for control

Extensive control of sweet briar has been previously undertaken in Warrumbungle and Mount Kaputar national parks. Further control to maintain the benefits of these programs is a lower priority.

Control

Mechanical removal, grazing and/or herbicide application can be used to control sweet briar. Within Northern Plains Region herbicide via basal bark application, cut stump and overall spray will be used to continue control.

Monitoring

All infestations that are treated will be mapped and recorded. Recording and ongoing mapping of control programs that are implemented each season will provide information on the effectiveness of control as well as increases or decreases in the area of infestations. Ground inspections will continue to monitor the effectiveness of control programs and for any new incursions.

Control of other weeds

There are many other weeds in reserves in Northern Plains Region. These include, but are not limited, to golden dodder, Paterson's curse, tree of heaven, mintweed, khaki weed, castor oil plant, horehound, cathead, cotton bush and several species of thistle. Control of species such as these will continue to be carried out where they impact upon reserve values, such as around campgrounds and visitor areas. Additionally, control may be carried out in some reserves in conjunction with higher priority control programs for other weed species.

Appendix 1 New and emerging pest species

New pest species

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

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

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

^{**} Noxious Weeds in Control Classes 1, 2 and 5 are notifiable weeds under the *Noxious Weeds Act 1993*. This means that you must notify the local control authority within 3 days of becoming aware that the notifiable weed is on the land.

Emerging pest species

In Northern Plains Region, there are a number of weeds and pest animals that pose a risk of invasion and/or further spread and establishment. Those listed below are not currently known to exist in reserves, exist in small isolated infestations or are only in a small number of reserves. These species, the locations of current infestations and/or possible reserves where infestations may establish are discussed below.

Feral deer

Within Northern Plains Region, current populations of feral deer are known in Mount Kaputar NP, Bobbiwaa SCA, Couradda NP, Leard SCA, Moema NP, Weetalibah NR, Wondoba SCA, Bidson SCA, Somerton NP, Pilliga NP and SCA, Dapper NR, Goodiman SCA, Goonoo NP and SCA and Yarrobil NP. Both fallow deer and red deer have been identified within the Region.

Feral deer impact by selective browsing, spreading weeds, wallowing, rubbing trees and other vegetation and causing erosion through scrapes and pads. Their browsing can impact on native vegetation by preventing the establishment of seedlings and reducing seed reproduction of established plants. While some threatened species may be impacted by this selective browsing, it can also lead to changes in vegetation communities with more palatable species being reduced and less palatable species becoming dominant. Furthermore, native animals that rely on native plant species for food or shelter may be impacted through competition with feral deer (Claridge 2010).

Herbivory and environmental degradation caused by feral deer is listed as a KTP under the TSC Act.

Currently there are limited effective and efficient control options for feral deer. In Northern Plains Region deer may be opportunistically controlled through ground or aerial shooting programs targeting other pests. There is research being undertaken to develop a targeted and efficient control technique. If this develops, control programs using these techniques could assist in feral deer management in the Region.

Feral horses

Within Northern Plains Region, infestations of feral horses are known in Pilliga West NP and SCA and Pilliga NP and SCA. While the exact number of feral horses is unknown, the Pilliga West NP and SCA population is larger (estimated to be less than 50) than the Pilliga NP and SCA population (estimated to be less than 10).

There appears to be strong community ties to the Pilliga West NP and SCA population where the majority of horses are thought to descend from horses that were used historically for snigging logs in the timber industry. There appears to be weaker community ties with the Pilliga NP and SCA population.

Generally, horse populations can cause both economic and environmental impacts. Economic impacts can include damaging fences and infrastructure such as water points, competing with livestock for pasture and being a potential carrier of exotic diseases. Environmental impacts can include soil erosion from tracks and pads, damage to native vegetation from trampling and browsing and disturbance of water points (Berman et al. 1993). While the level of impacts caused by the feral horse populations in the Pilliga is largely not known, there have been some safety concerns resulting from a small number of motor vehicle accidents involving horses.

Monitoring programs involving remote cameras and dung counts are being developed to gather more information on individuals and distribution and activity of these populations.

Aquatic weeds

In Northern Plains Region, aquatic weeds including hymenachne (*Hymenachne amplexicaulis*), salvinia (*Salvinia molesta*), water lettuce (*Pistia stratiotes*) and water hyacinth (*Eichhornia crassipes*) have been identified as threats to the Ramsar wetlands in Macquarie Marshes NR, Narran Lake NR and Gwydir Wetlands SCA. There are currently no known infestations of any of these species in any of the wetlands in Northern Plains Region.

Hymenachne is a semi-aquatic perennial grass that has become a major weed of wetlands, flood plains and sugar cane crops of northern Australia. Small infestations have been identified on the North Coast of NSW. It has the potential to spread in northern NSW and become a major weed of wetlands and waterways. It is listed as a WoNS and a Class 1 weed in NSW (NSW Primary Industries 2011).

Salvinia is a free-floating aquatic fern that grows in still and slow-flowing fresh water. In Australia, it predominantly occurs in streams along the east coast. It has the potential to spread throughout much of Australia where it would impact on waterways and irrigation areas. It is listed as a WoNS and a Class 2 weed in all areas of Northern Plains Region (NSW Primary Industries 2011).

Water lettuce is a free-floating plant that has an appearance like an open head of lettuce. It grows in still and slow-flowing fresh water. In NSW, there have been a number of infestations identified around the northern coastal areas. It has the potential to spread in rivers, wetlands, lakes and streams, especially in areas with a subtropical climate. It is listed as a Class 1 weed in NSW (NSW Primary Industries 2011).

Water hyacinth is a free-floating perennial water plant that grows in still and slow-flowing fresh water. It occurs along the east coast of Queensland and NSW as well as along the Gingham Watercourse near Moree where it threatens to spread further into the Murray-Darling system. The Gingham Watercourse bifurcates from the Gwydir River, and the Gwydir River flows into Gwydir Wetlands SCA. Under favourable conditions infestations can double in mass every five days and seeds can remain viable for over 20 years. It is listed as a Class 2 weed in all areas of Northern Plains Region (NSW Primary Industries 2011).

Rangers and pest management staff involved in management of Macquarie Marshes NR, Narran Lake NR and Gwydir Wetlands SCA are aware of these threats. During routine management activities they will continue to be on the lookout for these species. If any infestations are identified, control programs will be implemented and the relevant LCA notified.

Hudson pear

Hudson pear (*Cylindropuntia rosea*) is a branched cactus with cylindrical stem and segments that are covered in white spines up to 3.5 cm long. Its current distribution in NSW is limited to areas around Lightning Ridge, Grawin, Glengarry, Cumborah, Brewarrina, Coonamble and Goodooga. It can grow in a variety of soil types and habitats. Its spines are capable of penetrating footwear and tyres as well as embedding in the skin of people, native animals, stock and working animals causing severe discomfort. It is easily spread by segments attaching to animals and vehicles which, once dropped, readily establish as new plants. It is a Class 4 weed across NSW (NSW Primary Industries 2011).

Hudson pear is known on a property adjoining Narran Lake NR and on properties close to Warrambool SCA. NPWS staff have been involved in cooperative control efforts in areas close to Narran Lake NR. Continued vigilance during routine reserve inspections and activities will ensure any infestations are identified and controlled. Identification of any infestation will be reported to the relevant LCA.

One Hudson pear plant was possibly identified on Warrambool SCA in March 2012. Further surveys to confirm and map any infestation and, if required, implement a control program are being planned to ensure an infestation does not establish.

Prickle bushes (mesquite and Parkinsonia)

Mesquite (*Prosopis* sp. and hybrids) is a prickly bush that occurs in semi-arid areas and could potentially grow across much of Australia. It can be in the form of multi-stemmed shrubby bushes or single stemmed trees 3–15 m in height. It has

zigzagged branches with thorns and fern-like leaves. It spreads by seeds that are moved by floodwater or consumed by animals including cattle, sheep, pigs, horses, goats, emus and kangaroos and excreted in a viable condition. It is listed as a WoNS and a Class 2 weed across NSW (Department of Natural Resources and Mines 2003).

In Northern Plains Region, an infestation is known on a property between Pilliga and Coonamble. This infestation is under ongoing control with new germinations occurring annually.

Rangers and pest management staff involved in the management of Pilliga West SCA and NP are aware of this threat. During routine management activities they will continue to be on the lookout for mesquite. If an infestation is identified, control programs will be conducted by NPWS and the relevant LCA notified.

Parkinsonia (Parkinsonia aculeate) is a prickly bush that is most frequently found around creeks, rivers, bores and dams and on black soil plains. The largest infestations are in northern Australia, with smaller infestations found in NSW and South Australia. It is a many-branched, spreading shrub or small tree, usually 2–8 m high. Young plants are usually single thorny stems that are hairless and pale to dark green. *Parkinsonia* is distinguished from other prickly bushes by its tiny oblong leaflets on a flattened leaf stalk, while other species have fernlike leaves. It is spread along waterways in floating seed pods or in mud on machinery, animals or footwear. It is listed as a WoNS and a Class 2 weed across NSW (Department of Natural Resources, Mines and Energy 2004).

In Northern Plains Region infestations are known on the Barwon River downstream of Mungindi and on the Narran River near Angledool. Much of the Barwon River infestation has been controlled, but further control and follow-up is required. The Narran River infestation is thought to be under control; however, ongoing vigilance is required to ensure new germinations do not establish.

Rangers and pest management staff involved in management of Budelah NR (Macintyre River), Narran Lake NR (Narran River), Warrambool SCA (The Big Warrambool) and Barwon NR and SCA (Barwon River) are aware of the threat to these reserves. During routine management activities they will continue to be on the lookout for these species. If any infestations are identified, control programs will be conducted by NPWS and the relevant LCA notified.

Parthenium weed

Parthenium weed (Parthenium hysterophorus) is an erect annual herb that grows up to 150 cm high. It has a hairy, longitudinally grooved stem, pale green leaves and white florets. It can germinate at any time of the year; however, the main germination is late spring to early summer following suitable rainfall. Each plant can produce about 15,000 seeds which can be spread short distances by wind or water, or larger distances by animals, vehicles and farm machinery. It generally occurs on heavier fertile soils in disturbed areas such as roadsides, stock camps, previously cultivated or run-down areas (Parsons and Cuthbertson 1992). It is listed as a WoNS and a Class 1 weed across NSW.

Large areas of Queensland are infested; however, only small isolated infestations occur elsewhere in Australia. In Northern Plains Region several isolated infestations have been identified along roadsides, mainly on major highways, or on properties where the movement of stock, fodder or machinery from Queensland has introduced seed. A small infestation was identified and treated on the public roadside (Ridge Road) running through Warrambool State Conservation Area prior to acquisition as an NPWS reserve. LCA and NPWS staff are aware of this location and it will be monitored for further germinations.

Pest management staff across Northern Plains Region are aware of the threat and the need to be on the lookout for parthenium weed and other new threats. Attention will be paid to roadsides when travelling public roads that pass through reserves. If any infestations are identified, control programs will be conducted by NPWS and the relevant LCA notified.

Tropical soda apple

Tropical soda apple (*Solanum viarum*) is a prickly perennial shrub that grows up to 2 m high. It has cream coloured spines, large leaves, white flowers and fruit that looks similar to small water melons when immature, reaching golf ball size and turning yellow as they mature. It was first recorded in Australia in August 2010 in the Kempsey area and several other small infestations have since been identified around Wingham, Coffs Harbour and Grafton (NSW Primary Industries 2011). It is listed as a Class 2 weed across Northern Plains Region.

Currently there are no recorded infestations in Northern Plains Region. While it appears that this weed would be most suited to a coastal climate, pest management staff across Northern Plains Region are aware of the threat and will continue to be on the lookout for tropical soda apple and other new threats. If any infestations are identified, control programs will be conducted by NPWS and the relevant LCA notified.

Fireweed

Fireweed (*Senecio madagascariensis*) is a yellow flowered daisy-like plant that grows up to 60cm high. Its leaves are 2–7 cm long, and its flowers are 1–2 cm in diameter and commonly have 13 petals. Fireweed mostly occurs in coastal areas, however infestations have been recorded on the tablelands. Inland infestations are thought to be less invasive due to the reduced suitability of growing conditions. A native plant with several subspecies (*Senecio pinnatifolius*) is sometimes confused with fireweed. The native species is more widely distributed, occurs in a range of climatic and geographical regions and is not considered a weed (NSW Primary Industries 2011). Fireweed is not a declared weed in any part of Northern Plains Region.

Currently there are no recorded infestations of fireweed in Northern Plains Region. While it appears that this weed would be most suited to the coastal and tablelands climates, pest management staff across Northern Plains Region are aware of the threat and will continue to be on the lookout for fireweed and other new threats. If any infestations are identified, control programs will be conducted by NPWS and the relevant LCA notified.

Appendix 2 Key threatening processes

Pest animal and weed KTPs as listed in Schedule 3 of the TSC Act (AustLII 2011):

- Competition and grazing by the feral European rabbit, *Oryctolagus cuniculus*
- Competition and habitat degradation by feral goats, *Capra hircus*
- Herbivory and environmental degradation caused by feral deer
- Invasion and establishment of exotic vines and scramblers
- Invasion and establishment of scotch broom (*Cytisus scoparius*)
- Invasion and establishment of the cane toad (*Bufo marinus*)
- Invasion, establishment and spread of lantana (*Lantana camara*)
- Invasion of native plant communities by African olive (*Olea europaea* L. subsp. *cuspidate*)
- Invasion of native plant communities by *Chrysanthemoides monilifera*
- Invasion of native plant communities by exotic perennial grasses
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants
- Predation and hybridisation by feral dogs, *Canis lupus familiaris*
- Predation by *Gambusia holbrooki* Girard, 1859 (plague minnow or mosquito fish) (as described in the final determination of the Scientific Committee to list the threatening process)
- Predation by the European red fox *Vulpes vulpes*
- Predation by the feral cat *Felis catus*
- Predation, habitat degradation, competition and disease transmission by feral pigs, *Sus scrofa*.

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