PRELIMINARY DRAFT

NSW **National Parks and Wildlife Service**

Northern Tablelands Region

Pest Management Strategy

2008-2011

Department of **Environment & Climate Change** NSW

PRELIMINARY DRAFT

Published by:
Department of Environment and Climate Change NSW
59–61 Goulburn Street
PO Box A290
Sydney South 1232
Ph: (02) 9995 5000 (switchboard)
Ph: 131 555 (environment information and publications requests)
Ph: 1300 361 967 (national parks information and publications requests)
Fax: (02) 9995 5999
TTY: (02) 9211 4723
Email: info@environment.nsw.gov.au
Website: www.environment.nsw.gov.au

DECC 2007/xxx
ISBN 978 1 74122 xxx x

www.npws.nsw.gov.au

For further information contact:
Regional Operations Coordinator
Northern Tablelands Region
Northern Branch
Parks and Wildlife Group
Department of Environment and Climate Change
85-87 Faulkner Street
Armidale NSW 2350
Telephone: 02 6776 0000

Cover photo: TBA

This plan should be cited as follows:

Department of Environment and Climate Change NSW. (2007). Northern Tablelands Region Pest Management Strategy 2008-2011. DECC, Sydney, NSW

The New South Wales National Parks and Wildlife Service (NPWS) is now part of the Department of Environment and Climate Change (DECC). Throughout this strategy, references to “NPWS” should be taken to mean the NPWS carrying out functions on behalf of the Director General and the Minister of DECC.

PRELIMINARY DRAFT

Table of Contents

1 Introduction

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

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

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

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

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

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

2 Purpose of the Strategy

The development of Regional Pest Management Strategies (RPMS) provide NPWS with a strategic approach to pest management across NSW. The strategy developed for each region provides a tool to broadly identify pest distribution and their associated impacts across the park system. It details priority actions for each Region, including actions listed in the PAS and TAPs, wild dog and feral pig control

to protect neighbouring properties, and site-based weed control. It also allows resources to be allocated to high priority programs. The RPMS also recognises the requirements of other related plans or strategies, such as Wild Dog Plans or Bush Regeneration Plans, that provide a more detailed approach to pest management.

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

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

3 Legislation and Policy

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

National Parks and Wildlife Act 1974

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

Threatened Species Conservation Act 1995

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

Rural Lands Protection Act 1998

The pest animal provisions of the *Rural Lands Protection Act 1998* (RLP Act) outline the conditions under which animals, birds and insects are "declared" pests and provides for the control of such pest species. Gazettal of pest species occurs through Pest Control Orders that allow the Minister for Primary Industries to specify pest

species on a state wide or local basis and the conditions or factors that apply to the control of each pest. Rabbits, wild dogs and feral pigs have been declared pest animals throughout NSW.

The RLP Act binds the Crown for the control of pest animals declared under the Act. Public land managers such as the NPWS are required to eradicate (continuously suppress and destroy) pest animals "…to the extent necessary to minimise the risk of the pest causing damage to any land" using any lawful method or, if the Order specifies a method to be used, by the method specified.

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

Noxious Weeds Act 1993

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

Amendments to the *Noxious Weeds Act* in 2005 repealed the NSW *Seeds Act 1982* and introduced a new classification system of weed control classes based on the degree of threat and the distribution of the introduced plant within the state. These new control classes are:
Control Class 1 – State Prohibited Weeds
Control Class 2 – Regionally Prohibited Weeds
Control Class 3 – Regionally Controlled Weeds
Control Class 4 – Locally Controlled Weeds
Control Class 5 – Restricted Plants.
Under this new classification system, Control Classes 1, 2 and 5 noxious weeds are referred to as notifiable weeds.

Pesticides Act 1999

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

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

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

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

Pesticide Notification: Notification requirements apply to pesticide applications by public authorities in public places (including NPWS managed park lands). The NPWS

Pesticide Use Notification Plan sets out how the Department will notify the community about pesticide applications in public places. (The plan can be located on the NPWS web site).

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

Use of a pesticide must be in accordance with the Control Order where they exist. Current Control Orders can be found at:
www.environment.nsw.gov.au/pesticides/pco.htm

Game and Feral Animal Control (Game) Act 2002

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

Other Relevant Legislation

- *Environment Protection and Biodiversity Conservation Act 2000* (Australian)
- *Agricultural and Veterinary Chemicals Code Act 1994*
- *Environmental Planning and Assessment Act 1979*
- *Firearms Act 1996*
- *Heritage Act 1977*
- *Prevention of Cruelty to Animals Act 1979*
- *Occupational Health and Safety Act 2000*
- *Wilderness Act 1987*
- *Protection of the Environment Operations Act 1997*
- *Local Government Act 1993*
- *Biological Controls Act 1985*

Park Management Program and Policies

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

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

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

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

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

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

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

- possession and use of firearms by NPWS staff and other approved users,
- firearms administration and record keeping,
- location and storage of firearms,
- planning and risk management for firearms operations,
- maintenance and modification of firearms,
- animal welfare issues related to shooting pest animals and euthanasing native animals, and
- firearms training.

The statewide *Conservation Risk Assessment and Pesticides Policy Directive* requires conservation risk assessments for the application of pesticides on park to ensure that an appropriate level of environmental assessment is carried out prior to application of pesticides in or on parks.

The *Exotic Plant Species Policy* gives priority to control programs for exotic plants that are increasing in abundance and distribution, displacing native flora and fauna or where NPWS estate adjoins uninfected or agricultural land. Programs that will be effective and involve techniques with little harmful or residual environmental impact have preference.

The *Introduced Animals Policy* states that (with limited exceptions) introduced animals shall not be allowed to remain on NPWS estate as they may prey on native fauna or have other adverse impacts on vegetation, soils and water quality.

The *Environmental Integrity Policy* outlines the requirement for the protection of biological diversity within the park and reserve system at three levels: genetic, species and ecological. This is particularly relevant for bush regeneration projects that involve planting programs.

The *Feral Animal Aerial Shooting Team Policy* outlines the procedures and safety requirements for the humane destruction of feral animals.

Other plans

Other plans that help direct pest management may include Catchment Action Plans, regional weed plans, state and national strategies, and reserve Plans of Management.

4 Regional Overview

The NPWS Northern Tablelands Region covers an area of approximately 51,000 square kilometres of northern New South Wales. The Region stretches from the NSW-Queensland border in the north, to below Walcha and Tamworth in the south and from around Warialda/Gunnedah in the west to half way down the escarpment in the east (Figures 1 & 2).

The Northern Tablelands reserve system is comprised of over 578 000 hectares, in over 81 reserves in the Region. The Region comprises 33 National Parks, 30 Nature

Reserves, 18 State Conservation Areas and 1 Aboriginal Area. The reserves on the eastern gorge country are well known for their conservation values and wild and scenic features. The reserves on the tableland and north-west slope areas conserve unique areas of the landscape and high conservation remnants of the original New England Tableland and Nandewar bio-regions.

The Region contains significant bio-geographic landscapes ranging from sub-tropical, warm temperate and dry rainforest, open woodlands, isolated granite outcrops supporting unique vegetation to wetland communities. Much of the Northern Tableland Region's landscape has been modified by farming and urban development but significant areas have been conserved in the reserves managed by the NPWS.

The Northern Tablelands Region continues to develop important partnerships with reserve neighbours, communities in adjoining towns and villages, local government, the Rural Fire Service, Rural Lands Protection Boards, Forests NSW, local members of NSW Parliament, conservation groups, neighbours and other special interest groups.

The Region is resourced to deliver work programs with a Regional office and an Operational Support and Coordination Unit in Armidale and four Area offices with workshop/depots in Tenterfield, Glen Innes, Armidale and Walcha and depots in Bingara and Yetman.

The tables in Appendix 1 provide a short description of the climate, soil type, flora and fauna for each of the four management Areas in the Northern Tablelands Region –Tenterfield, Glen Innes, Armidale and Walcha.

Figure 1 Regional Map – Glen Innes and Tenterfield Areas

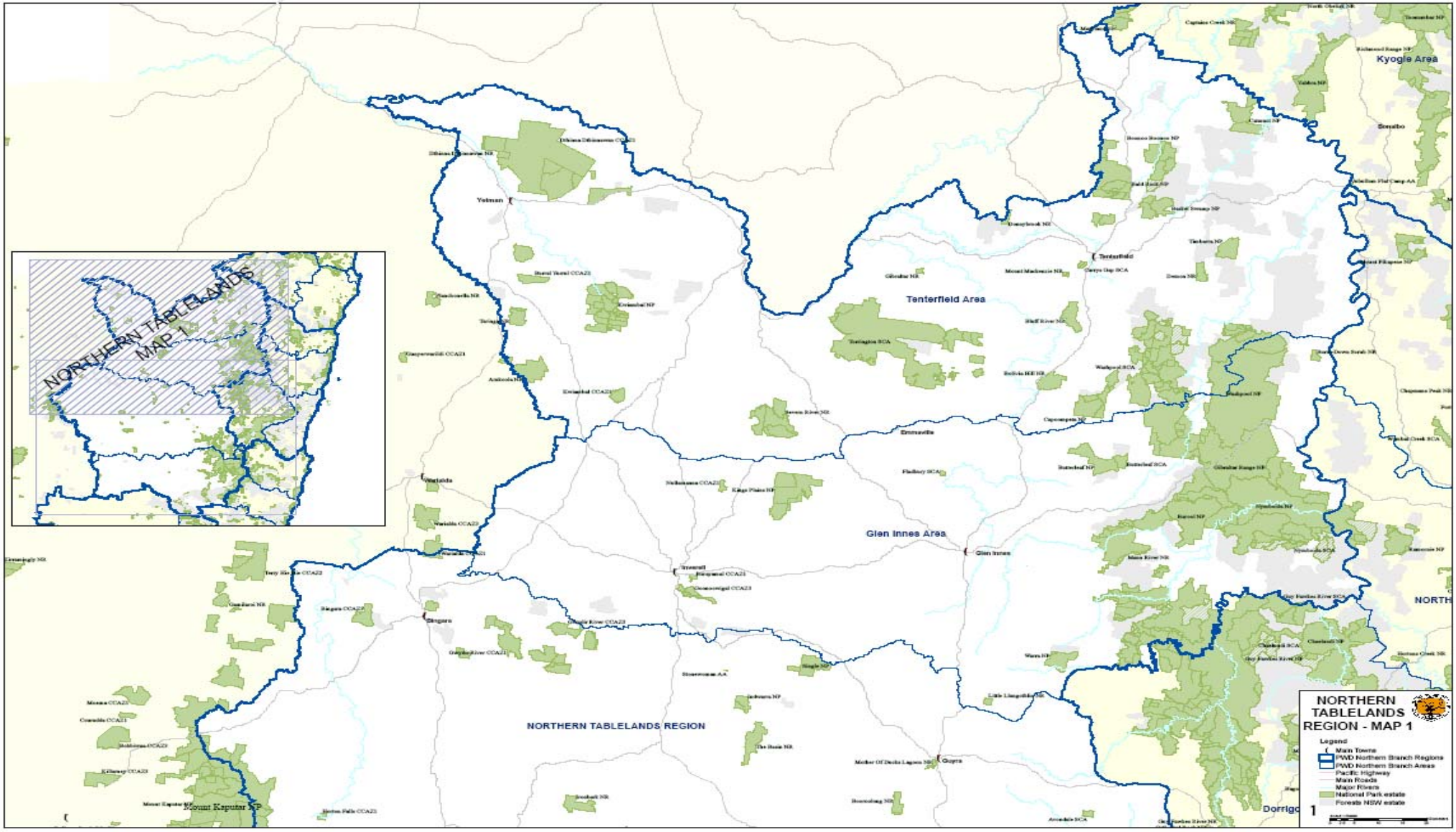
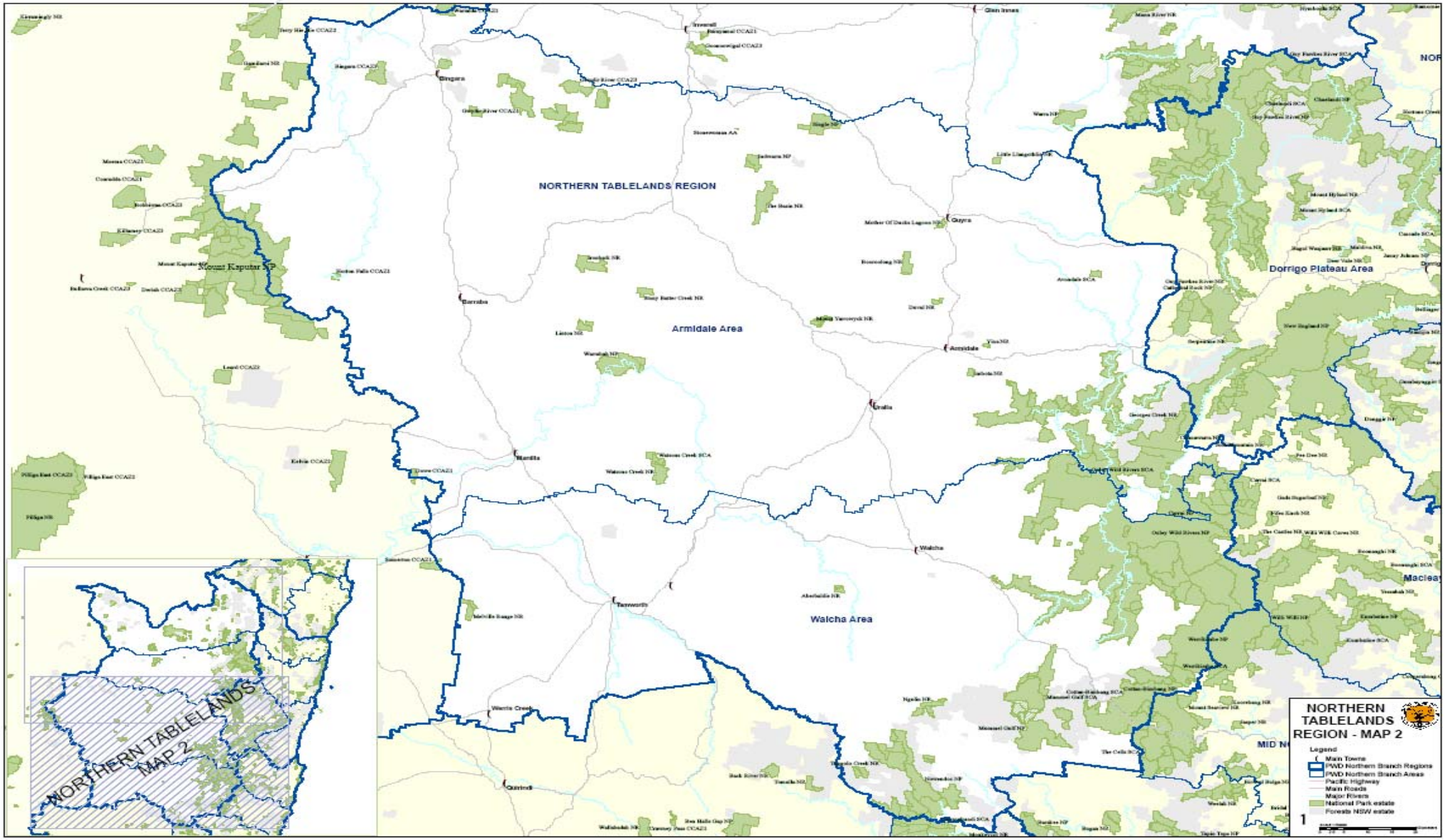


Figure 2 Regional Map 2 – Armidale and Walcha Areas



5 Pest Distribution Tables

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

Pest (Animal) Distribution

Table 1. Distribution of Pest Animal Species in Tenterfield NPWS Area.

Significant Pest - warrants control, established widespread populations throughout a reserve.

Minor Pest – Scattered/isolated populations throughout a reserve.

Not recorded in the Reserve

Reserve	Deer	Feral Cats	Feral Cattle	Feral Goats	Feral Horses	Feral Pigs	Foxes	Rabbits	Wild Dogs
TENTERFIELD AREA									
Arakoola NR									
Bald Rock NP									
Basket Swamp NP									
Bluff River NR									
Bolivia Hill NR									
Boonoo Boonoo NP									
Burral Yurral CCA NP & NR									
Capoompeta NP									
Cataract NR									
Currys Gap SCA									
Demon NR									
Donnybrook NP									
Dthinna Dthinnawan CCA NP & NR									
Kwiambal NP & CCA NP									
Mount Mackenzie NR									
Gibraltar NR									
Severn River NR									
Taringa NR									
Timbarra NP									
Torrington SCA									
Washpool NP & SCA (west)									

Table 2. Distribution of Pest Animal Species in Glen Innes NPWS Area.

Significant Pest - warrants control, established widespread populations throughout a reserve.

Minor Pest – Scattered/isolated populations throughout a reserve.

Not recorded in the Reserve

Reserve	Deer	Feral Cats	Feral Cattle	Feral Goats	Feral Horses	Feral Pigs	Foxes	Rabbits	Wild Dogs
GLEN INNES AREA									
Baramayal CCA NP									
Barool NP									
Burnt Down Scrub NR									
Butterleaf NP & SCA									
Fladbury NR									
Gibraltar Range NP									
Goonoowigal CCA SCA									
Guy Fawkes NP									
Kings Plains NP									
Little Llangothlin NR									
Mann River NR									
Nullamanna CCA NP									
Nymboida NP & SCA									
Warra NP									
Washpool NP & SCA (north)									

Table 3. Distribution of Pest Animal Species in Armidale NPWS Area.

Significant Pest - warrants control, established widespread populations throughout a reserve.

Minor Pest – Scattered/isolated populations throughout a reserve.

Not recorded in the Reserve

Reserve	Deer	Feral Cats	Feral Goats	Feral Horses	Feral Pigs	Foxes	Rabbits	Wild Dogs
ARMIDALE AREA								
Avondale SCA								
Bingara CCA SCA								
Booroolong NR								
Cunnawarra NP								
Duval NR								
Georges Creek NR								
Gwydir River CCA NP & SCA								
Horton Falls CCA NP								
Imbota NR								
Indwarra NR								
Ironbark NR								
Linton NR								
Mother of Ducks Lagoon NR								
Mount Yarrowyck NR								
Oxley Wild Rivers NP & SCA								
Single NP								
Stonewoman AA								
Stony Batter Creek NR								
The Basin NR								
Warialda CCA NP & SCA								
Warrabah NP								
Watsons Creek NR & SCA								
Yina NR								

Table 4. Distribution of Pest Animal Species in Walcha NPWS Area.

Significant Pest - warrants control, established widespread populations throughout a reserve.

Minor Pest – Scattered/isolated populations throughout a reserve.

Not recorded in the Reserve

Reserve	Deer	Feral Cats	Feral Goats	Feral Horses	Feral Pigs	Foxes	Rabbits	Wild Dogs
WALCHA AREA								
Aberbaldie NR								
Carrai NP & SCA								
Cottan-Bimbang NP & SCA								
Melville Range NR								
Mummel Gulf NP & SCA								
Ngulin NR								
Nowendoc NP								
Oxley Wild Rivers NP & SCA								
Tuggolo Creek NR								
Werrikimbe NP & SCA								

Pest (Weed) Distribution

Table 5. Distribution of Pest Weed Species in Tenterfield NPWS Area.

Significant Pest - warrants control, established widespread populations throughout a reserve.

Minor Pest – Scattered/isolated populations throughout a reserve.

Not recorded in the Reserve

Reserve	African Love Grass	Blackberry	Cats Claw Creeper	Coolatai Grass	Crofton Weed	Giant Parramatta Grass	Honey Locust	Lantana	Mother of Millions	Mysore Thorn	Nodding Thistle	Osage Orange	Prickly Pear spp	Privet	Tree of Heaven	Whisky Grass	Xanthium spp
TENTERFIELD AREA																	
Arakoola NR																	
Bald Rock NP																	
Basket Swamp NP																	
Bluff River NR																	
Bolivia Hill NR																	
Boonoo Boonoo NP																	
Burral Yurral CCA NP & NR																	
Capoompeta NP																	
Cataract NR																	
Currys Gap SCA																	
Demon NR																	
Donnybrook NP																	
Dthinna Dthinnawan CCA NP & NR																	
Kwiambal NP & CCA NP																	
Mount Mackenzie NR																	
Gibraltar NR																	
Severn River NR																	
Taringa NR																	
Timbarra NP																	
Torrington SCA																	
Washpool NP & SCA (west)																	

Table 6. Distribution of Pest Weed Species in Glen Innes NPWS Area.

Significant Pest - warrants control, established widespread populations throughout a reserve.

Minor Pest – Scattered/isolated populations throughout a reserve.

Not recorded in the Reserve

Reserve	African Love Grass	Blackberry	Cats Claw Creeper	Coolatai Grass	Crofton Weed	Giant Parramatta Grass	Honey Locust	Lantana	Mother of Millions	Mysore Thorn	Nodding Thistle	Osage Orange	Prickly Pear spp	Privet	Tree of Heaven	Whisky Grass	Xanthium spp
GLEN INNES AREA																	
Barayamal CCA NP																	
Barool NP																	
Burnt Down Scrub NP																	
Butterleaf NP & SCA																	
Fladbury NR																	
Gibraltar Range NP																	
Goonoowigal CCA SCA																	
Guy Fawkes NP																	
Kings Plains NP																	
Little Llangothlin NR																	
Mann River NR																	
Nullamanna CCA NP																	
Nymboida NP & SCA																	
Warra NP																	
Washpool NP & SCA (north)																	

Table 7. Distribution of Pest Weed Species in Armidale NPWS Area.

Significant Pest - warrants control, established widespread populations throughout a reserve.

Minor Pest – Scattered/isolated populations throughout a reserve.

Threat to the Reserve.

Not recorded in the Reserve

Reserve	Blackberry	Blue Heliotrope	Box Thorn	Coolatai Grass	Giant Parramatta Grass	Lantana	Mother of Millions	Nodding Thistle	Prickly Pear spp.	Privet	Salix spp.	Serrated Tussock	St. John's Wort	Whisky Grass	Xanthium spp.
ARMIDALE AREA															
Avondale SCA															
Bingara CCA SCA															
Booroolong NR															
Cunnawarra NP															
Duval NR															
Georges Creek NR															
Gwydir River CCA NP & SCA															
Horton Falls CCA NP															
Imbota NR															
Indwarra NR															
Ironbark NR															
Linton NR															
Mother of Ducks Lagoon NR															
Mount Yarrowyck NR															
Oxley Wild Rivers NP & SCA															
Single NP															
Stonewoman AA															
Stony Batter Creek NR															
The Basin NR															
Warialda CCA NP & SCA															
Warrabah NP															
Watsons Creek NR & SCA															
Yina NR															

Table 8. Distribution of Pest Weed Species in Walcha NPWS Area.

Significant Pest - warrants control, established widespread populations throughout a reserve.

Minor Pest – Scattered/isolated populations throughout a reserve.

Threat to the Reserve.

Not recorded in the Reserve

Reserve	Blackberry	Blue Heliotrope	Coolatai Grass	Crofton Weed	Giant Parramatta Grass	Lantana	Nodding Thistle	Prickly Pear spp.	Salix spp.	Serrated Tussock	St. John's Wort	Whisky Grass	Xanthium spp.
WALCHA AREA													
Aberbaldie NR													
Carrai NP & SCA													
Cottan-Bimbang NP & SCA													
Melville Range NR													
Mummel Gulf NP & SCA													
Ngulin NR													
Nowendoc NP													
Oxley Wild Rivers NP & SCA													
Tuggolo Creek NR													
Werrikimbe NP & SCA													

6 Pest Management Objectives

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

NPWS Pest Management Programs also aim to:

- increase community understanding of the adverse impacts of pests on biodiversity, Aboriginal heritage and historic cultural heritage; and
- support cooperative approaches and participation in pest management programs with the community and other agencies.

7 Pest Management Principles

Wherever possible, NPWS adopts an integrated approach to pest management where more than one control technique is used across the landscape. Integrated pest management is likely to be more effective because it avoids selecting for herbicide resistant weed biotypes or bait-shy animals.

Targeting more than one pest species is important as the control of one species may benefit another eg. control of foxes may benefit rabbits, control of lantana often leads to an increase in other weeds.

Control is usually undertaken at particular times of the year when pests are most vulnerable (eg. translocation of herbicides to growing points is usually greater when weeds are flowering).

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

- Pest control is targeted to species/locations where benefits will be greatest;
- Development of control priorities are set by clearly defining the problem to be addressed, ie. specific impacts are identified so that the purpose of control is clear;
- Where relevant, pest control is collaborative and across tenure, ie. undertaken on a landscape approach;
- Early detection of new incursions and rapid response is generally the most cost-effective form of pest control;
- Priority is given to mitigating the impacts on biodiversity of a pest that has cultural significance, whilst minimising impacts on cultural values;
- The aim of most pest control programs is to minimise the adverse impacts of pests, as many exotic pests are already widespread (eg. foxes, blackberries) and for these species eradication is not possible under current economic constraints;
- The focus of control programs is directed towards the values to be protected because killing pests, by itself, does not necessarily minimise their impacts due to the fact that ecological processes are complex and can be affected by a range of factors;
- Conservation risk assessments are undertaken prior to pest control, where required;
- Pest management strives to strike a balance between cost efficiency, target specificity and animal welfare;
- Where appropriate, pest control employs a combination of control methods and strategies (integrated pest management);
- Pesticide use complies with relevant legislation and is employed in a manner that minimises impacts on the environment;
- Pest management programs are often integrated with other land management activities, such as fire and recreation management; and
- Monitoring is being implemented, at varying levels, to demonstrate and improve the ongoing effectiveness of control programs.

8 Pest Program Priorities

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

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

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

Critical Priority

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

High Priority

5. Continuing and enhancing existing fire, pest and weed management programs to increase the ability of native flora and fauna to cope with future disturbances.
6. Programs that target pests (other than those covered in priorities above) that impact significantly on World Heritage or international heritage values, eg. removal of feral horses from Oxley Wild River NP, pest control in RAMSAR wetlands;
7. Programs targeting pests that impact significantly on important cultural heritage values, eg. control of feral goats where they are inhabiting an area containing Aboriginal rock art; control of rabbits undermining an historic building;

Medium Priority

8. Programs that target pests (other than those covered in priorities above) that impact significantly on Wilderness, Wild Rivers, national heritage values or other important listed values, eg. control of lantana along a declared Wild River or within a Wilderness area;
9. Programs that target pests that impact significantly on recreation, landscape or aesthetic values, eg. control of blackberry on the margins of camping areas; control of weeds in an area of natural beauty that is visited frequently;

10. Community or cooperative programs targeting pests that impact significantly on park values or agricultural production and that have ongoing, proven effectiveness and participation, eg. fox and rabbit control with the assistance of an established community group; control of Regionally Controlled Noxious Weeds (Control Class 3 weeds);
11. Community or cooperative programs that are implemented as part of an endorsed state or regional plan (and not covered above in higher priorities),

Lower Priority

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

In some circumstances, new programs may be introduced, or priority programs extended to target pests where a control "window of opportunity" is identified, e.g. where burnt areas become more accessible for ground control of weeds; where drought makes control of feral pigs and feral goats more efficient because they congregate in areas where water is available; when specific funding opportunities arise; or when a new bio-control 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.

9 Pest Program Recording and Monitoring

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

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

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

As a result, measuring the response to pest control is expensive and can be afforded for only a small sub-set of control programs.

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

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

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

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

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

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

Following is a list of some of the pest management activities that the Northern Tablelands Region of NPWS records:

- aerial baiting runs and kilograms of bait dropped;
- aerial shooting runs and number of pest animals killed;
- surface and mound baiting locations;
- trapping and shooting success (eg. Number of pigs or goats shot in each reserve);
- details of herbicide application for weed control programs;
- before and after photos for monitoring of weeds spraying success;
- number of horses removed from reserves;
- wild dog incidents;
- wild dog predation areas;
- Judas collar tracking.

10 Regional Coordination and Support of Pest Control Programs

Pest control programs are coordinated by the local NPWS Area and Region in order to ensure that resources are utilised to achieve the best possible outcomes. Regional support is provided through the Operations Support and Coordination Unit (OSCU). OSCU staff provide strategic planning advice, information and advice on the most suitable and effective control techniques, mapping and monitoring support and region wide coordination for pest control programs. Area staff are responsible for the implementation of the pest control programs within their Area, e.g. spraying of weeds, trapping of pigs etc.

Area and Regional assistance is also required to efficiently work with neighbours, community groups and other agencies. Education of staff and the broader community are essential requirements in integrated pest management and are also best achieved by centralised coordination.

Staff also work closely with other local organisations in order to gain an integrated landscape approach to pest management. These organisations include:

- Southern New England Landcare;
- New England Weeds Authority;
- Border Rivers Gwydir CMA;
- Rural Lands Protection Boards; and
- Wild Dog Control Associations.

11 Pest Program Overviews

Pest Programs are listed in alphabetical order below.

Pest Animal Species Programs

DEER (*Dama* and *Cervus* spp.)

Distribution and Abundance

Deer, at low to medium densities, are widespread across north-eastern New South Wales. Their presence has been confirmed in numerous reserves in the Northern Tablelands Region (refer to Pest Distribution Tables). Off park the management of deer is the responsibility of the NSW Game Council, as deer are recognised as a game species, under the *Game and Feral Animal Control Act 2002*.

The distribution and density of deer in the Northern Tablelands is increasing rapidly and the management of deer is a major issue for NPWS in the Region.

Impacts

The impact of deer has not yet been fully assessed in the Region. Deer graze on native flora and compete with native fauna for food and shelter. Where there is overlap between deer distribution and the presence of ROTAP's, impacts could be severe.

There are also increasing reports of motor vehicle accidents, caused by deer crossing roads between dusk and dawn.

Priorities for Control

- Reserves where deer are establishing include: Kings Plains NP, Nowendoc NP and Capoompeta NP, Mann River NR and Tuggolo Creek NR.
- Implementation of control in areas where deer are causing impacts on flora or fauna species.

Control

- Undertake surveys to record an index of the distribution, density and species of deer on reserves in the Northern Tablelands Region (NTR). Survey methods would include sand plot monitoring, dung counts and liaison with neighbouring landholders.
- Liaise with the NSW Game Council to access information on the distribution and density of deer species present in the NTR.
- Conduct cooperative control programs with adjoining landholders such as spotlight shooting and trapping.
- Use of the 'Judas' technique to increase knowledge on deer habits and movement patterns such as home range and average group size.
- All deer control will be carried out in accord with the appropriate Code of Practice and Standard Operating Procedures.

Monitoring

- Reduction in density and distribution of deer on NPWS estate, assessed from reports of sightings by NPWS staff, neighbours and the general public.

FERAL CAT (*Felis catus*)

Distribution and Abundance

Feral cats are found at low to medium densities throughout the tablelands and occur in nearly all reserves within the NTR.

Impacts

A range of native species, including birds, small mammals, reptiles and rodents are subject to predation by feral cats. However there is no clear evidence that predation is having a significant impact on any native species within the NTR. Feral cats also compete with native predators such as the Spotted-tailed and the Eastern Quoll for food.

Endangered or threatened species within the Region that predation by feral cats may pose a risk to include: the Regent Honeyeater, the Hastings River Mouse and the Border Thick-tailed Gecko.

Priorities for Control

Feral cat control is generally a low to medium priority for the Region. Planned feral cat control programs will only be initiated where there is an established need to protect endangered or threatened species or for other identified management purposes. Opportunistic control may be undertaken in conjunction with pest management or field activities.

Control

All feral cat control will be carried out in accordance with the appropriate Code of Practice and Standard Operating Procedures. Control methods for feral cats may include cage trapping, padded-jaw trapping and shooting.

Monitoring

Currently there are no cost-effective methods for monitoring the abundance of feral cats or their impact on native wildlife. Monitoring will be limited to the opportunistic collection of data during by staff during field operations. All data whether feral cat sightings or control will be entered into the regional pest database.

FERAL GOAT (*Capra hircus*)

Distribution and Abundance

Feral goats occur across a wide range of habitats in all states of Australia. Within the NTR, feral goat populations are largely restricted to native vegetation remnants in hilly to mountainous areas of both public and private lands.

They are present in 29 reserves within the Region, with the highest densities being on the western slopes of the tablelands. The density and distribution of goat populations varies between reserves. In some of the larger reserves, such as Oxley Wild Rivers NP, goats occur in small localised populations while some smaller reserves, especially in western areas, have light to moderate populations throughout.

The Pest Animal Distribution Tables provide an indication of the distribution of feral goats within the Region.

The presence of wild dogs or other predators may limit the range of feral goats to the steeper and more rugged areas.

Impacts

Grazing and browsing by feral goats has significant impacts on native vegetation. It can lead to changes in species composition as more palatable species are eaten and removed, as well as changes in vegetation structure. Areas with a high density of goats have a conspicuous browse line, as all foliage within their reach is consumed.

Feral goats can survive on highly fibrous, low nutrient herbage, provided sufficient water is available and will consume litter, fruit fall, bark and sticks. This can lead to a decrease in overall cover and an increase in bare ground. This, combined with trampling and soil surface damage caused by their hooves, may result in significant increases in soil erosion. These habitat changes in turn affect native fauna, which may also be impacted by feral goats through competition for food and shelter.

Competition and habitat degradation by feral goats has been listed as a key threatening process under the NSW TSC Act. In the NTR, there are 28 species listed as endangered or vulnerable under the TSC Act which are impacted upon by feral goats. These include; mammals, reptiles and plants, as well as four endangered ecological communities. Feral goats also cause damage to Aboriginal heritage sites, compete with neighbouring livestock and are potential vectors of livestock diseases.

Harvesting of feral goats has become an important income source for some landholders, and this view of goats as a potential resource needs to be taken into consideration when conducting control programs.

Priorities for Control

High priority sites for feral goat control in the NTR are Oxley Wild Rivers NP, Warrabah NP, Ironbark NR, Mount Yarrowyck NR, Torrington SCA, Bolivia Hill NR, Kwiambal NP, Bluff River NR and the Severn River NR. These reserves have a high density of goats and/or a high number of goat vulnerable threatened entities (GVTE's).

Dthinna Dthinnawan CCA, Gwydir River CCA, Taringa NR, Arakoola NR, Kings Plains NP, The Basin NR and Nullamanna CCA are medium priority sites, having a high density of goats but a lower number of GVTE's.

Washpool NP, Single NP, and Indwarra NR have lower densities of feral goats, and fewer GVTE's and are considered low priority sites for feral goat control.

Control

Effective control of feral goats requires an integrated approach using several complementary control techniques. In the NTR, the main control techniques are aerial shooting and trapping programs. In addition, landholders adjacent to reserve boundaries are being encouraged to reduce feral goat numbers through mustering and trapping, however the main source of reinvasion is from adjoining properties that do little or no control. Therefore, for areas such as Warrabah NP, Kwiambal NP, Ironbark NR and Severn River NR where migration is constant, aerial shooting programs will be conducted at least bi-annually to maintain or reduce the current goat density. Alternative exclusion options need to be investigated with neighbours to further reduce migration levels.

All feral goat control will be carried out in accordance with the appropriate Code of Practice and Standard Operating Procedures.

Monitoring

Changes in the relative abundance of feral goats are assessed during successive aerial shoots and trapping/mustering programs by comparing kills (cull rate compared from shoot to shoot) or captures per unit effort (time). The impacts of feral goats on vegetation and erosion have previously been investigated in the NTR, resulting in a number of publications, however no monitoring programs are currently in operation.

FERAL HORSE (*Equus caballus*)

Distribution and Abundance

In New South Wales, feral horses are a significant problem within a number of conservation reserves along the Great Dividing Range and eastern seaboard. English (2001a) estimated the population of feral horses in NSW as between 5000 and 8000 horses. Conservation reserves in NSW where horses are a significant problem include Guy Fawkes River, Kosciusko, Oxley Wild Rivers, Yuraygir, Barrington Tops, Blue Mountains, and Kanangra-Boyd National Parks and Yerranderie State Conservation Area. Feral horses are also present on lands adjoining most of these reserves.

Feral horses occur within three reserves within NTR, these being Oxley Wild Rivers (OWRNP), Guy Fawkes River and Nowendoc National Parks. The most significant population within the region is in OWRNP which is estimated to contain in excess of 300 horses. The majority of feral horses in Guy Fawkes River NP are within the portion of the park managed by the North Coast Region of NPWS, with only a small number in the NTR. A very small population of feral horses (<20) graze on the periphery of Nowendoc NP with their home range predominantly in the Hunter Region of NPWS or on adjoining private property.

Impacts

Feral horses accelerate erosion through trampling, compaction and grazing. They also impact on native vegetation and ground-nesting birds, foul water holes and contribute to the spread of weeds. In high altitude alpine herb fields trampling and grazing of bog and fen communities creates gully lines along horse trails that drain these sensitive communities. In water catchment areas, feral horse impacts accelerate soil erosion that increases sedimentation and potential transference of dangerous pathogens into water supplies. As horse density within conservation reserves increase their impacts on the environment become more significant.

In OWRNP impacts in the form of compacted horse pads, disturbance of soil stream bank damage and heavy grazing of native and introduced flora is evident. Soil erosion and increased weed growth has also been noted in areas frequented by feral horses.

Priorities for control

OWRNP has been identified as a high priority area for feral horse control in the NTR due to the significance of the biological, landscape and cultural values of the park. In Guy Fawkes River NP, NTR will work closely with North Coast Region's program to remove feral horses from their portion of the park. A Feral Horse Management Plan has been adopted for both of these reserves.

Control

Different horse control techniques are required depending on factors such as season, feed availability, site accessibility, and horse density. A fully integrated suite of control techniques have been considered and combinations of different techniques have been assessed and are used to control feral horses. In OWRNP the initial control method will be the use of feed based lures to draw horses into portable trap yards. Captured horses will then transported from the park and made available to identified horse interest groups for re-homing. Other control techniques may be

developed and utilised later in the program as required. All feral horse control will be carried out in accordance with the appropriate Code of Practice and Standard Operating Procedures.

Monitoring

The effectiveness of horse removal programs will be assessed by measuring the reduction over time of the horse population in the park and preventing increases in local density and expansion of horse distribution. The horse population in OWRNP will be monitored by population modelling from data collected during ground and aerial surveys of horses in the park.

FERAL PIG (*Sus scrofa*)

Distribution and Abundance

Feral pigs are widely distributed throughout the northern slopes and tablelands, across all tenures. They have been listed as a significant pest on 36 reserves throughout the NTR. Higher populations generally occur along watercourses, around swamps and in areas with adequate harbour such as blackberry, bracken and forest.

Impacts

Feral pigs, a declared pest animal in NSW, are a serious environmental and agricultural pest. Their habit of wallowing and rooting for food can cause soil erosion, silting and weed growth. They are known to predate on a number of native mammals, ground nesting birds, reptiles and amphibians.

Endangered or threatened species, within the NTR that may be susceptible to pig predation include the Hastings River Mouse, the Yellow-spotted Tree Frog, and the Border Thick-tailed Gecko as well as a number of ground orchids and ferns.

Feral pig impacts, on agriculture, include lamb predation and damage to crops, pasture, fences and watering points. They also act as carriers of endemic livestock diseases and are potential carriers of exotic disease. Because of these impacts and their large home range, feral pig activity on reserves can be a contentious issue with neighbours, requiring a cooperative approach for effective management.

Priorities for Control

Feral pig control is a high priority on all reserves within the NTR. Reserves to be included in annual control programs include Oxley Wild Rivers NP, Werrikimbe NP, Single NP, Mummel Gulf NP & SCA, Nowendoc NP, Warrabah NP, Kwiambal NP, Bald Rock NP, Boonoo Boonoo NP, Warra NP, Booroolong NR, Arakoola NR, Bluff River NR, Mount Yarrowyck NR, Ngulin NR and Ironbark NR.

Control

Fully integrated programs that utilise aerial shooting, trapping and poisoning as the primary control techniques will be used to control feral pigs in the NTR. Wherever possible, cooperative programs will be undertaken in conjunction with Rural Lands Protection Boards and neighbouring land managers covering all land tenures. All feral pig control will be carried out in accordance with the appropriate Code of Practice and Standard Operating Procedures.

Monitoring

Feral pig populations and distribution will be monitored in reserves across the Region. Data relating to sightings and signs of pig activity such as rooting and wallowing will be recorded and entered into the regional pest database.

FOX (*Vulpes vulpes*)

Distribution and Abundance

Foxes are abundant throughout the NTR with the highest concentrations in the fragmented environment of agricultural areas. These areas offer a wide variety of food, cover and den sites. Fox densities are generally lower in mountainous, heavily forested areas, typical of the majority of NPWS estate in this Region.

Impacts

The fox is recognised as a serious environmental pest that is believed to predate on a number of native mammals, ground nesting birds, reptiles and amphibians. Endangered or threatened species, within the NTR, that may be susceptible to fox predation include the Hastings River Mouse, the Yellow-spotted Tree Frog, the Border Thick-tailed Gecko and the Brush-tailed Rock-wallaby.

Foxes may also compete with native carnivores such as the Spotted-tailed and the Eastern Quoll for food. They have also been implicated in the spread of a number of weeds, in particular blackberry.

As an agricultural pest, foxes can have a significant impact on newborn sheep, goats and poultry. Recent studies have shown they can account for up to 30% of lamb deaths in some areas.

Further detail regarding fox impacts and management can be found in the Fox Threat Abatement Plan.

Priorities for Control

Priorities for management will concentrate on identified threats to endangered or threatened native species, or to livestock on neighbouring private properties.

The highest priority site in the NTR is the Little Llangothlin Nature Reserve (RAMSAR site).

Control

All fox control will be carried out in accordance with the appropriate Code of Practice and Standard Operating Procedures.

Control programs will be implemented in a cooperative manner, where neighbours and local pest animal control groups are involved.

Control will utilise the buried bait station technique with 1080 poison, as the primary control method. Trail baiting, spotlight shooting, fumigation of dens and trapping will be secondary methods.

NPWS will support and participate in local and regional joint control initiatives and encourage landholders to participate in coordinated group control programs.

Monitoring

- Short term reduction in fox density during critical breeding periods for threatened species or during crucial lambing periods.
- Reduction in neighbour complaints.
- An increase in Spotted Tail Quoll populations, and other vulnerable or threatened species such as the Hastings River Mouse.

RABBIT (*Oryctolagus cuniculus*)

Distribution and Abundance

Rabbits are found in most habitats throughout Australia below the Tropic of Capricorn, except for the densest forests, above 1500m or on black soil plains. Rabbit populations are essentially contiguous throughout the New England and Northern Tablelands Region (NTR), finding their highest density in semi-open grazing country. They are present at low to very low densities on numerous reserves throughout the region.

Impacts

Rabbits have significant impacts on native vegetation. Selective grazing and browsing of more palatable species leads to changes in species composition and habitat structure and even at low densities, rabbits can prevent the regeneration of impacted species through consumption of seed and seedlings. During drought, rabbits will also consume the bark and roots of native species, resulting in the death of large numbers of plants. Their digging activities also scratch out seedlings and damage root systems and combined with the damage they cause to both above and below ground vegetation, can lead to increased soil erosion. The resultant habitat degradation in turn affects native fauna, which may also be impacted by rabbits through competition for food and shelter. Rabbits also provide a food source for cats and foxes, maintaining high numbers of these introduced predators, which in turn impact native prey species.

Competition and grazing by European rabbits has been listed as a *key threatening process* under the NSW *Threatened Species Conservation Act* and rabbits are also a declared a pest animal under the *Rural Lands Protection Act 1998*. Rabbits can cause damage to Aboriginal heritage sites, compete with neighbouring livestock and impact forestry operations. The impacts of rabbits have been reduced since the release of myxomatosis and more recently rabbit haemorrhagic disease (RHD), however even at low densities rabbits can prevent the regeneration of impacted plant species and recent reports suggest rabbit numbers may be increasing again.

Priorities for Control

The density of rabbits is low to very low on most reserves in the NTR and in many cases it is far higher on adjoining private property. Consequently a priority will be given to undertaking rabbit control where it is a part of a coordinated program across all tenures. Medium priority sites in the NTR are Oxley Wild Rivers NP, Booroolong NR, Bolivia Hill NR, Ngulin NR, Linton NR, Imbota NR and Torrington SCA.

Control

Effective control of rabbits requires an integrated approach using several complementary control techniques. In the NTR, the main control techniques used will be warren ripping, warren fumigation, 1080 baiting and RHD baiting. All rabbit control will be carried out in accordance with the appropriate Code of Practice and Standard Operating Procedures.

Monitoring

During field inspections, GPS will be used to collect raw data, such as the location of warrens and above ground harbours where rabbits are seen to shelter. This data will be entered into the regional pest database.

Rabbit population abundances will be monitored using spotlight counts, walk transect counts, counts of warrens and counts of active entrances.

WILD DOG (*Canis lupus familiaris* and *C.l.dingo*)

Distribution and Abundance

Populations of wild dogs (including dingoes) occur mainly along the Great Dividing Range, coastal hinterlands, and in north-western NSW. In the NTR they occur on private and public lands and are most prevalent in densely timbered areas along the escarpment.

Wild dogs are present in 40 reserves within the NTR from Cataract NP in the north through Washpool NP, Gibraltar Range NP, Oxley Wild Rivers NP to Nowendoc NP in the south. Most of these reserves are included under Schedule 2 of the Wild Dog Pest Control Order.

Impacts

Wild dogs, including dingoes, can cause substantial losses to livestock enterprises, especially sheep and goat grazing operations. These impacts are widespread in the eastern half of the NTR, with the heaviest losses occurring where forested and gorge areas interface with fine wool sheep country. The western boundary of OWRNP, which encompasses much of the Macleay gorges, typifies this interface with the adjoining open grazing country of the New England Tablelands between Armidale and Walcha.

The impacts of wild dogs on native species appear to be greatest on large mammals, such as kangaroos and swamp wallabies, large ground-dwelling birds, such as emus and terrestrial wetland birds. Regulation of large herbivores by wild dogs in fragile arid and semi-arid environments may benefit biodiversity by reducing the impacts of overgrazing. Wild dogs also have the potential to suppress populations of pest species such as feral goats, pigs and foxes, although quantitative evidence of this is limited.

In contrast, predation by wild dogs may have negative impacts on some threatened species. For example, dog predation can be a high source of mortality in koala populations and when combined with habitat fragmentation has the potential to cause local extinctions. While no major impacts on biodiversity have been recorded in the NTR, wild dogs have been identified as a potential threat to Brush-tailed Rock-wallaby (BTRW) populations in the Green Gully area of OWRNP.

Priorities for Control

Wild dogs, including dingoes, have been declared as a pest animal under the *Rural Lands Protection Act* and they must be controlled on Crown lands (see Section 3.3 of the Act). However, the dingo is unprotected under Schedule 11 of the *National Parks and Wildlife Act 1974*, it is a native animal, and there is a requirement for it to be conserved both on DECC managed lands and within NSW generally.

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

Priorities for wild dog control on reserves in the NTR are based primarily on the level of livestock predation reported by adjoining landholders, in accord with the relevant wild dog management plans. Control will be focused on areas of reserves where there are current and/or historic records demonstrating significant impact on livestock from wild dogs emanating from the reserves. There will be close liaison with the local WDCA and landholders when developing control programs.

Priority will also be given to protection of BTRWs in the Green Gully area of OWRNP. If research indicates that predation by wild dogs does pose a significant threat, control will be undertaken to ensure to the long-term viability of these populations.

Control

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

- Exclusion or barrier fencing where the terrain is suitable and there is sufficient support from neighbouring landholders;
- Aerial baiting in the more rugged inaccessible areas where other control techniques may not be cost-effective; and
- Ground/mound baiting and trapping in accessible areas.

Reactive control in response to reports of livestock predation or dog activity will include:

- Ground or mound baiting;
- Trapping using either DECC staff or contract trappers; and
- “Howling up” and shooting.

Monitoring

Stock losses caused by wild dogs in the NTR are recorded by the Armidale and Northern New England RLPBs. Such measures are essential in planning and evaluating the effectiveness of control programs included in wild dog management plans. Wild dog abundance and activity is measured annually by the NTR via track counts and bait takes from mound bait stations in the various reserves. This data will be used by the NTR to refine wild dog control programs.

Weed Species Programs

AFRICAN BOXTHORN *(Lycium ferocissimum)*

Distribution and Abundance

African boxthorn, a native of southern Africa, occurs in all Australian states and is one of Australia's most widespread weeds. In NSW the heaviest infestations are on the central and northern slopes and plains. In the NTR it is present in at least three reserves in the Bingara and Warialda areas.

Impacts

African boxthorn is an aggressive invader pastures, roadsides and natural bushland. It forms dense thickets armed with sharp spines that form an impenetrable barrier to humans, livestock and some native animals. It also blocks access to watercourses and provides harbor for pest animals such as rabbits and foxes. It listed on the Gwydir and Inverell Shire Council Noxious Weed List as a Class 4A plant.

Priorities for Control

Priority will be given to the control of small isolated infestations of boxthorn where it is not well established within the reserve and/or on adjoining properties. Priority will also be given to the control of any infestation that is included in a coordinated program targeting the weed across all land tenures.

Control

African boxthorn can be controlled using mechanical and/or chemical methods. Mechanical removal by pushing out and stacking plants with a tractor or dozer can be used for the immediate removal of large infestations. Herbicide application will be required to treat regrowth following mechanical removal. Foliar application of herbicide is the preferred method of controlling smaller infestation or isolated bushes.

Monitoring

All African boxthorn infestations will eventually be mapped and the data stored in the regional pest database.

AFRICAN LOVEGRASS (*Eragrostis curvula*)

Distribution and Abundance

African Lovegrass is a widespread weed in the Tenterfield Local Government Area, with small scattered infestations being present in the Bald Rock and Boonoo Boonoo National Parks. Infestations are also located in other reserves in the Tenterfield and Glen Innes areas. Roadside slashing and burning on access roads to National Park areas has increased the density and distribution of this weed dramatically over the previous 10 years, and is the main dispersal method for this weed in the Tenterfield area.

Impacts

This summer growing perennial grass establishes from seed and has the potential to invade native communities by forming dense swards of tussocks. This weed is extremely aggressive, and has the ability to out compete many native grasses, particularly after fire or drought events when native flora species are suppressed. Seed dispersal is facilitated by machinery and vehicles, warranting hygiene measures to be implemented to reduce seed spread. This weed currently has no classification under the *Noxious Weeds Act*.

Priorities for Control

- Areas where infestation levels are minor and scattered such as Bald Rock and Boonoo Boonoo National Parks.
- Boundary areas where infestations in neighbouring lands are encroaching onto DECC managed lands.

Control

- Map infestations on a regional basis.
- Vehicle and machinery hygiene is essential to reduce the spread of this weed. Vehicles or machinery that travel through infested areas should be thoroughly washed down before moving to areas where this weed is not present.
- Fostering the competitive ability of native species. This will provide competition for African Lovegrass and reduce re-invasion levels.
- Established infestations are best treated with herbicide in February and March, preferably with wick application. Spot spraying is not selective and will remove all competition, resulting in quick re-invasion. Hand chipping can be used where infestations are small.
- Cooperative programs with neighbours and local councils should be encouraged to suppress and control this weed.

Monitoring

- Reduction in distribution and density as confirmed by mapping of annual control programs.

BLACKBERRY (*Rubus fruticosus (agg)* spp. *fruiticosus*)

Distribution and Abundance

Blackberry is widespread in numerous reserves in eastern fall and western slopes country. It establishes readily in a wide variety of soil types and vegetation communities.

Impacts

Blackberry is a proclaimed Class 4 plant in NSW and is regarded as a major agricultural and environmental weed. It invades disturbed areas, competing with other plants for moisture and nutrients, covering large areas with a dense canopy that excludes light from the soil surface.

Blackberry also provides harbour for rabbits, foxes and feral pigs and reduces access by park users.

Priorities for Control

The control of blackberry is generally considered to be of high priority in the NTR, particularly where follow-up control is required to maintain and build on the extensive programs previously undertaken on this weed.

Control

- Map the distribution of blackberry on NPWS land and adjoining properties.
- Reduce its distribution and potential to spread through treatment with herbicide.
- Carry out follow-up treatment as required. The frequency of follow-up treatment should be a maximum of 2 years. It is rarely possible to locally eradicate this weed.
- Trial bio-control agents to determine effectiveness as a control measure.

Monitoring

- Reduction in distribution and density as confirmed by mapping of annual control programs.

BLUE HELIOTROPE (*Heliotropium amplexicaule*)

Distribution and Abundance

Blue heliotrope (*Heliotropium amplexicaule)* a native of South America, is widespread in southern Queensland and northern New South Wales where it is a declared noxious weed in 14 local government areas. Blue heliotrope has been recorded in 12 reserves within the NTR including Oxley Wild Rivers and Nowendoc National Parks as well as a number of reserves in the western portions of Armidale and Tenterfield Areas. It grows in a wide range of soil types with heaviest infestations often occurring within riparian zones.

Impacts

Blue heliotrope is toxic to livestock, causing liver damage and stock deaths. It competes effectively with native flora and introduced pasture species. It proliferates aggressively due to its abundant seed output and ready regeneration from root buds and root fragments after disturbance.

Priorities for Control

Priority will be given to preventing the establishment of new infestations of blue heliotrope on any reserve within the region.

Priority will also be given to Oxley Wild Rivers NP for the release of bio-control agents due to the current and potential impact of blue heliotrope on the conservation values of this world heritage area.

Control

Currently there are no effective control techniques available for established infestations of blue heliotrope. Herbicides registered for blue heliotrope have had very limited success and are not selective. Small isolated infestations may be treated by spot-spraying.

Biological control offers the only cost-effective option for the control of larger established infestations of blue heliotrope. The bio-control agent blue heliotrope leaf-beetle (*Deuterocampta quadrifuga*) has been released at a site in Oxley Wild Rivers National Park. If the beetle proves to be viable and effective in controlling the weed it will be released into other infestations within the park and eventually into other reserves within the Region.

Monitoring

Monitoring of blue heliotrope will be limited to recording any significant changes in distribution. The spread and effectiveness of any bio-control agents will also be monitored.

CATS CLAW CREEPER (*Macfadyena unguis-cati*)

Distribution and Abundance

This weed is prevalent in the Clarence River catchment to the north of Washpool National Park, and occurs along the eastern fringes of Guy Fawkes River National Park at Dalmorton in the North Coast Region. Isolated infestations are located around abandoned forestry houses on the western boundary of Dthinna Dthinnawan National Park.

Impacts

This vine forms dense mats over trees and threatens the biodiversity of riparian and rainforest communities. It spreads rapidly along the fringing tree lines of watercourses choking vegetation, killing trees and contributing to bank erosion and siltation.

Large underground tubers produce climbing runners that form a thick carpet of stems and leaves that choke out small existing plants and stops germination of all species. The large climbing stems through a combination of weight and shading cause the eventual death of the largest canopy trees. Cats Claw Creeper is currently classified as a Class 4 weed.

Priorities for Control

- Areas where isolated infestations exist within National Park areas.
- Boundary areas where infestations in neighbouring lands are encroaching onto DECC (PWG) estate.

Control

- Map current infestations across the NTR.
- Contain and reduce present infestations with strategic herbicide application.
- Monitoring and frequent follow-up control is necessary for a minimum of five years.
- Monitor the progress of infestations in riparian areas within 1 kilometre of National Park boundaries and encourage cooperative control with neighbours to prevent dispersal of the weed into DECC (PWD) estate.

Monitoring

- Containment of existing infestation and reduction in distribution and density as confirmed by mapping of annual control programs.

COOLATAI GRASS (*Hyparrhenia hirta*)

Distribution and Abundance

Coolatai grass is an aggressive weed that has become established in many reserves across the NTR. It is more prevalent in western reserves as the weed was originally introduced into the Warialda area. However, this weed is now common in eastern reserves both above and below the escarpment. The most common dispersal method is by vehicle and stock movement along roadsides and stock routes.

Impacts

This weed currently carries no classification under the *Noxious Weeds Act*, but due to its ability to spread rapidly, it is quickly dominating grassy box woodland habitats and other vegetation communities. This weed completely smothers existing vegetation, is drought tolerant and is one of the major threats to native pasture and woodland biodiversity.

Priorities for Control

- Isolated infestations or new incursions where effective control will cease further distribution of the weed (e.g. Guy Fawkes River NP, Nymboida NP).
- Where infestations are impacting upon the conservation values of an area.
- Riparian areas where downstream effects will significantly boost distribution.

Control

- Map current infestations across the NTR.
- Herbicide control to be implemented at the most appropriate times of the year, with the implementation of rigorous follow-up control.
- Vehicle and machinery hygiene is essential to reduce the spread of this weed. Vehicles or machinery that travel through infested areas should be thoroughly washed down before moving to areas where this weed is not present.
- Fostering the competitive ability of native species. This will provide competition for Coolatai Grass and reduce re-invasion levels.
- Established infestations are best treated with glyphosate when plants are actively growing in February and March, preferably with wick application. Spot spraying is not selective and will remove all competition, resulting in quick re-invasion. Hand chipping can be used where infestations are small.
- Cooperative programs with neighbours and local councils should be encouraged to suppress and control this weed.

Monitoring

- Containment of existing infestation and reduction in distribution and density as confirmed by mapping of annual control programs.

CROFTON WEED (*Ageratina adenophora*)

Distribution and Abundance

Crofton weed, a native of Mexico, is now widespread in coastal areas from southern Queensland to Woolongong in New South Wales. Isolated infestations occur on the northern and central tablelands. This weed has been recorded in 8 eastern escarpment reserves within the NTR, mainly in the Glen Innes area. The infestations usually occur in disturbed areas, particularly along roadsides.

Impacts

Crofton weed is an aggressive Class 4 plant that competes successfully with native flora species. It forms dense swards where conditions suit, excluding native species. The effectiveness of control programs is often limited due to access problems created by the plants' preference for steeply sloping areas with rainfall in excess of 1500 mm per annum.

Priorities for Control

The control of Crofton weed is generally considered to be of low to medium priority in the NTR. Control of Crofton weed will aim to prevent any new infestations establishing and setting seed. Priority will also be given to the control of smaller isolated infestations where there is adequate access for spraying equipment.

Control

Control techniques suitable for Crofton weed management in conservation areas include mechanical, chemical and biological.

- Contain present infestations with strategic herbicide application.
- Treat as priority any new, isolated infestations.
- Investigate the use of biological control options such as the spot fungus (*Cercospora eupatoris*).

Monitoring

Infestations of Crofton weed will be systematically mapped and monitored to identify and changes to distribution or density eventually.

GIANT PARRAMATTA GRASS (*Sporobolus indicus v. major*)

Distribution and Abundance

Giant Parramatta Grass, a significant weed of the north coast of NSW, occurs in numerous reserves along the eastern escarpment and also occurs in some western reserves.

Seed dispersal is facilitated by machinery and vehicles, warranting the implementation of hygiene measures to reduce transportation of seed.

Impacts

Giant Parramatta Grass, a proclaimed Class 3 plant in NSW, is an aggressive perennial weed that has invaded large areas of land on the north coast of NSW. An extremely prolific seeder, it has the potential to colonise large areas of DECC (PWG) estate, dominate native species and alter the fire regime. It can dominate disturbed areas such as fire trails and roadsides where seed is frequently transported due to vehicles and machinery.

Priorities for Control

- Frequently used access trails (to reduce spread to other areas).
- Areas within water catchments.
- Areas where low density populations exist and native flora species have good natural regeneration ability.

Control

- Map the distribution of Giant Parramatta Grass on reserves within the region.
- Selectively treat (wick wiper) existing infestations with herbicide to encourage competition from native species.
- Prevent Giant Parramatta Grass from becoming established in new areas on DECC (PWG) estate.
- Train all field-based staff to identify Giant Parramatta Grass to ensure early detection of any new infestations.
- Prevent further spread by:
    - erecting temporary fencing and signs at each infestation;
    - ensure vehicles operating in the area are inspected and cleaned before moving to new areas; and
    - reducing the unauthorised use of management trails.

Monitoring

- Reduction in distribution and density as confirmed by mapping of annual control programs.

HONEY LOCUST (*Gleditsia triacanthos*)

Distribution and Abundance

This weed occurs in several reserves in the Glen Innes and Tenterfield areas.

The tree is found predominantly in riparian areas and is found on the banks of the Severn, Macintyre and Mann Rivers, and is rarely found at distances of more than 400 metres from a watercourse.

The populations in all areas consists mostly of mature Honey Locust trees (up to 6 metres high), with high numbers of seedlings present in some areas. Control programs have drastically reduced infestations along the Severn, Macintyre and Mann River's, however this Class 3 weed is still a major problem in these areas.

Impacts

This weed is an invasive tree capable of out-competing and replacing native vegetation. It is a serious pest and when disturbed mechanically or by fire, it can produce dense regrowth, eventually forming impenetrable thickets. Seed is spread by flood waters or by stock and feral animals that eat the seed and pass it in their dung.

Long spines along the branches and trunk can inflict painful injuries to humans and native fauna species.

Priorities for Control

- High priority for control in Mann River National Park and Barool National Park (both follow-up and initial control).
- Infestations in Severn River Nature Reserve and Kwiambal National Park are at low densities due to intensive control programs over the previous 10 years. Follow up control is still required to reduce re-establishment.

Control

- Map distribution on DECC (PWG) estate, on a region-wide basis.
- Herbicide application using basal bark application for mature trees or foliar application for seedlings when trees are actively growing.
- Participation with neighbours and catchment management initiatives to reduce establishment of new infestations on DECC (PWG) estate.
- Extensive follow-up control necessary for a minimum of 5 years to reduce seedling growth to prevent re-establishment of this weed.

Monitoring

- Reduction in distribution and density as confirmed by mapping of annual control programs (local eradication considered possible in some areas).

LANTANA (*Lantana camara L.*)

Distribution and Abundance

Lantana is widely distributed east of the Great Dividing Range along the coastal strip from Eden on the south coast of NSW to Cooktown in northern Queensland. Isolated infestations have been reported in the Northern Territory, Western Australia and Victoria. In the NTR it occurs in most reserves along the eastern fall country at altitudes below 750 metres. Population densities are greatest in open forest or disturbed temperate rainforest communities. Lower density lantana infestations occur on dry slopes adjoining open forest communities. Most infestations of lantana are the common pink type, apart from several small populations of pink-edged red lantana in Oxley Wild Rivers National Park.

Impacts

Lantana is listed as a Weed of National Significance due to its impact on primary industries, conservation and biodiversity. In natural ecosystems lantana infests forest edges and riparian areas, penetrates disturbed rainforest and invades open woodland. Its dense thickets exclude native species through smothering and allelopathic effects, dominate understoreys and reduce biodiversity. The lantana thickets also increase the intensity of wildfire and provide harbour for pest animals such as feral pigs.

Lantana is a major threat to the dry rainforest remnants in Oxley Wild Rivers National Park which are part of the Gondwana Rainforests of Australia and listed as a World Heritage Area.

Priorities for Control

The control of lantana is generally considered to be a medium priority in the NTR.

Priority will be given to the control of lantana where:

- it poses a threat to high conservation value areas such as the Gondwana dry rainforests;
- it is impacting on riparian zones or reducing access to watercourses by native animals or park users;
- it is a smaller isolated or new infestation that can potentially be removed completely; and
- it is impacting on public or management access along roads or trails.

To date a priority has been given to areas of Oxley Wild Rivers, Washpool, Gibraltar Range and Guy Fawkes National Parks, and Georges Creek Nature Reserve.

Control

An integrated approach is taken to the control of lantana in the NTR. Foliar application of herbicide is used where there is access for spraying equipment and the size of the infestation makes this method viable.

Hand-pulling has been used to remove small numbers of isolated plants

Biological control agents will be released into larger infestations where other control techniques are impractical due to restrictions on access or the extent of the infestation. Three bio-control agents have already been released in the Region, a leaf-mining beetle, a stem-sucking bug and a rust.

Monitoring

Lantana infestations will be progressively mapped on all reserves within the Region. Annual control programs will also be mapped and the data entered into the regional pest database. This information will be used to monitor changes to the distribution and/or density of lantana within the Region and the effectiveness of control programs.

MOTHER OF MILLIONS (*Bryophyllum* spp.)

Distribution and Abundance

Mother of Millions occurs in several reserves in the Tenterfield area. Minor infestations are present in Kwiambal National Park and a serious infestation is present in Dthinna Dthinnawan National Park.

Impacts

These plants have the capacity to spread quickly and to form dense colonies, especially in leaf litter or shallow soils in shady woodlands. Dense colonies exclude native flora species from establishing. Due to their drought tolerance and reproductive ability, this weed is very persistent and continues to reproduce in most conditions. This plant is toxic to stock.

This weed is currently classified as a Class 4 weed.

Priorities for Control

- Frequent follow up control is necessary to prevent this weed dispersing over a larger area within Kwiambal NP.
- Containment of the infestation in the Dthinna Dthinnawan NP and strategic control to prevent further spread.

Control

- Map distribution of infested areas.
- Limit access to infested areas to reduce further spread by vehicles or equipment.
- Use herbicide to control this weed where infestations are large. Small colonies can be pulled by hand. Plants which are hand-pulled must be carefully removed and destroyed or they can re-establish where they are left.
- Burn treated infestations to reduce seedling growth.
- Monitoring and frequent follow-up control is necessary for a minimum of 5 years.
- Participate with neighbours and catchment management initiatives to reduce establishment of new infestations.

Monitoring

- Reduction in distribution and density as confirmed by mapping of annual control programs.
- Photo points to monitor re-infestation and effectiveness of long term control.

MYSORE THORN (*Caesalpinia decapetala*)

Distribution and Abundance

Mysore thorn (also known as Thorny Poinciana) has limited distribution in the NTR. It is found in Nymboida National Park and is located on private property close to the Guy Fawkes River National Park. In Queensland this weed is listed as a major pest species, occurring in the Brisbane, Yeppoon and Toowoomba districts. It is currently classified as a Class 3 weed.

Impacts

This deciduous, sprawling noxious shrub, with numerous spines, forms impenetrable thickets limiting animal movement and smothering other plants. Its branches are covered with inward facing barbs which can ensnare native mammals and cattle. It can smother native flora species and invades forest communities in riparian areas. Serious infestations along riverbanks are likely to affect streamflow.

Priorities for Control

- Nymboida National Park.
- Where infestations are limited or are a new incursion and effective control will cease further distribution of the weed.
- Where infestations are likely to spread onto adjoining private property.

Control

- Map current infestations across the NTR.
- Contain and reduce present infestations with strategic herbicide application.
- Monitoring and frequent follow-up control is necessary for a minimum of 5 years.
- Participate with neighbours and catchment management initiatives to reduce establishment of new infestations on DECC (PWG) estate and neighbouring lands.

Monitoring

- Reduction in distribution and density as confirmed by mapping of annual control programs.

NODDING THISTLE *(Carduus nutans)*

Distribution and Abundance

Nodding thistle, a native of Europe, northern Africa and parts of Asia is found in the higher rainfall tableland areas of NSW and in Victoria and Tasmania. In the NTR it has been recorded in 5 reserves – Mummel Gulf and Nowendoc National Parks and Mother Of Ducks, Ngulin and Little Llangothlin Nature Reserves. All infestations are limited to small isolated areas, mostly with low plant density and have been subject to annual control programs.

Impacts

Nodding thistle is a proclaimed Class 4 weed and is regarded as a serious environmental and agricultural weed. It grows in dense patches that reduces access and alters species composition. Nodding thistle produces allelopathic compounds that depress other plants.

Priorities for Control

As the distribution of Nodding thistle is limited to very small area in each reserve, a high priority will be given to the control of all infestations with the aim of preventing the weed becoming established.

Control

- Continue to closely monitor known locations during the growing season and immediately treat any plants that are detected.
- Treat existing infestations with herbicide treatment, chipping and/or hand-pulling where plants are in low numbers.
- Ensure control is completed prior to seed set each year.
- Monitor likely areas for new infestations.

Monitoring

All known infestations of Nodding thistle will be mapped and monitored annually to ensure there is no increase in distribution or density.

OSAGE ORANGE (*Maclura pomifera*)

Distribution and Abundance

This weed infestation is found in Kwiambal National Park and the Severn River Nature Reserve.

This weed is found predominantly on the banks of the Severn and Macintyre Rivers in the above areas. It is more prevalent in Kwiambal National Park, with the majority of the population being located on the Macintyre River. There are scattered trees on the Severn River. Seedling growth and spread of this weed appears to be limited.

Impacts

This tree grows to a height of 6-8 metres when mature, and due to its multi-stemmed nature, can form dense infestations if left uncontrolled. Due to its preference for growing in riparian areas, it can restrict access and eventually block small waterways. The semi-sprawling growth pattern of this tree reduces the ability of native vegetation to re-establish. This weed currently has no weed classification.

Priorities for Control

- Macintyre River in Kwiambal NP.
- Follow up control along the Severn River in Kwiambal NP.

Control

- Map distribution in affected areas.
- Control utilising herbicide application carried out in conjunction with neighbours.
- Encourage cooperative control with neighbours.

Monitoring

- Reduction in distribution and density as confirmed by mapping of annual control programs.
- Local eradication in riparian areas considered possible.

PRICKLY PEAR SPP. *(Opuntia spp.)*

Distribution and Abundance

Common prickly pear is widespread on the northern slopes and tablelands. It occurs in both eastern escarpment areas and western areas, but is more common in western reserves where the drier climate and shallow soils suit establishment of this weed.

Populations vary from scattered individual plants to larger patches.

Impacts

Prickly pear is a proclaimed Class 4 plant and is regarded as a serious environmental pest. Dense patches can form an impenetrable barrier to native animals and humans. It can also act as harbour for rabbits and other pests.

Priorities for Control

The control of prickly pear is generally considered to be of low to medium priority in the NTR.

Priority will be given to the control of isolated new infestations to prevent the pear from becoming established in new locations.

Priority will also be given to the control of established infestations where there is a significant impact upon the conservation values of the reserve, threatened flora or fauna species or it is necessary for other identified management purposes.

Control

An integrated approach will be used to control prickly pear in the NTR.

The biological control agents Cactoblastis *(Cactoblastis cactorum)* and Cochineal *(Dactylopious opuntiae)* will be the primary method for control of large established infestations of pear. Where necessary, the manual transfer of segments of pear infected with the bio-control agents will used to assist spread to other infestations.

Herbicide will be used to treat small isolated patches of pear, where there is no evidence of biological control agents or there is an identified need for a more rapid removal of the pear.

Monitoring

Monitoring of prickly pear will be limited observations by field staff of the density and distribution of the weed and of the distribution and effectiveness of bio-control agents.

PRIVET (*Ligustrum lucidum*)

Distribution and Abundance

This weed is present in the Kings Plains National Park and Oxley Wild Rivers National Park. In Kings Plains an infestation occurs along Kings Plains Creek on the northern boundary of the park. The infestation continues into private property along the creek.

A minor, low density population also occurs in the Gara Gorge visitor area of Oxley Wild Rivers NP.

Impacts

This weed colonises gullies, creek banks, bushland and pasture, causing damage to native vegetation by forming dense infestations and out competing native vegetation. The dense colonies formed by this weed prevent any re-establishment by native species. Privet is suspected of being poisonous, and is known to cause hay fever. This plant is currently classified as a Class 4 weed.

Priorities for Control

- Kings Plains Creek (Kings Plains NP).
- Gara Gorge visitor area, Oxley Wild Rivers NP.

Control

- Map all privet on DECC (PWG) estate, on a regional basis.
- Herbicide treatment with either cut-stump or stem injection for mature trees, or foliar application for seedlings.
- Follow-up treatment for a minimum of five years is necessary due to the large seed bank present.

Monitoring

- Reduction in distribution and density as confirmed by mapping of annual control programs (local eradication considered possible).

SERRATED TUSSOCK (*Nassella trichotoma*)

Distribution and Abundance

Serrated tussock is a common weed on the Northern Tablelands and has established on many private properties. Imbota NR is the only reserve in the NTR where this weed has been recorded. It is a small infestation with a very limited distribution. Serrated tussock has been identified on numerous private properties adjoining several other reserves.

Impacts

Serrated tussock is a Class 3 weed that dominates native pasture, seeds prolifically and is unpalatable to herbivores. It competes with native species and can impact on the conservation values of natural areas.

Priorities for Control

A high priority will be given to preventing serrated tussock from becoming established in Imbota Nature Reserve. The current very effective annual control program has limited the infestation to a small section of the reserve and reduced the density to a minimum number plants germinating each year.

Control

- Control all serrated tussock plants with herbicide application, chipping or hand-pulling, prior to seed set.
- The area of the infestation will be inspected regularly during the growing season to ensure early detection any new germinations of the weed.
- Inspection of other DECC (PWG) estate for this weed, particularly in areas where adjoining private property has serrated tussock infestations.

Monitoring

- Map the current infestation at Imbota Nature Reserve and monitor for any changes in distribution or density.
- Monitor other reserves that are threat of invasion by serrated tussock from adjoining private properties.

ST JOHN'S WORT (*Hypericum perforatum*)

Distribution and Abundance

The heaviest infestations of St John's Wort in New South Wales are along the tablelands and slopes. In the NTR it occurs in Nowendoc National Park and Mother of Ducks Lagoon Nature Reserve. It is also in close proximity and poses a threat to Kings Plains, Cottan-Bimbang and Mummel Gulf National Parks.

Impacts

St John's Wort is a proclaimed Class 3 plant and is regarded as a serious agricultural and environmental pest. It is a highly prolific seeder, out competes native flora species and is toxic to livestock.

The weed spreads by seed and by lateral roots. Seeds have a sticky coating and can adhere to native fauna or livestock and be dispersed long distances. Seeds can also be transported in the digestive tracts of animals.

Priorities for Control

Effective control programs have reduced the infestation of St John's Wort at the Mother of Ducks Lagoon to a few plants. It will be a high priority to continue with this control work until the weed is eradicated from the reserve.

Priority will also be given to ongoing control programs in Nowendoc National Park which have also reduced the distribution and density of this weed.

Control

- Monitor known infestations during the growing season and immediately treat with herbicide any plants that are detected before seed set.
- Follow-up at least once during the growing season (preferably twice).

Monitoring

- All infestations in and near DECC (PWG) estate will be mapped and monitored for changes in distribution and density.
- All known infestations will be monitored during the growing season and any plants that are detected will be immediately treated with herbicide to prevent seed set.
- Susceptible DECC (PWG) areas will be monitored for new infestations, particularly Kings Plains, Cottan-Bimbang and Mummel Gulf National Parks.

TREE OF HEAVEN (*Ailanthus altissima*)

Distribution and Abundance

This weed occurs in several reserves in the NTR. This weed is usually found in riparian areas, and is common along the Severn River in both Kwiambal National Park and the Severn River Nature Reserve, Goonoowigal and Barayamal Nature Reserves and Arakoola Nature Reserve.

Trees in the above areas occur in dispersed clumps and vary in age from seedlings to mature trees up to 3.5 metres high. It is classified as a Class 4 weed.

Impacts

This weed has an aggressive nature, and can colonise areas rapidly by suckering. This weed is an important competitor for light and nutrients, and as the leaves contain allelopathic substances, growth of competing plants is inhibited, therefore encouraging growth of monospecific stands. Direct contact with the plant can cause dermatitis.

Priorities for Control

- Goonoowigal and Barayamal Nature Reserves.
- Initial control programs commenced in 1999 and annual follow up control is necessary in Severn River Nature Reserve, Arakoola Nature Reserve and Kwiambal National Park.

Control

- Map distribution of known infestations on a region-wide basis.
- Treat existing infestations with appropriate herbicides.
- Follow-up treatment to be conducted for a minimum of 5 years as re-growth from suckers is persistent.

Monitoring

- Reduction in distribution and density as confirmed by mapping of annual control programs.

WHISKY GRASS (*Andropogon virginicus L*)

Distribution and Abundance

Whisky grass is a widespread weed in the NTR with infestations common along roadsides, railways, low fertility marginal lands and overgrazed native pastures. Infestations occur in numerous reserves in the Region, such as Boonoo Boonoo, Oxley Wild Rivers and Kings Plains National Parks and Bolivia Hill Nature Reserve. Scattered infestations occur in numerous other reserves as well.

Impacts

This perennial grass is unpalatable to native fauna species, and is an effective competitor with native grasses such as Kangaroo Grass and Native Sorghum, particularly after fire or drought events when native flora species are suppressed. Infestations can become severe, particularly following major fire events. Achieving effective control, particularly where large, scattered infestations exist is difficult.

Seed catches in animal fur easily which facilitates dispersal. In addition, machinery and vehicles contribute to the spread of this weed. This weed currently has no classification under the *Noxious Weeds Act*.

Priorities for Control

- Areas where infestations are limited such as Kings Plains National Park and Martins Flat on Boonoo Boonoo National Park.
- Bolivia Hill Nature Reserve.

Control

- Infestations will be mapped on a regional basis.
- Vehicle and machinery hygiene is essential to reduce the spread of this weed. Vehicles or machinery that travel through infested areas should be thoroughly washed down before moving to areas where this weed is not present.
- Fostering the competitive ability of native species will provide competition for Whisky Grass and reduce re-invasion levels;
- Established infestations are best treated with herbicide, preferably with wick application. Spot spraying is not selective and will remove all competition, resulting in quick re-invasion. Hand chipping can be used where infestations are small;
- Cooperative programs with neighbours and local councils should be encouraged to suppress and control this weed.

Monitoring

- Reduction in distribution and density as confirmed by mapping of annual control programs.
- Photo points to monitor re-infestation and effectiveness of long term control.

WILLOWS (*Salix* species).

Distribution and Abundance

More than 100 species of willows have been deliberately introduced into this country for landscaping, nurseries or shade and shelter for livestock. At least a dozen of these species and their hybrids are now widespread in south-eastern Australia. They occur in varying densities along rivers, creeks and other watercourses in many reserves within the NTR.

Impacts

Willows pose a major threat to riverine and freshwater wetland systems. Dense growth of seedlings and young trees can alter stream beds and channel flow, resulting in increased bank erosion. Mature trees produce large amounts of wind-dispersed seed annually.

Priorities for Control

The control of Willows is generally considered to be of low to medium priority in the NTR however a higher priority will be given where:

- They are a small isolated infestation likely to spread into new areas;
- There is evidence of a detrimental impact on stream banks; and
- They impact on the conservation and/or recreational values of a reserve.

Control

The following mechanical or chemical methods may be used to control willows:

- Trees less than 0.5 metre tall can usually be pulled out by hand;
- The use of larger machinery to remove mature willows is rarely justifiable and can cause damage to the stream bank; and
- Chemical application methods such as foliar spraying for trees up to 2 metres high, stem injection or cut stump for larger trees have been used successfully to control willows.

Monitoring

Monitoring will be limited to field observations to detect changes to the distribution or density of willows on the reserves.

XANTHIUM SPP. *(X. spinosum, X. occidentale,)*

Distribution and Abundance

Xanthium spp. (Bathurst, and Noogoora burr) are widespread throughout eastern Australia. They occur across the Northern Slopes and Tablelands, particularly within riparian zones or on the heavier soils of associated flats. These weeds have been recorded in more than 20 reserves within Northern Tablelands Region, particularly in western areas.

Impacts

Xanthium spp., proclaimed Class 4 weeds, can be serious environmental weeds that compete with native species for moisture and nutrients and detract from the conservation and recreational values of an area. They can be toxic to livestock and can be a major source of vegetable fault in wool.

Priorities for Control

The control of Xanthium spp. is generally considered to be of low to medium priority in the NTR. A higher priority will be given to the control of Xanthium spp. where there is regular visitor usage or where there is a likelihood of spread to adjoining properties.

Control

Spot spraying with herbicide will be used to control Xanthium Spp. in areas where there is a significant impact on conservation values or identified need for management purposes.

Small isolated infestations may also be controlled with herbicide to prevent establishment in new areas.

All control will be undertaken at an appropriate time to prevent seeding.

Monitoring

Monitoring will be limited to observations by field staff of the density and distribution of these weeds particularly within riparian zones where there is high visitor usage. All weed control programs will be mapped and the data entered into the regional pest database.

Emerging Pest Species

BELL MINER ASSOCIATED DIEBACK

Distribution and Abundance

Bell Miner Associated Dieback (BMAD) is found in coastal forest types between Victoria and southern Queensland. The actual distribution in the Northern Tablelands Region is not known in detail, however, significant areas of forests within the region are at risk or have already been impacted by BMAD.

Areas showing the BMAD have been identified in Nymboida, Barool, Gibraltar Range, Mummel Gulf and Cottan-Bimbang National Parks. It is suspected to be present in a number of other reserves along the eastern fall.

Impacts

The Impacts of BMAD range from biodiversity to economic and recreational. Forests infected with BMAD are severely degraded and in some situations are beyond recovery and the only ecological option is to “re-start the forest”.

Avifauna are known to be affected by the presence of over-abundant Bell miners, two species of Eucalypt (*E. scorparia* and *E. dunnii*) are highly vulnerable to BMAD. BMAD has been reported in 50% of the *Eucalyptus dunnii* communities in northern NSW. The highest risk group of fauna at risk of BMAD are the Eucalypt dependent arboreal species and large forest owls. Koala, Greater, Squirrel and Yellow bellied gliders and Brush-tailed Phascogale may all be at risk of decline due to poor forest health.

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

Priorities for Control

- Nymboida, Barool and Cottan-Bimbang National Parks;

Control

Control of BMAD is a difficult challenge and in the absence of empirical evidence to confirm the causes, operational activities to prevent spread is limited to weed control and fire management. The use of fire to manage Lantana and manipulate Bell Miner habitat is the more useful tool available for mitigating BMAD impacts at this stage.

Monitoring

Monitoring of existing BMAD trial sites should focus on Barool and Nymboida National Parks and the health of the trees and the abundance of Bell Miners will be included in operational planning in NTR.

INDIAN OR COMMON MYNA (*Acridotheres tristis*)

Distribution and Abundance

The Indian or Common Myna (*Acridotheres tristis*) is thought to have been introduced to Australia from SE Asia in the 1860's. Since this introduction the species has spread through natural dispersal and by deliberate introductions from the original release sites of Melbourne and Sydney to most of coastal eastern Australia. In recent years it appears that populations of Indian Mynas have increased and expanded their habitat from areas with close association to human habitation to include open pasture lands and open forest.

Indian Mynas are not widely distributed throughout the Region, but information on their distribution and density in the NTR needs to be collected. A small population of the birds has been recorded in Oxley Wild Rivers National Park

Impacts

The Indian Myna is a very intelligent and aggressive bird that is known to evict native birds; parrots, kookaburras and pee-wee's from their nests, dump out their eggs and chase them away from their nests, and drive them away from the area. In urban habitats they are considered to be a threat to the long term survival of native birds. Indian Mynas are also suspected to contribute to the spread of certain weed species such as Bitou bush.

Priorities for Control

- DECC to encourage local governments in the Region to undertake control programs to reduce the spread of the birds onto DECC (PWG) estate.
- Development of effective control techniques to eradicate the Indian Myna population in Oxley Wild Rivers National Park.

Control

A trapping system developed by Dr Chris Tidemann at the Australian National University (ANU) is currently being trialled by a number of community groups and local councils along coastal New South Wales. Trapping has been successful in cities such as Canberra in reducing localised populations of Indian Mynas. Trapping may be used in the NTR in the future.

Monitoring

In the Northern Tablelands Region NPWS staff will actively record/maintain information on the locations of Indian Myna populations within the Region and enter this information into a database such as Wildlife Atlas.

12 Identified Key Threatening Processes in the NTR

The Region is a very biodiverse region, containing great diversity of biodiversity and number of threatened species and endangered ecological communities. There are many threats to these species and communities some of which have been identified at the Federal and State level as 'Key Threatening Processes'. The processes currently evident in the NTR are listed below.

Key Threatening Process	Type	State	National
Invasion and establishment of exotic vines and scramblers	Weed	●	
Invasion of native plant communities by exotic perennial grasses	Weed	●	
Invasion, establishment and spread of *Lantana camara*	Weed	●	
Competition and grazing by the European rabbit	Pest animal	●	●
Competition and habitat degradation by feral goats (*Capra hircus*)	Pest animal	●	●
Competition from feral honeybees	Pest animal	●	
Herbivory and environmental degradation caused by feral deer	Pest animal	●	
Introduction of the large earth bumblebee (*Bombus terrestris*)	Pest animal	●	
Predation by feral cats	Pest animal	●	●
Predation by the European Red Fox	Pest animal	●	●
Predation, habitat degradation, competition and disease transmission by Feral Pigs (*Sus scrofa*)	Pest animal	●	●
Alteration to the natural flow regimes of rivers, streams, floodplains & wetlands.	Habitat loss/change	●	
Bush rock Removal	Habitat loss/change	●	
Clearing of native vegetation	Habitat loss/change	●	●
Alteration of habitat following subsidence due to long wall mining	Habitat loss/change	●	
Ecological consequences of high frequency fires	Habitat loss/change	●	
Human-caused Climate Change	Habitat loss/change	●	●
Loss and/or degradation of sites used for hill-topping by butterflies	Habitat loss/change	●	
Removal of dead wood and dead trees	Habitat loss/change	●	
Infection of frogs by amphibian chytrid fungus causing the disease *chytridiomycosis*	Disease	●	●
Infection of native plants by *Phytophthora cinnamomi*	Disease	●	●

Climate Change

Climate change has been listed as a key threatening process under the *Threatened Species Conservation Act 1995*. Projections of future changes in climate for NSW include higher temperatures, increasing sea levels and water temperatures, elevated CO_2, more intense but possibly reduced annual average rainfall, increased temperature extremes and higher evaporative demand.

These changes are likely to lead to greater intensity and frequency of fires, more severe droughts, reduced river runoff and water availability, regional flooding, increased erosion and ocean acidification.

The direct impacts of climate change on species and ecosystems may include:

- Range shifts and species movement towards cooler latitudes or higher elevations or in response to changed rainfall frequencies and/or distributions;
- Extinctions of local populations along range boundaries;
- Changes in productivity and nutrient cycling within ecosystems, due to a combination of climate change and increasing carbon dioxide levels;
- Increasing invasion by opportunistic, weedy or highly mobile species, especially into sites where local populations of existing species are declining;
- Increasing threat to freshwater ecosystems through decreasing water flows and changes in water temperature and chemistry; and
- Progressive decoupling of species interactions (for example plants and pollinators).

Ross Bradstock of the University of Wollongong, believes the greatest detrimental impact will be on the cover and diversity of woody species. The warm to cool temperate Sclerophyll forests and woodlands typical of this region will see an increased fire risk resulting from more droughts with a decline in shrub species and potentially an increase in invasive grasses (Bradstock, 2007).

Adjusting NPWS management of the environment, through programs to reduce the pressures arising from other threats such as habitat fragmentation, invasive pest species, bushfires, pollution and urban expansion, will help reduce the severity of the effects of climate change.

For this reason NPWS will continue with and enhance existing pest and weed management programs to increase the ability of native flora and fauna to cope with future climatic disturbances.

APPENDICES

APPENDIX 1 - Reserve Descriptions

Table 1 - ARMIDALE AREA

Park/Reserve	Area (ha)	Soil Type/Geology	Climate	Rainfall (mm p.a.)	Flora	Fauna
Avondale SCA	313	Girrakool beds and Agnes Greywacke (metamorphosed sedimentary rock). Skeletal fragmented rocky soils (lithosols) and poorly defined sandy soils with low nutrient value (solods).	Cool temperate. Av. Min: 0°C Av. Max: 25°C	800 - 1000	Tablelands dry open forest. 233 native plants recorded. Silver-top Stringybark - Forest Ribbon Gum Open Forest. Wattle-leaved Peppermint. Broad-leaved Stringybark Open Forest. Yellow Pomaderris, Narrow-Leaved Orangebark.	Vulnerable Eastern False Pipistrelle, Barking Owl, Eastern Bent-wing Bat, Long-nosed Potoroo, Eastern Cave Bat. Very significant for woodland bird species.
Bingara CCA SCA	1 977	Restricted serpentinite habitats	Cool temperate. Av. Min: 2°C Av. Max: 33°C	750	The Grassy White Box Endangered Ecological community is present, as is a poorly reserved Silver-leaved Ironbark-Spinifex community.	Over 103 vertebrate species including four species of arboreal mammals, nine species of bats and twenty reptile species. Eighteen Threatened Fauna species have been recorded including the endangered Regent Honeyeater.
Booroolong NR	965	Mixed sedimentary/ granitic. Soils mostly infertile granite.	Cool temperate. Av. Min: 0°C Av. Max: 25°C	800 - 1000	Layered open forest, New England Stringybark, Narrow-leaved Peppermint and Silver-top Stringybark dominant. One possible threatened species *Thesium australe*	Endangered Booroolong Frog, Bush Stone Curlew, Vulnerable Regent Honeyeater, Border Thick-tailed Gecko, Square-tailed Kite. Common macropods and feral pigs.
Cunnawarra NP	5 598	Highly metamorphosed sedimentary rocks, some basalt and granite. Soils lithosols and red earths	Cool temperate, variable Av. Min: 0°C Av. Max: 25°C	900 – 1500	Extensive old growth moist open forest, tall open forest, mixed rainforests. Stands of Red Cedar (*Toona ciliata)*	88 bird, 35 mammal, 10 reptile, 7 amphibian. 10 species listed on TSC Act 1995.
Duval NR	242	Duval adamellite with sedimentary patch in north east corner. Shallow, sandy soils	Cool temperate. Av. Min: 0°C Av. Max: 20°C	1100 - 1300	Tall open forests grading into dry open woodland. Dominant Manna Gum, Silver-top Stringybark, Yellow Box. Little or no shrub layer. Threatened *Boronia granitica* predicted.	Potential habitat for Border Thick-tailed Gecko, Turquoise Parrot. Common macropods, significant densities of Greater Glider, Common Ringtail.
Georges Creek NR	1 263	Steep sedimentary siltstone, sandstone, and mudstone. Soils yellow earth/ lithosols.	Cool Temperate Av. Min: 0°C Av. Max: 28°C	800 - 1300	Sclerophyll forest, subtropical warm temperate rainforest/ riparian communities. Dominated by Spotted Gum, New England Blackbutt.	Likely to contain at least 11 species under TSC Act 1995.
Gwydir River CCA NP & SCA	9 525	Deep loamy soils. Bundarra Granites. Gwydir River Frontage.	Cool temperate. Av. Min: 2°C Av. Max: 33°C	750	Vulnerable plant Ooline (*Cadellia pentastylis*) occurs along with two endangered ecological communities, one being Howell Shrublands. Blakely's Red Gum and Yellow Box also present.	142 vertebrate species recorded. Eleven threatened fauna species recorded. Other priority fauna recorded include Long-thumbed Frog, Eastern Banjo Frog, Leaden Delma, Musk Lorikeet, Crested Shrike-tit, Red-capped Robin, Spotted Quail-thrush, Plum-headed Finch, Eastern Horseshoe Bat and *Mormopterus* sp. (lp).

Park/Reserve	Area (ha)	Soil Type/Geology	Climate	Rainfall (mm p.a.)	Flora	Fauna
Horton Falls CCA NP	260	Clastic Sediments (arenite, conglomerate, siltstone, tuff) of the Palaeozoic Era (Carboniferous Period).	Cool temperate. Av. Min: 0°C Av. Max: 31°C	690	Stringybark & Ironbark dominant forests and woodlands with some Riverine vegetation. Also some Orange Gum / Tumbledown Gum forest complex. There is some indication of dry rainforest species occurring within the reserve. Possibly contains *Grammitis stenophylla* (endangered) and *Cadellia pentastylis* (vulnerable).	No fauna survey to date but adjacent records would indicate that the area may provide habitat for the Squirrel Glider, Regent Honeyeater, Turquoise Parrot, various vulnerable woodland birds including Speckled Warbler & Brown Treecreeper.
Imbota NR	218	Sandon beds sedimentary. Soils generally sandy and highly erodible	Cool Temperate Av. Min: 0°C Av. Max: 28°C	900	Open forest and woodland, dominant species New England Blackbutt, Tumbledown Gum, Orange Gum, New England Stringybark.	61 bird, 5 mammal species. Endangered Regent Honeyeater, Vulnerable Koala, Barking Owl, Swift Parrot, Square-tailed Kite.
Indwarra NR	931	Acid volcanic ridge, sedimentary gully.	Cool Temperate Av. Min: 1°C Av. Max: 25°C	760	Dry open forests and woodlands. Dominant species Apple/ Mann Gum, Orange Gum, New England Blackbutt, Apple Box, Tumbledown Gum. Most in old growth condition.	Predicted habitat for Regent Honeyeater, Swift Parrot, Turquoise Parrot, Border Thick-tailed Gecko. Barking Owl known to occur.
Ironbark NR	1 652	Bundarra granite/ rhyolite. Sandy granitic soils.	Cool Temperate Av. Min: 3°C Av. Max: 28°C	760	Woodland/ Open forest. Dominant Red Stringybark, Tumbledown Gum, Apple Box, Black Cypress Pine. 6 known ROTAPS.	8 recorded vulnerable or endangered species, including Regent Honeyeater.
Linton NR	666	Sedimentary Woolomin Beds. Highly variable soil composition, all highly erodible and infertile.	Cool Temperate Av. Min: 3°C Av. Max: 28°C	680	Woodland/ Open forest. Dominant Tumbledown Gum, New England Blackbutt, Rough Barked Apple.	Regent Honeyeater, Barking Owl, Border Thick-tailed Gecko. Large and significant avifauna population.
Mother of Ducks Lagoon NR	187	Tertiary basalt, basaltic soils and peat.	Cool Temperate Av. Min: 0°C Av. Max: 25°C	900	Aquatic vegetation dominated by native and introduced grasses when water level is low.	Various migratory avifauna, including Japanese (or Latham's) Snipe.
Mount Yarrowyck NR	579	Bundarra granites, eroding to form infertile and highly erodible yellow podzolic soil	Cool Temperate Av. Min: 3°C Av. Max: 28°C	800	Dry woodland, scrub and heath. Dominant species Youman's Stringybark, Rough Barked Apple, Yellow Box.	Common macropods, habitat for Border Thick-tailed Gecko.
Oxley Wild Rivers NP & SCA	148 847	Slates, metamorphic sandstones and siltstones, Granites, conglomerates, serpentinites, quaternary sediments.	Highly variable Cool temperate. Av. Min: 0°C Av. Max: 25°C	Highly variable 620mm to 1500mm west to east	Dry rainforests, sub tropical rainforests, warm temperate rainforest, open forests with grassy understorey, gorge edge forests, tablelands remnant forests, valley floor forests.	Brush-tailed Rock Wallaby, Tiger Quoll, Glossy-Black Cockatoo, Koala, Parma Wallaby.
Single NP	2 562	Acid volcanic soils	Cool Temperate Av. Min: 1°C Av. Max: 25°C	747 – 1100	Dry open forest, with large stands of ROTAP Eucalypt species - Narrow Leafed Black Peppermint (*Eucalyptus nicholli*)	Glossy Black Cockatoo, Grey Kangaroo, Swamp Wallaby.
Stonewoman Aboriginal Area	1.8	Granitic rock	Cool Temperate	747 – 1100	Dry open woodland, much of it disturbed remnant forest.	Glossy Black Cockatoo, Grey Kangaroo, Swamp Wallaby.

Park/Reserve	Area (ha)	Soil Type/Geology	Climate	Rainfall (mm p.a.)	Flora	Fauna
			Av. Min: 1°C Av. Max: 25°C			
Stony Batter Creek NR	562	Granite with infertile sandy soils	Cool Temperate Av. Min: 3°C Av. Max: 28°C	700	Open woodland. Dominant Red Gum, Manna Gum, Orange Gum, New England Blackbutt, Black Cypress Pine. Possibly *Eucalyptus youmanii*.	Habitat for Border Thick-tailed Gecko and Turquoise Parrot. Common macropods.
The Basin NR	2 272	Permian volcanics, carboniferous sediments. Yellow podzolic, infertile soils.	Cool Temperate Av. Min: 1°C Av. Max: 25°C	760	Open woodland, woodland and heath. Dominant Orange Gum, New England Stringybark, Red Stringybark.	Common macropods such as Wallaroo, Eastern Grey Kangaroo, Swamp Wallaby. Potential habitat for Regent Honeyeater.
Warialda CCA NP & SCA	4 504	Permian metasediments and conglomerates in the south. Coarse-grained Jurassic sandstone in the north. Limited areas of basalt flows, lithic arenite sediments and Ordovician metasediments.	Cool temperate. Av. Min: 0°C Av. Max: 33°C	700	White Box- Yellow Box –Blakey's Red gum Endangered Ecological Community. Dwyer's Red Gum- Black Pine; Mugga Ironbark; Green Mallee Woodlands; Blakely's Red Gum riparian woodlands and Northern Smooth Barked Apple open forests and woodlands. One national poorly known plant species (*Isotropis foliolosa*) is recorded.	14 threatened animal species identified. Other regionally significant and priority species identified include the Spotted Quail-thrush, Crested Shrike Tit, Red-capped Robin, Emu, Pacific Baza and Brush Turkey.
Warrabah NP	4 058	Bundarra granite outcrops over infertile granite soil	Cool Temperate Av. Min: 3°C Av. Max: 28°C	700	Woodland of White Cypress Pine, Hill Red Gum and Caley's Ironbark. Rare Quinn's Mallee and Endangered Ecological community of Howell Shrublands.	Common macropods, Platypus, rare Namoi River Elseya, vulnerable Turquoise Parrot.
Watsons Creek NR & SCA	1 910	Bundarra granites, eroding to form infertile and highly erodible yellow podzolic soil	Cool Temperate Av. Min: 1°C Av. Max: 25°C	800	Dry sclerophyll woodland. Dominant species: Red Stringybark, Cypress Pine, Apple Box, Ironbark and White Box. Native orchids, Boronia and Cycads occur on the reserve.	Common macropods including Eastern Grey Kangaroo, Swamp Wallaby and Red-necked Wallaby.
Yina NR	98	Sandon beds sedimentary. Soils generally sandy and highly erodible	Cool Temperate Av. Min: 0°C Av. Max: 28°C	900	Open forest and woodland, dominant species New England Blackbutt, Tumbledown Gum, Orange Gum, New England Stringybark.	45 bird, 4 mammal species. Vulnerable Koala, Barking Owl.

Table 2 - GLEN INNES AREA

Park/Reserve	Area (ha)	Soil Type/Geology	Climate	Rainfall (mm p.a.)	Flora	Fauna
Barayamal CCA NP	177	Basalt with minor outcrops of laterite.	Av. Min: 1.0°C Av. Max: 29.2°C	765	White Box Woodland, Blakely's Red Gum - Yellow Box Woodland, Red Stringybark - Rough-barked Apple Woodland.	Threatened fauna such as the Square-tailed Kite and Turquoise Parrot have been recorded nesting in the reserve. Koala sightings.
Burnt Down Scrub NR	363	Red/Yellow podzolics on slopes. Deep brown earths in deposition areas.	Av. Min: -0.2°C Av. Max: 23.4°C	2450	Tall Open Woodland communities. Dominant species include White Mahogany, Sydney Blue Gum, and *Allocasuarina.*	Spotted Tailed Tiger Quoll, Parma Wallaby, Rufous Bettong, Long-nosed Potoroo.
Butterleaf NP & SCA	3 715	Red/Yellow podzolics on slopes. Deep brown earths in deposition areas.	Av. Min: -0.2°C Av. Max: 23.4°C	2450	Open/dry-wet sclerophyll. New England Blackbutt, Tallowwood, Bluegum.	Eastern Grey Kangaroo, Spotted Tailed Tiger Quoll, Swamp Wallaby, Red-necked Wallaby.
Fladbury SCA	113	Shallow infertile soils including angular parent rock (traprock)	Av. Min: 0.0°C Av. Max: 24°C	846	4 vegetation communities – *Acacia neriifolia*, Blackbutt /Stringybark open forest, Box woodland, Stringybark /Orange Gum/Narrow-leafed Ironbark woodland	Key fauna habitat. Major habitat for Glossy-Black Cockatoos. Other species – Diamond Firetail, Hooded Robin, Speckled Warbler, Barking Owl. Eastern Grey Kangaroo, Wallaroo.
Gibraltar Range NP (World Heritage Listed 1986)	25 382	Granite Plateau in Northwest. Red/brown earths, red/yellow podzolics.	Warm - Cool temperate Av. Min: -0.2°C Av. Max: 24°C	2450	Wet sclerophyll, rainforest understorey. Sedge swamps, heathland in shallow soils. New England Blackbutt, Tallowwood, Bluegum.	Parma Wallaby, Spotted Tailed Quolls, Long Nosed Potoroo. 141 bird species One quarter of which are at their geographic limits.
Goonoowigal CCA SCA	1 051	Undifferentiated Gilgai granite	Av. Min: 1.0°C Av. Max: 29.2°C	765	Old growth Grassy Woodlands. Stringybark and New England Blackbutt Forests. Box Woodland endangered ecological communities, Howell Shrubland. Threatened species - *Macrozamia humilis, Eucalyptus mckiena, Goodenia macbaronii, Homoranthus prolixus.*	Threatened fauna recorded in the reserve includes: Turquoise Parrot, Brown Treecreeper, Diamond Firetail, Speckled Warbler, Border Thick-tailed Gecko, Greater Long-eared Bat Glossy Black Cockatoo, Squirrel Glider, Regent Honeyeaters and Black-throated Finches.
Guy Fawkes River NP	30 485	Mix of sedimentary and metamorphic rocks. Granite intrusion forms the Chaelundi Plateau. Basalt present at Ebor Falls.	Warm - cool temperate Av. Min: 1.7°C Av. Max: 26°C	1397	Open woodland vegetation. Dry rainforest in upper slopes and protected valleys. Yellow box, Cabbage Gum, Blakely's Redgum, Broad-leafed Stringybark.	Grey kangaroo, Wallaroos, Swamp Wallabies, Red-necked Wallabies, Brush-tailed Rock Wallabies, Pademelons, and Potoroos in rainforest areas.
Kings Plains NP	6 893	Granite/ sandstone based. Low fertility soils.Southern and eastern boundaries-small areas of basalt. Alluvial deposits on creek.	Cool temperate Av. Min: 1°C Av. Max: 26°C	807 mm	Open woodland dominated by Ironbark, Cypress Pine, Yellow Box, Stringybarks. Heath areas common, containing rare species such as folded leaf wax flowers.	Red Necked Wallaby, Eastern Grey Kangaroo, Wallaroos, Brush Tailed Rock Wallaby, Platypus. Birds include Crimson Rosella's, Yellow Tailed Black Cockatoo, Honeyeater species.
Little Llangothlin NR	257	Basalt soil. Basalt weathers to red/brown clay soils.	Cool temperate. Av. Min: 0.7°C Av. Max: 25.3°C	850 (mainly summer)	Submerged communities to terrestrial vegetation. Remnant Snow Gum communities. Peppermints present.	100 bird species, 40 of which are water-birds. Eastern Grey Kangaroos, Swamp Wallabies. No small mammals.
Mann River NR	7 216	Granitic/volcanic rocks. Red/brown earths, red/yellow podzolics.	Warm - cool temperate Av. Min: -0.2°C Av. Max: 24°C	1029	Tall open forest, understorey of dry heath. River Oaks in river. Ironbark, Bloodwood, Stringybark, White Mahogany at altitude.	50 bird species including Yellow Faced Honeyeater. Tiger Quolls, Brush-tailed Rock Wallabies.

Park/Reserve	Area (ha)	Soil Type/Geology	Climate	Rainfall (mm p.a.)	Flora	Fauna
Nullamanna CCA NP	295	Permian mudstones and lithic sandstones. Deep loam to skeletal clay soils on flats, relatively high to medium fertility. Shallow sandy soils on western hills supporting poorer soils.	Cool temperate Av. Min: 1°C Av. Max: 26°C	800 mm	Caleys Ironbark, Tumbledown Red Gum, Black Cypress is a very common and often dominant associate. 100 ha of the forest comprises either Grey Box and/or Mugga Ironbark	No threatened species recorded. Vulnerable species include Black-chinned Honeyeater, Diamond Firetail, Speckled Warbler and Brown Treecreeper.
Nymboida NP & SCA	37 262	Section of granite plateau. Deep gorges and valleys. Yellow podzolic soils - red earths.	Warm temperate Av. Min: 4.5°C Av. Max: 28°C	1029	Warm temperate rainforest -low shrubby woodlands. Moist escarpment-Tallowwood, Blue Gum, Brush Box. Dry valley - Grey Gum, Grey Ironbark, Spotted Gum.	Threatened species include Hastings River Mouse, Brush-tailed Rock Wallaby, Quolls.
Warra NP	2 023	Oban River Leucadamelllites, shallow infertile soils.	Cool Temperate Climate Av. Min: 0.7°C Av. Max: 25.3°C	1010	Open woodland vegetation. Dominant species include New England Blackbutt, Broad – Leafed Stringybark, Messmate, Stringybark, *Leptospermum*, *Hakea*. ROTAP species: *Grevillea scortechinii*, *Persoonia procumbens*.	Spotted Tailed Tiger Quoll, Eastern Grey Kangaroo, Red-Necked Wallaby, Dark Brown Swamp Wallaby, Yellow-Tailed Black Cockatoos, Glossy Black Cockatoos, Masked Owl.
Washpool NP & SCA (World Heritage Listed 1986)	70 717	Red/Yellow podzolics on slopes. Deep brown earths in deposition areas.	Warm temperate in lower areas. Temperate in higher areas Av. Min: -0.2°C Av. Max: 23.4°C	2450	Warm temperate rainforest. Open/dry-wet sclerophyll. Largest remaining Coachwood stand in Australia. Brushbox also present.	141 bird spp. recorded. Spotted tailed tiger quoll, Parma wallaby, Rufous Bettong, Long nosed Potoroo.

Table 3 - TENTERFIELD AREA

Park/Reserve	Area (ha)	Soil Type/Geology	Climate	Rainfall (mm p.a.)	Flora	Fauna
Arakoola NR	2 979	Sandstone and basalt parent material.	Cool temperate. Av. Min: 2°C Av. Max: 31°C	750	Open woodland. Dominant species include Smooth Bark Apple, Narrow Leaved Ironbark, White Cypress. ROTAP species *Pomaderris queenslandica* present.	Turquoise Parrot, Koala, Emu, Common Bent Wing Bat, Honeyeaters
Bald Rock NP	8 906	Granite outcrops common Skeletal soils, podsols and sands occur on the slopes. Yellow podsols on lower slopes. Soils generally shallow, sandy porous.	Cool temperate. Av. Min: 4°C Av. Max: 25°C	847	700 plant species recorded. Open forest common. Consists of New England Blackbutt and Round Leaf Gum. Open woodland widely distributed. Sedgeland and heaths present.	Red Necked Swamp Wallabies, Black Striped Wallabies, Eastern Grey Kangaroo, Wallaroos common.
Barool NP	11 210	Granitic topography. Red / brown earths, red / yellow podzolics.	Warm - Cool temperate Av. Min: -0.2°C Av. Max: 24°C	2450	Warm temperate rainforest -low shrubby woodlands. Tallowwood, Blue Gum, Brush Box, Grey Gum, Grey Ironbark, Spotted Gum.	Parma Wallaby, Spotted Tailed Quolls, Long-nosed Potoroo.
Basket Swamp NP	2 818	Exposed granite outcrops. Skeletal grey soils in granite ridges. Siliceous sands and basic podsols on upper slopes. Soils generally poor.	Cool temperate Av. Min: 4°C Av. Max: 25° C	847	Open forest predominant. Sedgeland and open heath also occur.	Red Necked, Swamp And Pretty Faced Wallabies. Echidna, Brown Bandicoot. Varied bird life.
Bluff River NR	1 755	Ryholite and rhyodacite granite. Shallow infertile soils.	Cool temperate. Av. Min: 0°C Av. Max: 25°C	750 – 1100	Open woodland, Dry rainforest. Narrow Leaved Ironbark, Rough Barked Apple, *Allocasurina, Acacia pycnostachya*.	Tiger Quoll, Brush Tailed Rock Wallaby, Koala, Powerful Owl, Glossy Black Cockatoo, Regent Honeyeater, Grass Skink.
Bolivia Hill NR	1 768	Bolivia Range Leucoudamellite. Shallow Granitic soils	Cool temperate. Av. Min: 0°C Av. Max: 25°C	800	Low woodland to tall open forest, with many ROTAP species including *Homoranthus biflorus, Acacia pycnostachya, Boronia* sp. J.	Glossy Black Cockatoo, Grey Kangaroo, Swamp Wallaby, Tiger Quoll.
Boonoo Boonoo NP	5 126	Exposed granite outcrops. Skeletal grey soils in granite ridges. Siliceous sands and basic podsols on upper slopes. Soils generally poor.	Cool temperate Av. Min: 4°C Av. Max: 25°C	847	Open forest predominant (80% of park). Sedgeland and open heath also occur.	Red Necked, Swamp and Pretty Faced Wallabies. Echidna, Brown Bandicoot. Varied bird life.
Burral Yurral CCA NP & NR	2 371		Cool temperate. Av. Min: 2°C Av. Max: 31°C	750		
Cataract NR	3458		Cool temperate. Av. Min: 5°C Av. Max: 25°C	1402		

Park/Reserve	Area (ha)	Soil Type/Geology	Climate	Rainfall (mm p.a.)	Flora	Fauna
Capoompeta NP	4 296	Red/Yellow podzolics on slopes. Deep brown earths in deposition areas.	Av. Min: -0.2°C Av. Max: 23.4°C	2450	Open/dry-wet sclerophyll. New England Blackbutt, Tallowwood, Bluegum.	Eastern Grey Kangaroo, Spotted Tailed Tiger Quoll, Swamp Wallaby, Red-Necked Wallaby.
Currys Gap SCA	218	Mixed geology of granite intrusives and volcanic acids. Infertile shallow soils.	Cool temperate. Av. Min: 0°C Av. Max: 25°C	900	Orange Gum , New England Blackbutt, Tumbledown Gum, Round–leaved Gum, Broad–leaved Stringybark, Apple Box.	Important habitat for vulnerable animals such as the Border Thick – tailed Gecko, Squirrel Glider and Glossy Black Cockatoo.
Demon NR	889	Within granite belt, steep slopes. Granite tors present Soils include sands, brown/yellow podzolics.	Cool temperate. Av. Min: 2.3°C Av. Max: 24.5°C	1431	10 vegetation communities - Low woodland, tall open forest/closed forest in narrow moist gullies. Closed forest contains 3 ROTAP species, including *Eucalyptus scias* ssp *apoda*.	18 species listed on TSC Act, 1995 Include Powerful Owl, Parma Wallaby, Brush-tailed Rock Wallaby, and Spotted Tiger Quoll.
Donnybrook NP	276		Cool temperate. Av. Min: 0°C Av. Max: 25°C	847		
Dthinna Dthinnawan CCA NP & NR	27 855	Quaternary colluvial deposits and Jurassic Sandstones with intrusive granites, predominantly sandy loams of low fertility.	Cool temperate. Av. Min: 2°C Av. Max: 31°C	680	Dry rainforest, Box-Gum Woodland EEC, Narrow-leaved Ironbark, Northern Smooth-barked Apple, Dirty Gum Bull Oak, Pilliga Box, Long-fruited Bloodwood, Western Grey Box. Endangered and rare plants: *Polygala linariifolia*, *Homoranthus sp nov., Platyzoma microphylla, Dodonaea macrossanii, Hakea purpurea, Eucalyptus panda, Calytrix longiflora.*	Endangered and Vulnerable species including: Turquoise Parrot, Brown Treecreeper (eastern ssp.), Speckled Warbler, Koala, Diamond Firetail, Red-capped Robin, Squatter Pigeon, Black-striped Wallaby, Dunmall's Snake, Painted Honeyeater, Glossy Black-Cockatoo, Grey-crowned Babbler, Hooded Robin, Square-tailed Kite, Greater Long-eared Bat, Little Pied Bat, Little Cave Bat, Yellow-bellied Sheathtail Bat, Spotted-tail Quoll, Squirrel Glider, Koala.
Kwiambal NP & CCA NP	9 147	Granite geology, hilly and rugged with low rocky ridges. Shallow low nutrient soils. Yellow podzolic soils, alluvial sands along river.	Cool temperate. Av. Min: 2°C Av. Max: 31°C	750	Predominantly dry open woodland. White Cypress Pine, Caley's Ironbark, Tumbledown Gum, Blakely's Red Gum, Silver Leafed Ironbark, White Box, Yellow Box.	7 vulnerable species – Brown, Treecreeper, Speckled Warbler, Squirrel Glider, Yellow-Bellied Sheath-Tailed Bat, Greater Long-Eared Bat, Little Pied Bat. Red - Necked Wallaby, Swamp Wallabies, Platypus, Grey Kangaroo. Spotted Tiger Quolls to the north.
Mount Mackenzie NR	140.7	Steep granite outcrops, infertile sandy loam soil.	Cool temperate. Av. Min: 0°C Av. Max: 25°C	800	Contains an interesting array of forest ecosystems including Yellow Box, New England Blackbutt and Snow Gum. Rare flora include *Acacia macnuttiana*.	The forest ecosystems of this area provide potential habitat for the rare and threatened Turquoise Parrot, New Holland Mouse and Chestnut Rumped Hylacola
Gibraltar NR	160.6	Steep rocky terrain with infertile soils	Cool temperate. Av. Min: 0°C Av. Max: 25°C	440 – 700	Mapped as Candidate Old Growth Forest. Tumbledown Ironbark, Silver Leafed Ironbark, *Persoonia Terminalis, Allocasuarina*.	Wallaroo, Swamp Wallaby. Other possible species likely to occur are Regent Honeyeater, Turquoise Parrot, Brush Tailed Rock Wallaby
Severn River NR	5 831	Soils poor; topography rugged.	Cool temperate.	714	Consists of grassland, shrubland and open woodland.	Koalas, Platypus, Red Necked Wallaby, Eastern Grey Kangaroos.

Park/Reserve	Area (ha)	Soil Type/Geology	Climate	Rainfall (mm p.a.)	Flora	Fauna
		Slopes- loamy-clay subsoils Lower slopes- brown/grey cracking clays.	Av. Min: 2.5°C Av. Max: 29°C		Ironbark, Hill Red Gum, *Callitris* spp. Native grasses- *Themeda* spp, *Aristida* spp.	46 bird species.
Taringa NR	1 338					
Timbarra NP	1 771	New England Batholith and Stanthorpe Adamellite. Skeletal strongly weathered and leached rudimentary podzols and siliceous sands. Yellow and gleyed podzols and humic podzols and gleys.	Temperate. Av. Min: 3°C Av. Max: 30°C	850-2500	Rainforest, tall wet eucalypt forest, dry eucalypt forest dominated by Blackbutt, closed shrublands, sedgelands.	Swamp Wallaby, Eastern Pygmy-Possum, Brown Antechinus, Bush Rat, Swamp Rat And Koala, Glossy Black Cockatoo, Sooty Owl, Powerful Owl, Rufous Bettong, Spotted Tailed Quoll.
Torrington SRA	29 370	Granite based, characterised by rocky outcrops. Sandy loam soils. Areas of yellow and red textured contrast soils. Alluvial soil in streams.	Cool temperate. Av. Min: 0°C Av. Max: 25°C	600 - 800	Diverse array of plant communities. Wet heath in east to woodland in drier west. 700 plant species recorded. 36 rare species	31 mammal species. Include Tiger Quoll, Eastern Grey Kangaroo, Swamp Wallaby. 135 bird species.
Washpool NP & SCA (World Heritage Listed 1986)	70 717	Red/Yellow podzolics on slopes. Deep brown earths in deposition areas.	Warm temperate in lower areas. Temperate in higher areas Av. Min: -0.2°C Av. Max: 23.4°C	2450	Warm temperate rainforest. Open/dry-wet sclerophyll. Largest remaining Coachwood stand in Australia. Brushbox also present.	141 bird spp. recorded. Spotted Tailed Tiger Quoll, Parma Wallaby, Rufous Bettong, Long Nosed Potoroo.

Table 4 - WALCHA AREA

Park/Reserve	Area (ha)	Soil Type/Geology	Climate	Rainfall (mm p.a.)	Flora	Fauna
Aberbaldie NR	285	Kilburnie Adamellite, a granitic rock associated with the New England Batholith. Soils are granitic sandy loams.	Cool Temperate Av. Min: -2°C Av. Max: 28°C	700-900	Mountain Gum, New England Blackbutt. Vulnerable and rare plants include: Youman's Stringybark, *Eucalyptus nicholii, Eucalyptus malacoxylon, Eucalyptus elliptica.*	Koala. No fauna surveys conducted to date.
Carrai NP & SCA	12 301	The plateau is comprised of a major elevated granite pluton amongst surrounding sedimentary terrain in the upper Macleay catchment. The park consists of a large section on the southern edge of the plateau and steep dissected topography along the north-eastern escarpment. Elevated gradient from approximately 280m to1100m.	Cool temperate Av. Min: 3°C Av. Max: 26°C:	1100 –1600 varying with altitude	Important addition to the north east forest system and protects at least 20 mapped forest ecosystems including eight that are poorly represented. There are important areas of sub tropical rainforests occupying sheltered gullies in the southern section of the park. The varied topography and ecosystems support a rich flora including 7 rare or threatened plants.	Forested environments support a diverse fauna and are especially significant as they protect key populations of the endangered Hastings River Mouse and vulnerable Rufous Scrub-bird as well as harbouring high densities of Spotted-Tailed Quoll. Protects important foraging habitat for the vulnerable Little and Common Bent-wing Bats.
Cottan-Bimbang NP & SCA	16 121	The park occupies a varied and rugged wilderness landscape of sedimentary geology encompassing an elevated gradient ranging from 160m to 1200m on the edge of the southern New England Tablelands.	Warm temperate Av. Min: 5°C Av. Max: 30°C:	1000 to 1500 varying with altitude	The park reserves an outstandingly diverse range of forest ecosystems, most of which are in old growth condition – including sub tropical rainforest. It protects the only area of Bull Oak in north east NSW. Contains a rich flora and potential habitat for several rare or threatened plants.	The mosaic of forest ecosystems support a diverse fauna, including important regional populations of Koala, Yellow-bellied Glider, Spotted-tailed Quoll, Sooty, Powerful and Masked Owls. It also provides potential habitat for other threatened species
Melville Range NR	842	Carboniferous sedimentary rocks, conglomerates, acid tuffs, coarse lithic sandstones, Currabubula Coepolly and Merlewood formations.	Cool Temperate Av. Min: 3°C Av. Max: 26°C	520	Woodlands and open forests with a grassy and shrubby understorey. Main forest types, Narrow-leaved Peppermint, White Box, Tumbledown Red Gum, Yellow Box, Rough-barked Apple, Blakely's Red Gum, *Acacia cheelii*, Rusty Fig, Black Cypress Pine.	Turquoise Parrot (V), Eastern Grey Kangaroo, Wallaroo, Wedge-tailed Eagle, Galah, Kookaburra, Eastern Rosella, King Parrot, Grey Fantail, Jacky Winter, Apostlebird, etc…
Mummel Gulf NP & SCA	15 214	Most of the park lies upon sedimentary parent material but smaller areas of basic igneous geology occur along the divide.	Cool Temperate Av. Min: -1°C Av. Max: 28°C	900-1200	Extensive tracks of old growth forest. Mosaics of highland wet forests. Subtropical rainforests occupy some of the sheltered gullies particularly in the far south of the park.	Tiger Quoll, Common Bent-wing Bat, Great Pipistrelle, Red-necked & Parma Wallaby, Common Wombat, Long-nosed Potoroo, Hastings River Mouse, Square-tailed Kite, Powerful, Sooty & Masked Owl, Crimson Rosella, Yellow- tailed Black Cockatoo.
Ngulin NR	1 253	Igneous rocks underlies moderately steep terrain.	Cool Temperate Av. Min: -3°C Av. Max: 28°C	900-1200	Dry and moist forest. A major occurrence of Messmate/ Mountain Gum forest, a significant proportion in old growth condition.	Tiger Quoll, , Red-necked Wallaby, Eastern grey Kangaroo, Stuttering Barred Frog, Stephens Banded Snake, Masked Owl, Crimson Rosella, Yellow- tailed Black Cockatoo.
Nowendoc NP	16 917	Underlying sedimentary	Cool Temperate	700-1100	Rich mosaics of old growth dry and moist	Tiger Quoll, Common Bent-wing Bat, Great

Park/Reserve	Area (ha)	Soil Type/Geology	Climate	Rainfall (mm p.a.)	Flora	Fauna
		geology and consists of steep dissected topography.	Av. Min: -2°C Av. Max: 28°C		forest, a significant proportion in old growth condition.	Pipistrelle, Parma Wallaby, Yellow Bellied Glider. Birds include Square-tailed Kite, Sooty & Powerful Owl, Glossy Black Cockatoo.
Oxley Wild Rivers NP & SCA	148 847	Slates, metamorphic sandstones and siltstones, Granites, conglomerates, serpentinites, quaternary sediments.	Highly variable Cool temperate. Av. Min: 0°C Av. Max: 25°C	Highly variable 620-1500 west to east	Dry rainforests, sub tropical rainforests, warm temperate rainforest, open forests with grassy understorey, gorge edge forests, tablelands remnant forests, valley floor forests.	Brush-tailed Rock Wallaby, Tiger Quoll, Glossy-Black Cockatoo, Koala, Parma Wallaby.
Tuggolo Creek NR	646	Predominantly granitic rock with basic igneous rock on Eastern boundary. Low to moderate soil fertility.	Cool Temperate Av. Min: -2°C Av. Max: 28°C	1000-1200	Predominantly dry open forest with some moist open forest in south-east corner.	Spotted –tailed Tiger Quoll, Common Bent-wing Bat, Eastern False Pipistrelle, common macropods, Square-tailed Kite, Masked Owl, Crimson Rosella, Yellow- tailed Black Cockatoo, Honeyeater species.
Werrikimbe NP & SCA	16 092	The park lies within the New England Fold Belt of eastern Australia, a geological structure which was formed as a large mid Palaeozoic to early Mesozoic sedimentary basin. The parent material consisting mainly of Devonian metamorphosed sedimentary rocks, intruded by upper Permian igneous rock.	Cool temperate Av. Min: 4°C Av. Max: 28°C:	1603	Supports a diverse mosaic of plant communities in response to marked variations in altitude, climate, landform and fire history. There are 24 rare or threatened plant species of which 2 are listed as “Endangered” and 3 as “Vulnerable”. Plant communities include rainforest, sclerophyll forests, woodland, heath, grass tree scrub, sedge swamps and meadow swamps.	The diversity of habitats within the park supports a rich native faunal assemblage – 38 native mammal, 26 reptile, 15 amphibian and 150 bird species, 31 of these classified as threatened.

PRELIMINARY DRAFT

APPENDIX 2 - Pest Program Priorities

	CRITICAL				HIGH			MEDIUM				LOW	
Pest Program Armidale Area	1.Human Health / National Emergency	2.New Incursions or Limited Distribution	3.Threatened species/communities	4.Impacts on agriculture	5.Continuing / Enhancing Existing Programs	6.World Heritage	7.Cultural Heritage	8.Wilderness/Wild Rivers	9.Recreation/Aesthetic	10.Community Cooperative program	11.State or Regional Plan	12.Community programs / local impacts	13.Maintain benefits of previous programs
Vertebrate Pest Control													
Feral Pigs & Goats Aerial Shooting Program OWRNP, BBS/Nandewar Reserves, Warrabah NP, Mt Yarrowyck NR,													
Feral Pig Trapping Program Single NP, Booroolong NR, OWRNP, Ironbark NR, Mt Yarrowyck NR, Watsons Creek NR.													
Mound Baiting for Foxes OWRNP, Single NP, Booroolong NR, Imbota NR, Yina NR, Avondale SCA													
Fox Control Mother of Ducks Lagoon NR													
Horse Removal Program OWRNP													
Rabbit Control OWRNP**,** Imbota NR, Linton NR, Mt Yarrowyck NR, Yina NR													
Wild Dog Reactive Control - Baiting, Trapping OWRNP, Georges Creek NR													

PRELIMINARY DRAFT

Pest Program Armidale Area	CRITICAL				HIGH			MEDIUM				LOW	
	1.Human Health / National Emergency	2.New Incursions or Limited Distribution	3.Threatened species/communities	4.Impacts on agriculture	5.Continuing / Enhancing Existing Programs	6.World Heritage	7.Cultural Heritage	8.Wilderness/Wild Rivers	9.Recreation/Aesthetic	10.Community Cooperative program	11.State or Regional Plan	12.Community programs / local impacts	13.Maintain benefits of previous programs
Weed Control													
Giant Parramatta Grass Control Program OWRNP													
St John's Wort Control Program Mother of Ducks Lagoon NR													
Serrated Tussock Control Program Imbota NR, Yina NR													
Nodding Thistle Control Program Mother of Ducks Lagoon NR													
Blackberry Control Program OWRNP, Single NP, Booroolong NR, Imbota NR, Linton NR,													
Lantana Bio-Control and Spraying Program OWRNP, Georges Creek NR,													
General Weed Control Program OWRNP, BBS/Nandewar,													
Blackberry Control Program Duval NR, Georges Creek NR, Ironbark NR, Mother of Ducks Lagoon NR, Mt Yarrowyck NR, Yina NR, Watsons Creek NR,													
Coolatai Grass Control Program Mt Yarrowyck NR													
Xanthium spp. Control Program Warrabah NP,													

PRELIMINARY DRAFT

Pest Program Glen Innes Area	CRITICAL				HIGH			MEDIUM			LOW		
	1.Human Health / National Emergency\	2.New Incursions or Limited Distribution	3.Threatened species/communities	4.Impacts on agriculture	5.Continuing / Enhancing Existing Programs	6.World Heritage	7.Cultural Heritage	8.Wilderness/Wild Rivers	9.Recreation/Aesthetic	10.Community Cooperative program	11.State or Regional Plan	12.Community programs / local impacts	13.Maintain benefits of previous programs
Vertebrate Pest Control													
Feral Pigs & Goats Aerial Shooting Program Kings Plains NP, Nullamanna NR													
Feral Pig Trapping & Baiting Program Butterleaf NP, Kings Plains NP, GFRNP, Warra NP,													
Judas Pig Program GFRNP													
Buried Baiting for Foxes Little Llangothlin NR													
Cat Control Program Gibraltar Range NP, Washpool NP,													
Wild Dog Reactive Control - Baiting, Trapping Butterleaf NP & SCA, Western Washpool NP (Curramore), Barool NP, Mann River NR, GFRNP, Warra NP													
Wild Dog Strategic Aerial and Ground Baiting Gibraltar Range NP, Washpool NP, Burnt Down Scrub NR, Western Washpool NP (Curramore), Mann River NR, GFRNP, Warra NP,													
Wild Dog Trapping Program GFRNP, Western Washpool NP (Curramore), Mann River NR, Warra NP, Kings Plains NP, Nullamanna NR													
Wild Dog Collaring Program GFRNP													
Deer Control Program Mann River NR, Kings Plains NP													

PRELIMINARY DRAFT

Pest Program Glen Innes Area	CRITICAL				HIGH			MEDIUM				LOW	
	1.Human Health / National Emergency	2.New Incursions or Limited Distribution	3.Threatened species/communities	4.Impacts on agriculture	5.Continuing / Enhancing Existing Programs	6.World Heritage	7.Cultural Heritage	8.Wilderness/Wild Rivers	9.Recreation/Aesthetic	10.Community Cooperative program	11.State or Regional Plan	12.Community programs / local impacts	13.Maintain benefits of previous programs
Weed Control													
Perennial Grasses Control Program (Whisky Grass, Coolatai Grass, Hemlock) Gibraltar Range NP, Washpool NP, Mann River NR, Nymboida NP & SCA, GFRNP, Kings Plains NP, Barool NP, Little Llangothlin NR,													
Crofton Weed Control Program Barool NP													
Blackberry Control Program Little Llangothlin NR,													
Lantana Bio-Control and Spraying Program Gibraltar Range NP, Washpool National Park, GFRNP,													
Honey Locust Control Program Barool NP													
Mysore Thorn Control Program Nymboida NP & SCA													
Nodding Thistle Control Program Little Llangothlin NR													
Privet Control Program Kings Plains NP													

PRELIMINARY DRAFT

	CRITICAL				HIGH			MEDIUM				LOW	
Pest Program Tenterfield Area	1.Human Health / National Emergency	2.New Incursions or Limited Distribution	3.Threatened species/communities	4.Impacts on agriculture	5.Continuing / Enhancing Existing Programs	6.World Heritage	7.Cultural Heritage	8.Wilderness/Wild Rivers	9.Recreation/Aesthetic	10.Community Cooperative program	11.State or Regional Plan	12.Community programs / local impacts	13.Maintain benefits of previous programs
Vertebrate Pest Control													
Feral Pigs & Goats Aerial Shooting Program Arakoola NR, Kwiambal NP, Taringa NR, Dthinna Dthinnawan CCA, Burral Yurral CCA, Bolivia Hill NR, Bluff River NR, Gibraltar NR, Severn River NR,													
Feral Pig Trapping & Baiting Program Kwiambal NP, Bald Rock NP, Boonoo Boonoo NP, Basket Swamp NP, Washpool (West) NP, Capoompeta, Bolivia Hill NR, Torrington SCA,													
Buried Baiting for Foxes Arakoola NR, Dthinna Dthinnawan CCA, Taringa NR,													
Wild Dog Trapping Program Washpool (West) NP, Capoompeta, Bolivia Hill NR, Curry's Gap NR, Mt Mackenzie NR, Bluff River NR, Torrington SCA, Cataract NR													
Wild Dog Reactive Control - Baiting, Trapping Washpool (West) NP, Capoompeta, Bolivia Hill NR, Curry's Gap NR, Mt Mackenzie NR, Bluff River NR, Torrington SCA,													
Wild Dog Strategic Aerial and Ground Baiting Washpool (West) NP, Capoompeta, Bolivia Hill NR, Bluff River NR, Cataract NR													

PRELIMINARY DRAFT

Pest Program Tenterfield Area	CRITICAL				HIGH			MEDIUM				LOW	
	1.Human Health / National Emergency	2.New Incursions or Limited Distribution	3.Threatened species/communities	4.Impacts on agriculture	5.Continuing / Enhancing Existing Programs	6.World Heritage	7.Cultural Heritage	8.Wilderness/Wild Rivers	9.Recreation/Aesthetic	10.Community Cooperative program	11.State or Regional Plan	12.Community programs / local impacts	13.Maintain benefits of previous programs
Weed Control													
Perennial Grasses Control Program (Whisky Grass, Coolatai Grass, African Lovegrass, Giant Parramatta Grass) Bald Rock NP, Boonoo Boonoo NP, Bolivia Hill NR, Curry's Gap NR, Severn River NR, Basket Swamp NP, Washpool (West) NP,													
Mother of Millions Control Program Kwiambal NP, Dthinna Dthinnawan NR													
Tiger Pear Curry's Gap NR,													
Blackberry Control Program Bald Rock NP, Boonoo Boonoo NP, Basket Swamp NP, Washpool (West) NP, Curry's Gap NR,													
Lantana Bio-Control and Spraying Program Cataract NP & SCA, Timbarra NR,													
Salix Spp. & Peach Tree Control Program Arakoola NR													
Tree of Heaven Control Program Arakoola NR, Kwiambal NP, Severn River NR,													
Honey Locust Control Program Kwiambal NP, Severn River NR,													
Privet Control Program Curry's Gap NR													

	CRITICAL				HIGH			MEDIUM				LOW	
Pest Program Walcha Area	1.Human Health / National Emergency	2.New Incursions or Limited Distribution	3.Threatened species/communities	4.Impacts on agriculture	5.Continuing / Enhancing Existing Programs	6.World Heritage	7.Cultural Heritage	8.Wilderness/Wild Rivers	9.Recreation/Aesthetic	10.Community Cooperative program	11.State or Regional Plan	12.Community programs / local impacts	13.Maintain benefits of previous programs
Vertebrate Pest Control													
Deer Control Program Nowendoc NP, Tuggolo Creek NR													
Feral Pigs & Goats Aerial Shooting ProgramOWRNP, Nowendoc NP													
Feral Pig Trapping & Baiting Program OWRNP, Mummel Gulf NP & SCA, Nowendoc NP, Werrikimbe NP & SCA, Ngulin NR													
Mound Baiting for Foxes OWRNP, Mummel Gulf NP, Ngulin NR, Aberbaldie NR, Melville Range NR													
Horse Removal Program OWRNP													
Rabbit Control Werrikimbe NP & SCA, Melville Range NR													
Wild Dog Reactive Control - Baiting, Trapping OWRNP, Cottan-bimbang NP, Mummel Gulf NP, Nowendoc NP, Werrikimbe NP, Ngulin NR, Tuggolo Creek NR.													
Wild Dog Strategic Aerial and Ground Baiting OWRNP, Cottan Bimbang NP, Mummel Gulf NR, Nowendoc NP, Werrikimbe NP, Tuggolo Creek NR													

PRELIMINARY DRAFT

	CRITICAL				HIGH			MEDIUM				LOW	
Pest Program Walcha Area	1.Human Health / National Emergency	2.New Incursions or Limited Distribution	3.Threatened species/communities	4.Impacts on agriculture	5.Continuing / Enhancing Existing Programs	6.World Heritage	7.Cultural Heritage	8.Wilderness/Wild Rivers	9.Recreation/Aesthetic	10.Community Cooperative program	11.State or Regional Plan	12.Community programs / local impacts	13.Maintain benefits of previous programs
Weed Control													
Coolatai Grass Control Program OWRNP													
Giant Parramatta Grass Control Program OWRNP, Carrai NP,													
Crofton Weed Control Program OWRNP, Cottan-bimbang NP, Mummel Gulf NP													
Nodding Thistle Control Program Ngulin NR													
Blackberry Control Program Mummel Gulf NR, Nowendoc NP, Werrikimbe NP, Ngulin NR													
Blackberry & Lantana Control Program OWRNP,													
Lantana Biological Control OWRNP,													
General Weed Control Program OWRNP,													
Prickly Pear Biological & Chemical Control OWRNP													