



NSW **National Parks
and Wildlife Service**

Northern Rivers Region

Pest Management Strategy

2008-2011



Department of **Environment and Conservation** NSW



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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.

Table of Contents

1	Introduction.....	1
2	Purpose of the Strategy	1
3	Legislation and Policy	2
4	Regional overview	6
4.1	Operational Overview	6
4.2	Pest Management Planning	7
4.3	Threatened Species Programs	8
4.4	NPWS Staff Training Programs.....	8
5	Pest Distribution Tables	10
6	Pest Management Objectives	13
7	Pest Management Principles	13
8	Pest Program Priorities	14
9	Pest Program Recording and Monitoring	16
10	Regional coordination and support of pest control programs.....	18
10.1	Githabul Indigenous Land Use Agreement.....	18
10.2	Arakwal Indigenous Land Use Agreement	19
10.3	Memorandum of Understanding in relation to the cooperative cross border management of national parks and other reserves in New South Wales and Queensland	19
10.4	Department of Defence.....	19
10.5	Southern Cross University	20
10.6	North Eastern Pest Animal Advisory Committee (NEPAAC)	20
10.7	North Coast Weeds Advisory Committee (NCWAC)	20
10.8	South East Queensland Pest Advisory Forum (SEQPAF).....	21
10.9	Newrybar Swamp Feral Pig Management Committee.....	21
10.10	Pandanus Planthopper Working Group.....	21
10.11	Pied Oystercatcher Management Committee.....	21
10.12	Pied Oystercatcher Interagency Working Group	22
10.13	Bell Miner Associated Dieback Working Group (BMAD)	22
10.14	Tweed Bitou Bush Management Committee	22
10.15	Discovery Ranger Program.....	22
10.16	Border Ranges Biodiversity Hotspot Project.....	22
10.17	Darling Downs-Moreton Rabbit Board.....	22
10.18	Other local groups including Landcare	23
11	Pest Program Overviews	24
11.1	Vertebrate Pests in the Northern Rivers Region.....	24
11.1.1	<i>Wild Dogs (Canis lupus familiaris and C. l. dingo) in the Northern Rivers Region</i>	24
11.1.2	<i>Feral Cat (Felis catus) in the Northern Rivers Region</i>	28
11.1.3	<i>European Red Fox (Vulpes vulpes) in the Northern Rivers Region</i>	30
11.1.4	<i>Cane Toad (Bufo marinus) in the Northern Rivers Region</i>	32
11.1.5	<i>Feral Pig (Sus scrofa) in the Northern Rivers Region</i>	34
11.1.6	<i>Feral Goats (Capra hircus) in the Northern Rivers Region</i>	36
11.1.7	<i>Feral Cattle (Bos taurus) in the Northern Rivers Region</i>	37
11.1.8	<i>European Rabbit (Oryctolagus cunicullus) and Brown Hare (Lepus capensis) in the Northern Rivers Region</i>	38
11.1.9	Bell Miner Associated Dieback in the Northern Rivers Region	40
11.1.10	Indian or Common Myna (Acridotheres tristis) in the Northern Rivers Region	42
11.1.11	Feral Poultry (Gallus bankiva sp.) in the Northern Rivers Region	43
11.2	Emerging Pest Issues	44

11.2.1	<i>Yellow Crazy Ants (Anoplolepis gracilipes) & Red Imported Fire Ants (Solenopsis invicta) in the Northern Rivers Region</i>	44
11.2.2	<i>Exotic Fungi, Red Pored Fungi (Faviolaschia calocera) in the Northern Rivers Region</i>	46
11.2.3	<i>Lethal Yellowing (Phytoplasma) in the Northern Rivers Region</i>	47
11.2.4	<i>Pandanus planthopper (Jamella australiae) in the Northern Rivers Region</i>	48
11.2.5	<i>Feral Deer (family Cervidae) in the Northern Rivers Region</i>	50
11.2.6	<i>Red-eared Slider Turtle (Trachemys scripta elegans) in the Northern Rivers Region</i>	52
11.2.7	<i>Plant Pathogen (Phytophthora cinnamomi) in the Northern Rivers Region</i>	53
11.2.8	<i>Plant Pathogen (Phellinus noxious) in the Northern Rivers Region</i>	55
11.3	<i>Noxious weeds of the Northern Rivers Region</i>	57
11.3.1	<i>Bitou Bush (Chrysanthemoides monilifera subsp. Rotundata) – Northern Rivers Region</i>	57
11.3.2	<i>Lantana (Lantana Camara) – Northern Rivers Region</i>	58
11.3.3	<i>Glory Lily (Gloriosa superba) - Northern Rivers Region</i>	61
11.3.4	<i>Groundsel Bush (Baccharis halimifolia) - Northern Rivers Region</i>	62
11.3.5	<i>Giant Parramatta Grass (Sporobolus indicus var. major) & Giant Rat's Tail Grass (Sporobolus pyramidalis) - Northern Rivers Region</i>	63
11.3.6	<i>Coolatai grass (Hyparrhenia hirta) - Northern Rivers Region</i>	64
11.3.7	<i>Camphor Laurel (Cinnamomum camphora) - Northern Rivers Region</i>	64
11.3.8	<i>Blackberry (Rubus fruticosus aggregate) - Northern Rivers Region</i>	66
11.3.9	<i>Exotic Vines- Northern Rivers Region</i>	67
11.3.10	<i>Rainforest Restoration- Northern Rivers Region</i>	69
11.4	<i>Aquatic Weeds of the Northern Rivers Region</i>	71
11.4.1	<i>Salvinia (Salvinia molesta) - Northern Rivers Region</i>	71
11.4.2	<i>Alligator Weed (Alternanthera philoxeroides) - Northern Rivers Region</i>	72
11.5	<i>Other Significant Weeds- Northern Rivers Region</i>	73
11.5.1	<i>Environmental weeds and garden escapees</i>	73
11.5.2	<i>Non-endemic species (former plantations)</i>	75
12	<i>Summary of Northern Rivers Region Pest Program 2008-2011</i>	77
13	<i>Related Documents & Further Reading</i>	93
14	<i>Appendices</i>	95
14.1	<i>Appendix 1 - Pest Planning Approach</i>	95
14.2	<i>Appendix 2 - Linkages of Pest Management Strategies</i>	96
14.3	<i>Appendix 3 - Summary of EEC's relevant to the Northern Rivers Region</i>	97
14.4	<i>Appendix 4 - Summary of KTP's relevant to the Northern Rivers Region</i>	100
14.5	<i>Appendix 5 - Declared Noxious Weeds Classes</i>	104
14.6	<i>Appendix 6 – NRR Noxious Weeds List</i>	115

Figures

Figure 1:	<i>Northern Rivers Region</i>	9
Figure 2:	<i>Map A: Dingo Management Areas within Tweed-Lismore, Casino and Northern New England Rural Lands Protection Board, Northern NSW</i>	27

Commonly used terms and acronyms

Term	Acronym	Definition
ACEC	Animal Care and Ethics Committee	
BSC	Ballina Shire Council	
CMA	Catchment Management Authority	CMAs are regional bodies that work in partnership with farmers, local groups, Aboriginal communities, local government, industry and State Government agencies to develop the best policies and programs for natural resource management at a catchment level.
CVC	Clarence Valley Council	
DECC	Department of Environment and Climate Change	The State Government Department that brings together a range of conservation and natural resources science and programs, including native vegetation, biodiversity and environmental water recovery to provide an integrated approach to natural resource management. DECC includes the Parks and Wildlife Group, whose 'public' name is NPWS.
DoL	Department of Lands	
DoP	Department of Planning	
DPI	Department of Primary Industries	
EEC	Endangered Ecological Community	
EP&A Act	Environmental Planning and Assessment Act	
EPBC Act	Environment Protection and Biodiversity Conservation Act	
Fox TAP	Fox Threat Abatement Plan	
ILUA	Indigenous Land Use Agreement	An indigenous land use agreement "is a voluntary agreement between a native title group and others about the use and management of land and waters. An ILUA can deal with the management of an existing park or the creation of a new park.
KTP	Key Threatening Process	
MoU	Memorandum of Understanding	
NP	National Park	
NPW Act	National Parks and Wildlife Act	
NPWS	NSW National Parks and Wildlife Service	The 'public' name of Parks and Wildlife Group within DECC.
NR	Nature Reserve	
NRR	Northern Rivers Region	
NSW	New South Wales	
PaCS	Planning and Coordination Section	The Section within each Parks And Wildlife Group

		Branch responsible for planning and coordinating activities and administration across the Branch. Includes Operations, Assets, Planning, Community Programs and Business Services Units.
PAS	Priority Action Statement	The PAS provides an overview of recovery actions for all NSW threatened species, populations and ecological communities. It establishes relative priorities and timetables for carrying out recovery actions, and will establish performance indicators to monitor the progress of each species' recovery.
PMP	Pest Management Plan	
PoM	Plan of Management	
PWG	Parks and Wildlife Group	The Group within the Department of Environment and Climate Change that manages the NPWS estate.
QLD	Queensland	
QPWS	Queensland Parks and Wildlife Service	
RLPB	Rural Lands Protection Board	Statutory bodies under the Rural Lands Protection Act 1998 that deliver essential services to ratepayers and others in each district as the frontline in the management of animal health, pest animal and insect control, travelling stock reserves, stock movement, stock identification and drought relief. There are currently 47 RLPBs which cover NSW.
RPMS	Regional Pest Management Strategy	This document.
RSPCA	Royal Society for Protection of Cruelty to Animals	
RR&RP	Rainforest Restoration and Rehabilitation Plan	
RVC	Richmond Valley Council	
SCU	Southern Cross University	
SSMP	Site Specific Management Plan	
TAP	Threat Abatement Plan	Comprehensive plans to tackle the state's 'Key Threatening Processes' - from foxes and feral cats to land clearing and firewood collection. The plans outline actions to manage these threats, and explain how the actions can be put into effect.
TSC Act	Threatened Species Conservation Act	

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

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

The control of pests outside of parks is the responsibility of private landholders and other agencies such as rural lands protection boards, local councils, the Department of Primary Industries, Catchment Management Authorities (CMAs) and the Department of Lands. CMAs are regional bodies that work in partnership with farmers, local groups, Aboriginal communities, local government, industry and State Government agencies including NPWS to develop policies and programs for natural resource management at a catchment level. 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 NSW, the main pest management priorities for the conservation of biodiversity are focussed on threatened species and endangered ecological communities (EEC's), and are identified in the Threatened Species Priorities Action Statement (PAS), individual threat abatement plans (TAPs) and reserve plans of management. Pest programs are also integrated with other park management programs such as fire management.

2 Purpose of the Strategy

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

New pest species continue to establish in the environment either through the importation of new species into Australia or the escape of domestic plants and animals. Prevention and early

detection followed by eradication is the most cost-effective way to minimise the impacts of new pests. The NPWS works with other agencies to prevent the introduction of new pests into the wild and to respond rapidly when new incursions occur. The response of NSW government agencies to new pests will be coordinated through the NSW Invasive Species Plan.

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

3 Legislation and Policy

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

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, state conservation areas, historic sites and Aboriginal areas with the Director-General of the NPWS. Key management objectives include conservation, provision of appropriate scientific and educational opportunities, and management of fire and pest species. These are achieved through the preparation and implementation of plans of management for each reserve, which identify pest species present, control strategies and priorities for that reserve.

Threatened Species Conservation Act 1995

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

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 NSW. 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 NSW. 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 (refer Appendix 5 & 6).

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 the following.

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

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

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

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

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

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

Game and Feral Animal Control (Game) Act 2002

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

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*

Park Management Program and policies

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

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

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

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

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

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

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

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

A state wide 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.

Other plans

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

This Regional Pest Management Strategy satisfies several State Plan targets:

E4 Better environmental outcomes for native vegetation, biodiversity, land, rivers and coastal waterway: This Strategy contains a number of actions to help achieve priority E4, through the implementation of feral animal and weed control programs to reduce impacts on biodiversity.

P6 Increased business investment in rural and regional NSW. This Strategy contains actions that will reduce potential and actual economic impacts of pests to neighbouring enterprises.

E1 A secure and sustainable water supply for all users. This Strategy includes actions that will enhance water catchment values through the control of weeds and feral animals in catchment areas.”

Catchment Action Plans are developed by Catchment Management Authorities (CMA's). These CMA's are regional bodies that work in partnership with farmers, local groups, Aboriginal communities, local government, industry and state government agencies including NPWS to develop policies and programs for natural resource management at a catchment level

4 Regional overview

Northern Rivers Region (NRR) is located on the far north coast of NSW. The Region stretches from Clarence Valley boundary in the South, NSW/Qld border near Killarney and Maryland in the west, and to the NSW/Queensland State Border in the north. Refer to Figure 1 for a map of Northern Rivers Region area.

The NRR is centred on the Mt Warning Shield volcano. This area is the most biologically diverse region of NSW and contains the greatest number of endemic plants and animals. It has a highly complex ecology and is the core area for subtropical rainforest on the continent, and at the northern and southern axes of temperate and dry rainforest respectively. Apart from the larger forest areas, there are many tiny 'islands' of remnant rainforest (Big Scrub remnants) remaining after mass land clearing of the last two centuries.

The Region manages a total of 76 gazetted areas covering approximately 165,538 hectares, approximately 15% of the far north coast of NSW.

The Region comprises 21 national parks, 43 nature reserves, one historic site, three aboriginal areas, and one aboriginal place and two Indigenous Land Use Agreements (ILUA's). The Region covers the most biologically diverse part of NSW and 14 of the Service's parks have World Heritage Status (Gondwana Rainforests of Australia). These parks were inscribed on the World Heritage list as international recognition of their global significance. The Gondwana Rainforest Reserves include the most extensive areas of subtropical rainforests in the world, large areas of warm temperate rainforests and nearly all of the Antarctic Beech cool temperate rainforest. These parks also complement other Australian World Heritage rainforests in the Wet Tropics and the Tasmanian Wilderness.

The Region includes the local government areas of Tweed, Byron, Ballina, Lismore, Kyogle, Clarence, Richmond Valley, and Tenterfield Shires. Noxious weeds are managed by local councils in Tenterfield and Clarence Valley, and by a county council, (Far North Coast Weeds) on behalf of Tweed, Byron, Ballina, Lismore, Kyogle and Richmond Valley shires. Three Rural Lands Protection Boards operate in the area, namely Tweed-Lismore, Casino and Northern New England.

The parks of the NRR are part of the identity, spirituality, connection and resource base of the Bundjalung and Githabul Aboriginal people. The Arakwal National Park is the first national park in Australia to be created under an ILUA with the traditional owners, Byron Bay Arakwal people, as joint managers with NPWS. In 2007 over 124 ha were added to NPWS estate as part of the ILUA. The Githabul ILUA was signed in February 2007 and involves more than 112,000 ha near Mt Lindsay. The Githabul ILUA is the largest area that will be jointly managed in NSW.

4.1 Operational Overview

NPWS parks within NRR are managed by four areas: Richmond River, Tweed, Byron Coast and Kyogle. A description of these areas is provided below:

Richmond River Area

Richmond River Area encompasses the local government areas of Lismore, Ballina, Richmond Valley, some of the Byron Shire and a small amount of Clarence Valley. A total of 29 NPWS parks are managed from an Area office located at Alstonville and a works depot in the Wollongbar Industrial Estate.

The Area manages a variety of parks including the World Heritage listed Gondwana Nightcap National Park, small endangered ecological community rainforest remnants of the former largest area of subtropical rainforest 'The Big Scrub'. The Area also manages a large portion

of the coastline in covering 36km in Broadwater and Bundjalung National Parks.

Byron Coast Area

Byron Coast Area is made up of eight parks and encompasses a total area of 1417 hectares within Byron Shire (from the south of the Brunswick River to the border between Ballina and Byron Shires). Within the Byron Coast Area lies iconic sites such as Cape Byron Headland, the most easterly point on mainland Australia and the National Estate listed Cape Byron Lighthouse. The Area office and works depot are located in Byron Bay on Tallow Beach Rd adjoining Arakwal National Park.

Cape Byron State Conservation Area (SCA) is managed by the Cape Byron Headland Reserve Trust, and is directly responsible to the Director-General and the NSW Minister for the Environment. The 98 hectare SCA contains 23 vegetation communities.

Kyogle Area

Kyogle Area encompasses a total of 91981 ha, which is 61% of the total Northern Rivers Region. The Area office and works depot are located in separate premises on the Summerland Way in Kyogle, with an additional works depot in Urbenville. The Area manages 15 park areas, and covers the portion of the Northern Rivers Region. Within Kyogle Area there are three local government areas (LGA's), Kyogle, Casino and Tenterfield councils.

The Area manages large contiguous pieces of vegetation adjoining the Queensland border, including a number of World Heritage Gondwana parks such Murray Scrub in Toonumbar National Park, Border Ranges and Mallanganee National Park. Other iconic parks include Tooloom National Park containing the greatest macropod diversity in NSW.

The Area is also responsible for the Githabul ILUA covering over 112,000 ha.

Tweed Area

Tweed Area extends from the NSW QLD border to the Brunswick River. This Area manages part of the World Heritage Gondwana rainforest parks including Border Ranges National Park, Limpinwood and Numinbah Nature Reserves and is the epicentre of the Mt Warning caldera. The Area office and works depots are located in separate premises in Murwillumbah. Tweed Area encompasses 22 parks covering a total of 21217 ha, 14% of the Region. Within Tweed area there are two LGA's covering all of Tweed Shire and the northern part of Byron Shire.

4.2 Pest Management Planning

NPWS Northern Rivers Region has prided itself on the ability of the Region to plan programs. This began in the early 1990's with the development of Reserve specific 'Restoration and Rehabilitation Plans including weed control strategies'. Initially pest plant specific, these documents have developed into pest management plans including actions for both pest plant and pest animal species.

Pest specific strategies and management plans have been developed for specific sites and issues. Examples of these include the Newrybar Swamp Feral Pig Management Strategy and the draft North Coast Pandanus Planthopper Management Strategy. More recently, these strategies have been presented in a poster format similar to the NPWS Fire Management Strategies. The draft Northern Rivers Cane Toad Management Strategy and the Newrybar Swamp Feral Pig Management Strategy are examples of this style of plan.

The Region aims towards individual park and reserve pest management plans being developed, or where possible groups of parks with similar pest issues. Appendix 7 provides a summary of parks within the Region and indicates the planning status in relation to restoration

and rehabilitation plans and pest management plans.

Appendix 1 outlines the pest planning approach utilised in Northern Rivers Region. Appendix 2 outlines the linkages of pest management plans to other statutory planning documents including Park/Reserve Plans of Management and Priority Action Statements for threatened species.

4.3 Threatened Species Programs

Northern Rivers Region is the second most biodiverse region in Australia, containing great diversity of biodiversity and number of threatened species and endangered ecological communities. A description of the endangered ecological communities is summarised in Appendix 3 and KTPs is summarised in Appendix 4.

The information contained in these appendices demonstrates the complexity of vegetation communities in the Region and the state wide significance of the sites.

Given a large number of the threats to threatened species and endangered ecological communities are pest related, there are a range of species specific programs underway to enhance their habitat for both threatened plant and animal species.

Examples of threatened species programs in the Region include:

- Habitat management including weed control on Stott's Island NR for Mitchell's rainforest snail (*Thersites mitchellae*) and lowland rainforest community;
- Habitat management including fire and weed control for Eastern bristlebird (*Dasyornis brachypterus*) in Border Ranges NP;
- Habitat management including weed control for ripple-leaf muttonwood (*Myrsine richmondensis*) in Mallanganee NP
- Habitat management for the giant fern (*Angiopteris evecta*) in the Tweed Valley
- Predator control for the North Coast emu population in northern Bundjalung NP in association with pied oystercatcher protection
- Habitat management including weed control of the Fleays barred frog (*Mixophyes fleayi*) in Nightcap NP
- Habitat management of Byron Bay dwarf graminoid clay heath including weed control.

The examples given above is not a complete list of programs refer to Table 2 Summary of implementation priorities for relevant actions.

4.4 NPWS Staff Training Programs

As identified above, the NRR supports a large number of significant plant and animal species. Given the issues relating to working in and around threatened species and endangered ecological communities, and the demand for pest control works to reduce the threats to these species, it is a priority for staff involved in the management and implementation of these programs to possess the appropriate skills and qualifications. Over the last five years NPWS staff have had the opportunity to obtain skills and qualifications in Certificate II-IV in Conservation and Land Management (CLM or formally Bush Regeneration). Ongoing opportunities will be supported to provide additional training in this field.

Other training opportunities have also been provided for controls such as fox den fumigation. NRR will continue to provide opportunities for staff to attend relevant pest control training where available and within resources.



Figure 1: Northern Rivers Region

5 Pest Distribution Tables

The following pest distribution tables give an overview of priority pest species for each reserve within the Region. The data 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.

- Denotes established widespread populations throughout a park
- Denotes scattered populations throughout a park
- ⊙ Denotes isolated populations restricted to a small geographic area of a park
- Denotes not recorded within the park but known to occur in adjoining areas

Park	ha	Wild Dog	Fox	Feral Pig	Cat	Plant Hopper	Rabbit	Goat	Cane Toad	Bell Miner	Poultry	Livestock Cattle/Horse
Byron Coast												
Arakwal NP	185		●		●	○	●		●			
Broken Head NR	100		■	■	■	■			●			
Brunswick Hds sth NR	110		■		■				●		●	
Cape Byron SCA	98		■		■	●		●	●			
Cumbebin Swamp NR	40	■	■	■	■				■			
Hayters Hill NR	8	■	■		■				■			
Julian Rocks NR	2											
Tyagarah NR	871	■	■		■	■	■		●			
Ti Tree Lake AA	50											
Byron Coast Area totals		1464										

Tweed Area												
Border Ranges NP	31861	●	■		■				●	●		■
Captains Creek NR	2846	●	○		○				■	●		■
Hogarth Range NR	848	■	■		■				■	■		■
Jubullum Flat Camp AA	7											
Koreelah NP	5269	●	○		○		⊙		■	●		■
Mallanganee NP	1144	●	■		■				■	■		●
Maryland NP	2293	●		■	○		⊙					
Moore Park NR	13	■	■		■				■			■
Mount Clunie NP	1427	●	○		○		■		■			○
Mount Nothofagus NP	2175	●	○		○				■			■
North Obelisk NR	36	■	■		■							■
Richmond Range NP	15720	●	●		●				■	●		●

Park	ha	Wild Dog	Fox	Feral Pig	Cat	Plant Hopper	Rabbit	Goat	Cane Toad	Bell Miner	Poultry	Livestock Cattle/Horse
Tooom NP	4377	●	○		○				■	●		■
Toonumbar NP	14958	●	■		■				■	●		■
Toonumbar SCA	127	●	■		■				■	●		●
Yabbra NP	8889	●	●		●				■	●		■
Kyogle Area totals	91988											

Richmond River Area												
A.J. Big Scrub NR	21	●	●		■							
Ballina NR	665	■	■	●	■				■			
Boatharbour NR	27	■	■		■				●		●	
Broadwater NP	4055	■	●	■	■	■			■			
Bundjalung NP	14325	●	●	●	●	■			■			■
Bundjalung SCA	4867	●	●	●	●				■			■
Bungabbee NR	172	●	●		●				●	■		●
Bungawalbin NP	3722	●	●	●	●				■			●
Bungawalbin NR	464	●	●	●	●				■			●
Bungawalbin SCA	1838	●	●	●	●				■			●
Davis Scrub NR	15	■	■		■				■			■
Goonengerry NP	442	●	●		●				●			■
Jackywalbin SCA (Goonggawiyen)	649	●	■	■	●				●			■
Lennox Head AA	1		■						●			
Little Pimlico Island NR	6		■						■			
Mucklewee Mountain NR	355	●	●						●	■		●
Nightcap NP	8029	●	●						●			■
Dubay Jargum Nurahm AA	5	■	●		●				●			
Richmond River NR	252	■	●		●	■			●			■
Snows Gully NR	35	■	■		■	■			■			■
Tabbimoble Swamp NR	1074	●	●	●	●				■			■
Tuckean NR	1032	■	■		■				■	■		●
Tucki Tucki NR	5	■	■		■				■			■
Uralba NR	155	■	●		■				■			■
Victoria Park NR	17	■	●		■		■		■			

Park	ha	Wild Dog	Fox	Feral Pig	Cat	Plant Hopper	Rabbit	Goat	Cane Toad	Bell Miner	Poultry	Livestock Cattle/Horse
Whian Whian SCA	2439	●	●		●				■			
Wilson NR	27	■	●		●		●		●			■
Yarringully NR	287	●	●		●		●		●			
Yarringully SCA	162	●	●		●		●		●			
Richmond River Area totals 45143												

Tweed Area												
		○	○		○	■	⊙		●			
Billinudgel NR	738	○	○		○	■	⊙		●			
Brunswick Heads NR north	101		○		○	■			○			
Cook Island NP	5					■						
Couchy Creek NR	217		⊙									
Cudgen NR	743		○			■	⊙		○			
Cudgera Creek NR	62	⊙	○						○			
Duroby NR	31		○						⊙			
Hattons Bluff NR	18	○	○		○			⊙	○			
Inner Pocket NR	234	○	○		○				○			
Limpinwood NR	2862	○	○		⊙				⊙			
Marshalls Creek NR	113		○		○	■			○			
Mebbin NP	3804	●	○		○				○	■		⊙
Mooball NP	1164		○						●			⊙
Mount Jerusalem NP	5161	○	○		○				○			
Mount Nullum NR	99	○	○		○				○			
Mount Warning NP	2608	○	○		○				○			
Numinbah NR	893	○	○									
Stotts Island NR	153								○			
Tweed Estuary NR	64								⊙			
Tweed Heads HS	8		○						⊙			
Ukerebagh NR	120		○						⊙			
Wollumbin NP	1662	○	○		○				○			
Wollumbin SCA	368	○	○		○				○			
Wooyung NR	87		○		○	■			○			
Tweed Area totals 21315												

6 Pest Management Objectives

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

Programs also aim to:

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

7 Pest Management Principles

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

Priority is given to mitigating the impacts on biodiversity of a pest that has cultural significance, whilst minimising impacts on cultural values.

The aim of most pest control programs is to minimise the adverse impacts of pests, as many exotic pests are already widespread (eg. foxes, blackberries) and for these species eradication is not possible.

The focus of control programs is directed towards the values to be protected, because killing pests, by itself, does not necessarily minimise their impacts due to the fact that ecological processes are complex and can be affected by a range of factors.

- Risk assessments are undertaken prior to pest control, where required.
- Pest management strives to strike a balance between cost efficiency, target specificity and animal welfare.
- Where appropriate, pest control employs a combination of control methods and strategies (integrated pest management).
- Pest control programs take a holistic approach, given that the control of one pest may benefit other pests, in that they attempt to control all significant pest threats at a site.

Pesticide use complies with relevant legislation and is employed in a manner that minimises

impacts on the environment.

- Pest management programs are often integrated with other land management activities such as fire management and recreation management.
- Monitoring is being implemented, at varying levels, to demonstrate and improve the ongoing effectiveness of control programs.

The distribution and abundance of pests may be influenced by fire regimes. The frequency, severity and season of planned and unplanned fires may provide opportunities for enhanced pest control (eg capitalise on weeds killed by fire) or require additional control measures (eg respond to significant weed regeneration).

8 Pest Program Priorities

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

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

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

Critical Priority

1. Programs targeting pests 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 South Ballina priority site for pied oystercatcher protection as identified in the NSW Fox Threat Abatement Plan;
2. Programs that target pests which impact significantly on human health or are part of a declared national emergency eg. outbreak of foot and mouth disease or control of feral pigs in the catchment area of a domestic water supply reservoir;
3. Programs targeting pests that impact significantly on agricultural production eg. wild dog control where there is potential for significant stock losses as identified in Wild Dog Management Plans; programs to control State Prohibited or Regionally Prohibited Noxious Weeds (Control Class 1 and 2 weeds);
4. Programs addressing new occurrences of highly invasive pest species with potential for significant impacts on park values (subject to risk/feasibility assessment) eg. control of serrated tussock in an area previously free of the weed;

High Priority

5. Programs that target pests (other than those covered in priorities above) that impact significantly on Gondwana World Heritage or international heritage values, eg. control of cane toads impacting on World Heritage values of Border Ranges NP;
6. Programs targeting pests that impact significantly on important cultural heritage values eg. control of foxes where they are impacting on values of an Aboriginal burial site through site excavation and denning;

Medium Priority

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

Lower Priority

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

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

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. This is consistent with the key objectives for invasive species in the NSW Biodiversity and Climate Change Adaptation Framework. NPWS is supporting research to understand the interaction between climate change, pests and biodiversity.

Section 12 summarises NRR pest program priorities for 2008 – 2011.

Climate Change

Climate change has been listed as a KTP 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 CO₂, 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 existing pest and weed management programs to increase the ability of native flora and fauna to cope with future climatic disturbances.

9 Pest Program Recording and Monitoring

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

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

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

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

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

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

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

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

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

In Northern Rivers Region standardised data record sheets have been developed for the recording of pandanus planthopper, 1080 wild dog and fox baiting, and cane toad surveys. This data is captured using personal data assistants, ie IPAC, and relevant software, ie, Arcpad forms, so that the information can be downloaded directly into the Arcview GIS (Geographic Information Systems) system.

All pesticide use is identified and recorded on an 'intended pesticide use notification' form by both staff and contractors to communicate the intended use of a pesticide on park. Staff and contractors are also required to complete the 'daily chemical records' sheet for all weed and insecticide use, and baiting sheets for other pesticide use in accordance with the Pesticides Act.

A statewide strategy for monitoring NSW natural resources has been adopted by the State Government. The NSW Natural Resources Monitoring, Evaluation and Reporting (MER) Strategy seeks to measure long-term trends in natural resources in NSW and the effectiveness of specific management actions to sustain them. It is based on 13 statewide targets which define broadly the natural resources of interest including a specific target for invasive species (weeds and pest animals). By 2015 there is a reduction in the impact of invasive species (New South Wales State Plan: Priority E4 - Better environmental outcomes for native vegetation, biodiversity, land, rivers and coastal waterways). To assess progress towards this target, three indicators have been developed for invasive species:

- Number of new invasive species established (all new species whose impacts are likely to be significant)
- Distribution and abundance of emerging invasive species (selected species only).
- Success of control programs for widespread invasive species (selected species only) as measured by a reduction in impacts (e.g. a reduction in the impacts of foxes on biodiversity).

DECC has committed to providing information for the third indicator. This commitment is currently limited to biodiversity responses to fox control and bitou bush control at priority sites identified in the respective threat abatement plans (TAPs). Monitoring protocols for both TAPs have been developed and these will be used to guide the collection and analysis of data for these species. In the future, reporting on other pests may be provided if additional resources become available.

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. 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.

Regional staff are working with the Aboriginal communities particularly in the Arakwal and Githabul ILUA's areas and the broader community on a range of issues including pest management. Examples of projects include the preparation of pest management plans for Arakwal National Park and weed control at Jumbullum Flat Camp. Members of the Githabul Aboriginal community have also undertaken training in Certificate II in Conservation and Land Management (CLM) to gain skills in weed identification and control techniques for bushland regeneration projects.

Northern Rivers Region staff work with the Aboriginal community to prepare pest plans and seek support for the implementation of pest control works. Examples include weed control with Minjungbal at the Tweed Heads Historic site and Bandgalang with pied oystercatcher protection.

At a regional level, Northern Rivers Region staff participates in a number of coordinated pest programs with various land managers and stakeholders. Some programs involve attending and reporting at various committee/working group meetings such as the Newrybar Swamp Feral Pig Committee.

At a landscape level given the proximity of the Northern Rivers Region to Queensland, staff participation in cross border meetings with interstate counterparts to ensure integrated management of issues including pests. The NPWS/QPWS cross border committee and the South East Queensland Pest forum are examples of these.

In northern NSW focus committee's have evolved to establish coordination of pest management across regions and tenures. An example of these is the North Eastern Pest Animal Advisory Committee and North Coast Weeds Advisory Committee.

A summary of local committees and cross regional meetings attended by Regional staff is summarised below.

10.1 Githabul Indigenous Land Use Agreement

In February 2007 the Githabul People and the NSW Government signed an ILUA over approximately 110,000 hectares of public land in the Kyogle, Woodenbong and Tenterfield area. The ILUA incorporates nine national parks and thirteen state forests and allows for the creation of a number of jobs and opportunities for Githabul People.

The Githabul ILUA is the largest in New South Wales. Key to implementation of the ILUA will be establishment of the Githabul National Parks Management Committee on which Githabul People will hold a majority. The purpose of the Committee will be to make recommendations to the Director General of DECC about the management of the national parks incorporated

within the ILUA and advise on preparation of draft plans of management for approval by the Minister.

NPWS and the Northern Rivers CMA have supported the development of skills of the Githabul traditional owners through the provision of training in bush regeneration to manage weed issues in the local areas within the ILUA.

10.2 Arakwal Indigenous Land Use Agreement

Building on the previous agreement signed in 2001, the second and third stage of the Arakwal ILUA added over 124 hectares to national parks including Arakwal National Park, Cumbebin Swamp Nature Reserve and Broken Head Nature Reserve. A new 50 hectare area, Ti Tree Lake Aboriginal Area, was also approved under a separate ILUA with a special advisory committee of Bundjalung women.

NPWS staff will continue pest control, primarily weed control in these areas in accordance with local pest plans and the Arakwal traditional owners.

10.3 Memorandum of Understanding in relation to the cooperative cross border management of national parks and other reserves in New South Wales and Queensland

The NSW and Qld border forms a boundary between a number of national parks and other protected areas. The Qld and NSW governments have agreed to a Memorandum of Understanding (MoU) between QPWS and NPWS regarding complimentary management of adjoining parks including wilderness areas and the World Heritage Gondwana Rainforests of Australia areas.

In particular the MOU applies to the following parks:

In Queensland: Mount Barney National Park; Springbrook National Park; Lamington National Park; Main Range National Park; Girraween National Park; Culgoa Floodplain National Park; and Mount Chinghee National Park.

In New South Wales: Numinbah Nature Reserve; Limpinwood Nature Reserve; Border Ranges National Park; Mount Nothofagus National Park; Mount Clunie National Park; Koreelah National Park; Bald Rock National Park; and Culgoa National Park.

The vision is of agencies working in partnership to achieve excellence in conservation and sustainable use of natural and cultural values through an active program of cross border co-operation.

The MoU and Operational Agreement provides that the agencies will exchange information, ideas and expertise relevant to the protection of the areas special values. The agencies will also undertake joint actions and management operations related to management, conservation and protection of the areas values as outlined in the cooperative works program as well as on an as needs basis control of introduced plants and animals. Under the MoU each agency meets at least annually to facilitate development, coordination and implementation of cooperative management programs.

10.4 Department of Defence

A MoU between the Department of Defence and NPWS is currently being finalised between the two departments.

The purpose of the Agreement is to provide for a shared understanding and agreement between the departments on co-operative environmental management of EVDAWR in order to:

- a. Facilitate a consistent and effective approach to the environmental management of EVDRAW; and,
- b. Facilitate consideration of shared obligations to protect the environment and for Defence to enhance the capability of the Australian Defence Force, including but not limited to financial and other resources as practicable; and
- c. Facilitate the functions of NPWS, and the interests of other New South Wales departments, which NPWS represents through this Management Agreement.

10.5 Southern Cross University

A MoU between Southern Cross University (SCU) and NRR recognises and aims to promote mutual co-operation between SCU and the NPWS by encouraging and facilitating both collaboration on academic and research activities, and student and staff experiences.

The interaction and co-operation of the two groups has developed over more than a decade and has changed in character commensurate with the changing structure of each institution. The activities include ecological research, inventory of the regions' cultural, physical and biological resources, visitor use, together with education and management.

Students are provided with a list of research projects potentially relevant to integrated and post graduate studies. Many of these projects are pest related. Some of the past projects students have worked on include:

- A baseline road survey assessment of the distribution of the cane toad (*Bufo marinus*) in northern NSW.
- The trial of traps as a control method for cane toads in the NRR.
- The cane toad and community awareness in the Border Ranges National Park.

For a number of years NRR has also provided work opportunities for SCU students as part of an Industrial Work Placement Intern Program. SCU students are placed for approximately eight weeks in the Industrial Work Placement Intern Program. As part of the intern program students have worked on a range of projects including projects directly related to pest management such as: pandanus planthopper survey and monitoring; preparation of conservation risk assessments for wild dog control and cane toad management; and pied oystercatcher monitoring.

These collaborative programs benefit both parties. It provides students with hands on experience and also provides NPWS with research and planning resources.

10.6 North Eastern Pest Animal Advisory Committee (NEPAAC)

This cooperative management committee discusses primarily vertebrate pest issues across an area from the NSW/Qld border to Grafton including the north eastern part of the northern tablelands covering the Tweed-Lismore, Casino, Northern New England (Tenterfield and Glen Innes) and Grafton Rural Lands Protection Boards. Members include the RLPB Pest Animal Rangers/and or Board member, NSW DPI (Agriculture and Forests NSW), Dept of Lands, RSPCA, Game Council of NSW, and NPWS (North Coast, Northern Rivers and Northern Tablelands Regions). The Committee meets quarterly to discuss and review a range of pest programs, issues and their status, including new and emerging pests.

10.7 North Coast Weeds Advisory Committee (NCWAC)

This committee originally formed in 1990 with a focus on a specific weed (primarily giant Parramatta grass). Coordinating bodies such as these are required in the State to assist and facilitate the prioritisation of weed control programs and the dissemination of funding from

NSW DPI. This committee also assists the NRCMA with the implementation of key weed programs throughout the Region. The committee covers an area from Nambucca Shire in the south to the NSW Qld border in the north and includes Bellingen, Coffs Harbour, Clarence Valley and Tenterfield Shire Councils as well as the County Council known as Far North Coast Weeds (Richmond Valley, Ballina, Kyogle, Lismore, Tweed, Byron Shires). Other representatives include DPI (Agriculture & Forests NSW), DECC (including NPWS & EPA), Northern Rivers Landcare Association network, Rural Lands Protection Board, Country Energy, NSW Dept of Lands, Qld Dept of Primary Industries, North Coast Environment Council, NSW Nursery Industry Association and Northern Rivers CMA.

10.8 South East Queensland Pest Advisory Forum (SEQPAF)

The South East Qld Pest Advisory Forum (SEQPAF) provides a forum for pest related issues to be identified and advice given to the Land Protection Council - LPC (as created by the Land Protection (Pest and Stock Route Management) Act 2002) which is an advisory body to the Minister. The SEQ pest forum is similar to the NSW NEPAAC and NCWAC combined dealing with weeds and vertebrate pest issues. The Committee covers a large operational area from the far north QLD to the NSW/Qld border in the south covering 38 local government areas (prior to recent amalgamations). Representation is from various constituents including local councils, pest and weed contractors, and regional natural resource management bodies ie SEQ Catchments, Qld Dept of Primary Industries, Land Protection Officers, Biosecurity Queensland, Environmental Protection Agency including the Qld Parks and Wildlife Service. The meetings are hosted by local councils and administered by Biosecurity Queensland (formerly the Dept of Natural Resources and Water) in various locations around the south east of the State.

10.9 Newrybar Swamp Feral Pig Management Committee

This Committee coordinates the management of feral pig control across the various land tenures in the Newrybar Swamp involving private landholders, Ballina Shire Council, Tweed-Lismore Rural Lands Protection Board, RSPCA, Ballina Police and NPWS. The Committee meets quarterly (or as required) to report on feral pig activity and control efforts (including numbers of pigs destroyed) in accordance with the Newrybar Swamp Feral Pig Management Strategy. Funding has been received from the Northern Rivers CMA to implement actions from the strategy.

10.10 Pandanus Planthopper Working Group

The Working Group established soon after the detection of pandanus planthopper (*Jamella australiae*) in the Tweed Shire in 2004, in an effort to gain coordinated management of the pest including survey and control. The working group involves Tweed, Byron, Ballina, Richmond Valley and Clarence Valley Councils, Dept of Lands, Dept of Primary Industries and NPWS and has drafted a management strategy. The working group is chaired by local government and meets quarterly to discuss the status of the pest and control requirements. The Northern Rivers CMA has provided funding for the pest in the project area to assist the coordinated management and control of the pest.

10.11 Pied Oystercatcher Management Committee

This Committee oversees the implementation (by contract) of the annual Pied Oystercatcher Protection Program (primarily fox control and POC monitoring, in accordance with the NSW Fox TAP) amongst the various land tenures of Dept of Lands, Dept of Defence (Evans Head Air Weapons Range) and NRR. Representation is comprised of Ballina Shire and Richmond Valley Councils, Tweed – Lismore RLPB, Dept of Lands, RSPCA, landholder representative,

contractor and NPWS staff. It is operational for the period of the breeding season commencing in August through to January each year. Meetings are held monthly to report on the progress and status of the project to the relevant land managers and stakeholders.

10.12 Pied Oystercatcher Interagency Working Group

Ballina Shire Council has chaired this working group in response to the increasing need for cooperation regarding the management of threatened species predominantly pied oystercatchers and increasing development pressures. Further development in the coastal zone has the ability to prevent the fox control program in the South Ballina area continuing due to the inability to meet distance restrictions for the use of 1080. The approval of the Threatened Species (pied oystercatcher) Management Strategy (by Dept of Lands) outlined recommended actions for relevant land managers and stakeholders to implement. Members include Dept of Lands, Ballina Council, Dept of Planning and NPWS.

10.13 Bell Miner Associated Dieback Working Group (BMAD)

The working group was formed in 2001 following community concern relating to the impact of Bell Miner Associated Dieback (BMAD) affecting large areas of sclerophyll forests in the Kyogle Area. The condition which occurs across all tenures has significant impacts on forest values particularly natural and economic values. The condition is often associated with serious weed invasion as forest health declines. The working group is represented by the following stakeholders: DPI Forest NSW, North East Forest Alliance, Nature Conservation Council, Landcare, landholder representative, NSW Apiarists, private timber industry, and DECC (NPWS & CCEPD). The primary focus of the group is to implement the Bell Miner Associated Dieback Strategy (2004), and coordinate management actions including research and adaptive management trials. The committee is administered by DECC and meets monthly.

10.14 Tweed Bitou Bush Management Committee

The Tweed Bitou Bush Management Committee co-ordinates the control of bitou bush within Tweed Shire. Control of bitou bush involves aerial spraying and on-ground works within the northern containment zone. The committee comprises representation from Tweed Shire Council, Far North Coast Weeds, DECC and community representatives.

10.15 Discovery Ranger Program

The Region supports a permanent part-time Discovery Ranger coordinator and casual Discovery Rangers who delivery a range of school education and holiday programs. A number of the programs are pest related including the delivery of the *“Trap that Toad”* cane toad and *“Mitch the Rainforest Snail”* education kits to both schools and events such as the Big Scrub Rainforest Day held annually at Rocky Creek Dam. Other pest related programs include feral pig awareness and Pied Oystercatcher Protection.

10.16 Border Ranges Biodiversity Hotspot Project

This project was an initiative of the Northern Rivers CMA and DECC funded by the federal governments Natural Heritage Trust, for the development of a multi-species recovery plan and the implementation of key management actions for the far north coast of NSW and South East Qld. The project has identified key threatened and endangered species and threats that require management in the project area. Pest management is an integral part of this project given the biodiversity of species of native species in the Region. A number of actions to protect and conserve species relate to the mitigation of pest species.

10.17 Darling Downs-Moreton Rabbit Board

The Darling Downs-Moreton Rabbit Board is responsible for the maintenance of the rabbit

fence along the NSW/QLD border. A Memorandum of Understanding is currently being developed to allow staff of the Darling Downs - Moreton Rabbit Fence to undertake their management activities on DECC estate. The rabbit fence runs along the NSW-QLD state border which forms the boundaries of four NSW national parks. These include Border Ranges, Mt Clunie, Koreelah and Maryland national parks. These national parks include wilderness areas and the World Heritage Gondwana Rainforests of Australia.

The vision is of agencies working in partnership to achieve excellence in conservation and sustainable use of natural and cultural values and to prevent the incursion of rabbits into the Darling Downs-Moreton Rabbit Board operational area and into south east Queensland through an active program of cross border co-operation.

10.18 Other local groups including Landcare

Regional staff also contribute to local volunteer groups working on and adjoining parks in varying capacities. Examples of groups include the Belongil Bird Buddies in Byron Bay, Upper Wilson's Creek Landcare, Black Rocks Dunecare, Whian Whian Landcare, Couchy Creek Landcare Tweed Bird Observers, Friends of Cape Byron and Friends of Cudgen Nature Reserve.

11 Pest Program Overviews

11.1 Vertebrate Pests in the Northern Rivers Region

11.1.1 Wild Dogs (*Canis lupus familiaris* and *C. l. dingo*) in the Northern Rivers Region

Distribution and abundance

Populations of wild dogs (including dingoes) occur mainly along the Great Dividing Range, coastal hinterlands, and in north-western NSW. Wild dogs are a declared pest under the *Rural Lands Protection Act 1998*. Dingo conservation areas have been identified for NRs/NPs within the Region, known as Schedule 2 Areas under the RLP Act. Figure 2 identifies the Schedule 2 areas (national parks, nature reserves and state conservation areas) in Northern Rivers Region.

Wild dog distribution in the NRR has been identified and is cooperatively managed by Tweed-Lismore RLPB, Casino RLPB and the Legume/Koreelah Wild Dog Association within the New England RLPB.

Wild dogs are known to occur throughout the north-eastern portion of the Northern New England RLPB area. The abundance of wild dogs is greatest surrounding residential areas such as Old Koreelah and Legume and in areas adjoining forested lands. Concentrations of wild dogs are known to occur around Mount Clunie, New and Old Koreelah, Captains Creek and Acacia Plateau. Koreelah Range and Koreelah national parks (part of the Great Dividing Range) adjoin forested lands in Queensland providing corridors for the movement of wild dogs from one area to another.

Wild dog distribution throughout the Casino RLPB area is greatest surrounding town centres including Casino, Urbenville, Woodenbong and Kyogle and in areas adjoining forested lands. Concentrations of wild dogs are known to occur around Upper and Lower Duck Creek, Haystack and Urbenville. The existence of three forested ranges adjoining parks in Queensland provides corridors for the movement of wild dogs from one area to another.

Throughout the Tweed-Lismore RLPB area the abundance of wild dogs is greatest surrounding the town centres of Tweed Heads, Murwillumbah, Mullumbimby, Nimbin, Ballina and Lismore and in areas adjoining forested lands.

Concentrations of wild dogs are known to occur in Tyalgum/Brays Creek, Piggabeen, Minjinbil, Doon Doon, Koonyum Range, Blue Knob, Georgica and Jiggi areas.

Reports are common of uncontrolled domestic dogs in urban parks, such as Cudgen, Billinudgel, Tyagarah and Broken Head nature reserves. Roaming domestic dogs are often reported as being responsible for death and injury to native wildlife, particularly koalas.

Impacts

Wild dogs have a number of environmental impacts including:

- predation on native fauna
- vectors for disease that affects native fauna;
- cause of significant economic impact to rural landholders by killing livestock such as sheep and cattle; and
- hybridisation with dingoes.

The control of wild dogs and dingoes is more difficult than the control of other feral animals because of the need to conserve dingoes in core areas of crown lands. Although the dingo is unprotected under Schedule 11 of the *National Parks and Wildlife Act 1974*, it is a native

animal and there is an expectation that it will be conserved in NSW.

Priorities for control

There are three wild dog management plans prepared by RLPB boards in co-operation with the NPWS for areas within the NRR. These include Tweed Lismore, Casino and northern New England RLPB's. Priority areas for control are identified in each of the above mentioned plans including sites on private lands, state forest and parks.

Some of the priority areas include:

- Richmond Range, Yabbra, Tooloom and Maryland national parks (Kyogle Area);
- Nightcap, Goonengerry and Bundjalung national parks and Whian Whian State Conservation Area (Richmond River Area);
- Mebbin and Mt Jerusalem national parks and Mt Nullum Nature Reserve (Tweed Area).

These plans will be reviewed every 5 years and priorities may change during or after this time. For example Bungabbee and Muckleewee Mountain nature reserves (new additions - formerly state forests) are not acknowledged in the Casino WDM Plan, however wild-dog control is undertaken in these areas.

Wild dogs (including dingoes) may also be controlled in some areas to reduce the impacts on threatened species such as the shorebird and emu protection in northern Bundjalung NP, and quoll protection in Maryland NP.

Management of dingoes in visitor areas promotes visitor safety and the conservation of dingoes. Dingo management has adopted a risk management approach, whereby the likelihood and consequence of dingo-human interactions are evaluated. Control strategies to lessen the risk are then implemented. It is acknowledged that not all dingo-human risks can be controlled and visitors must be informed of the risks. A Risk Treatment Plan will be developed detailing risk assessments and control strategies where necessary.

Control

Strategic and reactive wild dog control programs will be undertaken in accordance with the relevant wild dog management plans for each board area. The methodology for a wild dog program being:

1. Determine the presence/absence of wild dogs by using sand pad transects in areas thought to be inhabited and monitoring these for three consecutive days. If presence has been established:
2. Conduct 1080 baiting in the identified area by establishing bait stations and monitoring these once a week for a period of three weeks (or longer if required).
3. Reassess the presence/absence of wild dogs in the identified area post baiting by re-establishing sand pad transects and monitoring for three days consecutively.
4. Repeat steps in spring and autumn of each year.

Control of wild dogs in Schedule 2 areas will focus on the interface and boundary of parks with neighbouring properties, to target wild dogs and to minimise hybridisation with dingoes in core areas of the areas.

All baiting is done using 250g dried meat baits prepared in accordance with the *Pesticide Control (1080 Dog Bait) Order 2002*.

If particular issues continue shooting and/or trapping of wild dogs may be undertaken by an authorised officer or approved NPWS contractor in accordance with an approved Shooting Operations Plan.

Monitoring - Wild Dogs

Monitoring of presence/absence is undertaken using the sand padding technique. Control programs are initiated when presence of dogs is recorded in areas where wild dog issues have been identified. Post baiting monitoring is also required using the sand padding technique. This technique allows for the evaluation of baiting success. Ongoing liaison with neighbours and the Tweed Lismore, Northern New England and Casino RLPB's may also inform NPWS as to the distribution of wild dogs throughout the NRR.

All data will be collected using standard monitoring forms (using IPACs where possible) and uploaded into Arc View.

Monitoring - Dingoes

In the event that a Risk Treatment Plan is required, then the monitoring will involve three levels - preventative, reactive and research.

Preventative monitoring consists of:

- Colour ear-tagging dingoes frequenting camping areas,
- Recording negative dingo-human interactions,
- Sand plot monitoring of the relative abundance of dingoes,
- Development of a Risk Treatment Plan, and
- Dingo aware signage and pamphlets for visitors.

Reactive monitoring includes:

- Evaluating individual dingo risk and
- Hazing.

Research includes:

- Home range and movement patterns,
- Social relationships within the pack, and
- DNA collection and analysis.

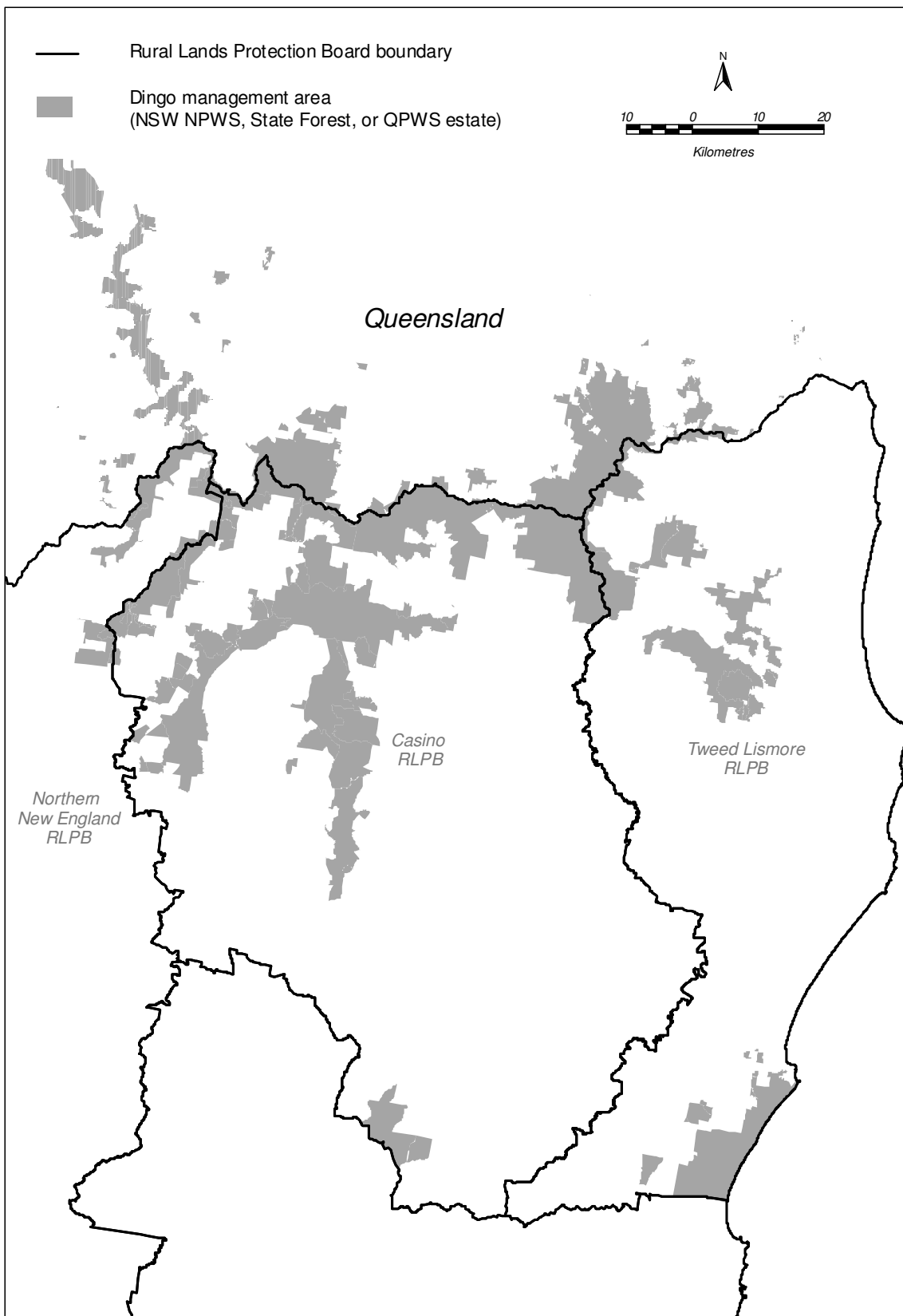


Figure 2: Map A: Dingo Management Areas within Tweed-Lismore, Casino and Northern New England Rural Lands Protection Board, Northern NSW

11.1.2 Feral Cat (*Felis catus*) in the Northern Rivers Region

Distribution and abundance

Cats have been present in Australia at least since European settlement, and may have arrived as early as the 17th century. Feral cats are now found throughout Australia. There are estimated to be 400,000 feral cats in NSW and around 12 million across Australia. Feral cats are solitary and predominantly nocturnal. Studies in western NSW have shown that males usually occupy a home range of 280 hectares, while females had smaller ranges of about 150 hectares but this may be larger if food supplies are scarce. They are less common in closed forests, preferring open, drier habitats such as grasslands. Although no specific systematic surveys have been undertaken for feral cats in the NRR, they have been recorded during sand padding surveys undertaken for Fox TAP and wild dog control programs. It is believed that feral cats are present to varying degrees in all parks; particularly near urban and rural areas. Feral cats have been recorded in Nightcap, Yabbra and Mebbin national parks and various other parks. It is also possible that roaming domestic cats rather than feral cats are observed in parks that adjoin private property and are located in close proximity to urban areas.

Impacts

Feral cats are carnivores and can survive with limited access to water. They generally eat small mammals, but also catch birds, reptiles, amphibians, fish and insects, taking prey up to the size of a brush-tail possum. There is clear evidence that feral cats have had a significant impact on island fauna. On the mainland, they contributed to the extinction of many small to medium sized mammals and ground-nesting birds; particularly in the arid zone. In some instances, feral cats have directly threatened the success of recovery programs for endangered species. Threatened species recorded in NRR that are known to be predated on by feral cats include Hastings River mouse (*Pseudomys oralis*) ground parrots (*Pezoporus wallicus*) and grass owls (*Tyto capensis*). Feral cats also carry infectious diseases such as toxoplasmosis and sarcosporidiosis, which can be transmitted to native animals, domestic livestock and humans.

Predation by feral cats is listed as a KTP under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) and the *NSW Threatened Species Conservation Act* (TSC Act). The *Threat Abatement Plan for Predation by Feral Cats* has been produced under the EPBC Act and is currently being produced under the TSC Act.

Priorities for control

A number of control techniques and a list of high priority locations for control are currently being compiled as part of the production of the NSW Threat Abatement Plan for predation by feral cats. NRR will continue to implement strategic control as part of integrated pest management programs such as Fox TAP and wild dog control as part of threatened species management. NRR will continue to support research into feral cat control and utilise any appropriate new control techniques where possible.

Control

Control of feral cats is problematic as they are hard to trap, do not readily take baits unless during periods of food shortage, and generally difficult to shoot as they avoid human contact. Even if feral cats are removed from an area, it is quickly recolonised (Dept. Environment and Heritage, 2004). Registration of the vertebrate pesticide sodium fluoroacetate (1080) is currently being sought for the control of feral cats where conditions for its use are suitable. Audible recorded lures for feral cats and other predators are available through a number of sources. Night shooting is assisted by the cat's distinctive, green eyeshine. Rubber-jawed, leg-hold traps can be laid in the same manner as they are laid for wild dogs and foxes. Cats can also be trapped in wire 'treadle-type' box traps although this method is most practical for semi-feral urban cats (Qld Natural Resources, 2006).

Roaming domestic cats will be managed by NPWS staff by encouraging neighbours to adequately control their domestic pets and prevent their straying onto NPWS parks.

Monitoring

Sand pads across forest tracks can provide some indication of feral cat numbers in remote locations and will continue to be recorded as part of the implementation of the Fox Threat Abatement Plan and regional wild dog control programs. This data will be collated and mapped in ArcView. A coordinated and standardised reporting system will be developed as part of the implementation of the Threat Abatement Plan for predation of feral cats.

11.1.3 European Red Fox (*Vulpes vulpes*) in the Northern Rivers Region

Distribution and abundance

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

Foxes occur throughout the Northern Rivers Region, in both urban areas and bushland parks.

Impacts

The introduction of foxes into Australia has had a devastating impact on native fauna, particularly among medium-sized (450-5000 g) ground-dwelling and semi-arboreal mammals, ground-nesting birds and freshwater turtles. Recent studies have shown that predation by foxes continues to suppress remnant populations of many such species. Foxes have also caused the failure of several attempts to reintroduce native fauna into areas of their former range. Predation by foxes was the first KTP to be listed under the NSW Threatened Species Conservation Act. Foxes are also significant predators of domestic stock including lambs and poultry; predation by foxes has the potential to reduce lambing rates significantly.

Northern Rivers Region is the second most biodiverse region in Australia, given this there are likely to be many impacts of foxes to the local area. Examples of threatened species most likely to be impacted include common planigale, red-legged pademelon, long-nosed potaroos, Hastings River mouse and bush and beach stone curlew.

There are no major agricultural impacts of foxes in NRR, however there are group baiting programs coordinated by the RLPB for general wildlife conservation purposes, and cattle producers to reduce spread of disease such as leptosporosis from foxes and wild dogs to livestock.

Priorities for control

There are a number of priority sites in NRR listed in the NSW Fox Threat Abatement Plan including pied oystercatchers (Richmond River Area) and rufous bettong (Kyogle Area). There are three priority NPWS areas for pied oystercatcher (POC) Protection Richmond River Nature Reserve, Broadwater and Bundjalung national park, and the adjoining South Ballina Crown Land managed by Dept of Lands. Dubay Jarjum Nurahm Aboriginal Area is also integral given the proximity to the POC nesting areas and the presence of foxes on the site.

Rufous bettong have been identified as a priority species for a number of parks in the Region particularly in the Kyogle Area, however foxes were not identified in reasonable numbers in most areas to warrant baiting. Yabbra National Park and the adjoining Yabbra State Forest continue to be baited. Private lands in the adjoining areas are also being targeted through funding provided by the Northern Rivers CMA.

There are other areas within the Region particularly adjoining urban areas where the community would like to see the control of foxes. Given current restrictions (distance restrictions) there are reasonable limits on the ability to undertake cost effective and efficient control of foxes in these areas, however it may be possible for targeted fox den fumigation to be implemented. Examples of such areas include Arakwal National Park and Brunswick Heads Nature Reserve.

Control

Under the plan, intensive broad-area 1080 baiting is being undertaken within Yabbra National Park and Yabbra State Forest for rufous bettong protection. Baiting is undertaken between March and October each year at three weekly intervals using Fox Off® and complemented by

a 10 day dry meat bait run once in the season.

Fox control to protect pied oystercatchers is undertaken as a combination of:

- Weekly 1080 baiting in July as a pre-breeding measure.
- 2-3 times per week 1080 baiting from August till December (prior to Christmas), or till fledging and/or as resources permit.
- Den fumigation August –October (or as identified when active).

Other fox control programs may be implemented as required and include 1080 baiting and den fumigation.

If particular issues (such as rogue or bait shy animals) persist, shooting and/or trapping of foxes may be undertaken by an authorised officer or approved NPWS contractor in accordance with an approved Shooting Operations Plan.

Monitoring

The impact of fox predation on pied oystercatchers and rufous bettong and the effectiveness of the control program are being assessed through long-term monitoring of priority species and fox populations.

Pied oystercatchers are monitored during the breeding season from August to January by counting:

1. the number of pied oystercatcher breeding territories (pairs) established at each of the identified locations (including GPS locations);
2. the number of clutches (of eggs) laid by each breeding pair during the project period including eggs lost, addled or re-laid;
3. the number of clutches hatched (at least one egg) by each breeding pair;
4. the number of chicks/runners raised by each breeding pair and monitor their progress;
5. the number of young fledged.

Foxes at the shorebirds sites are monitored 2-3 times per week concurrently with the shorebird monitoring, or as resources permit. The standard shorebird monitoring form is completed at the end of the breeding season and is analysed by the Pest Management Unit.

The rufous bettong monitoring consists of annual monitoring via cage trapping. Foxes are monitored by biannual binary counts of foxes on sand pads. Similarly data is analysed by the Pest Management Unit and published periodically as part of the review of the Fox Threat Abatement Plan.

Monitoring of other fox control programs will be undertaken as required using standardised techniques.

11.1.4 Cane Toad (*Bufo marinus*) in the Northern Rivers Region

Distribution and abundance

Cane toads are restricted to the northern region of NSW, with well-established colonies occurring in the Tweed River Valley and Lismore area. Their range extends along the coast as far south as Yamba, with isolated colonies around Angourie, Brooms Head and Port Macquarie. Established colonies of cane toads have been found up to 90km west of Ballina with the western boundary currently situated around Kyogle/Casino.

Vagrants are regularly reported in Sydney, Wollongong, Coffs Harbour and the Central Coast area. Vagrant reports are typically only one animal often found near tourist parks or landscape/nursery supplies or along railway or highway corridors.

Impacts

The cane toad is poisonous at all stages of its life (eggs, tadpoles, toadlets and adult toads) and they impact on native fauna during all of these stages. Their ability to survive in a range of habitats and wide temperature ranges (5-40°C) increases their threat to native species. Insects, smaller toads and native frogs, small snakes and the occasional small mammal are all part of the cane toads' diet. Not only do they prey on native fauna, but they also compete for food, shelter and breeding sites. Summers in Northern NSW provide ideal breeding conditions for cane toads. Females lay between 8,000-35,000 eggs at a time and may lay two clutches each year.

The invasion and establishment of cane toads has been listed as a KTP under both NSW (TSC Act) and Australian (*Environment Protection and Biodiversity Act 1999*) threatened species legislation.

The native species most likely to be impacted at the population level in Northern Rivers include spotted-tailed quoll (*Dasyurus maculatus maculatus*), common planigale (*Planigale maculate*), giant barred frog (*Mixophyes iterates*), and Fleay's barred frog (*Mixophyes fleayi*).

Priorities for control

Priorities for control are guided by the Northern Branch Cane Toad Management Strategy. This focuses on the following:

- controlling existing isolated populations on and nearby to DECC estate at Angourie and Brooms Head (Yuraygir NP) and Port Macquarie (Lake Innes NR);
- Preventing the establishment of new populations;
- Maintaining and developing community interest and awareness in cane toad control.

Border Ranges National Park has been identified as a priority site in DECC's Cane Toad Management Policy and Northern Branch Management Strategy. Northern Rivers Region has additionally prepared a Cane Toad Management Strategy to identify current presence/absence and priority areas for control based on achievability/distribution. NRR parks have been ranked as a high, medium or low priority. High priority areas include the World Heritage listed Border Ranges and Nightcap national parks, and adjoining areas of Mebbin National Park and Whian Whian State Conservation Area, and large areas of freshwater coastal wetlands covered in Broadwater and Bundjalung national parks. Refer to the regional strategy for location of other priority areas.

Control

Given the long established nature of cane toad populations on the far north coast particularly in Tweed, Byron and Ballina shires, there is varying interest and motivation in the implementation of cane toad control programs. Some local councils such as Byron have undertaken control in the form of community musters. Due to the extent of cane toad presence

in the Region, raising community awareness and encouraging members of the public to correctly identify cane toads and undertake appropriate control remains to be the main focus of control.

Control programs involving manual collection and trapping (using the 'super trap') will be implemented in the high priority parks during the cane toad season from Spring – Autumn each year.

Sightings and new reports from the public are crucial in providing a quick response to new incursions. NPWS staff will seek to confirm the status of new sightings outside the established areas within or in close proximity to NPWS parks.

Monitoring

Northern Rivers Region, where possible, will attempt to survey priority conservation areas to detect new incursions of cane toads through identified survey techniques including the road based visual and audio survey methodology. Information collected will be recorded in a standardised format using an IPAC.

All control programs (involving trapping and manual collection) will record the location, numbers collection, sex and size (if possible).

Data for PWG is collated by Northern Branch will be collated by PACS staff and reviewed annually for distribution to key stakeholders.

11.1.5 Feral Pig (*Sus scrofa*) in the Northern Rivers Region

Distribution and abundance

The distribution of feral pigs in the Northern Rivers Region is currently restricted to Ballina, Bungawalbin and Tabbimoble nature reserves and Bundjalung National Park. Feral pig distribution throughout these areas is seasonal and is dependant on climatic conditions and food supply.

Feral pigs are known to occur in the Northern Tablelands area and in south east Queensland. Feral pigs do occur in Maryland National Park in low numbers and are highly mobile throughout this area.

Exact numbers of feral pigs in these areas are currently unknown.

Impacts

'Predation, habitat degradation, competition and disease transmission by feral pigs" is listed as a KTP in NSW under the Threatened Species Conservation Act (1995). Significant vegetation communities such as SEPP 14 wetlands and endangered ecological communities occur within the coastal parks of the NRR.

Feral pigs can cause severe environmental damage by the uprooting of native seedlings in their search for food and the consumption of bulbs and roots. Feral pigs are omnivorous and can eat a wide range of food from vegetable/plant matter to animal matter and have been known to feed on small frogs, reptiles, birds and their eggs, and small marsupials.

Feral pigs can act as vectors for diseases such as tuberculosis and foot and mouth disease that can cause major economic losses for neighbouring farmers and disease outbreak in humans if contracted. Public safety can also be at risk from cars striking feral pigs crossing major arterial roads that surround many of the parks such as the Pacific Highway. Feral pigs also act as a vector for the spread of weeds through faecal deposition from the consumption of the fruits of the weed.

Priorities for control

There are three priority areas for control in Northern Rivers. Two of these are classified as critical priority.

The Newrybar Swamp area including Ballina Nature Reserve is a critical priority due to the potential for feral pigs to impact on public safety and public health that could result in a declared national emergency such as an outbreak of foot and mouth disease. The proximity to the local waste management facility, regional airport and towns of Ballina and Lennox Head make this program of critical importance. Feral pigs also impact on the biodiversity in the area including the SEPP 14 wetland areas.

Bundjalung National Park has also been identified as a critical priority area for control due to the presence of endangered ecological communities at risk from the damage feral pigs cause and predation of threatened species including shorebirds and emus. This work requires the support and assistance of the Dept of Defence at the Evans Head Air Weapons Range.

NPWS will also support programs in Tabbimoble Swamp NR, Bungawalbin and Maryland NPs' where possible. This may include survey and control of in conjunction with relevant RLPB's and landholders.

Control

Control of feral pigs will be undertaken in various capacities by NPWS in NRR involving trapping, shooting and use of 1080, where appropriate.

NPWS is a member of the Newrybar Swamp Feral Pig Management Committee and undertakes control as part of the implementation of the Newrybar Swamp Feral Pig Management Strategy with various land managers in the project area across multiple land tenures. For detailed control actions refer to this strategy. Trapping programs are currently ongoing in this area with cooperation of the Tweed-Lismore Rural Lands Protection Board, Ballina Shire Council and local land holders.

Trapping activities have also been implemented in Bundjalung National Park in conjunction with Department of Defence staff of the Evans Head Air Weapons Range. Trapping will continue in this area. Shooting of feral pigs may also be undertaken by an authorised officer or approved NPWS contractor as per an approved Shooting Operations Plan for the area.

Private landholders in areas surrounding the Ballina, Bungawalbin Nature Reserves, Maryland and Bundjalung national park areas also undertake "pig dogging". Unfortunately whilst some efforts may prove effective, this activity also contributes to the dispersal of feral pigs over a wider area, and illegal activities on parks. Pig dogging is not permitted on NPWS parks.

NPWS will work with RLPB's and QPWS regarding cross border, cross tenure programs to achieve effective and efficient control where practical.

Monitoring

Monitoring of feral pigs will be undertaken for both survey and investigation of reports and control programs.

Quantifying the success of the trapping programs comes in the form of:

- recording the GPS location of traps;
- details of individuals caught (sex, weight and reproductive status);
- ongoing reports of feral pig presence/absence;

to determine a reduction in feral pig numbers and extent of damage/destruction of affected native vegetation.

Monitoring is also undertaken for new incursions of pigs into previously uninhabited areas, and also for the expansion of known distribution to other areas, e.g. Broken Head in the Byron Coast Area. This will be undertaken with liaison and support of relevant RLPB's, adjoining regions and across the border regarding reports of feral pig activity and action taken.

Disease will also be monitored through collection of random blood samples from trapped pigs for presence of disease, eg, as part of the Newrybar Swamp Feral Pig Management.

11.1.6 Feral Goats (*Capra hircus*) in the Northern Rivers Region

Distribution and abundance

There are no known established populations of feral goats in the Region at present. Feral goats are however a problem in the adjoining Northern Tablelands Region and across the border in Queensland where large control programs are in place such as Girraween and Sundown National Parks.

There have previously been a small population of feral goats in the headwaters of Gorge Creek, west of Grevillea in Toonumbar National Park near Cox's Road.

Roaming domestic goats have been a problem in the past in a couple of parks including Uralba Nature Reserve near Alstonville and Hatton's Bluff near Murwillumbah. Occasional reports are also received of individuals such as the top of the cliff of Wanganui Gorge in Nightcap National Park. Cooperation from local neighbours in most cases sees these problems resolved, however requires ongoing monitoring. It is likely other occurrences of this nature may exist from time to time.

The Cape Byron State Conservation Area, jointly managed by the Cape Byron Headland Reserve Trust, the Arakwal traditional owners and NPWS, has one goat. Other individuals have been trapped and relocated. The one remaining animal will remain until natural attrition.

Roaming goats (domestic stock) from adjoining properties have been known to occur at Maryland NP.

Impacts

'Competition and habitat degradation of Feral Goats' is listed as a KTP under the TSC Act.

Feral goats have a number of impacts on the natural environment including:

- competition for food, water and shelter resources with native fauna;
- selective browsing and grazing habits which can damage the native vegetation;
- erosion and compaction problems due to cloven hoofs and movement patterns; and
- vectors of diseases of livestock, such as foot-rot.

Priorities for control

Given there are no current established populations of feral goats in the Region, reports of feral goats in parks will be investigated as necessary.

Control

Appropriate control techniques will be determined as required. In the case of straying stock from neighbouring properties, staff will liaise with neighbours regarding appropriate fencing for goats and the NPWS boundary fencing policy.

Monitoring

- Investigate reports of feral goats in parks in the Region as necessary.
- Liaise with the RLPB's regarding new feral goat populations in adjoining areas in conjunction with Tweed-Lismore, Casino and Northern New England RLPBs.
- Liaise with adjoining Regions and Queensland Parks and Wildlife staff regarding new incursions.

11.1.7 Feral Cattle (*Bos taurus*) in the Northern Rivers Region

Distribution and abundance

There are a few known cases of feral cattle on NPWS parks in NRR. Most occurrences of cattle grazing in parks have resulted from straying stock from neighbouring properties. This is an identified issue in Tuckean Nature Reserve and Bungawalbin Nature Reserve/State Conservation Area, Maryland and Border Ranges national parks. Other areas known to be affected from straying stock is in parks adjoining state forest with current grazing occupational permits for example; Captains Creek NR, , Yabbra, Richmond Range, Toonumbar and Mt Clunie national parks.

Wild cattle are known to occur in areas of former state forest with previous grazing occupational permits such as Bungabbee and Muckleewee nature reserves.

Impacts

Domestic and feral livestock have numerous impacts on the natural environment including:

- selective grazing pressure on native species
- soil compaction and erosion
- weed dispersal
- increased nutrient loadings
- establishment of movement trails
- potential spread of exotic diseases
- fires for “green pick”

Priorities for control

In the instance of roaming stock, priorities will be determined by areas in relation to the NPWS Boundary Fencing Policy and resources available for implementation. If stock pose a public safety risk, ie, motor vehicle collision or public nuisance, animals will be removed as a high priority. Where pest animals impact on the biodiversity conservation values of an area (including threatened species and endangered ecological communities) control programs will be implemented as a high priority.

Control

Direct liaison with owners to remove stock and co-operative fencing of boundaries and construction/reconstruction of boundary fences where required in accordance with the NPWS Boundary Fencing Policy. Wild cattle will be removed from parks by mustering or shooting using authorised NPWS staff or approved contractors in accordance with an approved Shooting Operations Plan. Any livestock removed by the Region will be in accordance with the Stock Impoundment Act in association with the relevant local government, and the requirements for impoundment.

In some circumstances dense infestations of lantana on park boundaries may provide a barrier to parks by restricting the entry of livestock.

Monitoring

- Monitor presence of livestock in parks in the Region.
- Document relevant information regarding control programs including the number of individuals removed.

11.1.8 European Rabbit (*Oryctolagus cuniculus*) and Brown Hare (*Lepus capensis*) in the Northern Rivers Region

Distribution and abundance

Rabbits are found in most habitats throughout Australia below the Tropic of Capricorn, except for densely forested areas, above 1500m or on black soil plains. The distribution of rabbits is widespread across rural lands on private property, however limited on parks in the NRR. The extent of rabbit populations is restricted to the border between NSW and QLD adjoining the rabbit fence, eg, Koreelah and Maryland national parks, maintained by the Darling-Down Moreton Rabbit Board and the interface between rural and residential areas in the Region, particularly rural residential areas. For example: the Alstonville Plateau and areas west of Lismore, and Arakwal National Park in Byron Bay.

Occasional sightings of hares are reported within the coastal NPWS parks, such as Cudgen Nature Reserve and Arakwal National Park. Hares have also been reported in Victoria Park on the Alstonville plateau.

More recently there have been small populations of domestic bred rabbits that have been released from persons previously kept as pets. There have been two populations requiring control, one at Casuarina Beach adjoining Cudgen Nature Reserve and another in Lennox Head.

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 the feral European rabbit' has been listed as a KTP under the NSW TSC Act and rabbits are declared a pest animal under the Rural Lands Protection Act 1998.

Rabbits can also 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

Given the limited occurrence of rabbits in the Region, control of European rabbits at Arakwal NP is a medium priority in the Region.

Liaise with the Tweed-Lismore, Casino and Northern New England RLPBs, Darling-Downs Moreton Rabbit Board and QPWS regarding new incursions of rabbits, and issues relating to the QLD/NSW Rabbit Fence.

In Maryland National Park which adjoins the border rabbit fence, control programs will be undertaken as a medium priority as required.

The control of hares is a low priority program in the Region.

Control

Control programs have been implemented in Arakwal National Park with the assistance of the Tweed-Lismore Rural Lands Protection Board using Pindone[®]. NPWS has also assisted with control programs at Casuarina Beach to reduce spread into adjoining Cudgen Nature Reserve. Various control programs, organised by the Tweed-Lismore, Casino and Northern New England RLPBs, are undertaken on agricultural land in the Region using a variety of control measures, primarily Pindone[®] and RCD.

Various other forms of control such as shooting, trapping and den fumigation will be used at Maryland National Park.

Monitoring

- Monitor previously infested areas for presence/absence of rabbits, and investigate reports of new areas of invasion within the Region in conjunction with the Tweed-Lismore, Casino and Northern New England RLPB's.
- Liaise with the Kyogle Area and Darling-Downs Moreton Rabbit Board and Queensland Parks and Wildlife Service regarding rabbit issues on the NSW/QLD border. This will be periodically reviewed.

11.1.9 Bell Miner Associated Dieback in the Northern Rivers Region

Distribution and abundance

Bell Miner Associated Dieback (BMAD) is found in coastal forests between Victoria and south east Queensland. The condition affects a number of eucalypt forest types and is associated with the establishment of bell miner colonies and an over abundance of sap sucking psyllid insects in the forest canopy. The persistence of psyllids in the canopy leads to dieback and eventually death of the affected trees.

An aerial survey in 2004 across the Kyogle area identified BMAD affecting a significant proportion of forests. Parks affected included Toonumbar, Border Ranges, Richmond Range, Yabbra, Koreelah, Tooloom and Captains Creek national parks. BMAD also affects a number of state forest and private lands in the region. BMAD has also been recorded on private lands adjacent to Mebbin National Park and while bell miners and BMAD have not been recorded from this reserve to date, parts of it may be vulnerable.

Impacts

'Forest eucalypt dieback associated with over-abundant bell miners and psyllids' has recently had a preliminary determination as a KTP under the TSC Act. The impacts of BMAD range from biodiversity to economic and recreational. Forests affected by BMAD are severely degraded with the loss of a significant proportion of overstorey species and subsequent invasion of the understorey by weeds, particularly Lantana. The Murray Scrub in Toonumbar National Park is a very significant example of a forest that has been so devastated by BMAD that recovery to its former state is unlikely for 50-100 years and not without significant human intervention.

Avifauna is known to be affected by the presence of over-abundant bell miners. A number of eucalypt species are 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

Programs are currently being implemented in Toonumbar and the Border Ranges national parks. These programs involve the control of weed species including the use of prescribed fire to control lantana. A program of stem injection using pesticide has also been trialled at Sheepstation Creek.

Control

Control of BMAD is a difficult challenge particularly 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. A number of trials sponsored by the BMAD Working Group are currently investigating these control or restoration options.

Monitoring

- Monitoring of existing NRR BMAD trials should be continued. Monitoring plots have been established at Toonumbar, Richmond Range and Border Ranges national parks.
- Fauna surveys at Richmond Range are being carried out by the BMAD Working Group

and Southern Cross University and ongoing support should be directed to the ongoing assessment of this study.

- Mebbin National Park should continue to be monitored for bell miners and BMAD.

11.1.10 Indian or Common Myna (*Acridotheres tristis*) in the Northern Rivers Region

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.

Local staff have indicated that Indian mynas are widely distributed throughout the Region particularly in the coastal areas adjoining major towns and cities. Birds have been identified in numerous locations including Woodburn and Coraki in the south, Woodenbong, Lismore, Kyogle and Mummulgum in the west, including Ballina, Byron Bay, Mullumbimby and to Tweed Heads in the north. There have been no confirmed populations occurring on park, but could potentially occur at Cape Byron.

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

The NRR will encourage community groups such as the Tweed Bird Observers in their control programs.

DECC will also encourage local governments in the Region to undertake control programs to reduce the spread of the birds onto parks.

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.

Monitoring

- In the NRR, staff are to actively record/maintain information on the locations of where Indian mynas are present and enter this information into a database such as Wildlife Atlas.

11.1.11 Feral Poultry (*Gallus bankiva* sp.) in the Northern Rivers Region

Distribution and abundance

There are a few locations in the NRR where domestic poultry have traditionally been released and left in roadside picnic areas. Various breeds of poultry, particularly roosters, are regularly dumped and released into the southern section of Brunswick Heads Nature Reserve. There are no other known areas on NPWS parks.

Impacts

- Feral poultry assist to spread weeds throughout the reserve by their scratching and foraging habits.
- They compete with native species for food and may potentially damage threatened species through foraging such as prickly pea *Desmodium acanthocladum* and the endangered Mitchell's rainforest snail *Thersites mitchellae*.
- They disturb adjoining private properties in the case of Brunswick Heads Nature Reserve by their crowing.

Priorities for control

1. Continue to implement capture and relocation programs for feral poultry within Brunswick Heads Nature Reserve.
2. Monitor other areas of NPWS estate for introductions of feral poultry and undertake control as required.

Control

A program of capture and relocation has occurred for feral poultry within Brunswick Heads and previously Boatharbour Nature Reserve. Ongoing programs are required as necessary, in association with Byron Shire Council and the Tweed-Lismore RLPB, when numbers reach a stage where capture effort is worthwhile.

Ongoing media is required to educate the community on the impacts of releasing unwanted poultry in conservation areas.

Assess new incursions of feral poultry and determine appropriate methods of control and management as required.

Monitoring

- Monitor numbers of individuals in known locations and assess new locations of feral poultry reported.
- Liaise with relevant local government and Rural Lands Protection Board.

11.2 Emerging Pest Issues

11.2.1 Yellow Crazy Ants (*Anoplolepis gracilipes*) & Red Imported Fire Ants (*Solenopsis invicta*) in the Northern Rivers Region

Distribution and abundance

Yellow crazy ants are naturally found in Africa or Asia and have been introduced into many tropical and subtropical areas. On the NSW North Coast yellow crazy ants were detected on Goodwood Island, lower Clarence River in July 2004. The ants were found around a wharf complex and nearby farmland. There are no known occurrences in NRR.

Red imported fire ants are from South America and were first discovered in Brisbane, Qld on the 22 February 2001. It is likely that they have been in the area for up to seven years before detection. Fire ants have not been recorded in NSW to date, but it is likely, that given transport systems and movement of infected materials, infestations may occur. NRR has a high potential for infestation due to the suitability of habitats, proximity to Brisbane and the transient nature of the local community particularly around Byron Bay and surrounds.

Impacts

Invasive ants are known to be ready invaders of disturbed habitats such as urban areas, forest edges or agricultural fields and are capable of invading undisturbed environments. High densities of the yellow crazy ant have the potential to devastate native 'keystone' species, resulting in a rapid alteration of ecosystem processes and negative effects on endemic species. On Christmas Island, as well as significantly and quickly altering the natural ecosystem processes and the associated environment, the yellow crazy ant has reduced native bird, reptile and mammal life. The ant threatens many endemic and endangered species, especially on islands, and undermines any potential or actual tourism investments. The ant has the potential to impart significant damage, or alternatively be advantageous to agricultural systems and plant species, depending on variables such as the crop, the geographical region and the types of pest and/or beneficial insects present. (http://www.issq.org/database/species/reference_files/anogra/anograinp.pdf)

Yellow crazy ant (YCA), (Fr. Smith) is declared a notifiable pest under the NSW *Plant Diseases Act 1924*, Proclamation P163.

The Imported Red Fire Ant is a tenacious (the "*invicta*" in its Latin name *Solenopsis invicta* means "not easily overcome") but ordinary looking red-brown ant. When their nest is disturbed, fire ants will aggressively attack the intruders, including humans and pets, by stinging repeatedly. Each sting releases a small amount of venom. The immediate sensation is that the bitten area of your body is on fire (hence "fire ants"). The sting gives rise to pustules which can be extremely itchy for a week. In about 1% of cases an allergic reaction will occur.

In the United States, fire ants can be a significant economic pest to agriculture because of their prevalence in orchards, crops and pastures, and their seed harvesting habits. A well-established fire ant nest usually takes the form of a mound, which can interfere with farm activities. Fire ants reduce land values in heavily infested areas. Under section 4 (1) of the *Plant and Diseases Act 1924*, proclamation P125 states a proclamation to regulate the importation and introduction of imported Red Fire Ants into NSW.

Priorities for control

NSW DPI commenced control of the yellow crazy ant infestation at Goodwood Island in September 2004. Control and surveillance has been ongoing since that time. NPWS North Coast Region has assisted with planning works and annual surveys. No ants have been detected since February 2006.

No fire ants have been detected in NSW as of late 2006 despite five years of surveillance.

Control

In NSW DPI has baited yellow crazy ants with the pesticides fipronil, formulated as *Presto*, and S-methoprene.

The Queensland DPI and Fisheries control fire ants in an infested area using a baiting program. The use of baits allows areas to be covered quickly and cost effectively, and makes the difficult task of locating every individual nest less essential. Worker ants carry the bait into the nest and feed it to the queen, larvae and other workers.

The bait used is a crushed corn saturated in soy bean oil, which makes it attractive to fire ants. There are three types of corn-based treatments being used to eradicate the fire ant. Two are methoprene and pyriproxyfen, which are insect growth regulators (IGRs). These baits do not kill the ants but sterilise the queen and stop the larvae from developing into mature ants. The worker ants are not replaced and the colony dies out.

The third bait type is hydramethylnon, which is slow acting but kills the ants. As with the IGRs the worker ants take the hydramethylnon bait back and feed it to the rest of the colony (including queens) which eat it and die.

To protect NSW from infestations of red imported fire ants the NSW DPI recommend not to bring anything onto property or estate, any item that could potentially contain the ants, items such as soil, mulch, pot plants, turf and other goods that may have been stored outside in an infested area.

Monitoring

Yellow crazy ants have been monitored by surveillance on the whole island once a year with no detections away from the wharf area (original infestation). NSW DPI survey the wharf precinct every six months. If no ants are detected by February 2008 then the infestation will be declared as eradicated.

Although no fire ants have been found in NSW to the end of 2006 the public should remain vigilant for fire ants and other exotic ants. Any reports should be directed to the NSW DPI on 1800 084 881. NPWS will continue to provide brochures to the public on this pest issue.

11.2.2 Exotic Fungi, Red Pored Fungi (*Favolaschia calocera*) in the Northern Rivers Region

Distribution and abundance

Favolaschia calocera is a bright orange fungus that has pores on the underside of the cap, which is up to 20mm in diameter. There is a stripe up to 15mm long, attached near the edge of the pileus. It grows in large colonies and is saprophytic in that it grows on dead plant material such as fallen logs.

Favolaschia calocera occurs naturally in the forests of Asia and Madagascar, but has been introduced to New Zealand and Europe. It has recently been recorded in Australia around Melbourne and at Lamington National Park Queensland.

Recent reports from Lamington National Park indicate that since it was first acknowledged to be present in 2006, it had spread substantially by 2007. No known occurrences of this fungi have been reported or observed in NRR.

Exotic fungi spread from spores attaching to footwear or clothing that has been exposed to a colonised area.

Impacts

The ecological impacts of introduced fungal species, apart from plant pathogens, have been largely ignored. The consequences of non-pathogenic exotic fungi invading indigenous ecosystems may be far-reaching. Such fungi could displace native species from the communities in which they occur, disrupt natural fungal successions in these communities, and disrupt the food chains of indigenous insects.

Priorities for control

The presence and impacts of this species are not yet fully known in the NRR thus there are currently no priorities for control issued.

Control

There are currently no control programs taking place in the NRR.

Monitoring

Staff of NRR to investigate and record any reports of the fungi presence in any of the parks of the NRR, and liaise with relevant agencies including QPWS and Queensland herbarium.

11.2.3 Lethal Yellowing (*Phytoplasma*) in the Northern Rivers Region

Distribution and abundance

Lethal yellowing is a widespread and fatal disease that effects at least 37 species of palm in the USA and the Caribbean region. The disease is believed to be caused by phytoplasmas. These unculturable cell wall-less organisms belong to a class of bacteria known as mollicutes. The phytoplasma is transported by phloem feeding planthoppers.

In Australia, phytoplasma are recognised as a cause of lethal yellowing in the grapevine industry, and are reported to be responsible for yellowing in papaya plants in Queensland.

There have been recent reports of lethal yellowing occurring in pandanus in NRR, including Wategoes Beach within Cape Byron SCA. Unconfirmed reports have been received from Ballina Shire at Lennox Head and detailed surveys of all NRR may be present in within other coastal parks of the Northern Rivers Region.

Impacts

The symptoms of Lethal yellowing include foliage yellowing, stunting, necrosis of flowers, foliage and roots and a decline of vigour leading to death. Pandanus have been identified as 'at risk' from this bacteria.

Priorities for control

At present confirmation of presence is required to activate a control program. Further sampling of suspect individuals is required to confirm presence of this bacteria.

Control

At present there is no known cure. However, in the USA they employ a preventative program using a Tree Saver® Injection System and water based antibiotic, oxytetracycline hydrochloride (OTC). This combats the disease in two ways:

1. The OTC makes the sap "taste very bad", so the bug finds feeding on treated trees undesirable; and
2. The presence of the OTC seems to greatly retard the phytoplasma's ability to live and or "prosper". Being a water based antibiotic in a water based organism, the half life of it's presence in the tree is only 4 months, thus the need for a minimum of 3 injections per year. This is a long term, ongoing project and needs to be continued once it is started.

There is currently no known registered treatment available for palms in Australia.

Monitoring

- DECC staff to investigate any of reports of yellowing.

11.2.4 *Pandanus planthopper (Jamella australiae) in the Northern Rivers Region*

Distribution and abundance

The planthopper occurs naturally in far north Queensland but has been introduced to southern Queensland and the far North Coast of NSW through plant trade and spread through natural means. First recorded in Northern Rivers Region (NRR) in March 2004 on the Tweed Coast near Kingscliff and Bogangar on Council managed lands. It was not detected in adjoining areas of NPWS estate. Further extensive surveys in 2005 identified the insect in the Byron and Ballina Shires. The survey indicated that Cape Byron State Conservation Area (SCA) was the only NPWS area where active insects were present.

Infested trees in Cape Byron SCA showed variable signs of damage primarily the presence of sooty mould and leaf yellowing. This indicated an early stage of infestation and control was initiated immediately. All other areas of NPWS estate in NRR, remain free of the planthopper, although occasional sightings of eggs have been identified on trees in Cape Byron SCA. Fortunately the systemic treatment undertaken has prevented development past this stage of the life cycle. All known records and new reports have been restricted to the Tweed, Byron and Ballina Shires north of the Richmond River, and have occurred largely through imported landscaping plants from QLD.

Impacts

The pandanus planthopper (*Jamella australiae*) causes dieback in pandanus palms (*Pandanus tectorius*) an iconic tree of the NSW North Coast. Heavy infestations of the planthopper feeding between the tightly packed leaves of pandanus trees destroy leaf tissue and produce large amounts of honeydew, which encourages the growth of moulds. Affected leaves drop and growing points die. Tree death follows within 3-18 months of the initial infestation.

In the area between Tweed Heads and Ballina several trees have already died (off-park). There is potential for the infestation to spread through natural pandanus populations. Local extinctions of pandanus could occur if these infestations are left unchecked.

Priorities for control

Broken Head Nature Reserve has over 1500 pandanus trees and maintaining these trees free of planthoppers is a critical priority for NRR. Other priorities are maintaining control in Cape Byron SCA and continued surveillance in other vulnerable parks where the planthopper has not yet established e.g. Wooyung and Cudgen nature reserves and Arakwal National Park.

Control

There are three potential methods of control:

1. chemical (involving insecticide control by stem injection, and foliar spraying, or a combination of both);
2. physical (leaf stripping and offsite disposal of affected leaves);and
3. biological (a native wasp predator).

A combination of the use of insecticides and leaf stripping (and disposal) will be used. For example, all affected trees in Cape Byron SCA have been treated with an insecticide. Pandanus trees in Wooyung and Cudgen nature reserves and Arakwal National Park are only a short distance from existing infestations and have been treated with a systemic insecticide as a preventative measure. A coordinated control program across land tenures will be essential to prevent further infestations within the current distribution, and to prevent the establishment of planthoppers in areas where it is absent.

Monitoring

The success of the planthopper management program will be determined by regular surveys that monitor the presence/absence of the planthopper and pandanus tree health (death/recovery). All records of monitoring and control have been captured electronically in NRR and will allow mapping of this data.

11.2.5 Feral Deer (family Cervidae in the Northern Rivers Region)

Distribution and abundance

Six deer species are known to have established feral populations in Australia. These are fallow deer (*Dama dama*), red deer (*Cervus elaphus*), sambar deer (*Cervu unicolour*), chital deer (*Axis axis*), rusa deer (*Cervus timorensis*) and hog deer (*Axis porcinus*). All deer species present in NSW have patchy distributions in forest and woodland in eastern New South Wales, with two species (Red and Fallow Deer) extending west of the Great Dividing Range (Adam 2004).

Deer live in herds with complex social organisation, often involving considerable competition between males in the breeding season. Deer are generally cryptic and although there is no state-wide census of numbers, deer populations in NSW are believed to have increased dramatically in recent years. This is mainly attributed to escapes and deliberate releases from deer farms, expansions of acclimatization herds and possibly in some areas deliberate translocation by hunters (Adam 2004). They are nocturnal or semi-nocturnal, sheltering by day in forest or woodland and emerging to graze from late afternoon to early morning in native grassland, improved pasture, crop or other agricultural land.

There are no recorded feral deer populations in NPWS Northern Rivers Region. This is largely due to the prevention of farming deer in the area by DPI due to the presence of the paralysis tick. Feral deer are known to occur in the adjoining Regions of the Northern Tablelands and SE Queensland.

Impacts

“Herbivory and environmental degradation caused by feral deer” have been declared a KTP under the TSC Act. Feral deer can have major impacts in parks by:

- destroying native plants. Deer can trample plants; graze on them, and ringbark young trees. Deer can have a major impact on the variety and abundance of plant species where populations are high;
- fouling waterholes;
- causing soil erosion;
- transmitting diseases such as foot-and-mouth disease, and;
- spreading weeds.

High densities of feral deer have been found to reduce understorey plant species in the Endangered Ecological Community Littoral Rainforest by as much as 70%. Feral deer populations elsewhere in the State have had significant impacts on the rare temperate and sub-tropical Illawarra rainforest, the threatened species *Syzigium paniculatum*, Littoral rainforest around Port Macquarie and trampling and browsing of threatened species in the Oxley Wild Rivers NP (Adam 2004). Deer have been found to browse on lantana, crofton weed, mistflower and mother of millions (Moriarty et al 2000). The dietary overlap between Rusa Deer and the Swamp wallaby (*Wallabia bicolour*) is estimated to be 15 – 50%, with one deer eating approximately the same amount of vegetation as three swamp wallabies (DEC 2005). Feral deer on roads have caused several major car accidents in NSW in recent years.

Control

A number of techniques are available for the control of Feral Deer including shooting (DECC, contract & private recreational shooters), fencing, trapping using feed based lures, oral sedation, mustering, and judas control. However, in remote areas on NPWS lands there are few viable cost-effective options available.

Priorities for control

There are no current priorities for control within Northern Rivers Region. Investigate reports and where appropriate implement species specific control programs to remove feral deer populations from NPWS lands in association with other land management agencies and private landholders.

Monitoring

Appropriate monitoring techniques would be initiated such as surveys in conjunction with relevant land management agencies and more specific site based spotlight transect counts, sand plots and scat count transects as necessary.

11.2.6 Red-eared Slider Turtle (*Trachemys scripta elegans*) in the Northern Rivers Region

Distribution and abundance

The current extent of the distribution of red-eared slider turtles (sliders) in NSW is unknown. Sliders are known to occur in the Hawkesbury–Nepean and other large rivers in central NSW. Unconfirmed reports of sliders have been received around the state most recently in a dam near Kyogle in Northern NSW. Sliders have not been recorded in waterways within DECC estate.

Impacts

The red-eared slider turtle is an aggressive animal, which can kill native turtles, birds and aquatic wildlife. They are included in the top 100 of the 'world's worst' invasive species' by the International Union for the Conservation of Nature (IUCN), due to their invasive nature and their potential impacts on biodiversity. In NSW, the true extent of their impact on aquatic ecosystems is unclear.

Priorities for control

There are no identified priorities for control of red-eared sliders on NPWS estate within Northern Rivers Region

Control

Increasing public vigilance and awareness is important to ensure timely reporting of suspected red-eared slider populations. Additionally, education of veterinarians and pet animal suppliers will improve response success.

Monitoring

- Reports received of suspected sliders in water bodies within NPWS estate will be appropriately recorded and investigated.
- NPWS to support DPI (Agriculture) regarding reports off park.

11.2.7 Plant Pathogen (*Phytophthora cinnamomi*) in the Northern Rivers Region

Distribution and abundance

Phytophthora cinnamomi is believed to have evolved in south-east Asia and was first described by a Dutch expert of plant disease in 1922. Whilst dieback was not discovered in Australia until 1922, it is believed that it was probably introduced in to Western Australia prior to the 1900's when quarantine procedures were not in place.

There are only two known locations where *Phytophthora cinnamomi* has been reported within NRR: Nightcap NP and Whian Whian SCA. The record of *Phytophthora* within Nightcap NP and Whian Whian SCA is as a result of surveys funded by the Gondwana WHA.

Impacts

Phytophthora cinnamomi is listed as key threatening process under both State and Federal legislation. A national threat abatement plan for *Phytophthora* was prepared in 2001. *Phytophthora* is a soil-borne pathogen belonging to the water mould group. It grows best in tropical conditions and is parasitic - requiring a living host on which to feed. This fungus is known to attack nearly 1000 plant species throughout the world and is one of the most widespread plant pathogens known to man. The spores of the fungus (zoospores and chlamydospores) spread rapidly through water and moist soil or via transfer in particles of infected soil, lodging on plant roots, eventually killing the host plant (Shearer and Bailey, 1989).

Cahill et. al (2002) states that human activity causes the most significant, rapid and large-scale spread of *P. cinnamomi* (Environment Australia 1999; Lewis & Colquhoun 2000). This spread occurs via:

- the movement of soils during road construction and maintenance, earthmoving, timber harvesting, mineral exploration and the use and transport of infested nursery stock (Environment Australia 1999, Marks & Smith 1991);
- recreational activities such as bushwalking, four wheel-driving and motorbike riding (Lewis & Colquhoun 2000);
- research-based activities eg: scientists and others studying rare flora and fauna (Environment Australia 2001); and
- movement of domestic stock, feral species (eg: pigs) and some native species (Lewis and Colquhoun 2000). *Phytophthora* infects a large number of species however they display varying effects - some are killed, damaged or show no apparent symptoms.

Management Objectives

One of the National Threat Abatement Plan (2001) objectives is preventing further species and ecological communities becoming threatened. By identifying affected areas and appropriate management, this will aim to achieve this objective.

- Prevent the spread of *Phytophthora* from current known locations to non-infected areas;
- Identify presence/absence of *Phytophthora* by conducting surveys and sampling areas of poor tree health or dieback ie continue to work with Gondwana Rainforest Reserves of Australia to manage outbreaks in World Heritage areas; and
- Identify and implement appropriate containment and hygiene protocols for affected areas. Ascertain if *Phytophthora* occurs in any other parks in the Region.

Control Priorities

Priorities will be determined as confirmed reports are established. eg: Nightcap NP and Whian Whian SCA. Priorities will be determined based on recommendations outlined in the report compiled on the 'Survey of Gondwana World Heritage Areas for presence of *Phytophthora*

cinnamomii Die-back (Root Rot)'

Once confirmed, development and implementation of a containment strategy for affected areas will be developed such as Nightcap NP and Whian Whian SCA, to prevent further spread throughout the park eg: provisions of wash down facilities for equipment to be installed and used in the affected areas.

Control Techniques

Appropriate controls will need to be determined on a site to site basis. This may include: signage, wash down bays/techniques, controlled use and the trial use of commercial phosphite to treat individual eucalypts through stem injection for example if appropriate.

A strategy to reduce public access to infected areas and catchments may also be required.

Monitoring

Develop best practise guidelines for managing areas with Phytophthora (including standardised monitoring forms for sampling potential Phytophthora sites)

Implement actions contained within Gondwana WHA Phytophthora survey and assessment.

Soil sampling in areas adjoining containment boundaries to monitor any movement.

Strategic and opportunistic checking of dieback in known areas.

11.2.8 Plant Pathogen (*Phellinus noxius*) in the Northern Rivers Region

Distribution and abundance

Phellinus noxius is a plant pathogen which causes root rot. The pathogen occurs in many counties throughout the world, usually below an altitude of 500m and at a longitude and latitude of 30N and 28S. In Australia the pathogen is known to occur from native forests in Cape York in Queensland to the NSW border. *Phellinus* has been detected in northern NSW and is often associated with tree death in recreational parks, gardens and residential areas. *Phellinus noxius* was detected in Cape Byron SCA at the Pass in April 2003. This pathogen was detected following the death of a threatened species, *Acronychia littoralis* and other native species in the same vicinity. It is not known to occur in other parks within NRR.

Impacts

The impacts of *Phellinus noxius* are tree death, including both mature and regenerating saplings of various age classes and species. Pegg, G. and Ramsden, M. (2003) identify this pathogen can affect the roots and stems of trees or as a perthophyte of the heartwood. It is also known as a saprophyte as a decay fungus in wood.

The fungal pathogen can affect a number of conifers including hoop pine (*Araucaria cunninghamii*) and bunya pine (*A. bidwillii*), and various angiosperms including *Acacia*, *Cedrela* and *Eucalyptus* species for example *E.tereticornis* and *E.grandis*. Horticultural trees crops such as *Macadamia* sp. and *Citrus* sp. may be affected by this pathogen (Pegg, G. and Ramsden, M., 2003).

Some of the species affected at The Pass at Cape Byron SCA included *Banksia integrifolia*, *Litsea australis*, *Macaranga tanarius*, *Cupaniopsis anachardioides*, *Arytera divaricata* and a number of species of *Ficus*. This has the potential to impact of numerous threatened species and endangered ecological communities throughout NRR.

Management Objectives

- To determine presence /absence of *P.noxius* in the Region as a cause of tree death or poor health of native plant species.
- Consultation with suitable plant pathologists to identify sampling techniques and determine presence/absence of the pathogen.
- Implement surveys to determine extent of infestation and identify appropriate containment strategies and management options ie root barriers.

Control Priorities

Priorities will be determined as suspected tree death or poor tree health is investigated. Once confirmed reports are established. eg: The Pass (Cape Byron SCA) further monitoring and surveying is required to detect presence/absence of the pathogen and potential containment strategies.

Control Techniques

The control technique consists of containment and no further spread of the pathogen to other areas and other plants in adjoining areas. Root barriers may be possible to restrict further expansion of the pathogen. Pegg, G. and Ramsden, M. (2003) recommend in the areas at the Pass (Cape Byron SCA) to dig trenches and inspect tree roots for the presence of *P.noxius*, if the visible disease front is identified then the placement of root barriers should follow.

Monitoring

Conduct inspections of tree death or poor tree health for *P.noxius* through standard sampling

protocols as identified by plant pathologists. Record information on sampling and results of presence/absence including GPS coordinates of location and map results. Initiate routine sampling in affected areas to determine extent and activity status of pathogen ie. reproducing.

11.3 Noxious weeds of the Northern Rivers Region

11.3.1 *Bitou Bush (Chrysanthemoides monilifera subsp. Rotundata) – Northern Rivers Region*

Distribution and abundance

NRR manages 63 km of coastline (excluding estuarine and offshore islands) where bitou bush is a common weed of the coastal parks. The distribution of bitou bush includes all coastal local government areas; Tweed, Byron, Ballina and Richmond Valley. Tweed and Ballina Councils have had extensive programs to control bitou bush within their areas including aerial spraying.

A large proportion of the coastal parks were formerly sandmined. These areas in particular have extensive areas of bitou bush both in extent and density.

Areas affected by bitou bush include: Tweed Estuary NR, Tweed Heads Historic Site, Ukerebagh NR, Cudgen NR, Wooyung NR, Billinudgel NR, Brunswick Heads NR, Marshall's Creek NR, Tyagarah NR, Cape Byron SCA, Arakwal NP, Ti-Tree Lake Aboriginal Area, Broken Head NR Richmond River NR, Dubai Jarjum Nurahm AA, Broadwater and Bundjalung NPs.

Queensland have had extensive bitou bush control programs in an attempt to eradicate the weed from the State. Ongoing programs intend to further restrict the distribution and abundance.

Impacts

'Invasion of native plant communities by bitou bush and bone seed' is listed as a KTP under the TSC Act 1995. In 2007, a Northern Rivers Regional Bitou Bush Strategy was prepared to identify and summarise the Region's commitment to implement the NSW Threat Abatement Plan. Bitou bush is also listed as a Weed of National Significance, and is a declared Class 4 Noxious Weed in the Far North Weeds County Council Area.

Bitou bush has a high visual impact because of its presence over such vast areas of the coastline. It is a highly competitive weed that displaces native vegetation in coastal environments. It is an aggressive invader and coloniser of dunal systems and nearby coastal environments. It is a prolific seeder with a seed viability of up to three years.

Bitou bush can also impact sites of cultural significance such as bora rings etc and require control. Additionally it provides shelter and food for introduced pests such as the European rabbits and foxes. Foxes and numerous native bird species feed on the black fruits, the seeds of which are then effectively and widely dispersed.

Priorities for control

As identified in the Northern Rivers Region Bitou Bush Strategy 2007-2012 there have been 20 significant sites ranked in terms of their regional priority. Below is a summary of the bitou TAP sites within the NRR parks:

Park/Reserve	TAP Site Number	Regional Priority
Cape Byron SCA	NR29	1
Broken Head NR	NR36	2
Brunswick Heads NR	NR25	3
Arakwal NP	NR32	4
Bundjalung NP (snapper rock)	NR66	4
Cudgen NR	NR 9	6
Broadwater NP	NR61	7
Bundjalung NP (north)	NR64	8

Wooyung NR	NR18	9
Bundjalung NP (ten mile beach, bombing range)	NR63	10
Billinudgel NR	NR21	11
Bundjalung NP (multiple sites)	NR67	12
Ukerebagh NR (mainland)	NR2	13
Wooyung NR (north)	NR16	14
Marshalls Creek NR	NR23	15
Tyagarah NR	NR26	16
Richmond River NR	NR58	17
Ukerebagh Island NR	NR1	18
Tweed Estuary NR	NR6	19
Ballina NR	NR42	19

Control

All control is done in a systematic/integrated approach as outlined in the relevant PMP's, R&R's and SSMP's as part of a staged method of control. There are three methods of control currently in use in the NRR. They are:

- *Physical*- Hand weeding, good for use in sensitive areas or follow up.
- *Chemical*- Herbicide spray of Glyphosate and Metsulfuron methyl, application by aerial spot spray, overspray, aerial boom spray, or cut and paint.
- *Biological*- the bitou seed fly (*Mesoclanis polana*), has been successful in reducing seed production by up to 50%. The bitou tip moth (*Comostolopsis germana*) has also been established in some areas of the NSW coast.

For recommended control actions see the Northern Rivers Region Bitou Bush Strategy and individual site specific management plans.

Of particular importance are two bitou bush control programs operating in the Region. A cross regional program between North Coast and Northern Rivers Regions in Bundjalung NP and Iluka NR covering 38 km of coastline, which commenced after wild fires during 2001/02. This program has seen extensive aerial spraying and spot spraying of bitou bush, as well as follow-up on ground works and monitoring. The second program is the 'Northern Containment Zone' between NSW and QLD State border, whereby NPWS has been implementing bitou bush control on Ukerebagh Island and Tweed Estuary Islands NR's as part of the prevention of re-invasion to SE QLD.

Monitoring

NRR will implement identified monitoring techniques outlined in the Bitou Bush TAP and best practice guidelines. Daily records sheets are kept in accordance with the Pesticides Act. Extensive mapping in Bundjalung NP shows the total area treated and ongoing infestations. Both aerial and ground photography has been taken at key photopoints to show changes over time, to monitor effectiveness of control programs and re-establishment of native vegetation communities.

11.3.2 Lantana (*Lantana Camara*) – Northern Rivers Region

Distribution and abundance

Lantana is a widespread, commonly occurring weed throughout all parks from the coast to the western areas of NRR. It occurs as both an edge and understorey species in a range of

vegetation communities in varying densities. Lantana has vigorous growth habits particularly in high rainfall parks such as Nightcap and Mt Warning national parks, and Numinbah and Limpinwood nature reserves. It readily invades disturbed plant communities particularly post fire and previous management operations such as logging, and as a result extremely dense infestations are common in areas of former state forests such as Mallanganee, Toonumbar, Richmond Range, Tooloom and Yabbra national parks.

Impacts

Lantana invades both disturbed and undisturbed bushland. In moister environments, lantana is a particularly aggressive coloniser and forms extremely dense infestations that totally smother the native vegetation and inhibit natural regeneration.

In some instances, lantana infestations on the edge of some parks can restrict the entry of cattle from adjoining properties. In the case of isolated rainforest remnants, it can also protect the vegetation from drying winds, excessive sunlight penetration *etc.* Lantana can also provide shelter for many native animals, including threatened species. It is essential that these issues are taken into account when developing and implementing weed control and/or restoration programs.

Changes in the forest structure of previously logged areas, such as Toonumbar NP, has greatly modified the habitat for native animals and birds. A dense understorey of lantana is now present in these areas and of particular concern are large areas of eucalypt dieback associated with over population of bell miners at Toonumbar NP. This indicates a possible imbalance in ecological processes within the ecosystem.

'The invasion, establishment and spread of *Lantana camara*' is listed as a KTP under the TSC Act.

Priorities for control

There are various priorities for lantana control in the Region. Lantana is controlled as part of overall restoration and weed control programs, threatened species and world heritage management, roadside maintenance and visitor facility maintenance. These programs vary from critical to medium priority. Examples include Maryland, Mt Warning, Border Ranges (eastern bristlebird habitat), Toonumbar (Murray Scrub), Mallanganee (*Myrsine richmondensis*) and Nightcap national parks and the Big Scrub Rainforest Remnants such as Victoria Park and Davis Scrub nature reserves.

Biological control agents have been released as part of the NSW lantana bio-control taskforce program. There have been various release sites in the Region including Mt. Warning and Border Ranges national parks. NPWS staff will continue to assist with this program where practicable.

Lantana is strategically controlled at 'trial sites' including Sheepstation Creek in Border Ranges NP in association with the National Lantana Management Committee and former 'trial plots' in Toonumbar NP. Additionally NPWS staff are working with the BMAD Working group on large scale control programs to reduce the impacts of BMAD.

Control

Control actions for implementation are identified in the Park Pest Management and Restoration and Rehabilitation Plans (where available) and threatened species recovery plans or PAS. A combination of manual and spraying herbicide techniques including splatter gun (high volume gun gas) are used, (where appropriate) to maximise native regeneration potential. Due to the nature of weed growth in NRR repeat treatments are required as part of the primary, secondary and maintenance modes of control.

Monitoring

Daily record sheets are kept for all weed control programs in accordance with the Pesticides Act. Before and after photos are also taken during the course of implementation of works. Where possible GPS locations are taken of work site locations including the extent of weed distribution and control implemented. Sites are re-visited periodically for follow-up treatment and maintenance.

11.3.3 Glory Lily (*Gloriosa superba*) - Northern Rivers Region

Distribution and abundance

Glory lily inhabits most coastal areas and its existence in the NRR is generally associated with the presence of bitou bush. In the NRR it is known to exist in isolated patches in Cudgen, Wooyong, Billinudgel, Brunswick Nth nature reserves and an extensive area adjoining DoL Dirrawong Reserve in Bundjalung NP.

Impacts

A native of Africa and Asia, glory lily is a popular plant in the floristry industry due to its striking and unique appearance. Glory lily is a herbaceous perennial, it stems to 4m that flower, produce fruit and die back annually. Leaves grow directly from stems without a leafstalk; tips often extend into a tendril. Large flowers with yellow/orange/red petals from Oct-May. A large green capsule fruit that dries and opens to expose bright orange/brown seeds.

Glory lily forms dense thickets that smother shrubs or herbs mainly in littoral rainforest and other coastal areas. It is extremely difficult to control due to its complex network of underground reproductive tubers. Regrowth readily occurs from seeds & roots. Seeds are often spread by humans, birds and animals.

Priorities for control

Various control programs are implemented across the region particularly in association with the implementation of bitou bush TAP actions and site specific management plans including Cudgen, Wooyung, Brunswick Heads (north) and Billinudgel nature reserves, and Bundjalung National Park. Control programs should occur to target new emerging growth from October through to November and include follow-up throughout the summer/autumn period. Collection of seed is also recommended if applicable, especially in newly identified locations.

Control

The control technique recommended for glory lily is to spray emerging growth with a one part glyphosate to 50 parts water plus LI 700. Follow up work is recommended annually to control emergents. Integrate weed control programs to follow-up and eradicate glory lily concurrently or in association with bitou bush control programs.

Monitoring

Continue to survey and monitor distribution and abundance of previously treated infestations in parks listed above. Record treatment on NPWS chemical record sheets in accordance with the Pesticides Act. Identify and develop control programs for new and outstanding infestations.

11.3.4 Groundsel Bush (*Baccharis halimifolia*) - Northern Rivers Region

Distribution and abundance

Groundsel bush is a declared category 3 Noxious Weed throughout NRR

The distribution of groundsel bush is fairly widespread across the Region both on public and private lands. Numerous parks contain infestations and the severity varies between parks. The Tweed and Brunswick valleys have been identified by Far North Weeds as the worst areas of infestation. Some of the most extensive areas infestations are found in the Tweed Valley, up near the NSW and QLD border in Border Ranges and Mebbin national parks and Limpinwood NR. Serious infestations occur at Ballina, Billinudgel Nature Reserve and Bundjalung NP. Other smaller infestations occur in Snow's Gully, Stott's Island, Richmond River, Hayter's Hill, Cumbebin Swamp, Ukerebagh nature reserves and Richmond Range, Koreelah, Mt Clunie, Tooloom, Toonumbar, Broadwater and Arakwal national parks.

Impacts

Groundsel bush is effectively dispersed by wind over widespread areas. It invades both agricultural and forested land, particularly moist areas such as swamps, gullies and drainage areas including both disturbed and undisturbed native plant communities. In areas of native vegetation, it directly competes with and displaces native species.

Priorities for control

Extensive control programs for groundsel bush occur in NRR. Many control programs are implemented to reduce spread into adjoining areas such as Richmond Range, Tooloom, Toonumbar national parks and Billinudgel NR. Long term follow-up weed control and maintenance of previously treated areas continues to occur in Border Ranges, Koreelah and Mt Clunie national parks, Limpinwood, Stott's Island, Bungabbee, Bungawalbin, Hayter's Hill, Snow's Gully and Ballina nature reserves.

Control

Control techniques commonly used include back pack spraying, vehicle-based spraying and manual herbicide application by both NPWS staff and contractors *i.e.* Far North Coast Weeds.

In some park areas some biocontrol predators such as the gall fly and stem borer are still active. Bio-control alone is not considered an effective form of control, as most agents reduce the amount of flower produced, but do not prevent flowering. For example a rust fungus *Puccinia evadens* hack was released in Broadwater NP in 2001. These agents form part of an integrated control program for the control of groundsel.

Monitoring

- Complete daily record sheets in accordance with the Pesticides Act including GPS locations of treatment sites.
- Survey and monitor ongoing control programs to assess follow-up treatments required.
- Investigate new reports of groundsel within parks.
- Conduct aerial surveys (where possible) between March-April when flowering.
- Identify and develop control programs for new and outstanding infestations.

11.3.5 Giant Parramatta Grass (*Sporobolus indicus* var. *major*) & Giant Rat's Tail Grass (*Sporobolus pyramidalis*) - Northern Rivers Region

Distribution and abundance

Giant Parramatta grass is a class 4 noxious weed and giant rat's tail grass is declared as a class 3 noxious weed in the NRR.

These grasses pose a major threat to productivity on grazing land, and are widespread throughout roadsides of Lismore, Richmond Valley, Tenterfield, Byron, Tweed and Kyogle Council areas. The main methods of dispersal are vehicle and stock movements.

There are several known infestations in the Region on NPWS parks. Most occur on the road verges of Mt Clunie, Koreelah, Yabbra, Richmond Range, Border Ranges, Mallanganee, Tooloom, and Toonumbar national parks, and Captain's Creek and Billinudgel nature reserve.

Other infestations adjoining parks on road reserves but not on NPWS managed lands include Bungawalbin NP, NR and SCA and Yarringly NR.

Impacts

Giant Parramatta grass and giant rat's tail grass are readily spread on the tyres of machinery and vehicles, and by cattle movements. They have the potential to spread rapidly throughout parks *via* track and road systems by visitor and NPWS vehicles.

Priorities for control

Follow-up control works are required for the following areas for Giant Parramatta grass in Mt Clunie, Koreelah, Yabbra, Richmond Range, Border Ranges, Tooloom and Toonumbar national parks, and Captain's Creek and Billinudgel nature reserve.

Control

- Roadside spraying using Taskforce® will be implemented by both NPWS staff and contractors *i.e.* Far North Coast Weeds and Tenterfield Council in August to November. In sensitive areas glyphosate products will be used to control GPG.
- Liaise with relevant authorities regarding cooperative programs in adjoining areas.
- NPWS staff to formulate hygiene protocol for NPWS vehicles and machinery in areas of heavy infestation to reduce spread.

Monitoring

- NPWS staff and contractors to document treatment details on chemical users forms in accordance with the Pesticides Act including GPS locations and lengths of roadsides treated.
- NPWS staff to assess known infestations and identify follow-up treatment requirements for identified areas. Liaise with local Councils and County Councils regarding coordinated management.

11.3.6 Coolatai grass (*Hyparrhenia hirta*) - Northern Rivers Region

Distribution and abundance

Coolatai grass is a highly invasive introduced grass that is a native to South Africa and the Mediterranean regions. Coolatai grass is a tall tufted summer active perennial grass that grows to 1.5m in height, and can be identified by paired seed heads and spikelets with whitish hairs and its leaves are 2-4mm wide, grey brown in colour and harsh to touch. Coolatai grass is drought tolerant and grows prolifically in the warmer months; it is frost sensitive thus dies back in winter.

Coolatai grass has been detected in the NRR at Maryland NP. African love grass has also been reported along the tracks and trails within Maryland NP. It is being controlled in conjunction with Coolatai grass. Coolatai grass has taken over large areas of the north-west of NSW. It also occurs on the north coast, slopes and table lands of NSW. Coolatai grass has the ability to invade non-disturbed areas thus making it an extremely invasive plant species.

Impacts

Coolatai grass together with a range of exotic perennial grasses has been listed as a KTP "Invasion of native plant communities by exotic perennial grasses" under the TSC Act.

Coolatai grass can quickly invade undisturbed areas thus leading to a significant reduction in biodiversity. It rapidly spreads by seed dispersal that attaches themselves to animals or machinery.

Priorities for control

Kyogle Area to continue control of Coolatai and African love grass with neighbours adjoining Maryland NP. Staff should be alerted to this weed and control new outbreaks as soon as practicable to reduce any further spread.

Control

There is currently an off label permit for the use of Glyphosate herbicides and tussock herbicides for the spot spraying of Coolatai grass, PER 7883, this is valid until the 30th of September 2009.

Monitoring

- All treatments to be recorded using chemical record sheets in accordance with the Pesticides Act.
- Kyogle Area staff to monitor Maryland NP to assess re-invasion of Coolatai grass and success of previous treatments, in conjunction with adjoining landholders and Tenterfield Council.
- Monitor presence of Coolatai in areas adjoining Jubullum Flat Camp where infestations outside of the reserve lease have been recorded.
- NPWS staff to familiarise themselves with Coolatai grass identification and investigate reports accordingly.
- NPWS staff to respond with control programs when appropriate and initiate vehicle hygiene to reduce further spread to other areas.

11.3.7 Camphor Laurel (*Cinnamomum camphora*) - Northern Rivers Region

Distribution and abundance

Camphor laurel is a declared category 4 noxious weed in all local government areas except the Shires of Tweed and Byron, and in part of the Shire of Ballina north of the Bruxner Highway where it is not declared a noxious weed.

Camphor laurel is a prolific seeder and is extremely attractive to native birds and butterflies as

a food source. As a result of bird dispersal, it has extensively naturalised throughout the far north coast of NSW. It is now widespread throughout the Tweed and Brunswick catchments and to a lesser extent in the Richmond catchment and Upper Clarence.

Camphor laurel commonly occurs throughout the small rainforest remnant parks of the Big Scrub including Victoria Park, Davis Scrub, Andrew Johnston Big Scrub nature reserves and is establishing in larger parks such as Nightcap, Mt Jerusalem, Mooball, Wollumbin national parks. Various stages of tree growth are represented in parks including large mature trees, saplings and seedlings.

Impacts

Camphor laurel is an aggressive competitor and invader of disturbed native plant communities, particularly the edges and gaps in rainforest remnants. It also rapidly colonises vast areas of previously cleared lands including grazing properties, where no control is implemented, rapidly transforming sites into camphor dominated forests.

Camphor is also rapidly establishing in wet and dry sclerophyll forests and the ecotones with rainforest, rapidly competing with native flora species.

Inhibits native rainforest regeneration and alters feeding patterns of native birds particularly rainforest pigeons, currawongs, figbirds, orioles *etc.* This results in widespread dispersal over the landscape.

Priorities for control

Early control of camphor laurel in newly established infestations is a high priority for control due to its highly invasive capabilities *e.g.* spraying of seedlings and injection of saplings in Nightcap and Border Ranges NPs and Bungabee and Muckleewee NR's. In areas where camphor laurel comprises a significant proportion of the native plant community and its structure, together with other weed species a longer term systematic approach to removal/control is required to maintain structure of the forest *eg* the Big Scrub rainforest remnants. Control should be implemented as part of the overall restoration of the native plant community outlined in Region's Rainforest Restoration Program plans and PMP's *eg* Mooball and Mt Jerusalem NP's.

Control

NRR has been actively controlling camphor laurel throughout many of the parks for several years prior to declaration as a noxious weed. Camphor laurels are regularly controlled as part of the RR&R plans *ie* the Big Scrub remnants.

Large trees are stem-injected unless they pose public liability threats to park visitors. In this situation they are cut down and the stump treated.

Caution is applied when treating large camphor laurel in rainforest remnants as it is important to retain a degree of canopy cover. In these situations, strategic control of camphor laurel is often undertaken over a long period of time.

All control works are undertaken as part of an integrated and systematic approach to rainforest restoration and rehabilitation in the Region.

Monitoring

- Daily record sheets are kept for all weed control programs in accordance with the Pesticides Act.
- Before and after photos are also taken during the course of implementation of works.
- Where possible GPS locations are taken of work site locations including the extent of weed distribution and control implemented. Sites are re-visited periodically for follow-up treatment and maintenance.

11.3.8 Blackberry (*Rubus fruticosus aggregate*) - Northern Rivers Region

Distribution and abundance

The term 'blackberry' covers at least 14 different but closely related species, including hybrids that have become naturalised in Australia.

Blackberry rarely invades undisturbed vegetation communities but does readily establish in disturbed areas on agricultural lands, roadsides, banks of watercourses, forests and bushland. It is common throughout temperate Australia in areas where rainfall is greater than 750 mm per annum. Blackberry is known to exist in isolated occurrences in the Kyogle area, the western side of the NRR in such parks as: Koreelah and Maryland national parks

Impacts

Blackberry is a *Weed of National Significance* because of its invasiveness, potential for spread, and economic and environmental impacts. It is listed as a Class 4 weed under the *Noxious Weeds Act* throughout most of NSW.

Blackberry is a sprawling perennial shrub that has long thorn covered stems (canes) that can form large thickets which exclude light from the soil surface. Thickets can grow to several metres high and seriously impede regeneration of native flora species through competition for moisture, soil nutrients and light. Large, dense infestations can restrict access to watercourses by native fauna and park users.

It also provides significant harbour for rabbits, foxes, feral pigs and other pest animal species.

Priorities for control

- Blackberry is a lower control priority within NRR due to its relative small, patchy and isolated occurrences commonly restricted to roadsides.
- Identify additional areas of infestation and program appropriate control.

Control

- Control Blackberry in identified areas of Koreelah and Maryland NP's in accordance with approved herbicides as per the label directions.
- Integrate roadside spraying programs including blackberry control to reduce the distribution and potential to spread.
- Survey previously treated areas and implement follow-up treatment as required.

Monitoring

- NPWS staff and contractors to document treatment details on chemical users forms in accordance with the Pesticides Act including GPS locations and lengths of roadsides treated.
- NPWS staff to assess known infestations and identify follow-up treatment requirements for identified areas.
- Liaise with local Councils and County Councils regarding coordinated management where relevant.

11.3.9 Exotic Vines- Northern Rivers Region

Distribution and abundance

There are a number of extremely invasive exotic vines and creepers that are adversely impacting on native vegetation in NRR, especially in rainforest parks and bushland environments in close proximity to urban areas. These vines are common throughout the Region particularly the Tweed, Lismore, Ballina, Byron and Richmond Valley and Clarence Valley Council areas. Exotic vine infestations are becoming more prevalent in the Kyogle and Tenterfield Shires particularly the Upper Clarence catchment.

Seeds are spread by water, wind, birds and/or flying foxes, resulting in widespread infestation of these species. A number of exotic vines and scramblers are currently recognised as significant environmental weeds in particular regions such as the NSW North Coast Weeds Advisory Committee, (undated). Generally exotic vines and scramblers are widespread, and locally abundant, in the eastern part of NSW.

Impacts

'Invasion and establishment of exotic vines and scramblers' is listed as a KTP under the TSC Act. A species in this listing are contained in Appendix 4. Many of the more serious species have recently been declared as control category 3 noxious weeds such as kudzu (*Pueraria lobata*).

Exotic vines and scramblers may act as transformer species, altering the nature of the environment where they become dominant. Rainforests are susceptible to invasion by exotic vines particularly after canopy disturbance. Exotic vines and scramblers may smother existing vegetation, both in the ground layer and canopy. This alters the light climate in the invaded community and may suppress regeneration of native species. The sheer weight of exotic vines may cause breakage of branches in the canopy, and in some cases total canopy collapse. Some species form dense ground cover carpets that suppress native species (for example *Tradescantia fluminensis* and *Vinca major*). In sclerophyll communities, exotic vines and scramblers are more mesic than the native species, and may change the nature of the fuel and thus alter fire behaviour and regime.

Invasion by exotic vines and scramblers can also alter other biotic aspects of communities such as the abundance and diversity of plant-dwelling invertebrates. Dense smothering blankets or thickets of exotic vines and scramblers may also restrict movement of some native fauna and adversely affect their ability to access water or other resources (while sometimes favouring other fauna by providing protective shelter and/or food). Exotic vines and scramblers such as *Asparagus* spp. form masses of tuberous roots that may alter the biota of the soil and litter, changing rates of litter decomposition and nutrient cycling and compete for water and mineral nutrients with other plant species. They may also create a humid microclimate at ground or lower trunk level, favouring pathogenic attack and altering soil moisture and nutrient fluxes. Riparian vegetation is particularly prone to infestation by vines such cat's claw, (*Macfadyena unguis-cati*) due to high water and nutrient availability.

Priorities for control

The Region's Rainforest Restoration Project focuses on the control of all weed species in parks, including vines and creepers. Additionally the Regional Bitou Bush Strategy identifies the Region's priorities in accordance with the Bitou Bush TAP including exotic vines that occur in association with bitou. Park SSMP's, PMP's and RR&RP's identify specific weed control priorities and treatments in accordance with specific site conditions and circumstances for examples threatened species and other weeds present.

These overall programs are of critical priority given their significant impact to biodiversity and

in particular threatened species. Refer to the section 11.3.1 for the bitou bush control priorities and section 11.3.10 for the rainforest restoration priorities. There are additional critical priority projects (where parks with draft or without pest planning documents) such Border Ranges NP (Cats Claw – Findon Creek) Duroby NR (Maderia Vine) and Mt Clunie and Korreelah NP's (Moth vine).

Control

Implement control actions in accordance with Park SSMP's, PMP's and RR&RP's and off label permits PER 9907 (Expiry – 31/03/2012) and PER 8219 (Expiry – 03/10/2010) specific weed control priorities and treatments. Identify serious and potentially serious outbreaks of exotic vines/creepers in parks not currently included in the Region's Rainforest Restoration Project and implement a control program if required.

Monitoring

- NPWS staff and contractors to document treatment details on chemical users forms in accordance with the Pesticide Act including GPS locations.
- NPWS staff to assess known infestations and identify follow-up treatment requirements for identified areas.
- Liaise with private landholders, local Landcare, local councils and county councils regarding coordinated management where relevant.

11.3.10 Rainforest Restoration- Northern Rivers Region

Distribution and abundance

NRR contains some of the most important areas of rainforest in Australia, including a number of internationally significant areas of the World Heritage Gondwana Rainforests of Australia. Most of the rainforest in the NRR of NSW belong to the subtropical and dry rainforest types including several remnants of littoral rainforest that exist within the management areas. A number of rainforest vegetation communities are now recognised as endangered ecological communities under the TSC Act. A description of these communities is provided in Appendix 3. Appendix 4 contains the list of NRR parks and their attributes including EEC's and threatened species.

Since the first rainforest restoration projects on service estate began in 1978, a number of projects have been undertaken. Funding for such projects had come from a variety of sources including the National Rainforest Conservation Program, corporate sponsorships, NSW Biodiversity Strategy, NSW Environmental Trust Grants, World Heritage Trust, NPWS funds that include both recurrent and capital. Employment programs and such as Jobskills and Green Corps, community groups such as Landcare groups and volunteers have also contributed to the implementation of these projects.

Impacts

There are many threats to the long term viability of rainforest remnants. Some of these include: the small size of the remnant, abrupt edges on the boundary, a large perimeter to area ratio and the isolation of many of these rainforest remnants which makes them extremely vulnerable to weed infestations and damage.

Probably the most damaging weeds to remnant rainforests are lantana, camphor laurel and exotic vines, as discussed in Sections 11.3.2, 11.3.7 & 11.3.9 above. These vines and other weeds can rapidly destroy the structure of the rainforest and halt all the stages of the forests succession and regeneration for an indefinite period.

Priorities for control

There are numerous critical priorities for control for rainforest particularly in NRR. The Border Ranges Biodiversity Threatened Species Recovery Plan will prioritise the actions for implementation due to the number of EEC's and threatened species on the far north coast of NSW and south east QLD. This document is a cross border (NSW/QLD) cooperative approach to biodiversity conservation management.

Noxious and environmental weeds are routinely controlled whenever they occur in NR/NPs in accordance with park PMP's, RR&RP's and SSMP's and identified priority actions. Other target specific control programs in rainforest are implemented across the Region and have been discussed in previous sections.

Control

NRR has been successful in the restoration of rainforest remnants and continues to manage programs within resourcing constraints. This has been achieved by adopting a systematic and integrated approach to the removal of weed species. The RR&RP's prepared for managing these areas contains restoration strategies and principles based on this approach.

Current programs have been funded by the Northern Rivers CMA and NPWS staff. Programs are being implemented in Andrew Johnston Big Scrub, Boatharbour, Broken Head, Brunswick Heads, Davis Scrub, Hayters Hill, Moore Park, Wilson Park, Victoria Park nature reserves, Cape Byron SCA, Nightcap, Toonumbar (Murray Scrub) and Mallanganee national parks.

The plans describe the native vegetation of the area, identify the weed species present and

the associated management problems, and recommend control techniques and priorities for control within that specific area. All works are implemented in accordance with current APVMA off label permits such as PER9907.

Monitoring

- NPWS staff and contractors to document treatment details on chemical users forms in accordance with the Pesticide Act including GPS locations.
- NPWS staff to sites and continue follow-up treatment requirements for identified areas.
- NPWS staff to liaise with SCU regarding developing a suitable monitoring tool for collection of data and reporting of implementation of control works for rainforest areas.

11.4 Aquatic Weeds of the Northern Rivers Region

11.4.1 *Salvinia (Salvinia molesta)* - Northern Rivers Region

Distribution and abundance

Salvinia is a category 3 declared noxious within NRR. Salvinia is an aquatic weed that presents a problem in a number of waterways, particularly in the Tweed and Richmond River catchments. It is relatively a minor problem, although at times infestations can be significant, in the Upper Clarence River. Salvinia has also been recorded in Tallows Creek upstream of Arakwal NP adjoining private lands after high rainfall events and when weir levels overflow.

There are limited parks in the Region that contain Salvinia infestations.

Impacts

Salvinia spreads vegetatively by fragmentation and can rapidly form a closely packed, dense mat which totally covers waterways.

It invariably survives all forms of treatment as any remaining fragments can double their biomass in 5-10 days.

Priorities for control

There are only two known infestations on NPWS estate in Region. One occurs in the old sand mining dams within Tyagarah NR and the other in Yarringly NR.

Control

Control of salvinia is a medium priority in the Region. Control programs at Yarringly NR will continue with the support of Far North Coast Weeds. Water hyacinth is occasionally reported in Yarringly and is treated concurrently with Salvinia.

Biological control will be investigated for its suitability of the sites eg *Cyrtobagous salviniae* (a weevil) and *Samea multiplicalis* (a moth).

Liaise with neighbours in Tallows Creek area with regard to Salvinia infestations.

Monitoring

- NPWS staff and contractors to document treatment details on chemical users forms in accordance with the Pesticide Act including GPS locations.
- NPWS staff to assess known infestations and identify follow-up treatment requirements for identified areas.
- NPWS staff to liaise with Far North Coast Weeds to identify new locations of infestation.

11.4.2 Alligator Weed (*Alternanthera philoxeroides*) - Northern Rivers Region

Distribution and abundance

Boatharbour Nature Reserve is the only reserve in NPWS Northern Rivers Region that has infestations of alligator weed. It occurs within the park as far as scattered infestations in Wilson Creek and along the creek bank, however occurs upstream to Bangalow. It is known to occur both in the riparian zone and in pastures on adjoining agricultural land upstream of the Reserve.

Impacts

Alligator weed produces masses of creeping and layering stems over land and water. It is an aggressive invader that responds to high nutrient levels and is a major threat to wetlands, creeks, rivers and vegetation communities along the floodplain. New plants regenerate readily from plant fragments which facilitates rapid spread and increases the difficulty of control. Alligator weed is a Weed of National Significance and is declared a Class 2 weed under the *Noxious Weeds Act* in the Far North Coast Weeds area.

Priorities for control

Far North Coast Weeds staff survey and inspect the sections of Byron and Wilsons Creeks for outbreaks of Alligator weed as a high priority for control. Any incursions in Boatharbour Nature Reserve will be treated in cooperation with Far North Coast Weeds. New incursions detected in parks will also be a high priority for control should they occur.

Control

Far North Coast Weeds undertake both physical and chemical control of alligator weed. A combination of herbicides may be used to control the weed depending on the location of the infestation ie terrestrial and aquatic sites. Physical removal is also used given the difficulty of site access and sensitivity of the natural environment. Biological control with the flea beetle (*Agasicles hygrophila*) is also an option depending on site suitability. NPWS will work with local control authorities, DPI and the Richmond River Catchment Alligator Weed Taskforce to manage the weed and apply herbicides as part of a collaborative control program.

Monitoring

- NPWS will liaise with Far North Coast Weeds regarding monitoring of the aquatic form of alligator weed on the Byron and Wilson Creeks.
- NPWS will record and map all occurrences of the terrestrial form of alligator weed on parks and will monitor its distribution in response to control.
- NPWS will liaise and attend Richmond River Catchment Alligator Taskforce meetings with the local control authority, DPI and landholder representatives regarding alligator weed.

11.5 Other Significant Weeds- Northern Rivers Region

11.5.1 Environmental weeds and garden escapees

Distribution and abundance

There are numerous other plant species that establish in urban bushland areas as a direct result of the dumping of garden clippings and rubbish and dispersal by birds and other frugivores. Garden species can also often remain at the site of previous habitation and invade surrounding native vegetation, e.g. Billy's Hut site in Limpinwood NR and the former Ranger's Cottage in Broken Head NR. Plants can also invade parks from neighbouring land such as pines at Arakwal NP and Broadwater NP.

These weeds are often restricted to the urban interface with park/reserve boundaries or water-courses within urban parks such as Billinudgel, Brunswick Heads, Marshalls Creek and Cudgen nature reserves and Arakwal NP. Weeds include such garden species as monstera (*Monstera deliciosa*), broad-leaf pepper tree (*Schinus terebinthifolius*), Philodendron spp., callisia (*Callisia fragrans*), cape ivy (*Senecio macroglossus*), red salvia (*Salvia* spp.) and black-eyed susan (*Thunbergia alata*), crofton weed (*Ageratina adenophora*) and mistflower (*Ageratina riparia*). Refer to Appendix 5 & 6 for a list of noxious and environmental weeds and their distribution throughout parks in the Region

There are a range of widespread weed issues in the Region such as large and small leaf privets *Ligustrum lucidum* and *Ligustrum sinense* associated with urban areas such as the case for Urbenville and Koreelah areas.

Impacts

The extent of the impacts of environmental weeds generally is related to the vectors of dispersal such as water, wind and avi fauna, that allows for rapid transportation of weed species. These species are often highly competitive and invasive in natural environments and become problems in a landscape scale.

Damage to native vegetation occurs as a direct result of the large bulk of vegetative material that is often dumped, including the change of nutrient status and therefore changing species diversity.

Individual species such as mistflower (*Ageratina riparia*), crofton weed (*Ageratina adenophora*) is a threat, by competition to Threatened Species, such as Euphrasia on the escarpment at Limpinwood/Numinbah nature reserves and Border Ranges NP. Dense infestations of both species inhibit native regeneration, particularly on the edges of waterways.

Priorities for control

Most other significant weeds are identified in existing RR&RP's, PMP's and SSMP's. Where a plan is draft or not yet prepared programs are developed with relevant stakeholders. Refer to previous sections on noxious weeds, bitou bush, rainforest programs for priority programs.

Rubbish dumping will continue in the parks, clearly indicating the need for constant education and awareness programs with neighbours and stakeholders.

Control

Undertake targeted control of weed species such as:

- Crofton weed and mistflower in strategic areas to minimise impacts on natural and recreational values such as hand removal at the Pinnacle in the habitats of *Euphrasia* eg: Border Ranges NP.
- Broad leaf pepper (*Schinus terebinthifolia*) control in Flat Camp AA and Cape Byron SCA.
- Privet control in Koreelah NP

Where restoration programs are currently being implemented all weeds should be controlled in accordance with the relevant plan (where available) and current off label permits.

Encourage and support existing, and assist in the establishment of local bush regeneration groups such as Dunecare and Landcare. Support and seek funding to provide community groups with resources to implement on ground works and information on appropriate weed control techniques, native plant and weed identification.

Monitoring

- NPWS staff, contractors and volunteers to document treatment details on chemical users forms in accordance with the Pesticide Act including GPS locations.
- NPWS staff to assess sites and continue follow-up treatment requirements for identified areas.

11.5.2 Non-endemic species (former plantations)

Distribution and abundance

There are a number of parks within the Northern Rivers Region that were formerly state forest or are adjacent to existing timber plantations. Some of these areas contain plantations consisting of both exotic and non-endemic species. The following table summarises the locations of plantations across the Region.

	Non-endemic species														
	Hoop pine (<i>Araucaria cunninghamii</i>)	Kauri Pine (<i>Agathis robusta</i>)	<i>Pinus</i> spp.	Bunya pine (<i>Araucaria bidwillii</i>)	Grey Ironbark (<i>Eucalyptus paniculata</i>)	White Gum (<i>Eucalyptus dunnii</i>)	Messmate (<i>Eucalyptus obliqua</i>)	Shining Gum (<i>E. nitens</i>)	Grey Ironbark (<i>E. siderophloia</i>)	Blackbutt (<i>E. pilularis</i>)	Flooded Gum (<i>Eucalyptus grandis</i>)	Gympie messmate (<i>E. cloeziana</i>)	Large-fruited Blackbutt (<i>E.pyrocarpa</i>)	Queensland maple (<i>Flindersia braeyleana</i>)	Mixed spp. unknown
Border Ranges NP			x							x					
Broadwater NP			x												
Bundjalung SCA						x	x								
Cudgen NR			x												
Goonengerry NP										x	x		x		
Jackywalbin NP			x												
Koreelah NP			x	x											
Mebbin NP	x	x	x							x	x	x			
Mt Jerusalem NP										x	x				
Nightcap NP	x						x	x		x	x			x	
Tooloom NP	x						x	x							
Toonumbar NP	x										x				
Whian Whian SCA	x				x	x	x	x	x					x	
Wollumbin NP										x	x				x
Yabbra NP	x		x			x									

Impacts

Former plantations where species are likely to spread require active control to (prevent spread and) to encourage natural vegetation structure and regeneration to improve ecological integrity including that of the indigenous gene pool. The extent of the impacts of non-endemic species generally is related to the potential for spreading and invasiveness of the particular species into surrounding park area.

Priorities for control

Northern Branch is preparing a Plantation Forests Management Strategy that involves the assessment and prioritisation of plantations in parks within Regions. Plantations are assessed using criteria to determine invasiveness and risk of plantation species and restoration capacity of the sites. Regional priorities will be determined through the outcome of this process. Upon completion implementation of required actions will be in accordance with the priorities identified in this process.

Control

Once priorities have been determined for restoration and rehabilitation involving potential harvesting and weed control, appropriate methods will be outlined in site specific management plans, for onground works works required.

Monitoring

- Implement standardised monitoring as recommended in the Branch Strategy.
- NPWS staff, contractors and volunteers to document treatment details on chemical users forms in accordance with the Pesticide Act including GPS locations.
- NPWS staff to assess sites and continue follow-up treatment requirements for identified areas.

12 Summary of Northern Rivers Region Pest Program 2008-2011

Pest or Issue	Action	Park	Priority				Responsibility	Partnerships
			Critical	High	Medium	Low		
Wild Dogs (11.1.1)	Implement actions from Wild Dog Management Plans: Casino, Tweed-Lismore, Northern New England Legume-Korreelah.	All parks	☺				All NPWS staff with assistance from PMO	Relevant RLPB
	Participate and contribute to Review of wild dog management plans (as required) with RLPB's and relevant stakeholders	All parks			☺		NPWS PMO with assistance with NPWS staff	Relevant RLPB, Dept of Lands, DPI (Forests and Agriculture)
	Undertake wild dog control including sand pad monitoring	Bundjalung NP, Nightcap NP, Whian Whian SCA, Bungabbee NR, Muckleewee NR, Goonengerry NP, Mebbin NP, Mt Jerusalem NP, Richmond Range NP, Mt Nullum NR, Maryland NP, Tooloom and Korreelah NP.	☺				PMO to coordinate with NPWS staff and contractors	Relevant RLPB
Cats (11.1.2)	Implement any actions from in accordance with the pending TAP for the feral cat and Recovery Plans for threatened species eg: POC.	All parks	☺				All NPWS staff with assistance from PMO	Relevant RLPB, local government, NRCMA and interested landholders and Landcare groups
	Encourage research into the distribution, abundance and monitoring of control programs for feral cats.	All parks					All NPWS staff with assistance from PMO	NRCMA, SCU, relevant RLPB and interested Landcare groups and landholders.
	Continue to co-ordinate with Tweed-Lismore and Casino RLPB and park neighbours regarding other pest animal	All parks						Relevant RLPB, Dept of Defence, NRCMA, local government, local Landcare groups and

Pest or Issue	Action	Park	Priority				Responsibility	Partnerships
			Critical	High	Medium	Low		
	control on adjoining lands ie Fox TAP and wild dog control.							individual landholders
	Where appropriate, support local of-park control programs (coordinated strategic programs encouraged)	Areas adjoining NPWS estate or identified as high conservation significance				☺	DECC to provide assistance where necessary	Relevant RLPB
Foxes (11.1.3)	Implement NSW Fox TAP	Bundjalung NP, Broadwater NP, Richmond River NR, Dubay Jargum Nurahm AA, Yabbra NP	☺				PMO to coordinate with NPWS staff and contractors	Relevant RLPB, NRCMA, DPI Forests
	Report data collected from programs to HO for collation and review of Fox TAP	Bundjalung NP, Broadwater NP, Richmond River NR, Dubay Jargum Nurahm AA, Yabbra NP	☺				PMO to coordinate with NPWS staff and contractors	
	Coordinate and administer NRR pied oystercatcher Protection Program including monthly Committee meetings with relevant land Managers during the POC breeding season.	Richmond River NR, Dubay Jargum Nurahm AA, Broadwater NP, Bundjalung NP			☺		Richmond River Area Rangers with assistance from PMO	DECC/Dept of Lands, Dept of Defence, Ballina Shire, Richmond Valley Council, Tweed-Lismore RLPB
	Implement relevant actions from Dept of Lands Threatened Species (pied oystercatcher) Management Strategy with stakeholders	Richmond River NR, Dubay Jargum Nurahm AA, Broadwater NP, Bundjalung NP			☺		Richmond River Area Rangers with assistance from PMO	DECC/Dept of Lands, Dept of Defence, Ballina Shire, Richmond Valley Council, Tweed-Lismore RLPB
	Implement fox control in conjunction with neighbours, landcare groups and local government	Brunswick Heads NR, Arakwal NP				☺	All NPWS staff with assistance from PMO	Byron Shire Council, local Landcare and individual landholders

Pest or Issue	Action	Park	Priority				Responsibility	Partnerships
			Critical	High	Medium	Low		
Cane Toad (11.1.4)	Implement Northern Branch Cane Toad Management Strategy	All parks	☺				All NPWS staff with assistance from PMO	Local government, NRCMA, local Landcare groups and individual landholders
	Implement Northern Rivers Regional Cane toad Management Strategy	Border Ranges NP, Nightcap NP, Mebbin NP, Whian Whian SCA, Broadwater NP, Bundjalung NP	☺				All NPWS staff with assistance from PMO	Local government, NRCMA, local Landcare groups and individual landholders
	Implement KTP 'cane toads' PAS actions relating to survey of current distribution in northern NSW	All parks	☺				All NPWS staff with assistance from PMO	NRCMA and local government, local Landcare groups and individual landholders.
	Implement cane toad education and awareness programs including 'Trap That Toad' School education program	All land tenures	☺				Discovery Coordinator with assistance from PMO and SRCR	Local Government, NRCMA, SEQId Catchments, QPWS, Dept of Education and local schools
Feral Pig (11.1.5)	Implement Newrybar Swamp Feral Pig Management Strategy	Ballina NR and adjoining lands	☺				Richmond River Area Rangers with assistance from PMO	Ballina Shire, Tweed-Lismore RLPB, private landholders, NRCMA
	Coordinate and administer Newrybar Swamp Feral Pig Management Committee including quarterly Committee meetings with relevant land Managers		☺				Richmond River Area Rangers with assistance from PMO	Ballina Shire, Tweed-Lismore RLPB, private landholders,
	Implement feral pig control KTP PAS action	Bundjalung NP, Ballina NR Bungawalbin NP, NR and SCA & Maryland NP	☺				All NPWS staff with assistance from PMO	Relevant RLPB
	Conduct feral pig education and awareness programs as part of Discovery program	All land tenures, particularly Lennox Head and Ballina			☺		Discovery Coordinator with assistance from PMO and SRCR	Dept of Education and local schools

Pest or Issue	Action	Park	Priority				Responsibility	Partnerships
			Critical	High	Medium	Low		
Feral Goats (11.1.6)	Liaise with Northern Tablelands Region (DECC) and QPWS regarding feral goat populations adjoining Northern Rivers Region Parks	All parks			☺		PMO and relevant Area NPWS staff	Northern New England RLPB, QPWS, Northern Tablelands Region (DECC)
	Liaise with local RLPB's regarding reports of feral goats in the Region	All parks	☺				PMO and relevant Area NPWS staff	Relevant RLPB, and NEPAAC
	Investigate reports of feral goats in the parks of the Region	All parks	☺				PMO and relevant Area NPWS staff	Relevant RLPB
	Liaise with neighbours regarding straying stock and boundary fencing policy	All parks	☺				Relevant Area staff	private landholders
Feral Cattle (11.1.7)	Implement actions from relevant Pest Management Plans including feral cattle and straying stock	Bungabbee and Muckleewee NR's.			☺		Relevant Area staff with assistance from PMO	Relevant RLPB, local government,
	Liaise with neighbours regarding straying stock and boundary fencing policy	All parks			☺		Relevant Area staff	private landholders
European Rabbit and Brown Hare (11.1.8)	Implement actions from relevant Pest Management Plans	eg: Arakwal NP			☺		Relevant Area staff with assistance from PMO	Byron Shire Council, Byron Bay High School, St Finbars Primary School, Tweed-Lismore RLPB
	Liaise with neighbours and adjoining land managers regarding control programs for rabbits and or brown hares	eg: Cudgen NR and Tweed Shire Council				☺	Relevant Area staff with assistance from PMO	Tweed-Lismore RLPB

Pest or Issue	Action	Park	Priority				Responsibility	Partnerships	
			Critical	High	Medium	Low			
	Implement MoU with Darling Downs-Moreton Rabbit Board, liaise with inspector and attend meetings when required.	Koreelah NP	☺				Relevant staff assistance PMO	Area with from	Casino RLPB /Northern New England RLPB
	Implement rabbit control in areas adjoining Darling Downs-Moreton Rabbit Fence.	eg: Maryland and Koreelah NP's	☺				Relevant staff assistance PMO	Area with from	Casino RLPB /Northern New England RLPB
Bell Miner Associated Dieback (11.1.9)	Implement Bell Miner Associated Dieback Strategy	All parks		☺			Relevant staff assistance PMO	Area with from	Forests NSW, landholders, BMAD working group
	Attend Bell Miner Assisted Dieback working Group and liaise with relevant stakeholders	All relevant parks		☺			Delegated representative	NRR	
Indian myna (11.1.10)	Support local government and the community to survey and control indian mynas					☺	Relevant staff assistance PMO	Area with from	Relevant local government, NRCMA, local Landcare groups and individual landholders
	Document sightings and investigate reports of indian mynas on parks of the Region.		☺				Relevant staff assistance PMO	Area with from	Relevant local government, NRCMA, local Landcare groups and individual landholders
Feral Poultry (11.1.11)	Undertake control of feral poultry in Brunswick Heads (south) NR	Brunswick Heads (south) NR				☺	Relevant staff assistance PMO	Area with from	Byron Shire Council and the Tweed-Lismore RLPB
	Investigate reports of feral poultry in other parks in the Region	All parks			☺		Relevant staff assistance PMO	Area with from	Relevant RLPB and local government

Pest or Issue	Action	Park	Priority				Responsibility	Partnerships
			Critical	High	Medium	Low		
Yellow Crazy Ants (11.2.1)	Investigate reports of yellow crazy ants in parks in the Region	All parks	☺				Relevant staff assistance PMO	Area with assistance from DPI Agriculture
Red-Imported Fire Ants (11.2.2)	Investigate reports of red imported fire ants in parks in the Region	All parks	☺				Relevant staff assistance PMO	Area with assistance from DPI Agriculture
Red Pored Fungi (11.2.3)	Investigate reports of red pored fungi in parks in the Region	All parks	☺				Relevant staff assistance PMO	Area with assistance from QPWS
Lethal Yellowing of Pandanus (11.2.4)	Investigate reports of lethal yellowing of pandanus in coastal parks	All coastal parks			☺		Relevant staff assistance PMO	Area with assistance from Pandanus Planthopper Working Group, local councils, DPI Agriculture, QPWS
Pandanus Planthopper (11.2.5)	Implement North Coast Pandanus Management Strategy	All coastal parks	☺				Relevant staff assistance PMO	Area with assistance from Pandanus Planthopper Working Group, local councils, DPI Agriculture, QPWS
	Participate and contribute to Pandanus Planthopper Working Group with relevant stakeholders		☺				PMO and relevant Area NPWS staff	Tweed, Byron, Ballina, Richmond Valley, Clarence Valley Councils, DPI Agriculture, Dept of Lands,
Red Eared Slider Turtles (11.2.6)	Investigate reports of red eared slider turtles on parks (or in close proximity to)	All parks	☺				PMO and relevant Area NPWS staff	DPI Agriculture, Biosecurity Queensland
	Support the investigation of reports of red eared slider turtles off park	Within Region, ie Kyogle report				☺	PMO and relevant Area NPWS staff	DPI Agriculture, Biosecurity Queensland

Pest or Issue	Action	Park	Priority				Responsibility		Partnerships
			Critical	High	Medium	Low			
Plant pathogen (<i>Phytophthora</i>) (11.2.7)	Prevent the spread of <i>Phytophthora cinnamomii</i> in current location to non-infected areas	All parks	☺				Relevant staff assistance PMO	Area with from	Gondwana Rainforests Of Australia, NRCMA, QPWS, local government
	Verify any potential/suspect occurrence of <i>Phytophthora cinnamomii</i> in other reserves in NRR via sampling with the Gondwana Rainforest Reserves WHA.	All parks	☺				Relevant staff assistance PMO	Area with from	Gondwana Rainforests Of Australia, NRCMA, QPWS, local government
	Development and implementation of appropriate containment and control eg trial the use of commercial phosphite (stem injecting individual eucalypt trees)	Affected parks ie Nightcap NP and Whian Whian SCA	☺				Relevant staff assistance PMO	Area with from	Gondwana Rainforests Of Australia, NRCMA, QPWS, local government
	Set up soil sampling areas adjacent to containment boundaries to monitor movement of pathogen	Affected parks ie Nightcap NP and Whian Whian SCA		☺			Relevant staff assistance PMO	Area with from	Gondwana Rainforests Of Australia, NRCMA, QPWS, local government
	Strategic and opportunistic surveys and sampling of dieback in known areas.	Affected parks ie Nightcap NP and Whian Whian SCA		☺			Relevant staff assistance PMO	Area with from	Gondwana Rainforests Of Australia, NRCMA, QPWS, local government
Plant pathogen (<i>Phellinus noxius</i>) (11.2.8)	Prevent the spread of <i>Phellinus noxius</i> in current location to non-infected areas	Cape Byron SCA	☺				Relevant staff assistance PMO	Area with from	Byron Shire Council
	Survey and monitor other tree dieback and poor palnt heath in other areas and confirm status of <i>Phellinus noxius</i>	All parks	☺				Relevant staff assistance PMO	Area with from	Relevant local government, NRCMA, local Landcare groups and individual landholders

Pest or Issue	Action	Park	Priority				Responsibility		Partnerships
			Critical	High	Medium	Low			
Bitou Bush (11.3.1)	Implement Bitou Bush TAP	All coastal parks	☺				Relevant staff assistance PMO	Area with from	Relevant local government, NRCMA, local Landcare groups and individual landholders
	Implement priority bitou bush control in accordance with Site Specific Management Plans and Bitou Bush TAP	All coastal parks	☺				Relevant staff assistance PMO	Area with from	Local government, Dept of Defence and Dept of Lands
	Implement Regional Bitou Bush Management Strategy	All coastal parks			☺		Relevant staff assistance PMO	Area with from	Relevant local council, local Landcare and individual landholders
	Participate and contribute in Tweed Shire Bitou Bush Management Committee	Ukerebagh Island NR, Tweed Estuary Islands NR, Cudgen NR, Wooyung NR, Billinudgel NR			☺		Relevant staff assistance PMO	Area with from	Far North Coast Weeds, Tweed Shire,
Lantana (11.3.2)	Undertake strategic control of lantana as priority actions from Park/Reserve Pest Management and Restoration and Rehabilitation Plans	All parks	☺				Relevant staff assistance PMO	Area with from	Relevant local council, local Landcare and individual landholders
	Undertake strategic control of lantana as priority actions relating to threatened species management including the implementation of recovery plan actions i.e. eastern bristlebird habitat management	Border Ranges NP for eastern bristlebird, Nightcap NP, Mallangane NP for <i>Myrsine richmondensis</i>	☺				Relevant staff assistance PMO	Area with from	QPWS, private landholders
	Support the development of the National Lantana Management Strategy	All parks	☺				PMO and relevant Area NPWS staff		NRCMA, landcare groups, DPI Forests,

Pest or Issue	Action	Park	Priority				Responsibility	Partnerships	
			Critical	High	Medium	Low			
Glory Lily (11.3.3)	Implement control programs across the region particularly in association with the implementation of Bitou Bush TAP actions and site specific management plans	Cudgen, Wooyung, Brunswick Heads (north) and Billinudgel NR's, and Bundjalung NP	☺				Relevant staff assistance PMO	Area with from	Far North Coast Weeds, local government, NRCMA, local Landcare and individual landholders
Groundsel Bush (11.3.4)	Undertake control of groundsel bush.	Border Ranges NP, Ukerebagh NR, Cudgen NR, Billinudgel NR, Mebbin NP, Stott's Island NR, Koreelah and Mt Clunie NP's.			☺		Relevant staff assistance PMO	Area with from	Far North Coast Weeds, Clarence Valley and Tenterfield Council and QPWS,
	Investigate new reports of groundsel bush	All parks including Hayters Hill NR, Arakwal NP and Cumbeebin Swamp NR			☺		Relevant staff assistance PMO	Area with from	Far North Coast Weeds, Clarence Valley and Tenterfield Council
Giant Parramatta Grass (11.3.5)	Undertake control of giant Parramatta grass	Toonumbar NP, Border Ranges NP, Richmond Range NP, Captain's Creek NR, Billinudgel NR, Yabbra NP, Koreelah NP and Mt Clunie NP.			☺		Relevant staff assistance PMO	Area with from	Far North Coast Weeds and Tenterfield Council and local contractors
	Investigate new reports of giant Parramatta grass	All parks			☺		Relevant staff assistance PMO	Area with from	Far North Coast Weeds, Clarence Valley and Tenterfield Council
Giant Rat's Tail Grass (11.3.5)	Undertake control of giant rat's tail grass	All parks			☺		Relevant staff assistance PMO	Area with from	Far North Coast Weeds, Clarence Valley and Tenterfield Council
Coolatai Grass (11.3.6)	Undertake control of Coolatai grass	Maryland NP	☺				Relevant staff assistance PMO	Area with from	Tenterfield Council

Pest or Issue	Action	Park	Priority				Responsibility		Partnerships
			Critical	High	Medium	Low			
	Investigate new reports of Coolatai grass	All parks eg: Jubullum Flat Camp	☺				Relevant staff assistance PMO	Area with from	Far North Coast Weeds, Clarence Valley and Tenterfield Council
Camphor Laurel (11.3.7)	Undertake control of camphor laurel	Nightcap, Mooball, Mt Jerusalem, Mt Warning and Border Ranges NPs and Victoria Park, Davis Scub, Andrew Johnsnton Big Scrub, Boatharbour, Tucki Tucki, Wilson, Billinudgel, Cudgen, Marshall's Creek, Inner Pocket, Brunswick Heads, Hayter's Hill, Bungabbee and Muckleewee NR's and Cape Byron SCA.			☺		Relevant staff assistance PMO	Area with from	Local government, Far North Coast Weeds and Tenterfield Council
Blackberry (11.3.8)	Undertake control of blackberry	Koreelah NP, Maryland NP			☺		Relevant staff assistance PMO	Area with from	Tenterfield Council and QPWS
	Investigate new reports of blackberry	All parks			☺		Relevant staff assistance PMO	Area with from	Tenterfield Council and QPWS
Exotic vines (11.3.9)	Undertake control of exotic vines in accordance with relevant Restoration and Rehabilitation Plans and Pest Management Plans in high priority areas containing EEC's and threatened species	All parks eg cat's claw control along Findon Creek in Border Ranges NP, balloon vine control in Moore Park NR, madeira vine control in Boatharbour NR, Koreelah and Mt Clunie NP's.	☺				Relevant staff assistance PMO	Area with from	NRCMA, local landcare groups, local councils

Pest or Issue	Action	Park	Priority				Responsibility	Partnerships	
			Critical	High	Medium	Low			
	Undertake control of exotic vines in accordance best practice control techniques in areas where no pest planning has been completed.	Moth vine control in Yabbra NP, madeira vine and cat's claw control in Duroby NR, kudzo control in Couchy Creek NR and Mt Jerusalem NP	☺				Relevant staff assistance PMO	Area with from	NRCMA, local landcare groups, local councils
	Investigate new reports of exotic vines (listed in KTP)	All parks	☺				Relevant staff assistance PMO	Area with from	QPWS, NRCMA, local landcare groups, local councils
	Implement key actions of the exotic vines KTP PAS	All parks	☺				Relevant staff assistance PMO	Area with from	NRCMA, local landcare groups, local councils
Rainforest Restoration (11.3.10)	Implement priority actions in Rainforest Remnants and Restoration and Rehabilitation Plans	Mallangane NP, Andrew Johnston Big Scrub NR, Boatharbour NR, Davis Scrub NR, Snow's Gully NR, Victoria Park NR, Wilson NR, Hayter's Hill NR, Moore Park NR, Stott's Island NR, Cape Byron SCA and Broken Head NR	☺				Relevant staff assistance PMO	Area with from	Local council and local landcare groups
	Implement priority actions for Rainforest in Pest Management Plans	Nightcap NP, Mt Warning NP, Border Ranges NP, Mallangane NP, Murray Scrub – Toonumbar NP	☺				Relevant staff assistance PMO	Area with from	local council and local landcare groups
Salvinia (11.4.1)	Undertake salvinia control	Bungawalbin, Tyagarah NR			☺		Relevant staff assistance PMO	Area with from	Far North Coast Weeds

Pest or Issue	Action	Park	Priority				Responsibility	Partnerships
			Critical	High	Medium	Low		
	Investigate new reports of salvinia	All parks			☺		Relevant staff with assistance from PMO	Far North Coast Weeds, Clarence Valley and Tenterfield Council
Alligator Weed (11.4.2)	Support FNCW in the control of alligator weed on Wilson and Byron Creeks	Boatharbour NR	☺				PMO with assistance from relevant Area Staff	Far North Coast Weeds
	Survey and control alligator weed in Boatharbour NR (terrestrial sites)	Boatharbour NR	☺				Relevant staff with assistance from PMO	Far North Coast Weeds
	Participate and contribute in the Richmond River Catchment Alligator Weed Management Committee	Boatharbour NR	☺				PMO with assistance from relevant Area Staff	Far North Coast Weeds
Pest Planning (4.2)	Prepare pest management plans for parks (currently without plans)	As per Appendix 4			☺		Relevant staff with assistance from PMO	Relevant local government, RLPB, NRCMA, local Landcare and individual landholders
	Review and update finalised Restoration and Rehabilitation Plans and Pest Management Plans as required	As per Appendix 4				☺	Relevant staff with assistance from PMO	Relevant local government, RLPB, NRCMA, local Landcare and individual landholders
	Implement priority actions for finalised Restoration and Rehabilitation Plans and Pest Management Plans	As per Appendix 4	☺				Relevant staff with assistance from PMO	Relevant local government, RLPB, NRCMA, local Landcare and individual landholders
	Seek external funding for the implementation of actions identified in Restoration and Rehabilitation Plans and Pest Management Plans	All parks	☺				Relevant staff with assistance from PMO	Relevant local government, RLPB, NRCMA, local Landcare and individual landholders

Pest or Issue	Action	Park	Priority				Responsibility	Partnerships	
			Critical	High	Medium	Low			
	Finalise current draft Pest Management Plans	Border Ranges NP, Bungabbee and Muckleewee Mountain NR's.		☺			Relevant staff assistance from PMO	Area with assistance from	Relevant RLPB, QPWS, local Landcare.
Threatened Species Programs (4.3)	Implement actions in approved Recovery Plans	Various parks i.e. <i>Myrsine richmondensis</i> Mallangane NP and Boatharbour NR, <i>Corchorous</i> Richmond Range and Bungabbee NR, Mitchell's rainforest snail Stott's Island NR, <i>Diploglottis campbelli</i> , giant fern	☺				Relevant staff assistance from PMO	Area with assistance from	Private landholders, NRCMA and local Councils
	Implement actions in Priority Action Statements	Various parks i.e. Nightcap Oak, eastern bristlebird, Border Ranges – Hastings River mouse.	☺				Relevant staff assistance from PMO	Area with assistance from	NRCMA
	Implement relevant actions in Cross regional projects such as the Border Ranges Biodiversity Hotspot Project and Multispecies Recovery Plan	All relevant parks	☺				Relevant staff assistance from PMO	Area with assistance from	NRCMA, local landcare groups, local councils
	Seek external funding for the implementation of actions identified in PAS, Recovery plans and Restoration and Rehabilitation Plans and Pest Management Plans for the enhancement of threatened species and endangered ecological communities	All relevant parks	☺				Relevant staff assistance from PMO	Area with assistance from	NRCMA, local landcare groups, private landholders and local councils

Pest or Issue	Action	Park	Priority				Responsibility	Partnerships
			Critical	High	Medium	Low		
Training of NPWS staff (4.4)	Provide relevant training to NPWS staff including: Chemical Users Certificate (AQF3), Conservation and Land Management Certificate (CLM) II - IV, fox den fumigation, 1080 baiting,		☺				PMO with assistance from ROC	RLPB's, TAFE, EnviTE, product manufacturers
Support regional coordination and support of pest programs and their implementation. (10)	Liase and encourage local aboriginal communities to support pest species awareness, training and control programs	Githabul and Arakwal ILUA parks		☺			Relevant Area staff with assistance from PMO	Githabul and Bundjalung people
	Support Department of Defence through the implementation of the MoU.	Bundjalung NP and SCA	☺				Relevant Area staff with assistance from PMO	Department of Defence
	Support Southern Cross University through implementation of the MoU including provision of student projects, placement of internships, and assistance with integrated and post graduate projects	All parks		☺			All Regional staff	Southern Cross University
	Participate and contribute in the North Eastern Pest Animal Advisory Committee (NEPAAC)	All parks		☺			PMO with assistance with Relevant regional staff	Dept of Lands, DPI (Agriculture & Forests), RLPB's, NRCMA, Game Council of NSW, RSPCA
	Participate and contribute in the North Coast Weeds Advisory Committee	All parks		☺			PMO with assistance with Relevant regional staff	Dept of Lands, DPI (Agriculture & Forests), RLPB's, NRCMA Local Councils

Pest or Issue	Action	Park	Priority				Responsibility	Partnerships
			Critical	High	Medium	Low		
	Participate and contribute in the South East Queensland Pest Advisory Forum	All parks		☺			PMO with assistance with Relevant regional staff	QPWS, Biosecurity QLD, Land Protection Officers, Landcare, Local Councils
	Participate and contribute in the Newrybar Swamp Feral Pig Management Committee	Ballina NR		☺			RRA staff with PMO assistance	Ballina Council, Tweed-Lismore RLPB, local landholders,
	Participate and contribute in the Pandanus Planthopper Working Group	All coastal parks		☺			PMO with assistance with Relevant regional staff	Tweed, Byron, Ballina, Richmond Valley, Clarence Valley Councils, DPI Agriculture, Dept of Lands,
	Coordinate and administer NRR Pied Oystercatcher Protection Program including monthly Committee meetings with relevant land Managers during the POC breeding season.	Richmond River NR, Dubai Jargum Nurahm AA, Broadwater NP, Bundjalung NP		☺			Richmond River Area Rangers with assistance from PMO	DECC/Dept of Lands, Dept of Defence, Ballina Shire, Richmond Valley Council, Tweed-Lismore RLPB
	Participate and contribute to the Pied Oystercatcher Interagency Working Group regarding the implementation of the Dept of Lands Threatened Species (pied oystercatcher) Management Strategy	Richmond River NR, Dubai Jargum Nurahm AA, Broadwater NP, Bundjalung NP		☺			Richmond River Area Rangers with assistance from PMO	DECC/Dept of Lands, Dept of Defence, Ballina Shire, Richmond Valley Council, Tweed-Lismore RLPB
	Participate and contribute to the Bell Miner Associated Dieback Working Group	Various parks including Border Ranges NP, Toonumbar NP, Richmond Range NP for example		☺			Kyogle Area with assistance from PMO	DECC, NEFA,
	Participate and contribute to the Border Ranges Biodiversity Hotspot Project	All parks	☺				Various Area's including PMO	NRCMA, QPWS

Pest or Issue	Action	Park	Priority				Responsibility	Partnerships
			Critical	High	Medium	Low		
	Encourage and support the Regional Discovery Ranger Program to deliver education and awareness programs regarding pest species and their management	All parks		☺			Discovery Coordinator with assistance from SRCR and PMO.	Dept of Education and local schools
	Participate and contribute to the Tweed Bitou Bush Management Committee	Various coastal parks		☺			Tweed Area with assistance from PMO	Tweed Shire Council and Far North Coast Weeds, NRCMA, local landholders and Landcare groups
	Participate and contribute to the Darling Downs-Moreton Rabbit Board	Various border parks Border Ranges, Mt Clunie, Koreelah and Maryland NP's.			☺		Kyogle Area with assistance from PMO	QPWS and relevant RLPB
	Encourage and support local landcare and interest groups regarding relevant pest species and their management	Various parks				☺	Relevant Area staff with assistance from PMO	local Council and local landcare groups
	Liaise and encourage local aboriginal communities to support pest species awareness and control programs	Various parks		☺			Relevant Area staff with assistance from PMO	local communities Aboriginal

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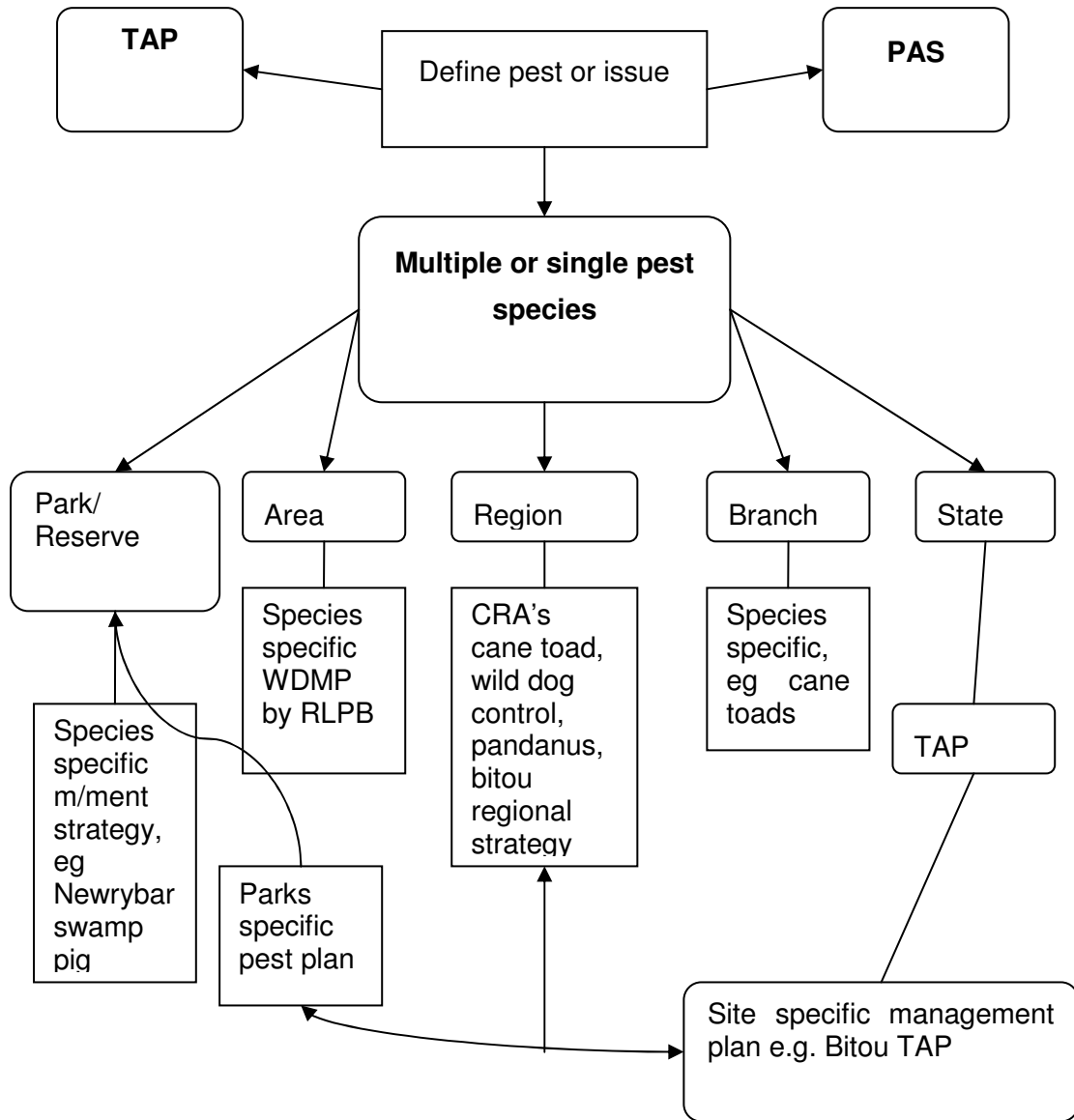
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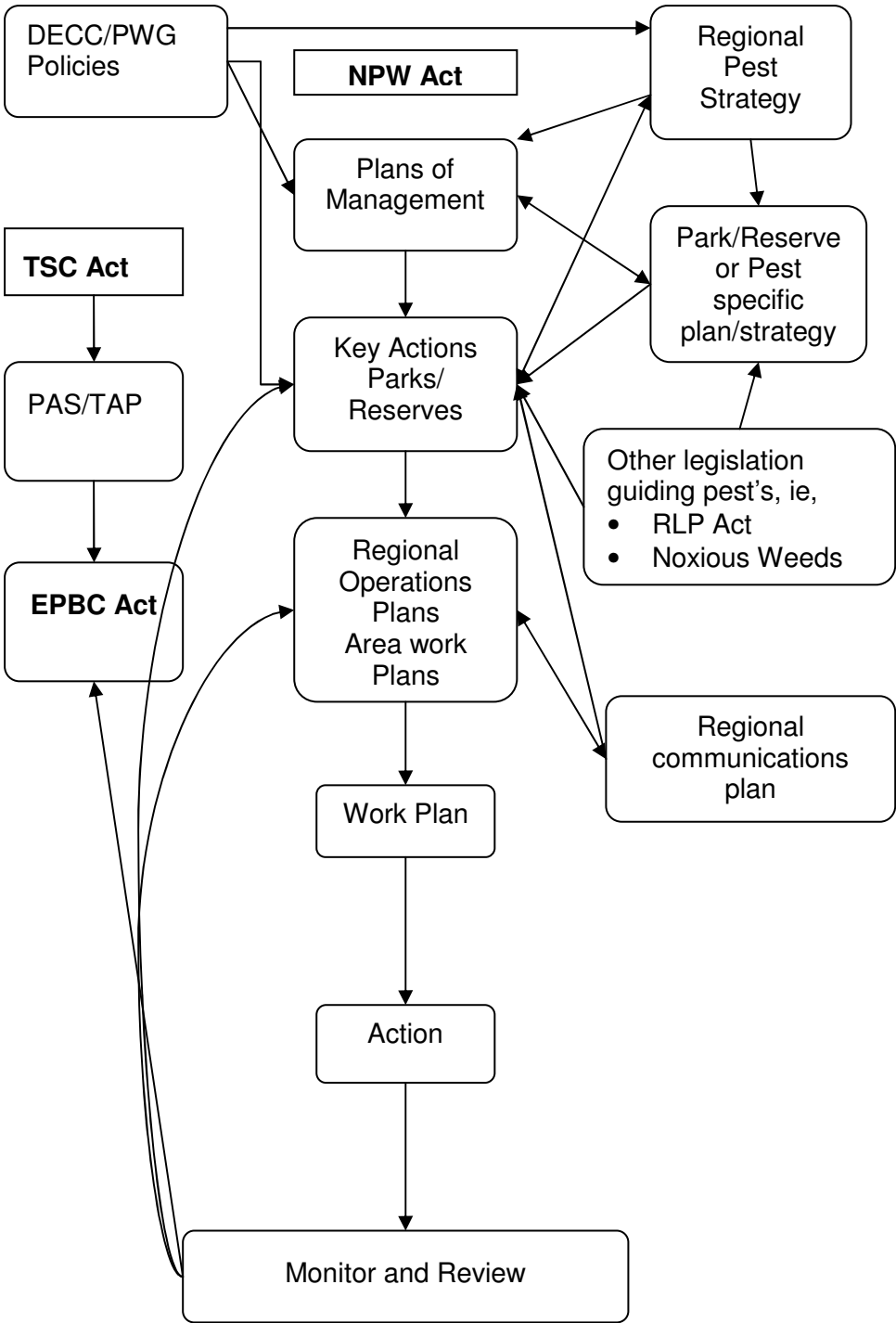
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14 Appendices

14.1 Appendix 1 - Pest Planning Approach



14.2 Appendix 2 - Linkages of Pest Management Strategies



14.3 Appendix 3 - Summary of EEC's relevant to the Northern Rivers Region Byron Bay Dwarf Graminoid Clay Heath

Consists of low-growing (to 50cm tall) woody shrubs, grasses and grass-like plants with patches of taller shrubs and occasional larger trees. The structure of the community is a heathland with occasional emergents of *Corymbia intermedia* and *Lophostemon suaveolens*. Most common plants include fern-leaved banksia (*Banksia oblongifolia*), hairy bushpea (*Pultenaea villosa*), kangaroo grass (*Themeda australis*) and broad sword sedge (*Lepidosperma laterale*). Found only at Byron Bay located on gently sloping clay ridges of low relief. Only five hectares of this community remains, occurring in small, disturbed and isolated fragments.

Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions

Coastal saltmarsh occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. It is frequently found as a zone on the landward side of mangrove stands. Characteristic plants include *Baumea juncea*, *Juncus kraussii*, *Sarcocornia quinqueflora*, *Sporobolus virginicus*, *Triglochin striata*, *Isolepis nodosa*, *Samolus repens*, and *Selliera radicans*. Tall reeds may also occur, as well as salt pans.

Freshwater Wetlands on Coastal Floodplains

Associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years. Typically occurs on silts, muds or humic loams in low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes. Generally occur below 20m elevation on level areas. Dominated by herbaceous plants and have very few woody species.

Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions

Generally a closed forest, the structure and composition of which is strongly influenced by its proximity to the ocean. Plant species of this community are predominantly rainforest species and vines may be a major component of the canopy. Scattered emergent individuals of sclerophyll species, such as *Angophora costata*, *Banksia integrifolia*, *Eucalyptus botryoides* and *E. tereticornis* occur in many stands. Littoral rainforest is very rare and occurs in many small stands. It occurs on sand dunes and on soil derived from underlying rock. Stands on headlands exposed to strong wind-action may take the form of dense, wind-pruned thickets, while stands in sheltered sites are generally taller. Characteristic species include; *Acmena smithii*, *Acronychia oblongifolia*, *Capparis arborea*, *Ficus watkinsiana*, *Melicope vitiflora*, *Syzygium leuhmannii* and *Tetrastigma nitens*.

Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion

This rainforest community now occurs only as small remnants in scattered localities on the NSW North Coast, occurring on fertile soils in lowland river valleys. Larger stands typically have a dense canopy, blocking most light from reaching the ground, creating cool, moist conditions within. This community supports a rich diversity of plants and animals. Typical tree species include; *Ficus macrophylla*, *F. obliqua* and *F. watkinsiana*, *Archontophoenix cunninghamiana*, *Livistona australis*, *Grevillea robusta*, *Syzygium australe* and *Castanospermum australe*.

Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion

Lowland rainforest may be associated with a range of high-nutrient geological substrates, notably basalts and fine-grained sedimentary rocks, on coastal plains and plateaux, footslopes and foothills. In the north of its range, Lowland rainforest is found up to 600m above sea level,

but in the Sydney Basin bioregion it is limited to elevations below 350 m.

Lowland Rainforest, in a relatively undisturbed state, has a closed canopy, characterised by a high diversity of trees whose leaves may be mesophyllous and encompass a wide variety of shapes and sizes. Typically, the trees form three major strata: emergents, canopy and sub-canopy which, combined with variations in crown shapes and sizes, give the canopy an irregular appearance.

The trees are taxonomically diverse at the genus and family levels, and some may have buttressed roots. A range of plant growth forms are present in lowland rainforest, including palms, vines and vascular epiphytes. Scattered eucalypt emergents (e.g. *Eucalyptus grandis*, *E. saligna*) may occasionally be present. In disturbed stands of this community the canopy continuity may be broken, or the canopy may be smothered by exotic vines. Although every stand of rainforest is unique in terms of its biota, lowland rainforest can be characterised by the following species: *Acacia irrorata*, *A. melanoxylon*, *Adiantum formosum*, *Breynia oblongifolia* and *Ceratopetalum apetalum*, these species may be locally abundant in some stands of the lowland rainforest, but may be more common overall in other communities.

River-Flat Eucalypt Forest on Coastal Floodplains on the NSW North Coast, Sydney Basin and South East Corner Bioregions

This EEC is found on the river flats of the coastal floodplains, generally occurring below 50m elevation, but may also occur on localised river flats up to 250m above sea level. It has a tall open tree layer of eucalypts, which may exceed 40m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include; *Eucalyptus tereticornis*, *E. amplifolia*, *Angophora floribunda* and *A. subvelutina*.

A layer of small trees may be present, including *Melaleuca styphelioides*, *Backhousia myrtifolia*, *Melia azaderach*, *Casuarina cunninghamiana* and *C. glauca*. A combination of features that distinguish this community from other endangered communities on coastal floodplains include; its dominance by either a mixed eucalypt canopy or by a single species of eucalypt, relatively low abundance or sub-dominance of *Casuarina* and *Melaleuca* species, relatively low abundance of *E. robusta*, and prominent groundcover of soft-leaved forbs and grasses.

Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion

This sub-tropical forest occurs on the coastal floodplains of the North Coast of NSW. It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include *Eucalyptus tereticornis* (forest red gum), *E. siderophloia* (grey ironbark), *Corymbia intermedia* (pink bloodwood) and, north of the Macleay floodplain, *Lophostemon suaveolens* (swamp turpentine).

Occupies central or marginal parts of floodplains and sandy flats, including Pleistocene back-barrier flats; habitats where flooding is periodic and soils are rich in silt and sand, sometimes humic, and show little influence of saline ground water. Associated with clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. Generally occurs below 50 m, but may occur on localised river flats up to 250 m elevation. The structure of the community may vary from tall open forests to woodlands, although partial clearing may have reduced the canopy to scattered trees. Typically these forests and woodlands form mosaics with other floodplain forest communities and treeless wetlands, and often they fringe treeless floodplain lagoons or wetlands with semi-permanent standing water.

Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions

This community is found on the coastal floodplains of NSW. It has a dense to sparse tree layer in which *Casuarina glauca* (swamp oak) is the dominant species northwards from Bermagui. Other trees including *Acmena smithii* (lilly pilly), *Glochidion* spp. (cheese tree) and *Melaleuca* spp. (paperbark) may be present as subordinate species, and are found most frequently in stands of the community northwards from Gosford. Tree diversity decreases with latitude, and *Melaleuca ericifolia* is the only abundant tree in this community south of Bermagui.

Associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Generally occurs below 20m (rarely above 10m) elevation. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees.

Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions

This swamp community has an open to dense tree layer of eucalypts and paperbarks although some remnants now only have scattered trees as a result of partial clearing. The trees may exceed 25m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality where the tree stratum is low and dense. For example, stands dominated by *Melaleuca ericifolia* typically do not exceed eight metres in height. The community also includes some areas of fernland and tall reedland or sedgeland, where trees are very sparse or absent.

The most widespread and abundant dominant trees include *Eucalyptus robusta* (swamp mahogany), *Melaleuca quinquenervia* (paperbark) and, south from Sydney, *Eucalyptus botryoides* (bangalay) and *Eucalyptus longifolia* (woollybut). Other trees may be scattered throughout at low abundance or may be locally common at few sites, including *Callistemon salignus* (sweet willow bottlebrush), *Casuarina glauca* (swamp oak) and *Eucalyptus resinifera* subsp. *hemilampra* (red mahogany), *Livistona australis* (cabbage palm) and *Lophostemon suaveolens* (swamp turpentine).

Associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. Generally occurs below 20 m (though sometimes up to 50 m) elevation. The composition of the community is primarily determined by the frequency and duration of waterlogging and the texture, salinity nutrient and moisture content of the soil, and latitude.

Themeda Grassland on Seacliffs and Coastal Headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions

Themeda australis is the dominant species in the themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner bioregion ecological community. *Themeda australis* is an extremely widespread species, but in this community it may have a distinctive appearance, being prostrate and having glaucous leaves. Scattered shrubs occur in many stands, most frequently *Pimelea linifolia*, *Banksia integrifolia* and *Westringia fruticosa*. These and other woody species often have dwarf growth forms. Although a number of woody species are listed as part of the community, these are usually sparsely distributed and may be absent from some stands. Tussocks of *Poa poiformis* may be found in some stands of the community, but *Poa poiformis*-dominated tussock grassland is generally found lower on cliffs (closer to the sea and more exposed to spray) and on steeper slopes.

14.4 Appendix 4 - Summary of KTP's relevant to the Northern Rivers Region

Key Threatening Process	Type	State	National
Invasion and establishment of exotic vines and scramblers	Weed	●	
Invasion of native plant communities by bitou bush & boneseed	Weed	●	
Invasion of native plant communities by exotic perennial grasses	Weed	●	
Invasion, establishment and spread of <i>lantana camara</i>	Weed	●	
Competition and grazing by the feral European rabbit	Pest animal	●	●
Competition and habitat degradation by feral goats (<i>Capra hircus</i>)	Pest animal	●	●
Competition from feral honeybees	Pest animal	●	
Herbivory and environmental degradation caused by feral deer	Pest animal	●	
Importation of red imported fire ants into NSW	Pest animal	●	●
Introduction of the large earth bumblebee (<i>Bombus terrestris</i>)	Pest animal	●	
Invasion and establishment of the cane toad	Pest animal	●	●
Invasion of the yellow crazy ant (<i>Anoplolepis gracilipes</i>)	Pest animal	●	●
Predation by feral cats	Pest animal	●	●
Predation by the European red fox	Pest animal	●	●
Predation by the plague minnow (<i>Gambusia holbrooki</i>)	Pest animal	●	
Predation by the ship rat (<i>Rattus rattus</i>) on Lord Howe Island	Pest animal	●	●
Predation, habitat degradation, competition and disease transmission by feral pigs (<i>Sus scrofa</i>)	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 by <i>Psittacine circoviral</i> (beak & feather) disease affecting endangered psittacine species	Disease	●	●
Infection of frogs by amphibian chytrid fungus causing the disease chytridiomycosis	Disease	●	●
Infection of native plants by <i>Phytophthora cinnamomi</i>	Disease	●	●
Death or injury to marine species following capture in shark control programs on ocean beaches	Other threat	●	
Entanglement in, or ingestion of anthropogenic debris in marine and estuarine environments	Other threat	●	●
Forest eucalypt dieback associated with over-abundant bell miners and psyllids*	Habitat loss/change	●	

*Preliminary determination

KTP listed Exotic Vines of the Northern Rivers Region

Scientific name	Common name
<i>Abrus precatorius/ subsp. /africanus/</i>	Crabs-eye Creeper
<i>Acetosa sagittata</i>	Potato Vine
<i>Anredera cordifolia</i>	Madeira Vine
<i>Araujia sericifera</i>	
<i>Aristolochia elegans</i>	Dutchman's Pipe
<i>Aristolochia littoralis</i>	Dutchman's Pipe
<i>Asparagus aethiopicus</i>	Ground Asparagus
<i>Asparagus africanus</i>	Asparagus Fern
<i>Asparagus asparagoides</i>	Bridal Creeper
<i>Asparagus plumosus</i>	Climbing Asparagus
<i>Asparagus scandens</i>	Climbing Asparagus
<i>Asystasia gangetica var. micrantha</i>	
<i>Caesalpinia decapetala</i>	Mysore Thorn
<i>Cardiospermum grandiflorum</i>	Balloon Vine
<i>Clematis vitalba</i>	Old Man's Beard
<i>Delairea odorata</i>	Cape Ivy

<i>Dioscorea bulbifera</i>	Aerial Yam
<i>Dipogon lignosus</i>	
<i>Hedera helix</i>	English Ivy
<i>Ipomoea alba</i>	Moon Flower
<i>Ipomoea cairica</i>	Coastal Morning Glory
<i>Ipomoea indica</i>	Morning Glory
<i>Ipomoea purpurea</i>	Morning Glory
<i>Lathyrus tingitanus</i>	
<i>Lonicera japonica</i>	Japanese Honeysuckle
<i>Macfadyena unguis-cati</i>	Cat's Claw
<i>Passiflora suberosa</i>	Corky Passion Flower
<i>Passiflora subpeltata</i>	Passion Flower
<i>Passiflora toriminiana</i>	
<i>Puearia lobata</i>	Kudzu
<i>Senecio angulatus</i>	
<i>Senecio macroglossus</i>	
<i>Solanum jasminoides</i>	Potato Vine
<i>Solanum seaforthianum</i>	Climbing Nightshade
<i>Sollya heterophylla</i>	
<i>Thunbergia alata</i>	Black-eyed Susan
<i>Thunbergia grandiflora</i>	Blue Trumpet Vine
<i>Tradescantia fluminensis</i>	
<i>Vinca major</i>	Periwinkle

Exotic Perennial Grasses Northern Rivers Region

Scientific name	Common name
<i>Agrostis capillaris</i>	Browntop Bent
<i>Andropogon virginicus</i>	Whisky Grass
<i>Cenchrus ciliaris</i>	Buffel Grass
<i>Chloris gayana</i>	Rhodes Grass
<i>Cortaderia</i> spp.	Pampas Grasses
<i>Ehrharta erecta</i>	Panic Veldgrass
<i>Eragrostis curvula</i>	African Lovegrass
<i>Hyparrhenia hirta</i>	Coolatai Grass
<i>Melinis minutiflora</i>	Molasses Grass
<i>Nassella neesiana</i>	Chilean Needlegrass
<i>Nassella trichotoma</i>	Serrated Tussock
<i>Panicum repens</i>	Torpedo Grass

<i>Paspalum urvillei</i>	Vasey Grass
<i>Pennisetum clandestinum</i>	Kikuyu
<i>Sporobolus fertilis</i>	Giant Parramatta Grass
<i>Phalaris aquatica</i>	Phalaris
<i>Setaria sphacelata</i>	South African Pigeon Grass
<i>Sporobolus natalensis</i>	Giant Rats Tail Grass
<i>Urochloa mutica</i>	Para Grass

14.5 Appendix 5 - Declared Noxious Weeds Classes

(As at 1st March 2006)

Noxious weed declarations for Far North Coast County Council

The following weeds are declared noxious in the Far North Coast County Council control area (Ballina, Byron, Kyogle, Lismore, Richmond Valley and Tweed Council areas). Further information on the legal requirements of the weed's listing and any variation in status within the local control area are available on the NSW Department of Agriculture website at www.agric.nsw.gov.au or from Far North Coast Weeds.

Common Name	Scientific Name	Class
Siam Weed	<i>Chromolaena odorata</i>	1
Spotted Knapweed	<i>Centaurea maculosa</i>	1
Water Caltrop	<i>Trapa</i> species	1
Water Lettuce	<i>Pistia stratiotes</i>	1
Water Soldier	<i>Stratiotes aloides</i>	1
Witchweed	<i>Striga</i> species except native species and <i>Striga parviflora</i>	1
Yellow Burrhead	<i>Limnocharis flava</i>	1
Anchored Water Hyacinth	<i>Eichhornia azurea</i>	1
Black Knapweed	<i>Centaurea nigra</i>	1
Broomrapes	<i>Orobanche</i> species except the native <i>O. cernua</i> variety <i>australiana</i> and <i>O. minor</i>	1
Chinese Violet	<i>Asystasia gangetica</i> subspecies <i>micrantha</i>	1
East Indian Hygrophila	<i>Hygrophila polysperma</i>	1
Eurasian Water Milfoil	<i>Myriophyllum spicatum</i>	1
Hawkweed	<i>Hieracium</i> species	1
Horsetail	<i>Equisetum</i> species	1
Hymenachne	<i>Hymenachne amplexicaulis</i>	1
Karoo Thorn	<i>Acacia karroo</i>	1
Kochia	<i>Bassia scoparia</i>	1
Lagarosiphon	<i>Lagarosiphon major</i>	1
Mexican Feather Grass	<i>Nassella tenuissima</i>	1
Miconia	<i>Miconia</i> species	1

Mimosa	<i>Mimosa pigra</i>	1
Pond Apple	<i>Amnona glabra</i>	1
Prickly acacia	<i>Acacia nilotica</i>	1
Parthenium Weed	<i>Parthenium hysterophorus</i>	1
Rubbervine	<i>Cryptostegia grandiflora</i>	1
Senegal tea plant	<i>Gymnocoronis spilanthoides</i>	1
Hygrophilia	<i>Hygrophilia costata</i>	2
Alligator Weed	<i>Alternanthera philoxeroides</i>	2
Mysore Thorn	<i>Caesalpinia decapetala</i>	3
Salvinia	<i>Salvinia molesta</i>	3
Kudzu	<i>Pueraria lobata</i>	3
Chinese Tallow	<i>Triadica sebifera</i>	3
Honey Locust	<i>Gleditsia triacanthos</i>	3
Groundsel Bush	<i>Baccharis halimifolia</i>	3
Green Cestrum	<i>Cestrum parqui</i>	3
Giant Rat's Tail Grass	<i>Sporobolus pyramidalis</i>	3
Chinese Celtis	<i>Celtis sinensis</i>	3
Yellow Bells	<i>Tecoma stans</i>	3
Broad-Leaf Pepper Tree	<i>Schinus terebinthifolius</i>	3
Lantana (red flowered and creeping)	<i>Lantana species</i>	4
Water Hyacinth	<i>Eichhornia crassipes</i>	4
St John's Wort	<i>Hypericum perforatum</i>	4
Spiny Burrgrass	<i>Cenchrus longispinus</i>	4
Harrisia Cactus	<i>Harrisia species</i>	4
Giant Parramatta Grass	<i>Sporobolus fertilis</i>	4
Spiny Burrgrass	<i>Cenchrus incertus</i>	4
Crofton Weed	<i>Ageratina adenophora</i>	4
Serrated Tussock	<i>Nassella trichotoma</i>	4
Columbus Grass	<i>Sorghum x alnum</i>	4
Chilean Needle Grass	<i>Nassella neesiana</i>	4

Scotch Broom/English Broom	<i>Cytisus scoparius</i>	4
Rhus Tree	<i>Toxicodendron succedanea</i>	4
Camphor Laurel	<i>Cinnamomum camphora</i>	4
Boneseed	<i>Chrysanthemoides monilifera</i> subspecies <i>monilifera</i>	4
Blackberry	<i>Rubus fruticosus</i> aggregate species	4
Bitou Bush	<i>Chrysanthemoides monilifera</i> subspecies <i>rotunda</i>	4
Prickly Pear	<i>Cylindropuntia</i> species	4
Prickly Pear	<i>Opuntia</i> species except <i>O. ficus-indica</i>	4
Bathurst, Noogoora, California, Cockle Burrs	<i>Xanthium</i> species	4
Pampas Grass	<i>Cortaderia</i> species	4
Nodding Thistle	<i>Carduus nutans</i>	4
Mistflower	<i>Ageratina riparia</i>	4
Johnson Grass	<i>Sorghum halepense</i>	4
Lantana	All <i>lantana</i> species	5
African Feather Grass	<i>Pennisetum macrourum</i>	5
African Turnip Weed	<i>Sisymbrium runcinatum</i>	5
African Turnip Weed	<i>Sisymbrium thellungii</i>	5
Annual Ragweed	<i>Ambrosia artemisiifolia</i>	5
Arrowhead	<i>Sagittaria montevidensis</i>	5
Artichoke Thistle	<i>Cynara cardunculus</i>	5
Athel Tree/Athel Pine	<i>Tamarix aphylla</i>	5
Bridal Creeper	<i>Asparagus asparagoides</i>	5
Burr Ragweed	<i>Ambrosia confertiflora</i>	5
Cabomba	<i>Cabomba caroliniana</i>	5
Cayenne Snakeweed	<i>Stachytarpheta cayennensis</i>	5
Clockweed	<i>Gaura lindheimeri</i>	5
Clockweed	<i>Gaura parviflora</i>	5
Corn Sowthistle	<i>Sonchus arvensis</i>	5
Dodder	All <i>Cuscuta</i> species except the native species <i>C. australis</i> , <i>C. tasmanica</i> and <i>C. Victoriana</i>	5

Espartillo		<i>Achnatherum brachychaetum</i>	5
Fine-Bristled Grass	Burr	<i>Cenchrus brownii</i>	5
Fountain Grass		<i>Pennisetum setaceum</i>	5
Gallon's Curse		<i>Cenchrus biflorus</i>	5
Glaucous Star Thistle		<i>Carthamus glaucus</i>	5
Golden Thistle		<i>Scolymus hispanicus</i>	5
Long-Leaf Primrose	Willow	<i>Ludwigia longifolia</i>	5
Mexican Poppy		<i>Argemone mexicana</i>	5
Mossman River Grass		<i>Cenchrus echinatus</i>	5
Onion Grass		All <i>Romulea</i> species and varieties except <i>R. rosea</i> var. <i>australis</i>	5
Oxalis		All <i>Oxalis</i> species and varieties except the native species <i>O. chnoodes</i> , <i>O. exilis</i> , <i>O. perennans</i> , <i>O. radicata</i> , <i>O. rubens</i> , and <i>O. thompsoniae</i>	5
Red Rice		<i>Oryza rufipogon</i>	5
Sagittaria		<i>Sagittaria platphylla</i>	5
Sand Oat		<i>Avena strigosa</i>	5
Smooth-Stemmed Turnip		<i>Brassica barrelieri</i> subspecies <i>oxyrrhina</i>	5
Soldier Thistle		<i>Picnomon acarna</i>	5
Texas Blueweed		<i>Helianthus ciliaris</i>	5
Willows		<i>Salix</i> species except <i>S. babylonica</i> , <i>S. x reichardtii</i> , <i>S. x calodendron</i>	5
Dense Waterweed		<i>Egeria Densa</i>	
Yellow Nutgrass		<i>Cyperus esculentus</i>	5

Noxious Weeds of the Far North Coast Weeds Area

Noxious Weeds Act, 1993:

The Noxious Weeds Act requires that occupiers of land control noxious weeds in line with the weed control class as designated in the weed control order.

Control Objectives:

The following control objectives for the plants identified as noxious weeds exist in the Far North Coast Weeds area

Class 1: Prevent the introduction and establishment of those plants in NSW

Class 2: Prevent the introduction and establishment of those plants in parts of NSW

Class 3: Reduce the area and the impact of those plants in parts of NSW

Class 4: Minimise the negative impact of those plants on the economy, community or environment of NSW

Class 5: Prevent the introduction of those plants within NSW or from NSW to another jurisdiction.

Control Categories

The following Control Classes apply to noxious weeds in the local control authority area covered by the Far North Coast County Council.

Class 1: The plant must be eradicated from the land and the land must be kept free of the plant. Owners or occupiers of land must notify Far North Coast Weeds within 3 days after becoming aware that the weed is present

Class 2: The plant must be eradicated from the land and the land must be kept free of the plant. Owners or occupiers of land must notify Far North Coast Weeds within 3 days after becoming aware that the weed is present

Class 3: The plant must be continuously suppressed and destroyed

Class 4: The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the Local Control Authority

Class 5: Owners or occupiers of land must notify Far North Coast Weeds of the presence of the weed on land or for sale within 3 days after becoming aware that the weed is present.

The information contained in this page is based on knowledge and understanding of Order(s) under the Noxious Weeds Act 1993 at the time of writing or at the time of last review. However, because: there may be changes to the Order(s) users are reminded of the need to ensure that information on which they rely is up to date, and some weed declarations of particular weeds have explanatory or qualifying notes and users should check the accuracy, completeness and currency of information by reading the Order(s), inquiring with the appropriate officer of the Local Government Authority for the user's locality, and/or consulting with an independent advisor.

Noxious weed declarations for Tenterfield Shire Council

The following weeds are declared noxious in the control area of Tenterfield Shire Council:

Weed	Class	Legal requirements
African boxthorn [<i>Lycium ferocissimum</i>]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
African feathergrass [<i>Pennisetum macrourum</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
African turnipweed [<i>Sisymbrium runcinatum</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
African turnipweed [<i>Sisymbrium thellungii</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Alligator weed [<i>Alternanthera</i>]	2	The plant must be eradicated from the land and the land must be kept free of the plant

Weed	Class	Legal requirements
philoxeroides]		
Anchored water hyacinth [Eichhornia azurea]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Annual ragweed [Ambrosia artemisiifolia]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Arrowhead [Sagittaria montevidensis]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Artichoke thistle [Cynara cardunculus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Athel pine [Tamarix aphylla]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Bathurst/Noogoora/Californian/cockle burrs [Xanthium species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Bear-skin fescue [Festuca gautieri]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Black knapweed [Centaurea nigra]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Blackberry [Rubus fruticosus aggregate species] except cultivars Black satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smoothstem, Thornfree	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration
Bridal creeper [Asparagus asparagoides]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Broomrapes [Orobancha species] Includes all <i>Orobancha</i> species except the native <i>O. cernua</i> variety <i>australiana</i> and <i>O. minor</i>	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Burr ragweed [Ambrosia confertiflora]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Cabomba [Cabomba caroliniana]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Cayenne snakeweed [Stachytarpheta cayennensis]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Chilean needle grass [Nassella neesiana]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Chinese violet [Asystasia gangetica subspecies]	1	The plant must be eradicated from the land and the land must be kept free of the plant

Weed	Class	Legal requirements
micrantha		This is an All of NSW declaration
Clockweed [<i>Gaura lindheimeri</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Clockweed [<i>Gaura parviflora</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Cockle burrs [<i>Xanthium</i> species.]		See Bathurst/Noogoora/Californian/cockle burrs
Columbus grass [<i>Sorghum x alnum</i>]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Corn sowthistle [<i>Sonchus arvensis</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Crofton weed [<i>Ageratina adenophora</i>]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Dodder [<i>Cuscuta</i> species] Includes All <i>Cuscuta</i> species except the native species <i>C. australis</i> , <i>C. tasmanica</i> and <i>C. victoriana</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
East Indian hygrophila [<i>Hygrophila polysperma</i>]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
English broom [<i>Cytisus scoparius</i>]		See scotch broom
Espartillo [<i>Achnatherum brachychaetum</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Eurasian water milfoil [<i>Myriophyllum spicatum</i>]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Fine-bristled burr grass [<i>Cenchrus brownii</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Fountain grass [<i>Pennisetum setaceum</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Gallon's curse [<i>Cenchrus biflorus</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Giant Parramatta grass [<i>Sporobolus fertilis</i>]	3	The plant must be fully and continuously suppressed and destroyed
Glaucous starthistle [<i>Carthamus glaucus</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Golden dodder [<i>Cuscuta campestris</i>]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Golden thistle [<i>Scolymus hispanicus</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Green cestrum [<i>Cestrum parqui</i>]	3	The plant must be fully and continuously suppressed and destroyed

Weed	Class	Legal requirements
Groundsel bush [Baccharis halimifolia]	3	The plant must be fully and continuously suppressed and destroyed
Harrisia cactus [Harrisia species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration
Hawkweed [Hieracium species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Hemlock [Conium maculatum]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Horsetail [Equisetum species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Hymenachne [Hymenachne amplexicaulis]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Italian bugloss [Echium species]		See Paterson's curse, Vipers bugloss, Italian bugloss
Johnson grass [Sorghum halepense]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Karoo thorn [Acacia karroo]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Kochia [Bassia scoparia] except <i>Bassia scoparia</i> subspecies <i>trichophylla</i>	1	except <i>B.scoparia</i> subspecies <i>trichophylla</i> The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Lagarosiphon [Lagarosiphon major]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Lantana [Lantana species]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Leafy elodea [Egeria densa]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Long-leaf willow primrose [Ludwigia longifolia]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Long-style feather grass [Pennisetum villosum]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Mesquite [Prosopis species]	2	The plant must be eradicated from the land and the land must be kept free of the plant
Mexican feather grass [Nassella tenuissima]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Mexican poppy [Argemone mexicana]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Miconia [Miconia species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration

Weed	Class	Legal requirements
Mimosa [<i>Mimosa pigra</i>]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Mossman River grass [<i>Cenchrus echinatus</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Mother-of-millions [<i>Bryophyllum</i> species and hybrids]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Nodding thistle [<i>Carduus nutans</i>]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Onion grass [<i>Romulea</i> species] Includes all <i>Romulea</i> species and varieties except <i>R. rosea</i> var. <i>australis</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Oxalis [<i>Oxalis</i> species and varieties] Includes all <i>Oxalis</i> species and varieties except the native species <i>O. chnoodes</i> , <i>O. exilis</i> , <i>O. perennans</i> , <i>O. radicata</i> , <i>O. rubens</i> , and <i>O. thompsoniae</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Pampas grass [<i>Cortaderia</i> species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Parkinsonia [<i>Parkinsonia aculeata</i>]	2	The plant must be eradicated from the land and the land must be kept free of the plant
Parthenium weed [<i>Parthenium hysterophorus</i>]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Paterson's curse, Vipers bugloss, Italian bugloss [<i>Echium</i> species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Pond apple [<i>Annona glabra</i>]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Prickly acacia [<i>Acacia nilotica</i>]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Prickly pear [<i>Cylindropuntia</i> species]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration
Prickly pear [<i>Opuntia</i> species except <i>O. ficus-indica</i>]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed This is an All of NSW declaration

Weed	Class	Legal requirements
Privet (Broad-leaf) [<i>Ligustrum lucidum</i>]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Privet (Narrow-leaf/Chinese) [<i>Ligustrum sinense</i>]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Red rice [<i>Oryza rufipogon</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Rhus tree [<i>Toxicodendron succedaneum</i>]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority This is an All of NSW declaration
Rubbervine [<i>Cryptostegia grandiflora</i>]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Sagittaria [<i>Sagittaria platyphylla</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Salvinia [<i>Salvinia molesta</i>]	2	The plant must be eradicated from the land and the land must be kept free of the plant
Sand oat [<i>Avena strigosa</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Scotch broom [<i>Cytisus scoparius</i>]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Senegal tea plant [<i>Gymnocoronis spilanthoides</i>]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Serrated tussock [<i>Nassella trichotoma</i>]	3	The plant must be fully and continuously suppressed and destroyed and the plant may not be sold, propagated or knowingly distributed
Siam weed [<i>Chromolaena odorata</i>]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Silver-leaf nightshade [<i>Solanum elaeagnifolium</i>]	3	The plant must be fully and continuously suppressed and destroyed
Smooth-stemmed turnip [<i>Brassica barrelieri</i> subspecies <i>oxyrrhina</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Soldier thistle [<i>Picnomon acarna</i>]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration

Weed	Class	Legal requirements
Spiny burrgrass [Cenchrus incertus]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Spiny burrgrass [Cenchrus longispinus]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
Spotted knapweed [Centaurea maculosa]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
St. John's wort [Hypericum perforatum]	3	The plant must be fully and continuously suppressed and destroyed
Sweet briar [Rosa rubiginosa]	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority
Texas blueweed [Helianthus ciliaris]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Water caltrop [Trapa species]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Water hyacinth [Eichhornia crassipes]	3	The plant must be fully and continuously suppressed and destroyed
Water lettuce [Pistia stratiotes]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Water soldier [Stratiotes aloides]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Willows [Salix species] Includes all <i>Salix</i> species except <i>S. babylonica</i> , <i>S. x reichardtii</i> , <i>S. x calodendron</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration
Witchweed [Striga species] Includes all <i>Striga</i> species except native species and <i>Striga parviflora</i>	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Yellow burrhead [Limnocharis flava]	1	The plant must be eradicated from the land and the land must be kept free of the plant This is an All of NSW declaration
Yellow nutgrass [Cyperus esculentus]	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with This is an All of NSW declaration

