Office of Environment & Heritage
NSW National Parks & Wildlife Service

Regional Pest Management Strategy 2012–17: North Coast Region

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

The New South Wales National Parks and Wildlife Service (NPWS) is part of OEH. Throughout this strategy, references to NPWS should be taken to mean NPWS carrying out functions on behalf of the Director General of the Department of Premier and Cabinet, and the Minister for the Environment.

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Summary

North Coast Region stretches from the north shore of the Hastings River to the Clarence River and west to the Great Dividing Range. It includes 99 protected areas, comprising 31 national parks, 49 nature reserves, 12 state conservation areas, three Aboriginal areas, two historic sites and two regional parks.

The reserve system in North Coast Region protects significant landscapes, including beaches, rocky shores and off-shore islands, coastal floodplains and estuaries, forested river gorges and valleys, spectacular sections of the Great Escarpment and plateau woodlands. There is a diversity of plant and animal communities in these reserves, including world heritage rainforests and old-growth eucalypt forest, as well as significant sites of Aboriginal and historic heritage.

Land-use patterns, past and present, together with the diversity of natural environments have resulted in a range of pest animal and plant species in parks and reserves. The main objective of pest management is to minimise the impacts of pest species on reserves and neighbouring lands and to work with other agencies and landholders to achieve these aims. However, given the complexity of species, environments and impacts and the limited resources available, it is critical to view these actions in a strategic context to focus limited resources on the most effective pest management.

Pest control programs continue to be a high priority. Long-standing pest programs, such as control of wild dogs and bitou bush, have reduced the impacts of the targeted species. However, the region continues to respond to new and emerging threats. The implementation of state-wide threat abatement plans for bitou bush and foxes at priority sites since 2008 has led to the recovery of native vegetation and the protection of threatened species. Much of the success of this work is a result of partnerships with stakeholders such as neighbours, community groups, neighbours, volunteers, agencies and local councils.

This regional pest management strategy identifies the key pest animal and plant species for reserve management in North Coast Region, the values they threaten and the programs that will be taken to minimise impacts. The process for identifying priority programs has been to review state-wide and broad strategic plans for direction, identify key reserve values and threats, consult with key stakeholders and identify what actions can be reasonably undertaken both using agency resources and in partnership with other government authorities, neighbouring landholders and community groups.

The Strategy includes tables of programs for works identified to be undertaken by NPWS during the period covered by this plan. This is a dynamic list which can be reviewed within the principles outlined in the strategy to reflect both successes of some programs and new and emerging threats and issues. This can include the extension of existing pest species such as cane toads or into the Region, or the identification of new threats such as myrtle rust where information on the potential impacts is unclear.

This Strategy profiles the animal pests, weeds and diseases in North Coast Region and outlines the priorities for pest management for the next four years within the Region. It should be read in conjunction with the state strategy which outlines the state-wide principles and goals for NPWS pest management.

Pest management highlights for the region include the management of wild dogs, foxes, bitou bush, lantana and cane toads.

Contents

Abbreviations

AA	Aboriginal area
BMAD	bell miner associated dieback
BPWW	Biodiversity Priorities for Widespread Weeds (BPWW CC1-6 refers to control categories within BPWW Statewide Framework[1])
DECCW	Department of Environment, Climate Change and Water NSW
DPI	Department of Primary Industries NSW
EEC	endangered ecological community
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
HS	historic site
KTP	key threatening process
LHPA	Livestock Health and Pest Authority
NP	national park
NR	nature reserve
NPWS	NSW National Parks and Wildlife Service
OEH	Office of Environment and Heritage
RLP Act	*Rural Lands Protection Act 1998*
ROTAP	rare or threatened Australian plant
RP	regional park
SCA	state conservation area
TAP	threat abatement plan
TSC Act	*Threatened Species Conservation Act 1995*
WoNS	Weed of National Significance

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

1 Introduction

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

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

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

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

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

2 Regional overview

Location

North Coast Region includes Coffs Harbour City, Bellingen Shire, Nambucca Shire, Kempsey Shire local government areas (LGAs), the majority of Clarence Valley LGA, and parts of Armidale, Dumaresq, Guyra Shire and Port Macquarie Hastings LGAs. It lies in Northern Rivers Catchment Management Authority.

Regional context

The region is responsible for the management of approximately 430,000 hectares of conservation reserves, comprising 31 national parks, 49 nature reserves, 12 state conservation areas, three Aboriginal areas, two historic sites and two regional parks – a total of 99 protected areas.

These protected areas form parts of the traditional lands of the Yaegl, Gumbaynggirr, Anaiwan and Dunghutti nations, whose people retain an active involvement and interest in their management and use.

The reserve system in North Coast Region protects significant landscapes ranging from the coast to the New England Tablelands, including beaches, rocky shores and off shore islands, coastal floodplains and estuaries, forested river gorges and valleys, spectacular sections of the Great Escarpment and plateau woodlands. A diversity of plant and animal communities is present in these reserves, including world heritage rainforests and old growth eucalypt forest, as well as significant sites of Aboriginal and historic heritage. There is an almost continuous chain of wilderness parks along this section of the Great Escarpment, including Willi Willi, New England, Cathedral Rock and Guy Fawkes River national parks, providing part of the existing protected areas that make up the Great Eastern Ranges Conservation Corridor.

There are long stretches of wild coastlines protected in the reserve system. Yuraygir National Park is the largest coastal park in NSW with over 60 kilometres of coastline featuring rocky headlands and sweeping beaches. When considered in conjunction with the Solitary Islands Marine Park and off-shore nature reserves, it is one of the few areas in Australia with a full combination of protected ecological systems from forests, heaths, freshwater streams, swamps, estuaries, coastal lagoons and lakes, beaches, headlands, islands and offshore waters as well as a significant proportion of the catchments of those estuaries.

One of the Region's newest coastal reserves is Gaagal Wanggaan (South Beach) National Park, which is jointly managed by the Aboriginal owners of the land and NPWS under Part 4A of the *National Parks and Wildlife Act 1974*. This protects the coastal lands and Warrell Creek between Nambucca Heads and Scotts Head, an area of special significance to the Gumbaynggirr Aboriginal people.

Park management

As well as conserving natural and cultural heritage values in partnership with the community, the Region provides opportunities for sustainable recreation and visitation to parks and reserves, and encourages people to enjoy and appreciate the natural and cultural values they offer. Visitors to the parks and reserves within the Region contribute significantly to the local economy and the regional manager sits on the board of the Mid North Coast Regional Tourism Organisation. The Region includes a major Rainforest Centre at Dorrigo National Park (part of the Gondwana Rainforests World Heritage Area). This visitor centre is a focus for interpreting the region's unique rainforest areas. In addition, a visitor centre at Trial Bay Gaol

provides a focus for the rich natural and cultural heritage of the area around Arakoon and Hat Head National Parks.

Community engagement

North Coast Region works in partnership with the community through the National Parks and Wildlife Regional Advisory Committee, which represents local communities with identified interests in heritage conservation, park management, local government and recreation. There is also a community-based Board responsible for the care control and management of the Coffs Coast Regional Park. A Board comprising a majority of Aboriginal owners has been appointed with responsibilities for the care, control and management of Gaagal Wanggaan (South Beach) National Park.

NPWS is also represented on inter agency working groups such as the North Coast Weeds Advisory Committee and North East Pest Animal Advsory Committee. NPWS staff work closely with the many community groups who have interests in park management, such as Landcare and Dunecare groups.

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

Pest management highlights

The land use patterns of past and present together with the diversity of natural environments have resulted in a wide and varied range of pests. A number of pest species are present in North Coast Region and their impacts can be observed in all reserves (see section 7). Some of the pests have been present for a long time, for example lantana, introduced to Port Macquarie in 1838, while new introductions, such as cane toads at Brooms Head in 2004 and myrtle rust at a number of locations in the region in 2010, are still emerging as threats.

Pest control programs continue to be a high priority within the Region. Long-standing pest programs, such as wild dog control and bitou bush control, have reduced the impacts of the targeted species and the Region continues to respond to new and emerging threats such as cane toads. The implementation of state-wide threat abatement plans (TAPs) for bitou bush and foxes at priority sites since 2008 have led to the recovery of native vegetation and the protection of threatened species. Much of the success of this work is a result of partnerships with other stakeholders such as neighbours, community groups, neighbours, volunteers, agencies and councils.


Torrington SCA
Washpool SCA
Mount Neville NR
Bundjalung SCA
Richmond River
Tenterfield
Burnt-Down Scrub NR
Bundjalung NP
Bolivia Hill NR
Banyabba SCA
Chapmans Peak NR
Banyabba NR
Washpool NP
Capoompeta NP
Northern Rivers
Woombah
Emmaville
Deepwater
Clarence North
Harwood
Fortis Creek NP
Lawrence
Maclean
Yamba
Butterleaf NP
Fladbury SCA
Butterleaf SCA
Wombat Creek SCA
Gibraltar Range NP
Corymbia SCA
Glen Innes
BYPDIR HIGHWAY
CORAL
SEA
Barool NP
Nymboida NP
Ulmarra
Yuraygir NP
Glen Innes
Mann River NR
Nymboida SCA
Ramornie NP
Grafton
Clarence South
Chambigne NR
Guy Fawkes River SCA
Guy Fawkes River NP
Chaelundi SCA
Koukandowie NR
Yuraygir SCA
Warra NP
Hortons Creek NR
Tallawudjah NR
Chaelundi NP
Sherwood NR
Glenreagh
Little Llangothlin NR
Arrawarra
Byrnes Scrub NR
Arrawarra Headland
Llangothlin
Nymboi-Binderay NP
Woolgoolga
Mullaway
Mount Hyland NR
Nana Glen
Coffs Coast RP
Guyra
South Guyra
Mount Hyland SCA
Nymboi-Binderay SCA
Emerald Beach
Cascade NP
Dorrigo Plateau
Cascade SCA
Coramba
Junuy Juluum NP
Bindarri NP
Avondale SCA
Guy Fawkes River NR
Boambee
North Coast
Dorrigo
Duval NR
Dorrigo NP
Sawtell
Bellinger River NP
Cathedral Rock NP
Bellingen
Raleigh
Bongil Bongil NP
Armidale
Baalijin NR
Serpentine NR
New England NP
Coffs Coast
Imbota NR
Hillgrove
Gumbaynggirr NP
Urunga
Juugawaarri NR
Jaaningga NR
Gumbaynggirr SCA
Jagun NR
Bowraville
Georges Creek NR
Dunggir NP
Walcha
Cunnawarra NP
Jobs Mountain NR
Macksville
Gaagal Wanggaan (Sth Beach) NP
Warrell Creek
Northern Tablelands
Pee Dee NR
TASMAN
SEA
Carrai SCA
Ngambaa NR
Carrai NP
Gads Sugarloaf NR
Arakoon NP
Fifes Knob NR
Oxley Wild Rivers NP
Willi Willi Caves NR
Clybucca AA
The Castles NR
Skillion NR
Smithtown
Boonanghi NR
Macleay
Yarravel NR
Hat Head
Boonanghi SCA
Kempsey
Yessabah NR
Hat Head NP
Willi Willi NP
Kumbatine NP
Kumbatine SCA
Werrikimbe NP
Maria NP
Crescent Head
Goolawah NP
Werrikimbe SCA
Mummel Gulf NP
Cooperabung Creek NR
Cottan-Bimbang NP
Mount Seaview NR
Mummel Gulf SCA
Limeburners Creek NP
The Cells SCA
Jasper NR
Lower North Coast
Wauchope
Manning-Hastings
Biriwal Bulga NP
Bago Bluff NP
Weelah NR
Bridal Veil Falls NR
Bugan NR
Lake Innes NR
North Coast Region
PWG Regions
PWG Areas
Motorway
Highway
Major Road
NPWS Estate
State Forest
Built Up Area
0 10 20
km
Office of Environment & Heritage
NSW National Parks & Wildlife Service
Map projection: Geocentric Datum of Australia (GDA) 1994
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3 Regional prioritisation

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

Critical priority

C-TSC (Threatened Species Conservation)

Programs targeting pests which are, or are likely to be, significantly impacting on threatened species, populations or communities. These include the highest priorities identified in the threat abatement plans (TAPs), Priorities Action Statements (PAS) and Biodiversity Priorities for Widespread Weeds (BPWW).

C-HD (Health and Disease)

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

C-EC (Economic)

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

C-NE (New and Emerging)

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

High priority

H-IH (International Heritage)

Programs that target pests that impact significantly on world heritage or international heritage values.

H-CH (Cultural Heritage)

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

Medium priority

M-WNH (Wilderness and National Heritage)

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

M-RA (Recreation and Aesthetic values)

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

M-CP (Cooperative Programs)

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

M-II (Isolated Infestations)

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

Lower priority

L-LP (Localised Programs)

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

L-PP (Previous Programs)

Previous programs targeting pests that have localised impacts on native species and ecosystems, and that can be efficiently implemented to maintain program benefits, for example the maintenance of areas treated previously for serrated tussock to continue keeping them weed free.

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

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

4 Prioritised regional pest programs

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

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Clarence North	Yuraygir NP	1510 - Angourie Back Beach	*Chrysanthemoides monilifera* subsp. *rotundata*	*Gleichenia mendellii* [Bitou TAP]; BPWW – CC2	Asset protection	Bush regeneration techniques including, overspray; cut and paint; cut, scrape and paint; stem injection with possible aerial boom and spot spray	C-TSC
Clarence North	Yuraygir NP	1511 - Angourie Point	*Chrysanthemoides monilifera* subsp. *rotundata*	Littoral Rainforest EEC (EPBC-ce; TSC-e), *Pultenaea maritima* (TSC-v), *Ischaemum triticeum, Allocasuarina defungens* (EPBC-e; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e). *Chamaesyce psammogeton* (TSC-e); BPWW – CC2	Asset protection	Bush regeneration techniques including, overspray; cut and paint; cut, scrape and paint; stem injection with possible aerial boom and spot spray	C-TSC
Clarence North	Yuraygir NP	1636 - Dirrangan Lookout track	*Chrysanthemoides monilifera* subsp. *rotundata*	Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e); *Ischaemum triticeum;* BPWW – CC2	Asset protection	Bush regeneration techniques including, overspray; cut and paint; cut, scrape and paint; stem injection with possible aerial boom and spot spray	C-TSC
Clarence North	Yuraygir NP	2075 - Yuraygir NP - many locations in park	*Chrysanthemoides monilifera* subsp. *rotundata, Lantana camara*	*Pandanus tectorius* var. *australianus* [Bitou TAP], *Casuarina equisetifolia, Elyonurus citreus* (TSC-e), *Hibiscus tiliaceus, Allocasuarina defungens* (EPBC-e; TSC-e), Littoral Rainforest EEC (EPBC-ce; TSC-e), Coastal Banksia Woodlands - *Banksia integrifolia* [Bitou TAP], Coastal Sand Dune Complex - *Acacia longifolia* var. *sophorae* [Bitou TAP], Frontal Dune Vegetation Complex; BPWW – CC2	Asset protection	Bush regeneration techniques including, overspray; cut and paint; cut, scrape and paint; stem injection with possible aerial boom and spot spray	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Clarence South	Yuraygir NP	1883 – Rocky Pt	Bitou bush, lantana, *Senna pendula*, coastal morning glory, Mickey Mouse plant	*Pultenaea maritima (TSC-v), Vigna marina* (Bitou Bush TAP – high), *Gleichenia mendellii* (Bitou Bush TAP – high) (BPWW – CC5)	Asset protection	Quickspray, backpack, cut and paint hand removal	C-TSC
Clarence South	Yuraygir NP	1935 – Shelley Headland	Bitou bush, lantana, *Senna pendula*, coastal morning glory, Mickey Mouse plant	*Pultenaea maritima* (TSC-v), Themeda Grassland on Seacliffs and coAstal Headlands EEC (TSC-e), Coastal Banksia Woodlands, Littoral Rainforest EEC (EPBC-ce; TSC-e) (BPWW – CC1)	Asset protection	Aerial spray, quadbike,backpack, hand removal, biocontrol	C-TSC
Clarence South	Yuraygir NP	1891 – Sandon backtrack, Sandon bluffs and Sandon south	Bitou bush, Lantana, *Senna pendula*, glory lily, coastal morning glory, Mickey Mouse plant	Littoral Rainforest EEC (EPBC-ce; TSC-e), *Acianthus exiguous* (ROTAP 3RC, Bitou – high), *Sophora tomentosa* (TSC-e) *Chamaesyce psammogeton* (TSC-e), *Calystegia soldanella* (Bitou Bush TAP – high), *Stackhousia spathulata* (Bitou Bush TAP – high), *Vigna marina* (Bitou Bush TAP – high), *Gleichenia mendellii* (Bitou Bush TAP – high), *Acrostichum speciosum*, *Marsdenia liisae* (ROTAP) (Bitou Bush TAP – low), Themeda Grassland on Headlands EEC (EPBC-ce; TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EEC (TSC-e), coastal banksia forest (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Clarence South	Clarence Estuary NR	Clarence River Entrance Fox TAP Site 27	Fox	Shorebirds - pied oystercatcher and beach stone curlew.	Asset protection	Monitor, den fumigation, trap	C-TSC
Clarence South	Yuraygir NP	Wooli	Foxes	Shorebirds, coastal emu, brolga	Asset protection	Ground baiting, trapping, den fumigation	C-TSC
Clarence South	Yuraygir NP	Yuraygir Mid	Foxes	Shorebirds, coastal emu, brolga	Asset protection	Ground baiting, trapping, den fumigation	C-TSC
Clarence South	Yuraygir NP	Yuraygir South	Foxes	Shorebirds, coastal emu, brolga	Asset protection	Ground baiting, trapping, den fumigation	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Clarence South	Yuraygir NP	1984 – Station Creek Beach Yuraygir	Groundsel bush, bitou bush, slash pine, lantana, winter senna, ground asparagus, broad leafed paspalum, Formosa lily	*Actites megalocarpa* (Bitou Bush TAP – high), *Geodorum densiflorum* (TSC-e) (BPWW – CC2)	Asset protection	Quickspray, backpack,, cut and paint, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	1577 - Candole Creek	Groundsel bush, bitou bush, winter senna, lantana	Subtropical Coastal Floodplain Forest (TSC-e), Coastal Saltmarsh (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EECs (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	1892 – Sandon River #1	Groundsel bush, bitou bush, winter senna, lantana	Subtropical Coastal Floodplain Forest TSC-e), Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain forest (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains (TSC-e), Littoral Rainforest EECs (EPBC-ce; TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	2013 – Toumbaal Creek	Groundsel bush, bitou bush, winter senna, lantana	Subtropical Coastal Floodplain Forest (TSC-e), Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EECs (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, chainsaw, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	1734 – Lake Cakora catchment	Groundsel bush, bitou bush, winter senna, vasey grass, lantana	Coastal Saltmarsh (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains (TSC-e), Swamp Oak Floodplain Forest EECs (TSC-e), *Rutidosis heterogama* (EPBC-v; TSC-v) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	1522 – Barcoongere River	Groundsel bush, lantana, slash pine, exotic grasses	Coastal Saltmarsh (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains (TSC-e), Swamp Oak Floodplain Forest (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains (TSC-e), Swamp Oak Floodplain Forest EECs (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, chainsaw, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	2060 – Wooli River	Groundsel bush, slash pine, lantana	Subtropical Coastal Floodplain Forest (TSC-e), Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EECs (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, chainsaw, biocontrol	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Clarence South	Yuraygir NP	1888 – Saltwater Creek	Groundsel bush, slash pine, lantana, winter senna	Subtropical Coastal Floodplain Forest (TSC-e), Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EECs (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, chainsaw, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	1985 – Station Creek	Groundsel bush, slash pine, lantana, winter senna, ground asparagus, Formosa lily	Subtropical Coastal Floodplain Forest (TSC-e), Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EECs (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, chainsaw, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	1616 – Corindi River	Groundsel bush, slash pinei, winter senna, lantana	Subtropical Coastal Floodplain Forest (TSC-e), Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EECs (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, chainsaw, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	1807 – Mullet Creek - (Green Hills west)	Groundsel bush, slash pinei, winter senna, lantana, pigeon grass	Subtropical Coastal Floodplain Forest (TSC-e), Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EECs (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, chainsaw, biocontrol, hand removal	C-TSC
Clarence South	Byrnes Scrub NR	1573 – Byrnes Scrub NR	Lantana	Lowland rainforest EEC (BPWW – CC1)	Asset protection	Quickspray, backpack spray, cut paint, hand pull,	C-TSC
Clarence South	Hortons Creek NR	1706 – Hortons Creek NR	Lantana	Lowland Rainforest EEC, *Eucalyptus dunnii*, *Harnieria hygrophiloides* (BPWW – CC2)	Asset protection	Quickspray, backpack spray, cut paint, hand pull	C-TSC
Clarence South	Sherwood NR	1936 – SE corner above Sherwood Creek Road	Lantana	Lowland rainforest EEC (BPWW – CC2)	Asset protection	Quickspray, backpack spray, cut paint, hand pull	C-TSC
Clarence South	Clarence Estuary NR	1595 - Clarence Estuary NR	*Lantana camara*	Littoral Rainforest EEC (EPBC-ce; TSC-e), *Tinaspora tinosporoides* (v TSC and EPBC), *Cynachum elegans* (EPBC-e; TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EEC (TSC-e), Swamp Oak Floodplain (e TSC), *Acianthus exiguus* [ROTAP], Coastal Saltmarsh, Coastal Wetlands, and Coastal Cypress Pine EECs; Bitou Bush TAP; BPWW – CC1	Asset protection	Bush regeneration techniques including, overspray; cut and paint; cut, scrape and paint; stem injection	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Clarence South	Yuraygir NP	1857 – Pigeon Gully	Lantana, senna floribunda, white passionfruit	Lowland Rainforest EEC (TSC-e), *Acronychia littoralis* (EPBC-e;TSC-e), *Boronia hapalophylla* (TSC-e), giant barred frog (EPBC-e; TSC-e) (BPWW – CC2)	Asset protection	Splatter gun, hand removal	C-TSC
Clarence South	Yuraygir NP	1822 – North Sandon	Lantana, winter senna, bitou bush, buffalo grass glory lily, coastal morning glory, white passionfruit, coastal tea tree, golden wreath wattle	*Sophora tomentosa* (TSC-e), Littoral Rainforest (EPBC-ce, TSC-e), Littoral Rainforest EEC (EPBC-ce; TSC-e), *Acianthus exiguous* (ROTAP 3RC, Bitou Bush TAP – high), *Stackhousia spathulata* (Bitou Bush TAP – high), *Acianthus amplexicaulis* (Bitou Bush TAP – low) (BPWW – CC2)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	1864 – Plumbago Headland (Lake Arragan to Shelley Headland)	Lantana, winter senna, bitou bush, coastal morning glory, *Leptospermum laevigatum*, *Acacia saligna*, painted spurge, Mossman river grass, groundsel bush	Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e) (BPWW – CC2)	Asset protection	Quickspray, aerial spray backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	1669 – Freshwater-Jones Beach	Lantana, winter senna, bitou bush, coastal morning glory, white passionfruit	Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e), Littoral Rainforest EEC, *Chamaesyce psammogeton* (TSC-e), *Calystegia soldanella* (Bitou Bush TAP – high), (Bitou Bush TAP – high), *Dianella congesta* (Bitou Bush TAP –medium) (BPWW – CC2)	Asset protection	Quickspray, aerial spray backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	1720 – Jones Beach	Lantana, winter senna, bitou bush, crofton weed	*Phauis australis* (EPBC-e; TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EEC (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	2047 – Wilsons Headland-Bare Pt-Diggers Camp	Lantana, winter senna, bitou bush, glory lily, coastal morning glory, white passionfruit, kikuyu, vasey grass, whisky grass	*Plectranthus cremnus* (ROTAP 3K, Bitou Bush TAP – high), *Chamaecrista maritima* (Bitou Bush TAP – high), *Ischaemum triticeum* (Bitou Bush TAP – high), *Pultenaea maritima* (TSC-v), *Thesium australe* (EPBC-v; TSC-v), Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e) (BPWW – CC2)	Asset protection	Quickspray, aerial spray backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Clarence South	Yuraygir NP	1893 – Sandon River #2,	Lantana, winter senna, bitou bush, *Stenotaphrum secundatum*, glory lily	*Sophora tomentosa* (TSC-e), Swamp Oak Floodplain Forest EEC (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	1874 – Redcliff Bitou Bush TAP site	Mickey mouse plant, broad leafed paspalum, winter senna, slash pine, bitou bush, lantana, coastal morning glory	Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e), Littoral Rainforest EEC (EPBC-ce; TSC-e), *Sophora tomentosa* (TSC-e), *Pultenaea maritima* (TSC-v) (TSC-v; Bitou Bush TAP – high), *Thesium australe* (EPBC-v; TSC-v) (BPWW – CC2)	Asset protection	Quickspray, backpack, cut and paint, biocontrol, hand removal	C-TSC
Clarence South	Yuraygir NP	1851 – Pebbly Beach	Mickey mouse plant, winter senna, slash pine, camphor laurel, bitou bush, lantana, coastal morning glory	Littoral Rainforest EEC (EPBC-ce; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e), *Casuarina equisetifolia* (Bitou Bush TAP – medium), Calystegia soldanella (Bitou Bush TAP – high) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Clarence South	Susan Island NR	1995 – Susan Island NR	Turkey rhubarb, moth vine, Dutchmans pipe, balloon vine, camphor laurel, Indian coral tree,moonflower, coastal morning glory, lantana, large-leaved privet, *L. sinense*, cat's claw creeper, castor oil, coral berry, Cocos palm, Queensland umbrella tree, trad	Lowland Rainforest on Floodplain EEC (TSC-e) (BPWW – CC1)	Asset protection	Backpack, cut/scrape/paint, hand removal, tree injection	C-TSC
Clarence South	Yuraygir NP	1532 – Big Island, Red Rock	Winter senna, ground asparagus, coastal morning glory, lantana, painted spurge, groundsel bush, bitou bush	Coastal Saltmarsh (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains (TSC-e), Swamp Oak Floodplain Forest EECs (TSC-e), pied oystercatcher (TSC-e), beach stone curlew (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Coffs Coast	Coffs Coast RP	2058 – Woolgoolga Lake north	Asparagus fern, mother-of-millions, bitou bush, coastal morning glory, painted spurge, lantana, ochna, broadleaf paspalum, umbrella tree, winter senna, fishbone fern, cocos palm	Littoral Rainforest EEC, Swamp Sclerophyll Forest on Coastal Floodplains EEC, Swamp Oak Floodplain Forest EEC, Subtropical Coastal Floodplain Forest EEC (BPWW – CC1)	Asset protection	Hand pull, backpack spraying, cut and paint, quickspray	C-TSC
Coffs Coast	Moonee Beach NR	1789 – Moonee Beach (southern end)	Bitou bush	Coastal woodland, Littoral Rainforest EEC, *Acianthus exiguus* (BPWW – CC1)	Asset protection	Hand pull, cut and paint, backpack spray, aerial spot spraying	C-TSC
Coffs Coast	Moonee Beach NR	2684 – Serenity Beach	Bitou bush	Littoral Rainforest EEC, coastal woodland (BPWW – CC*)	Asset protection	Hand pull, cut and paint, backpack spraying, quadbike spraying	C-TSC
Coffs Coast	Moonee Beach NR	1751 – Look At Me Now Headland	Bitou bush, broadleaf paspalum, kikuyu, setaria, winter senna, Rhodes grass	Themeda Grassland EEC, *Zieria prostrata*, *Thesium australe*, *Pultenaea maritima*, *Chamaesyce psammogeton*, *Plectranthus cremnus* (BPWW – CC1)	Asset protection	Hand pull, frilling, cut and paint, backpack spraying	C-TSC
Coffs Coast	Valla NR	1770 – Main reserve	Bitou bush, coastal morning glory, lantana, broadleaf paspalum, paspalum, winter senna	Littoral Rainforest EEC, Subtropical Coastal Floodplain Forest EEC, *Marsdenia longiloba* (BPWW – CC1)	Asset protection	Wick wiping, spot spraying, hand pull, quickspray, back pack spraying, cut and paint	C-TSC
Coffs Coast	Coffs Coast RP	2057 – Woolgoolga headland	Bitou bush, coastal morning glory, lantana, paspalum, broadleaf paspalum, winter senna, asparagus fern	Themeda Grassland on Seacliffs and Coastal Headlands EEC, Littoral Rainforest EEC, *Pultenaea maritima*, *Thesium australe*, *Sophora tomentosa* (BPWW – CC1)	Asset protection	Hand pull, backpack spraying, cut and paint, quickspray, aerial spot spray	C-TSC
Coffs Coast	Coffs Coast RP	1634 – Diggers Head	Bitou bush, coastal morning glory, lantana, paspalum, broadleaf paspalum, winter senna, ochna, molasses grass, fishbone fern, umbrella tree, cocos palm	Themeda Grassland on Seacliffs and Coastal Headlands EEC, *Zieria smithii*, *Pultenaea maritima*, Littoral Rainforest EEC, *Alexfloydia repens*, *Thesium australe* (BPWW – CC1)	Asset protection	Hand pull, backpack spraying, cut and paint, quickspray	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Coffs Coast	Jagun NR	1716 – Jagun NR	Bitou bush, glory lily, lantana, winter senna, broad leaf paspalum, groundsel bush, crofton weed, blue billy goat weed	Littoral Rainforest, Swamp Sclerophyll Forest, Swamp Oak Forest EECs, coastal woodland, moist eucalypt forest (BPWW – CC1)	Asset protection	Quickspray or quadbike, hand pull, back pack spray	C-TSC
Coffs Coast	Moonee Beach NR	1523 – Bare Bluff	Bitou bush, kikuyu, broad leaf paspalum, Rhodes grass, giant Parramatta grass, setaria	Themeda grassland, *Zieria prostrata*, *Pultenaea maritima*, *Plectranthus cremnus* (BPWW – CC1)	Asset protection	Backpack spraying, hand pull	C-TSC
Coffs Coast	Valla NR	1749 – Littoral rainforest	Bitou bush, lantana, broad leaf paspalum, palm grass, cocos palm, Singapore daisy, winter senna	Littoral Rainforest EEC, *Parsonsia dorrigoensis*, *Marsdenia longiloba* (BPWW – CC1)	Asset protection	Hand pull, backpack spray, cut and paint	C-TSC
Coffs Coast	Gaagal Wanggaan (South Beach) NP	2724 – Gaagal Wanggaan	Bitou bush, lantana, broadleaf paspalum, winter senna, groundsel bush, Rhodes grass, buffalo grass, torpedo grass, coastal morning glory	Littoral Rainforest EEC, coastal woodland, estuarine wetlands, dry eucalypt forest, tall dry heath	Asset protection	Backpack spray, cut and paint, quickspray, splatter gun, hand pull	C-TSC
Coffs Coast	Coffs Coast RP	1518 – Arrawarra headland	Bitou bush, lantana, paspalum, giant Parramatta grass	Themeda Grassland on Seacliffs and Coastal Headlands EEC, *Pultenaea maritima*, *Thesium australe* (BPWW – CC1)	Asset protection	Hand pull, backpack spraying, cut and paint, quickspray, aerial spot spray	C-TSC
Coffs Coast	Yarriabini NP	1781 – Middle Head and Middle Head west	Bitou bush, lantana, setaria, Rhodes grass, giant Parramatta grass, whisky grass, farmers friends	Themeda Grassland EEC, littoral rainforest EEC, *Thesium australe, Plectranthus cremnus* (BPWW – CC2)	Asset protection	Backpack spray, cut and paint, hand pull	C-TSC
Coffs Coast	Coffs Coast RP	1916 – SEPP26 (68c – 1.3 km north-east of Korora	Bitou bush, ochna	Littoral Rainforest EEC (BPWW – CC1)	Asset protection	Hand pull, backpack spraying, cut and paint, quickspray	C-TSC
Coffs Coast	Juugawaarri NR	1610 – Cooks Creek	Broad leaf paspalum	Lowland Rainforest EEC, *Parsonsia dorrigoensis* (BPWW – CC1)	Asset protection	Quickspray	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Coffs Coast	Juugawaarri NR	2788 – All roads	Broad leaf paspalum, giant Parramatta grass, Crofton weed	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest (BPWW – CC*)	Asset protection	Boom spray	C-TSC
Coffs Coast	Bongil Bongil NP	1860 – Pine Creek	Broad leaf paspalum, lantana	Moist eucalypt forest, Swamp Oak Forest EEC, *Alexfloydia repens* (BPWW – CC4)	Asset protection	Backpack spraying, hand pull	C-TSC
Coffs Coast	Jaaningga NR	2640 – Basin and Rocky Wharf Road	Broad leaf paspalum, lantana	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest, *Acacia chrysotrycha, Parsonsia dorrigoensis* (BPWW – CC2)	Asset protection	Hand pull, backpack spray, cut and paint	C-TSC
Coffs Coast	Jaaningga NR	1715 – Ridge and Basin roads	Broad leaf paspalum, lantana	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest, *Acacia chrysotrycha, Parsonsia dorrigoensis* (BPWW – CC2)	Asset protection	Cut and paint, back pack spray, hand pull	C-TSC
Coffs Coast	Jaaningga NR	1524 – Western Boundary Trail	Broad leaf paspalum, lantana	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest (BPWW – CC3)	Asset protection	Boom spray, quickspray	C-TSC
Coffs Coast	Sherwood NR	2056 – Woolgoolga Creek track area	Broadleaf paspalum, blue billy goat, environmental weeds	Lowland Rainforest EEC, *Senna acclinis*, *Amorphospermum whitei*, *Marsdenia longiloba*, *Alloxylon pinnatum* (BPWW – CC1)	Asset protection	Backpack spraying, hand pull	C-TSC
Coffs Coast	Bongil Bongil NP	1726 – Kite Creek	Broadleaf paspalum, lantana, winter senna, groundsel bush	*Alexfloydia repens*, *Amorphospermum whitei*, *Tylophora woollsii* (BPWW – CC1)	Asset protection	Backpack spraying, hand pull	C-TSC
Coffs Coast	Moonee Beach NR	1790 – Littoral Rainforest	Camphor laurel, umbrella tree, lantana, bitou bush	Littoral Rainforest EEC, *Acianthus exiguus* (BPWW- CC1)	Asset protection	Drill, cut stump, backpack spraying	C-TSC
Coffs Coast	Bongil Bongil NP	Bongil Bongil	Corvid species	Little terns	Asset protection	Poisoning	C-TSC
Coffs Coast	Bongil Bongil NP	Bongil Bongil	Domestic dogs	Little terns	Asset protection	Barrier fencing	C-TSC
Coffs Coast	Dunggir NP, Gumbaynggirr SCA	Rufous scrub bird habitat	Feral cat	Rufous scrub bird	Asset protection	Survey and monitor	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Coffs Coast	Coffs Coast RP	Hearnes lake	Fox	Little terns	Asset protection	1080 baiting, trapping, barrier fencing and monitoring	C-TSC
Coffs Coast	Gaagal Wanggaan (South Beach) NP	Nambucca Heads	Fox	Little terns	Asset protection	1080 baiting, trapping, fencing, signposting, sandplot survey and monitor	C-TSC
Coffs Coast	Bongil Bongil NP	Bongil Bongil	Fox and feral cats	Little terns	Asset protection	1080 baiting, trapping, signposting, sandplot survey and monitor	C-TSC
Coffs Coast	Ngambaa NR	2685 – Ennis and Bakers roads	Giant Parramatta grass, lantana	Moist eucalypt forest, dry eucalypt forest, *Marsdenia longiloba*, *Parsonsia dorrigoensis* (BPWW – CC*)	Asset protection	Boom spray, quickspray	C-TSC
Coffs Coast	Bongil Bongil NP	1567 – Bundagaree Trail (Tuckers Rock to Bundagen) and North Beach Bundagen	Glory lily, broadleaf paspalum, giant Parramatta grass, molasses grass	Littoral Rainforest EEC, moist eucalypt forest (BPWW – CC1)	Asset protection	Quadbike spraying, backpack spraying, hand pull	C-TSC
Coffs Coast	Valla NR	1525 – Beach/estuary	Ground asparagus, bitou bush, lantana, paspalum, broadleaf paspalum, winter senna	Littoral Rainforest, Subtropical Coastal Floodplain Forest EECs (BPWW – CC1)	Asset protection	Backpack spray, cut and paint, hand pull	C-TSC
Coffs Coast	Yarriabini NP	2686 – Kinki bananas	Groundsel bitou bush, lantana, Crofton weed, barna grass, yellow bells, paspalum, passionfruit	Littoral Rainforest EEC, moist eucalypt forest	Asset protection,	Quickspray, splatter gun, cut and paint, hand pull	C-TSC
Coffs Coast	Moonee Beach NR	1628 – Dammerels Head	Kikuyu, broad leaf paspalum, rhodes grass, giant Parramatta grass, setaria, bitou bush, lantana, ground asparagus, corky passionfruit	Themeda Grassland EEC, coastal woodland, *Zieria prostrata*, *Thesium australe*, *Pultenaea maritima*, *Chamaesyce psammogeton*, *Plectranthus cremnus* (BPWW – CC1)	Asset protection	Hand pull, backpack spraying	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Coffs Coast	Moonee Beach NR	1635 – Diggers Point	Kikuyu, broad leaf paspalum, Rhodes grass, giant Parramatta grass, setaria, bitou bush, winter senna	Themeda Grassland EEC, coastal woodland, *Zieria prostrata*, *Pultenaea maritima*, *Plectranthus cremnus* (BPWW – CC1)	Asset protection	Hand pull, cut and paint, backpack spraying	C-TSC
Coffs Coast	Ngambaa NR	1656 – Ennis rd / Greenhills Road area	Lantana	Lowland Rainforest EEC, moist eucalypt forest, *Pomaderris queenslandica*, *Marsdenia longiloba*, *Parsonsia dorrigoensis* (BPWW – CC3)	Asset protection	Cut and paint, back pack spray, hand pull	C-TSC
Coffs Coast	Bongil Bongil NP	1898 – Scrub Creek and North Scrub Creek	Lantana, bitou bush, glory lily	Swamp Sclerophyll Forest, Littoral Rainforest EECs, *Acronychia littoralis, Chamaesyce psammoget*on (BPWW – CC1)	Asset protection	Backpack spraying, hand pull	C-TSC
Coffs Coast	Ngambaa NR	1987 – Stockyard Creek rainforest	Lantana, broad leaf paspalum, Crofton weed	Lowland Rainforest EEC (BPWW – CC1)	Asset protection	Cut and paint, back pack spray, hand pull, quickspray	C-TSC
Coffs Coast	Yarriabini NP	2005 – The Pines	Lantana, broad leaf paspalum, giant Parramatta grass	Lowland Rainforest EEC, moist eucalypt forest, *Marsdenia longiloba, Parsonsia dorrigoensis* (BPWW – CC1)	Asset protection	Hand pull, backpack spray	C-TSC
Coffs Coast	Sherwood NR	2687 – Plantation sites	Lantana, broadleaf paspalum	Lowland Rainforest EEC, moist eucalypt forest, *Senna acclinis*, *Amorphospermum whitei*, *Marsdenia longiloba*, *Alloxylon pinnatum* (BPWW – CC*)	Asset protection	Back pack, hand pull	C-TSC
Coffs Coast	Bongil Bongil NP	1571 – Burma Frisbys Roads	Lantana, broadleaf paspalum, winter senna, trad	Swamp Oak Forest EEC, moist eucalypt forest, *Amorphospermum whitei, Alexfloydia repens* (BPWW – CC1)	Asset protection	Backpack spraying, cut and paint, hand pull	C-TSC
Coffs Coast	Juugawaarri NR	1528 – Bellbucca BMAD	Lantana, mistflower	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest (BPWW – CC1)	Asset protection	Quickspray	C-TSC
Coffs Coast	Bongil Bongil NP	2688 – Clarkes Road rainforest	Lantana, morning glory, broadleaf paspalum	Lowland Rainforest EEC, *Parsonsia dorrigoensis*, *Amorphospermum whitei* (BPWW – CC*)	Asset protection	Backpack spraying, cut and paint, hand pull	C-TSC
Coffs Coast	Nunguu Mirral AA	1856 – Picket Hill	Lantana, paspalum	Lowland Rainforest EEC, Subtropical Coastal Floodplain Forest EEC (BPWW – CC1)	Asset protection	Cut and paint, back pack spray, hand pull	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Coffs Coast	Bowraville NR	1550 – Bowraville NR	Lantana, paspalum, broadleaf paspalum, giant Parramatta grass	Lowland Rainforest EEC, Subtropical Coastal Floodplain Forest EEC, *Niemeyera whitei*, *Parsonsia dorrigoensis* (BPWW – CC1)	Asset protection	Quickspray, boom spray, splatter gun	C-TSC
Coffs Coast	Bindarri NP	1682 – Granite Pit Road area	Lantana, privets, broadleaf paspalum, morning glory	Lowland Rainforest EEC, moist eucalypt forest, *Anetholea anisata, Amorphospermum whitei* (BPWW – CC1)	Asset protection	Splatter gun, quickspray, cut and paint, hand removal	C-TSC
Coffs Coast	Ngambaa NR	1587 – Cedar Park	Lantana, winter senna	Lowland Rainforest EEC, moist eucalypt forest, *Senna acclinis*, *Niemeyera whitei*, *Marsdenia longiloba*, *Parsonsia dorrigoensis* (BPWW – CC3)	Asset protection	Splatter gun, quickspray, cut paint, hand pull	C-TSC
Coffs Coast	Bongil Bongil NP	2006 – Plantation blocks	Lantana, winter senna, Gympie messmate	Moist eucalypt forest, Littoral Rainforest EEC (BPWW – CC1)	Asset protection	Splatter gun, cut and paint, backpack spraying spray, hand removal	C-TSC
Coffs Coast	Bindarri NP	1759 – Lower Urumbillum Bindaray picnic areas	Lantana,exotic grasses, crofton weed	Lowland Rainforest EEC, *Parsonsia dorrigoensis*, *Amorphospermum whitei*, *Alloxylon pinnatum*, *Austrobuxus swainii* (BPWW – CC1)	Asset protection	Backpack spraying, cut and paint, hand pull	C-TSC
Coffs Coast	Muttonbird Island NR	1811 – Muttonbird central area	Madeira vine, turkey rhubarb, kikuyu, lantana, spiny burr grass	Themeda Grassland EEC, Littoral Rainforest EEC, *Pultenaea maritima*, *Plectranthus cremnus*	Asset protection	Hand pull, backpack spraying	C-TSC
Coffs Coast	Garby NR	1676 – adjacent to Arrawarra Road	Paspalum, whisky gass, kikuyu	Graminoid Heath EEC, coastal woodland (BPWW – CC1)	Asset protection	Quickspray	C-TSC
Coffs Coast	Garby NR	2689 -Garby	Post-fire grasses – setaria, giant Parramatta grass, whisky grass, Rhodes grass	Graminoid Heath EEC, coastal woodland (BPWW – CC*)	Asset protection	Backpack spraying	C-TSC
Coffs Coast	Bindarri NP	1520 – Bangalore Falls	Privet, blackberry	Lowland Rainforest EEC, *Niemeyera whitei*, *Parsonsia dorrigoensis* (BPWW – CC1)	Asset protection	Hand pull, cut and paint	C-TSC
Coffs Coast	Bindarri NP	2024 – Urumbillum Creek Falls	Privet, blackberry	Lowland Rainforest EEC, *Niemeyera whitei*, *Parsonsia dorrigoensis*, *Marsdenia longiloba* (BPWW – CC1)	Asset protection	Hand pull, cut and paint	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Coffs Coast	Garby NR	2683 – Gunbarrel Western boundary	Setaria, giant Parramatta grass, whiskey grass, Rhodes grass	Graminoid Heath EEC, coastal woodland (BPWW – CC*)	Asset protection	Quadbike spraying or backpack spraying	C-TSC
Coffs Coast	Dunggir NP	2690 – Hanging Rock Road	Trad	Lowland Rainforest EEC, moist eucalypt forest (BPWW – CC*)	Asset protection	Backpack spray	C-TSC
Coffs Coast	Coramba NR	1614 – Coramba rainforest	Trad, privets, moth vine	Lowland Rainforest on Floodplain EEC, *Senna acclinis* (BPWW – CC1)	Asset protection	Hand pull, backpack spraying	C-TSC
Coffs Coast	Bongil Bongil NP	1536 – Bluff Loop Walk	Winter senna, lantana, broadleaf paspalum	Littoral Rainforest EEC, Swamp Sclerophyll Forest EEC, moist eucalypt forest, *Acianthus exiguus* (BPWW – CC1)	Asset protection	Backpack spraying, Quadbike spraying, splatter gun, handpull	C-TSC
Dorrigo Plateau	Dorrigo NP	McGrath Hump	Bell miner associated dieback	White Gum Moist Forest and Grey Box – Grey Gum Wet Sclerophyll Forest of the North Coast Bioregion.	Asset protection	Supporting BMAD ecologist site surveys	C-TSC
Dorrigo Plateau	Chaelundi NP	2044 – Wild Lemon Creek/Sour gully area	Blackberry, giant Parramatta grass	Lowland rainforest EEC, *Macrozamia johnsonii*; BPWW – CC1)	Asset protection	Quadbike foliar spray	C-TSC
Dorrigo Plateau	Chaelundi NP	1718 – Joebill's Road, 2km east of Doon Goonge	Blackberry, giant Parramatta grass, lantana	Lowland Rainforest EEC, *Macrozamia johnsonii*, *Acalypha eremorum* (BPWW – CC2)	Asset protection	Quadbike foliar spray	C-TSC
Dorrigo Plateau	Chaelundi NP	1640 Doon Goonge Marara Creek	Blackberry, lantana	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest (BPWW – CC4)	Asset protection	Quadbike foliar spray	C-TSC
Dorrigo Plateau	Guy Fawkes River NP	1756 – Ebor Falls	Blackberry, oxeye daisy	New England Peppermint Woodland EEC, *Pterostylis metcalfei, Tasmannia glaucifolia*, subalpine woodland, high scenic values (BPWW – CC2)	Asset protection	Quickspray, backpack	C-TSC
Dorrigo Plateau	New England NP	2691 – Misty Valley	Blackberry, privet, honeysuckle	Cool temperate rainforest (BPWW – CC*)	Asset protection	Quadbike foliar spray	C-TSC
Dorrigo Plateau	Cathedral Rock NP	Cathedral Rock NP	Feral pig	Upland Wetlands of New England Tablelands EEC, Montain peatlands and swamps	Asset protection	Trapping and aerial shooting on park and neighbouring lands	C-TSC
Dorrigo Plateau	Chaelundi NP	1668 – Johnsons cycad, Frenchmans Creek/ridge	Giant Parramatta grass, lantana	Dry eucalypt forest, *Macrozamia johnsonii* (BPWW – CC2)	Asset protection	Quadbike foliar spray	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Dorrigo Plateau	Nymboi-Binderay NP	1862 – Platypus Flat camping area	Giant Parramatta grass, privet, moth vine, trad, honeysuckle, camphor laurel, honey locust, black locust, passionfruit, wild fruit	Lowland Rainforest EEC, campground (BPWW – CC2)	Asset protection	Quickspray, frill, hand pull	C-TSC
Dorrigo Plateau	Nymboi-Binderay NP	1603 – Cod Hole camping area	Giant Parramatta grass, privet, moth vine, tradescantia, smooth senna, honeysuckle, camphor laurel, honey locust, black locust, passionfruit, wild fruit	Lowland Rainforest EEC (BPWW – CC2)	Asset protection	Quickspray, frill, hand pull	C-TSC
Dorrigo Plateau	Nymboi-Binderay NP	1795 – Moses Rock Road (former flora reserve)	Honey locust, privet, fruit trees, blackberry, willow, giant Parramatta grass, mistflower, moth vine, trad, camphor laurel,	Lowland Rainforest EEC, *Triplarina imbricata*, *Melaleuca groveana*, *Babingtonia prominens* (BPWW – CC1)	Asset protection	Cut paint, frill, hand pull, back pack spray	C-TSC
Dorrigo Plateau	Chaelundi SCA	1937 – Silky Road area	Lantana, giant Parramatta grass	Lowland Rainforest EEC (BPWW – CC1)	Asset protection	Quickspray, splatter gun	C-TSC
Dorrigo Plateau	Bellinger River NP	2035 – Water Gum Falls	Lantana, mistflower, broad-leaved paspalum, privet	Lowland Rainforest EEC, Subtropical Coastal Floodplain Forest EEC, *Parsonsia dorrigoensis, Niemeyera whitei*; (BPWW – CC1)	Asset protection	Hand pull, backpack spray, cut and paint, frill, scrape and paint	C-TSC
Dorrigo Plateau	Dorrigo NP	1678 – Glennifer falls, gorge and lowland rainforest	Lantana, mistflower, trad, broad-leaved paspalum	Lowland Rainforest EEC, Subtropical Coastal Floodplain Forest EEC, *Hicksbechia pinnatifolia, Niemeyera whitei*; (BPWW – CC2)	Asset protection	Backpack spray, hand pull	C-TSC
Dorrigo Plateau	Dorrigo NP	1758 – Lower Rosewood Creek	Lantana, mistflower, tradescantia	Lowland Rainforest on Floodplain EEC, Gondwana World Heritage Area, *Hicksbechia pinnatifolia*, *Parsonsia dorrigoensis*, *Anetholea anisata* (BPWW – CC4)	Asset protection	Hand pull / dig out, scrape and paint, foliar spray, splatter gun	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Dorrigo Plateau	Bellinger River NP	1703 – Homelands Lowland Rainforest	Madeira vine, balloon vine, tradescantia, privets, mistflower, castor oil	Lowland Rainforest on Floodplain EEC, *Parsonsia dorrigoensis*; (BPWW – CC2)	Asset protection	Hand pull/ dig, backpack spray, cut and paint, frill, scrape and paint	C-TSC
Dorrigo Plateau	Dorrigo NP	2692 – Dorrigo Mountain	Moth vine, lantana	Lowland Rainforest on Floodplain EEC, *Parsonsia dorrigoensis, Sarcochilus fitzgeraldii* (BPWW – CC*)	Asset protection	Hand pull / dig out, scrape and paint, foliar spray, splatter gun	C-TSC
Dorrigo Plateau	New England NP	1553 – Brinerville/ Darkwood	Moth vine, privets, pyracantha, blackberry, giant Parramatta grass, sweet briar, lantana	Lowland Rainforest on Floodplain EEC, lowland rainforest, *Parsonsia dorrigoensis* (BPWW – CC1)	Asset protection	Quickspray, splatter gun, frill	C-TSC
Dorrigo Plateau	Cathedral Rock NP	2029 – Barokee, Cathedral Rock, Round Mountain	Oxeye daisy	Sublpine woodland, *Gentiana wissmannii* (BPWW – CC1)	Asset protection	Quickspray	C-TSC
Dorrigo Plateau	Dorrigo NP	1725 – Killungoondie plain	Privet, giant Parramatta grass	Olearia flocktoniae (BPWW – CC1)	Asset protection	Quickspray, backpack spray, cut and paint	C-TSC
Dorrigo Plateau	Nymboi-Binderay NP	1791 – Platypus Flat camping area to Blicks crossing	Privet, privet, moth vine, trad, smooth senna, honeysuckle, camphor laurel, passionfruit	Lowland Rainforest EEC (BPWW – CC2)	Asset protection	Quickspray, frill, hand pull, back pack spray	C-TSC
Dorrigo Plateau	Dorrigo NP	2639 – Regen 1 and 2	Privets, honeysuckle	Lowland Rainforest EEC (BPWW – CC1)	Asset protection	Quickspray, hand pull	C-TSC
Dorrigo Plateau	Muldiva NR	1805 – Muldiva NR	Privets, trad	Lowland Rainforest EEC, warm temperate rainforest (BPWW – CC5)	Asset protection	Quickspray, backpack, frill	C-TSC
Dorrigo Plateau	Dorrigo NP	2052 – Wonga Walk	Trad	Lowland Rainforest EEC, *Sarcochilus fitzgeraldii, Parsonsia dorrigoensis,* very high profile (BPWW – CC4)	Asset protection	Backpack spray, hand pull	C-TSC
Dorrigo Plateau	Cathedral Rock NP	2693 – Snowy Creek Upland wetland	Yorkshire fog grass, blackberry	Montane Peatlands and Swamps EEC, Upland Wetlands of New England Tablelands EEC (BPWW – CC*)	Asset protection	Wick wipe, backpack spray	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Macleay	Hat Head NP	2705 – North Gap headland to Little Bay incl Little Smoky	Bitou bush, lantana	Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e), *Pandanus tectorius* var. *australianus* (Bitou Bush TAP – medium), *Casuarina equisetifolia* (Bitou Bush TAP – medium) (BPWW – CC2)	Asset protection	Backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Macleay	Limeburners Creek NP	2708 – Barries Bay	Bitou bush, winter senna, lantana, coastal morning glory	Littoral Rainforest (EPBC-ce; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands (TSC-e), Subtropical Coastal Floodplain Forest (TSC-e), Swamp Oak Floodplain Forest (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EECs (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, , biocontrol, hand removal	C-TSC
Macleay	Hat Head NP	2709 – Connors to Hungry Head beach access	Bitou Bush, winter senna, lantana, coastal morning glory, blackberry, vasey grass, ground asparagus	Littoral Rainforest (EPBC-ce; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands EECs (TSC-e), *Casuarina equisetifolia* (Bitou Bush TAP – medium), *Plectranthus cremnus* (Bitou Bush TAP – high), *Thesium australe*, *Diuris superba*, *Zieria smithii* (Bitou Bush TAP – high), *Diuris curta* (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal, aerial spray, abseiling bush regenerators	C-TSC
Macleay	Hat Head NP	2710 – Korogoro	Bitou bush, winter senna, lantana, coastal morning glory, blackberry, vasey grass, ground asparagus	Littoral Rainforest (EPBC-ce; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands EECs (TSC-e), *Pandanus tectorius* var. *australianus* (Bitou Bush TAP – medium), *Casuarina equisetifolia* (Bitou Bush TAP – medium), *Plectranthus cremnus* (Bitou Bush TAP – high), *Thesium australe* (TSC-V), *Zieria smithii* (Bitou Bush TAP – high) *Chamaecrista maritima* (BPWW – CC*)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal, aerial spray	C-TSC
Macleay	Hat Head NP	2706 – Gap Beach	Bitou bush, winter senna, lantana, coastal morning glory, blue billy goat weed white passionfruit, broad leafed paspalum	Littoral Rainforest EEC (EPBC-ce; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e), Lowland Subtropical Rainforest EEC (TSC-e), palm forest, *Caesalpinia bonduc* (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal, revegetation	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Macleay	Hat Head NP	2707 – North Smoky to Green Island Track	Bitou bush, winter senna, lantana, coastal morning glory, blue billy goat weed, white passionfruit, buffalo grass, Noogoora burr	Littoral Rainforest EEC (EPBC-ce; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e), *Chamaecrista maritima*, *Cynanchum elegans*, *Plectrusia spathulata*, (all Bitou Bush TAP – high), *Dianella crinoides* (Bitou Bush TAP – medium), *Pandanus tectorius* var. *australianus* (Bitou Bush TAP – medium), *Casuarina equisetifolia* (Bitou Bush TAP – medium) (BPWW – CC1)	Asset protection	Backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Macleay	Arakoon NP	2711 – Pipeline to gaol	Bitou bush, winter senna, lantana, coastal morning glory, Formosa lily, ground asparagus, Mickey Mouse plant, *Bryophyllum* spp, *Hydrocotyle bonariensis*, glory lily	Littoral Rainforest (EPBC-ce; TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EECs (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Macleay	Arakoon NP	2712 – Monument Hill	Bitou bush, winter senna, lantana, coastal morning glory, Formosa lily, ground asparagus, Mickey Mouse plant, camphor laurel	Littoral Rainforest (EPBC-ce; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands EECs (TSC-e), *Casuarina equisetifolia* (Bitou Bush TAP – medium) grassy clay heathland, palm forest (BPWW – CC2)	Asset protection	Backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Macleay	Limeburners Creek NP	2713 – Back Plomer Beach	Bitou bush, winter senna, lantana, coastal morning glory, kikuyu	Subtropical Coastal Floodplain Forest (TSC-e), Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EECs (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, chainsaw, biocontrol, hand removal	C-TSC
Macleay	Arakoon NP	2714 – Little Bay	Bitou bush, winter senna, lantana, coastal morning glory, Madiera vine	Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e), *Pandanus tectorius* var. *australianus* (Bitou Bush TAP – medium), *Casuarina equisetifolia* (Bitou Bush TAP – medium), grassy clay heathland (BPWW – CC4)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal, revegetation	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Macleay	Goolawah NP	2717 – Racecourse Beach	Bitou bush, winter senna, lantana, coastal morning glory, vasey grass, ground asparagus	Littoral Rainforest EEC (EPBC-ce; TSC-e), coastal dune communities (BPWW – CC3)	Asset protection	Quickspray, aerial spraybackpack,splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Macleay	Limeburners Creek NP	2620 – North Shore Beach	Bitou bush, winter senna, lantana, coastal morning glory, vasey grass, ground asparagus	Littoral Rainforest (EPBC-ce; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands (TSC-e), Subtropical Coastal Floodplain Forest (TSC-e), Swamp Oak Floodplain Forest (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EECs (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, aerial spray, backpack, splatter gun, cut and paint, chainsaw, biocontrol, hand removal	C-TSC
Macleay	Limeburners Creek NP	2715 – Point Plomer	Bitou bush, winter senna, lantana, coastal morning glory, vasey grass, ground asparagus	Littoral Rainforest EEC (EPBC-ce; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e), *Casuarina equisetifolia* (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, chainsaw, biocontrol, hand removal	C-TSC
Macleay	Goolawah NP	2716 – Racecourse Headland	Bitou bush, winter senna, lantana, coastal morning glory, vasey grass,ground asparagus	Littoral Rainforest (EPBC-ce; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands EECs (TSC-e), *Casuarina equisetifolia* (Bitou Bush TAP – medium) (BPWW – CC1)	Asset protection	Backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Macleay	Limeburners Creek NP	2718 – Queens Head	Bitou bush, winter senna, lantana, coastal morning glory, vasey grass,ground asparagus, kikuyu	Littoral Rainforest EEC (EPBC-ce; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e), *Casuarina equisetifolia* (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, chainsaw, biocontrol	C-TSC
Macleay	Hat Head NP	2719 – Lighthouse historic heritage precinct incl north and east slopes	Bitou bush, winter senna, lantana, coastal morning glory, white passionfruit, buffalo grass, Madiera vine	Littoral Rainforest (EPBC-ce; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands EECs (TSC-e), *Pandanus tectorius* var. *australianus* (Bitou Bush TAP – medium), *Casuarina equisetifolia* (Bitou Bush TAP – medium) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal, revegetation	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Macleay	Hat Head NP	2720 – Smoky Beach 4WD access to Smoky Cape Lighthouse east of Lighthouse Road	Bitou bush, winter senna, lantana, coastal morning glory, white passionfruit, Madiera vine, Crofton weed	Littoral Rainforest (EPBC-ce; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands EECs (TSC-e), *Pandanus tectorius* var. *australianus* (Bitou Bush TAP – medium), *Casuarina equisetifolia* (Bitou Bush TAP – medium), *Acronychia littoralis* (TSC-e) (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal, revegetation	C-TSC
Macleay	Goolawah NP and RP	2721 – Delicate Beach	Groundsel bush, bitou bush, winter senna, lantana	Littoral Rainforest EEC (EPBC-ce; TSC-e), Coastal Dune Communities (BPWW – CC3)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Macleay	Limeburners Creek NP	2722 – Big Hill	Groundsel bush, bitou bush, winter senna, lantana, coastal morning glory	Littoral Rainforest EEC (EPBC-ce; TSC-e), Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e), *Casuarina equisetifolia* (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, chainsaw, biocontrol, hand removal	C-TSC
Macleay	Goolawah NP	2723 – Stage 2 additions	Groundsel bush, bitou bush, winter senna, lantana, garden escapes	Swamp Sclerophyll Forest on Coastal Floodplains EEC (TSC-e), coastal dune communities (BPWW – CC1)	Asset protection	Prepare plan and implement control	C-TSC
Macleay	Clybucca AA	2621 – Golden Hole South	Groundsel bush, lantana, coastal morning glory, moth vine, blackberry, winter senna	Swamp Oak forest (TSC-e), Coastal Saltmarsh EECs (TSC-e), mangrove vegetation, Aboriginal cultural heritage (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Macleay	Yessabah NR	2073 – Limestone areas	Lantana, moth vine, camphor laurel	Lowland subtropical rainforest on limestone (BPWW – CC2)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC
Macleay	Clybucca AA	2622 – Madeira rainforest	Madiera vine, small leafed privet, camphor laurel, lantana	Littoral Rainforest EEC (EPBC-ce; TSC-e), Aboriginal cultural heritage (BPWW – CC1)	Asset protection	backpack, cut, scrape, paint, hand removal,	C-TSC
Macleay	Yarrahapinni Wetlands NP	2070 – North Eastern fringe	Mulberry, lantana, coastal morning glory, moth vine, winter senna	Swamp Sclerophyll Forest on Coastal Floodplains EEC (TSC-e), Littoral Rainforest EEC, Swamp Oak Forest EEC (TSC-e) (BPWW – CC3)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	C-TSC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Macleay	Maria NP, Limeburners Creek NP, Goolawah NP, Goolawah RP	Maria River Wildlife Project	Wild dog, fox, cat, pig	Ground parrot, quoll, koala, public safety, livestock predation on adjoining private land, dingo conservation in Schedule 2 area	Asset protection	Trapping, survey and monitoring, research, public education, sign positing	C-TSC
Clarence South	Byrnes Scrub NR, Chambigne NR, Nymboi-Binderay NP, Nymboida NP, Ramornie NP, Sherwood NR	Ramornie, Nymboida, Nymboi-Binderay, Chambigne, Sherwood, Byrnes Scrub, North Coast LHPA wild dog management plan	Wild dog	Livestock on adjoining private land	Asset protection	Reactive program, implemented as required. Monitoring, baiting, trapping	C-EC
Clarence South	Yuraygir NP	To be developed	Wild dog	Neighbouring PP stock	Asset protection	Monitor- sandpadding, infra-red cameras; 1080 baiting	C-EC
Clarence South	Yuraygir NP and SCA	Northern Yuraygir, Central Yuraygir, Southern Yuraygir North Coast LHPA wild dog management plan	Wild dog	Biodiversity e.g., coastal emu, public safety, neighbours' stock	Asset protection	Monitoring (sandpadding, infra-red cameras), 1080 baiting, trapping	C-EC
Coffs Coast	Garby NR	APZ	Blue billy goat, grasses, annual weeds	Urban interface (fuel reduction) and graminoid heath, coastal woodland	Asset protection	Quickspray	C-EC
Coffs Coast	Bongil Bongil NP	Western Bongil Bongil NP	Wild dog	Livestock on adjoining private land	Asset protection	Reactive 1080 baiting with neighbours, sandplot survey and monitor	C-EC
Coffs Coast	Dunggir NP	Mid coast LHPA wild dog management plan – Dunggir NP	Wild dog	Livestock on adjoining private land	Asset protection	Reactive 1080 baiting with neighbours, survey and monitor	C-EC
Coffs Coast	Jaaningga NR	Mid coast LHPA wild dog management plan – Jaaningga NR	Wild dog	Livestock on adjoining private land	Asset protection	Strategic 1080 baiting with neighbours, sandplot survey and monitor	C-EC
Coffs Coast	Ngambaa NR	Mid coast LHPA wild dog management plan – Ngambaa NR	Wild dog	Livestock on adjoining private land	Asset protection	Reactive 1080 baiting with neighbours, sandplot survey and monitor	C-EC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Coffs Coast	Yarriabini NP	Mid coast LHPA wild dog management plan – Yarriabinni NP	Wild dog	Livestock on adjoining private land	Asset protection	Reactive 1080 baiting with neighbours, trapping, survey and monitor	C-EC
Dorrigo Plateau	Dorrigo NP	Dome Road, Mountain Top	Fox	Livestock on adjoining private land	Asset protection	Reactive 1080 baiting with neighbours	C-EC
Dorrigo Plateau	Bagul Waajaarr NR	Bagul Waajaarr NR	Wild dog	Livestock on adjoining private land	Asset protection	Strategic control (baiting and trapping) implemented with neighbours	C-EC
Dorrigo Plateau	Cathedral Rock NP	Western perimeter trail	Wild dog	Livestock on adjoining private land	Asset protection	Strategic control (baiting and trapping)implemented with neighbours, canid sandplot monitoring	C-EC
Dorrigo Plateau	Deer Vale NR	Deervale NR	Wild dog	Livestock on adjoining private land	Asset protection	Reactive 1080 baiting with neighbours	C-EC
Dorrigo Plateau	Dorrigo NP	Gleniffer, Slingsby Road	Wild dog	Livestock on adjoining private land	Asset protection	Reactive 1080 baiting with neighbours	C-EC
Dorrigo Plateau	Guy Fawkes River NP	Wongwibinda Area	Wild dog	Livestock on adjoining private land	Asset protection	Strategic control implemented with neighbours, canid monitoring	C-EC
Dorrigo Plateau	New England NP	North west escarpment	Wild dog	Livestock on adjoining private land	Asset protection	Reactive 1080 baiting with neighbours	C-EC
Dorrigo Plateau	Serpentine NR/ Cunnawarra NP	Park-wide and neighbouring properties	Wild dog	Livestock on adjoining private land	Asset protection	Reactive 1080 baiting with neighbours, map status of barrier fence, canid monitoring	C-EC
Macleay	Fishermans Bend NR	Mid Coast LHPA wild dog management plan – Loop and Bomaderry trails	Wild dog	Livestock on adjoining private land	Asset protection	Reactive 1080 baiting with neighbours, trapping, sandplot survey and monitor	C-EC
Macleay	Hat Head NP	Mid Coast LHPA wild dog management plan – Kilmores Trail	Wild dog	Livestock on adjoining private land	Asset protection	Reactive 1080 baiting with neighbours, trapping, sandplot survey and monitor	C-EC

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Macleay	New England NP	Mid Coast LHPA wild dog management plan – Postmans trail, O'Neils, F Tree, Hickeys Creek Roads	Wild dog	Livestock on adjoining private land	Asset protection	Strategic 1080 baiting with neighbours, sandplot survey and monitor	C-EC
Macleay	Willi Willi NP, Boonanghi NR and SCA	Mid Coast LHPA wild dog management plan – Flat Top Road, Double Head and Boonanghi Trail, Wombat Road	Wild dog	Livestock on adjoining private land	Asset protection	Strategic 1080 baiting with neighbours, sandplot survey and monitor	C-EC
Clarence South	Clarence Estuary NR	Clarence Estuary	Cane toad		Eradication	Survey/monitor, hand removal	C-NE
Clarence South	Yaegl NR	Yaegl	Cane toad		Eradication	Survey/monitor, hand removal	C-NE
Clarence South	Yuraygir NP	Northern Yuraygir,- Brooms Head – Sandon-Angourie	Cane toad		Eradication	Collection, survey, community education/awareness	C-NE
Clarence South	Clarence Estuary NR	Entire reserve	Yellow crazy ants		Eradication	Monitor	C-NE
Coffs Coast	Kororo NR	Kororo	Broad leafed pepper tree, cocos palm		Eradication	Backpack spraying, splatter, cut paint	C-NE
Coffs Coast	All Reserves	Various	Cane toad		Eradication	Respond to reports, hand collection, night survey and monitor	C-NE
Coffs Coast	Jagun NR	Jagun	Singapore daisy		Eradication	Hand pull, back pack spray	C-NE
Dorrigo Plateau	New England NP	Brinerville	Cat's claw creeper, cherry guava		Containment	Quickspray, splatter gun, frill	C-NE
Dorrigo Plateau	New England NP	Upper Darkwood	Feral cattle		Containment	Trapping	C-NE
Dorrigo Plateau	Guy Fawkes River NP	Marengo, Spion Kopje	Feral deer		Containment	Record sightings, investigate control options	C-NE

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Dorrigo Plateau	Guy Fawkes River NP	Ballards Flat	Honey locust		Eradication	Quickspray, quadbike foliar spray	C-NE
Dorrigo Plateau	Guy Fawkes River NP	Housewater Creek	Honey locust		Eradication	Quadbike foliar spray	C-NE
Dorrigo Plateau	Dorrigo NP	Waterfall Way and Rosewood River	Madeira vine, balloon vine		Eradication	Hand pull / dig out, scrape and paint, backpack spray, splatter gun	C-NE
Dorrigo Plateau	Bellinger River NP	Riverine areas	Red and fallow feral deer		Containment	Record sightings, investigate control options	C-NE
Dorrigo Plateau	New England NP	Upper Darkwood	Red and fallow feral deer		Containment	Record sightings, investigate control options	C-NE
Dorrigo Plateau Area	Guy Fawkes River NP	Bobs Creek	Honey locust		Eradication	Quadbike foliar spray	C-NE
Macleay	Off park	Off-park	Cane toad		Eradication	Hand collection, survey and monitor	C-NE
Macleay	Hat Head NP	Green Island, Borefields, McGuires and Tea Tree Trails	Coolatai grass		Eradication	Spot spray, physical removal	C-NE
Macleay	Hat Head NP	Hat Head beach dunes	Glory lily		Eradication	Spot spray, physical removal	C-NE
Macleay	New England NP	Hickeys Creek	Tropical soda apple		Eradication	Survey, inspection, physical removal and disposal off site.	C-NE
Clarence South	Clarence Estuary NR	Clarence Estuary	Feral poultry	Littoral Rainforest EEC (EPBC-ce; TSC-e), *Tinaspora tinosporoides* (v TSC and EPBC), *Cynachum elegans* (EPBC-e; TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains EEC (TSC-e), Swamp Oak Floodplain (e TSC), *Acianthus exiguus* [ROTAP], Coastal Saltmarsh EEC, Coastal Wetlands EEC, Coastal Cypress Pine EEC, Lantana TAP; Bitou Bush TAP	Asset protection	Physical removal	H-IH
Coffs Coast	Muttonbird Island NR	Muttonbird Island	Black rat, house mouse	Shearwaters (muttonbirds)	Asset protection	Poison baiting, trapping, survey and monitor	H-IH

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Coffs Coast	Muttonbird Island NR	Jetty Foreshore and eastern edge of reserve	Fox	Shearwaters (muttonbirds)	Asset protection	Den fumigation, 1080 baiting	H-IH
Coffs Coast	South Solitary Island HS	South Solitary Island	House mouse	Shearwaters (muttonbirds)	Asset protection	First generation rodenticide batiting	H-IH
Dorrigo Plateau	Mt Hyland NR and SCA	Southern end Marengo flora reserve	Blackberry, giant Parramatta grass	Gondwana WHA, subalpine woodland, cool temperate rainforest	Asset protection	Quickspray, boom spray	H-IH
Macleay	Yarrahapinni Wetlands NP, Clybucca AA and HS	Broadwater	Fox	Migratory shorebirds and waders	Asset protection	Strategic 1080 baiting, trapping, survey and monitor	H-IH
Macleay	Willi Willi NP	WHA Toorumbee Creek	Lantana	World heritage area	Asset protection	Aerial spray, quadbike, backpack, hand removal, biocontrol	H-IH
Macleay	The Castles NR	1653? – Haydonville east section	Lantana, *Rubus anglocandidans*, moth vine	World heritage area (BPWW – CC5)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, , biocontrol, hand removal	H-IH
Clarence South	Yuraygir NP	1619 – Cratchleys	Lantana, winter senna, bitou bush, glory lily, coastal morning glory, white passionfruit, Formosa lily, Mickey Mouse plant	Swamp Sclerophyll Forest on Coastal Floodplains (TSC-e), Littoral Rainforest EECs (BPWW – CC2)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	H-CH
Dorrigo Plateau	Guy Fawkes River NP	Dalmorton precinct, including camping area	Blackberry, lantana, giant Parramatta grass	Camp Ground Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest	Asset protection	Quickspray, quadbike foliar spray	H-CH
Macleay	Arakoon NP	Arakoon campground and gaol precinct	Bitou bush, winter senna, lantana, coastal morning glory, Formosa lily, ground asparagus, Mickey Mouse plant, mother-of-millions, resurrection plant, bindii	Visitor use areas, cultural heritage, *Pandanus tectorius* var. *australianus* (Bitou Bush TAP – medium), *Casuarina equisetifolia* (Bitou Bush TAP – medium)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	H-CH
Macleay	Arakoon NP	Trial Bay goal	Black rat	Historic building	Asset protection	Baiting with 1st generation rodenticides	H-CH

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Dorrigo Plateau	Guy Fawkes River NP	Perrys to Bobin	Blackberry	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest	Asset protection	Quadbike foliar spray	M-WNH
Dorrigo Plateau	Guy Fawkes River NP	Wonga block, Marys Creek, Mt Gardiner	Blackberry	Grassy woodland	Asset protection	Quadbike foliar spray	M-WNH
Dorrigo Plateau	New England NP	Petroi	Blackberry	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest	Asset protection	Quadbike foliar spray	M-WNH
Dorrigo Plateau	Guy Fawkes River NP	Pine Creek	Blackberry, lantana, giant Parramatta grass	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest	Asset protection	Quickspray, quadbike foliar spray	M-WNH
Dorrigo Plateau	Guy Fawkes River NP	Horse Management Zones	Feral horses		Eradication	Trapping, rehoming, survey and monitoring	M-WNH
Dorrigo Plateau	Guy Fawkes River NP	Sara River Starlight Gorge to Boyd, Guy Fawkes junction	Willows		Containment	Quadbike foliar spray	M-WNH
Clarence South	Yuraygir NP	All camping and day-use areas	Bindii		Asset protection	Quickspray, backpack spray	M-RA
Clarence South	Yuraygir NP	Illaroo Rest Area	Bitou bush, lantana, *Senna pendula*, coastal morning glory,	Illaroo Rest Area	Asset protection	Quickspray, backpack spray, cut paint, hand pull	M-RA
Clarence South	Yuraygir NP	Station Creek Rest Area	Bitou bush, lantana, winterr senna, coastal morning glory, broad leafed paspalum	Station Creek Rest Area	Asset protection	Quickspray, backpack spray, cut paint, hand pull	M-RA
Clarence South	Nymboi-Binderay NP	Nymboida River Camping Area	Large leafed privet, small leafed privet, lantana	Nymboida River Camping Area, riparian vegetation	Asset protection	Cut and paint, back pack spray, hand pull	M-RA
Clarence South	Nymboida NP	The Junction camping area	Large leafed privet, small leafed privet, lantana	The Junction Camping area, riparian vegetation	Asset protection	Cut and paint, back pack spray, hand pull	M-RA
Coffs	Moonee Beach NR	1751 – Look At Me Now Headland	Groundsel bush	Coastal woodland	Asset protection	Cut stump, back pack spray	M-RA
Coffs Coast	Moonee Beach NR	1661 – Fiddamans Beach	Bitou bush	Coastal woodland, Littoral Rainforest EEC (BPWW – CC1)	Asset protection	Backpack spraying, hand pull	M-RA
Coffs Coast	Moonee Beach NR	Back Sandy Beach	Bitou bush, lantana, winter senna	Coastal woodland, Littoral Rainforest EEC	Asset protection	Quadbike spraying, backpack spraying, cut and paint, hand pull	M-RA

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Coffs Coast	Bongil Bongil NP	Cabans, Tower, Lux, Hains, Rey, Full, Seaview, Halls, Cpt trails	Broad leaf paspalum	Moist eucalypt forest	Asset protection	Quickspray	M-RA
Coffs Coast	Bongil Bongil NP	Burma, Frisby, Saund, Overhead Bridge and Holts roads and Spring Track	Broad leaf paspalum	Moist eucalypt forest	Asset protection	Quickspray	M-RA
Coffs Coast	Gumbaynggirr SCA	1748 – Little Wonder	Broad leaf paspalum	Lowland Rainforest EEC, moist eucalypt forest, *Niemeyera whitei*, *Parsonsia dorrigoensis* (BPWW – CC4)	Asset protection	Boom spray	M-RA
Coffs Coast	Bongil Bongil NP	Flying Fox trail	Broad leaf paspalum, lantana	Moist eucalypt forest	Asset protection	Quickspray, splatter gun	M-RA
Coffs Coast	Bongil Bongil NP	East Ren, Beach, Palm Cross, Souris, School roads	Broad leaf paspalum, lantana	Moist eucalypt forest	Asset protection	Quickspray	M-RA
Coffs Coast	Bongil Bongil NP	Gordons, Red Hill, Toby roads	Broad leaf paspalum, lantana	Moist eucalypt forest	Asset protection	Quickspray	M-RA
Coffs Coast	Bongil Bongil NP	Hunters, Cabbage Tree, Thome Ridge and Flying fox roads	Broad leaf paspalum, lantana	Moist eucalypt forest	Asset protection	Quickspray	M-RA
Coffs Coast	Ganay NR	Blairs and Rickerbys roads	Broad leaf paspalum, lantana	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest	Asset protection	Boom spray	M-RA
Coffs Coast	Jaaningga NR	1524 – Basin Road	Broad leaf paspalum, lantana	Lowland Rainforest EEC, moist eucalypt forest, *Acacia chrysotrycha, Parsonsia dorrigoensis* (BPWW – CC3)	Asset protection	Boom spray, quickspray	M-RA
Coffs Coast	Jaaningga NR	Edwards Knob Trail	Broad leaf paspalum, lantana	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest	Asset protection	Boom spray, quickspray	M-RA
Coffs Coast	Bongil Bongil NP	1854 – Peninsula Pine Block and Sand hills	Broad leaf paspalum, lantana, bitou bush, winter senna	Moist eucalypt forest, Littoral Rainforest EEC (BPWW – CC5)	Asset protection	Splatter gun, cut and paint, backpack spraying, hand pull	M-RA
Coffs Coast	Moonee Beach NR	Sandy APZ	Broadleaf paspalum, kikuyu, setaria, winter senna, rhodes grass	Coastal woodland, Littoral Rainforest EEC	Asset protection	Quickspray	M-RA

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Coffs Coast	Bongil Bongil NP	Lyons, Railway, Williams roads and trails NW of Williams Road	Broadleaf paspalum, lantana	Moist eucalypt forest, Lowland Rainforest EEC	Asset protection	Quickspray	M-RA
Coffs Coast	Bongil Bongil NP	Baileys, Burkes, Godfreys, Raceway roads	Broadleaf paspalum, lantana	Lowland Rainforest EEC, moist eucalypt forest, *Parsonsia dorrigoensis*	Asset protection	Quickspray	M-RA
Coffs Coast	Bongil Bongil NP	Bonville Creek research site	Broadleaf paspalum, lantana	Lowland Rainforest EEC, moist eucalypt forest	Asset protection	Backpack spraying, cut and paint, hand pull	M-RA
Coffs Coast	Bongil Bongil NP	Raceway trail	Broadleaf paspalum, lantana	Moist eucalypt forest	Asset protection	Quickspray, splatter gun	M-RA
Coffs Coast	Bongil Bongil NP	Reedys, Archers, Balls roads	Broadleaf paspalum, lantana	Moist eucalypt forest, Lowland rainforest EEC	Asset protection	Quickspray	M-RA
Coffs Coast	Bongil Bongil NP	Scrubby, Clarkes, Duffs, OCon, Caper, Tuckers, Ground, Myle roads	Broadleaf paspalum, lantana	Moist eucalypt forest, Littoral Rainforest EEC	Asset protection	Quickspray	M-RA
Coffs Coast	Bongil Bongil NP	Bongil Picnic Area	Broadleaf paspalum, lantana, canna lily, camphor laurel, winter senna	Littoral Rainforest EEC, moist eucalypt forest	Asset protection	Backpack spraying, hand pull	M-RA
Coffs Coast	Bongil Bongil NP	2046 – Williams Road	Broadleaf paspalum, lantana, Crofton weed, narrow leaf cotton bush, blue billy goat weed, thistles	Moist eucalypt forest, Littoral Rainforest EEC (BPWW – CC3)	Asset protection	Mattock, hand pull, quickspray, backpack spraying	M-RA
Coffs Coast	Sherwood NR	Powerline trail	Broadleaf paspalum, lantana, winter senna	Lowland Rainforest EEC, moist eucalypt forest	Asset protection	Backpack spraying, hand pull	M-RA
Coffs Coast	Yarriabini NP	Main access trails	Camphor laurel, broad leaf paspalum, giant Parramatta grass	Moist eucalypt forest, dry eucalypt forest, *Marsdenia longiloba*, *Parsonsia dorrigoensis*	Asset protection	Backpack spray, cut stump, boom spray, quickspray	M-RA
Coffs Coast	Ulidarra NP	Road camphors	Camphor laurel, groundsel bush	Moist eucalypt forest, Lowland Rainforest EEC, *Parsonsia dorrigoensis*	Asset protection	Cut and paint	M-RA
Coffs Coast	Ganay NR	The Slip	Crofton weed, blue billy goat weed, whisky grass	Lowland Rainforest EEC, moist eucalypt forest, *Parsonsia dorrigoensis*	Asset protection	Quickspray	M-RA

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Coffs Coast	Dunggir NP	1729 – Kosekai Lookout	Crofton weed, mistflower, giant Parramatta grass	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest (BPWW – CC4)	Asset protection	Quickspray	M-RA
Coffs Coast	Dunggir NP	1693 – Dunggir, Hanging Rock and Kosekai Roads	Giant Parramatta grass, crofton weed, lantana	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest (BPWW – CC4)	Asset protection	Boom spray, Quickspray	M-RA
Coffs Coast	Ngambaa NR	Browns and Farmers roads	Giant Parramatta grass, lantana, wild tobacco	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest	Asset protection	Boom spray, quickspray	M-RA
Coffs Coast	Moonee Beach NR	Moonee Beach groundsel	Groundsel bush	Swamp Sclerophyll Forest, Saltmarsh EECs	Asset protection	Cut stump	M-RA
Coffs Coast	Bongil Bongil NP	Groundsel trail	Lantana	Moist eucalypt forest	Asset protection	Splatter gun	M-RA
Coffs Coast	Bongil Bongil NP	Old Coast Road	Lantana	Moist eucalypt forest, Lowland Rainforest EEC	Asset protection	Splatter gun	M-RA
Coffs Coast	Ganay NR	Kennaicle Creek	Lantana, blue billy goat weed	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest, *Hicksbechia pinnatifolia*, *Parsonsia dorrigoensis*	Asset protection	Splatter gun	M-RA
Coffs Coast	Bollanolla NR	1540 – Reserve trails	Lantana, broad leaf paspalum, camphor laurel	Lowland Rainforest EEC, moist eucalypt forest (BPWW – CC1)	Asset protection	Quickspray, boom spray, splatter gun, cut and paint, stem inject, foliar spray	M-RA
Coffs Coast	Bindarri NP	2023 – Urumbullum Dairyville entrance	Lantana, broadleaf paspalum	Lowland Rainforest EEC, *Parsonsia dorrigoensis*, *Amorphospermum whitei* (BPWW – CC4)	Asset protection	Backpack spraying, cut and paint, hand pull	M-RA
Coffs Coast	Ulidarra NP	End Peak base track and Ulidarra walking track	Lantana, broadleaf paspalum	Moist eucalypt forest, Lowland Rainforest EEC, *Parsonsia dorrigoensis*	Asset protection	Quad bike, splatter gun, hand pull	M-RA
Coffs Coast	Ulidarra NP	Tallow trail	Lantana, broadleaf paspalum	Moist eucalypt forest, Lowland Rainforest EEC, *Parsonsia dorrigoensis*	Asset protection	Quad bike, splatter gun, hand pull	M-RA
Coffs Coast	Ulidarra NP	Roads and trails	Lantana, broadleaf paspalum, palm grass	Moist eucalypt forest, Lowland Rainforest EEC	Asset protection	Quickspray	M-RA
Coffs Coast	Bongil Bongil NP	Overhead Bridge Road 'Delayed transfer'	Lantana, broadleaf paspalum, winter senna	Moist eucalypt forest, Lowland Rainforest EEC, adjacent to RTA fauna overpass	Asset protection	Splatter gun, quickspray, cut and paint, hand removal	M-RA
Coffs Coast	Sherwood NR	1677 – Gentle Annie Road	Lantana, broadleaf paspalum, winter senna	Lowland Rainforest EEC, *Amorphospermum whitei* (BPWW – CC1)	Asset protection	Backpack spraying, hand pull	M-RA

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Coffs Coast	Sherwood NR	Picnic area Entrance	Lantana, broadleaf paspalum, winter senna, trad	Lowland Rainforest EEC	Asset protection	Backpack spraying, hand pull	M-RA
Coffs Coast	Ngambaa NR	1507 – Allgomerra Creek Road	Lantana, giant Parramatta grass	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest (BPWW – CC3)	Asset protection	Boom spray, quickspray	M-RA
Coffs Coast	Garby NR	School	Lantana, grasses, blue billy goat weed, Crofton weed	Moist eucalypt forest	Asset protection	Quickspray, cut stump	M-RA
Coffs Coast	Ngambaa NR	1782 – Miles Camp Water	Lantana, moth vine	Lowland Rainforest EEC, moist eucalypt forest, *Marsdenia longiloba*, *Parsonsia dorrigoensis* (BPWW – CC4)	Asset protection	Quickspray, hand pull moth vine	M-RA
Coffs Coast	Kororo NR	1727 – Kororo	Lantana, ochna, Crofton weed, palm grass	Moist eucalypt forest, Lowland Rainforest EEC, *Kennedia retrorsa* (BPWW – CC1)	Asset protection	Backpack spraying, splatter, cut paint	M-RA
Coffs Coast	Yarriabini NP	1752 – Lookout	Lantana, setaria, rhodes grass, giant Parramatta grass, whisky grass, farmers friends	Littoral Rainforest EEC, moist eucalypt forest (BPWW – CC5)	Asset protection	Backpack spray, hand pull	M-RA
Coffs Coast	South Solitary Island HS	1971 – South Solitary Island	Madeira vine, kikuyu, grasses, mother-of-millions	Themeda Grassland EEC, *Zieria prostrata*, *Plectranthus cremnus* (BPWW – CC2)	Asset protection	Backpack spraying	M-RA
Coffs Coast	Bindarri NP	Bindarri roads	Pasture grasses, blue billy goat, Crofton weed	Lowland Rainforest EEC, moist eucalypt forest, *Parsonsia dorrigoensis*	Asset protection	Quickspray	M-RA
Coffs Coast	Bongil Bongil NP	1847 – Palm Crossing Trail	Rhodes grass	Lowland Rainforest EEC, moist eucalypt forest, *Acronychia littoralis, Chamaesyce psammogeton* (BPWW – CC1)	Asset protection	Quickspray	M-RA
Coffs Coast	Moonee Beach NR	Dammerels APZ	Winter senna	Littoral Rainforest EEC, coastal woodland	Asset protection	Cut stump	M-RA
Dorrigo Plateau	Cascade NP	1750 – Lloyds siding Road, Briggsvale, Ben Bullen Road	Aesthetic values, giant Parramatta grass, pine, camphor laurel, privet, groundsel bush	Lowland Rainforest EEC (BPWW – CC5)	Asset protection	Boom spray, quickspray	M-RA
Dorrigo Plateau	Guy Fawkes River NP	Ballards Flat	Blackberry, Coolatai grass	River oak gallery forest, dry eucalypt forest; recreation area	Asset protection	Quickspray, quadbike foliar spray	M-RA

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Dorrigo Plateau	Chaelundi NP	1640 – Chandlers Creek area	Blackberry, lantana, privet	Aesthetic values, Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest; (BPWW – CC4)	Asset protection	Quadbike foliar spray	M-RA
Dorrigo Plateau	Guy Fawkes River NP	Ebor cemetery	Blackberry, Scotch broom, apples	Subalpine woodland, high scenic values	Asset protection	Quickspray, backpack	M-RA
Dorrigo Plateau	Bagul Waajaarr NR	Haywards Access	Giant Parramatta grass	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest	Asset protection	Boom spray	M-RA
Dorrigo Plateau	Bagul Waajaarr NR	Riordans Block	Giant Parramatta grass	Grassy woodland	Asset protection	Boom spray	M-RA
Dorrigo Plateau	Guy Fawkes River NP	Nulluma Trail, Fossickers Ridge, Pine Creek Trail	Giant Parramatta grass	Grassy woodland	Asset protection	Boom spray	M-RA
Dorrigo Plateau	Chaelundi NP	Doon Goonge camping area	Giant Parramatta grass, blackberry, lantana, privet	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest, camp ground	Asset protection	Quadbike foliar spray	M-RA
Dorrigo Plateau	Chaelundi NP	1872 – Upper Chandlers Creek	Lantana, blackberry	Lowland Rainforest EEC, dry eucalypt forest, moist eucalypt forest (BPWW – CC 2)	Asset protection	Quadbike foliar spray	M-RA
Dorrigo Plateau	Junuy Juluum NP	1723 – Junuy Juluum entire reserve	Privets, honeysuckle, blackberry, giant Parramatta grass, black locust	Lowland Rainforest EEC, *Eucalyptus dorrigoensis*, *Austrobuxus swainii*, *Alloxylon pinnatum* (BPWW – CC4)	Asset protection	Quickspray, bush regen	M-RA
Macleay	Hat Head NP	North west HH National Park	Fox	Public use areas and cooking facilities	Asset protection	Reactive 1080 baiting to create fox free buffer	M-RA
Macleay	Arakoon NP	Trial Bay Gaoal and Visitor use areas	Indian myna	Visitor use areas	Asset protection	Trapping in conjunction with Macleay wide Indian Myna control program	M-RA
Macleay	Goolawah NP and RP	Campground program	Panic veldt grass, bitou bush, lantana, senna pendula	Campgrounds	Asset protection	Quickspray, backpack, splatter gun, cut and paint, , biocontrol, hand removal	M-RA
Clarence South	Yuraygir NP	1733 – Lake Arragan	Groundsel bush, lantana, winter senna, bitou bush, coastal morning glory, coastal tea tree, golden wreath wattle	Coastal Saltmarsh (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains (TSC-e), Swamp Oak Floodplain Forest EECs (TSC-e) (BPWW – CC4)	Asset protection	Backpack, biocontrol, cut/scrape/paint, hand removal, chainsaw	M-CP

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Clarence South	Yuraygir NP	Yuraygir	Horses	Biodiversity	Asset protection	Passive mustering, adopting out, assist neighbours	M-CP
Dorrigo Plateau	New England NP	New England NP	Bell miner associated dieback	Native eucalypt forest	Asset protection	Supporting BMAD ecologist site surveys	M-CP
Dorrigo Plateau	Junuy Juluum NP	Junuy Juluum NP	Phytophthora	Native vegetation	Asset protection	Investigate sites and erect educational signage	M-CP
Dorrigo Plateau	New England NP	New England NP	Phytophthora	Native vegetation	Asset protection	Investigate sites and erect educational signage	M-CP
Macleay	Kumbatine NP	Kumbatine	Bell miner associated dieback	Native eucalypt forest	Asset protection	Supporting BMAD ecologist site surveys	M-CP
Macleay	New England NP	Kilprotay and Hickeys Road	Bell miner associated dieback	Native eucalypt forest	Asset protection	Supporting BMAD ecologist site surveys	M-CP
Macleay	Hat Head NP	1699 – Hat Head NP south – Hungry Beach access to Crescent Head	Bitou bush	Littoral Rainforest EEC (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal, aerial spray	M-CP
Macleay	Hat Head NP	1698 – Smoky Beach access to Hat Head	Bitou bush	Littoral Rainforest EEC (BPWW – CC1)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal, aerial spray	M-CP
Macleay	Hat Head NP	Lower Slopes of Big Smoky north and west of lighthouse road	Bitou bush, winter senna, lantana, coastal morning glory, white passionfruit	Tall eucalypt forest with rainforest in gullies	Asset protection	Backpack, splatter gun, cut and paint, biocontrol, hand removal, revegetation	M-CP
Macleay	Yarrahapinni Wetlands NP	Naturally vegetated parts of the reserve poor access	Groundsel bush	Swamp Sclerophyll Forest on Coastal Floodplains (TSC-e), Swamp Oak Forest EECs (TSC-e)	Asset protection	Cut and paint, biocontrol, hand removal	M-CP
Macleay	Yarrahapinni Wetlands NP	Western Regeneration Paddocks	Groundsel bush, camphor laurel, lantana, winter senna	Swamp Sclerophyll Forest on Coastal Floodplains EEC (TSC-e), Swamp Oak Forest EEC (TSC-e), Subtropical Coastal Floodplain Forest (TSC-e)	Asset protection	Quickspray, backpack, cut and paint, biocontrol, hand removal	M-CP
Macleay	Fishermens Bend NR	1665 – Eastern section of reserve	Lantana	Dry and moist eucalypt forests, riparian vegetation (BPWW – CC4)	Asset protection	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	M-CP

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Macleay	Cooperbung Creek NR	1611 – Cooperabung Creek NR	Lantana, camphor laurel, winter senna	Dry and moist eucalypt forests, riparian vegetation (BPWW – CC5)	Asset protection	Develop weed management strategy and implement control	M-CP
Macleay	Fifes Knob NR	1663 – Fifes Knob NR	Lantana, camphor laurel, winter senna	Dry and moist eucalypt forests, riparian vegetation (BPWW – CC5)	Asset protection	Develop weed management strategy and implement control	M-CP
Macleay	Yarravel NR	2071 – Yarravel NR	Lantana, camphor laurel, winter senna	Dry and moist eucalypt forests, riparian vegetation (BPWW – CC5)	Asset protection	Develop weed management strategy and implement control	M-CP
Macleay	Boonanghi NR	1545 – Boonanghi NR	Lantana, camphor laurel, winter senna, moth vine	Dry and moist eucalypt forests, riparian vegetation (BPWW – CC5)	Asset protection	Develop weed management strategy and implement control	M-CP
Macleay	Willi Willi NP	Willi Willi National Park,	Lantana, camphor laurel, winter senna, moth Vine	Dry and moist eucalypt forests, riparian vegetation	Asset protection	Develop weed management strategy and implement control	M-CP
Macleay	Goolawah NP	Goolawah Lagoon	Salvinia, water hyacinth	Aquatic ecosystem	Asset protection	Prepare plan, use integrated pest management.	M-CP
Clarence South	Yuraygir NP	Pebbly Beach – broad leaf paspalum	Broad leafed paspalum		Containment	Quickspray, backpack, splatter gun, cut and paint, biocontrol, hand removal	M-II
Clarence South	Yuraygir NP	Station Creek – broad leaf paspalum	Broad leafed paspalum		Containment	Quickspray, backpack, splatter gun, cut and paint, chainsaw, biocontrol, hand removal	M-II
Clarence South	Yuraygir NP	Wilsons Headland-Bare Pt-Diggers Camp – Coolatai grass. Singapore daisy, painted spurge Formosa lily	Coolatai grass, Singapore daisy, painted spurge, Formosa lily		Containment	Quickspray, aerial spray backpack, splatter gun, cut and paint, biocontrol, hand removal	M-II
Coffs Coast	Yarriabini NP	The tower	Coreopsis		Containment	Backpack spray, hand pull	M-II
Coffs Coast	Garby NR	Wet areas	Groundsel bush		Containment	Backpack spraying	M-II

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Dorrigo Plateau	Guy Fawkes River NP	Housewater Creek	Blackberry, Coolatai grass		Containment	Quadbike foliar spray	M-II
Dorrigo Plateau	Cascade NP	Bobo River	Groundsel bush		Containment,	Quickspray	M-II
Dorrigo Plateau	Cunnawarra NP	Newells culvert, Armidale-Kempsey Road	Pines		Containment	Chainsaw, quickspray	M-II
Dorrigo Plateau	Nymboi-Binderay NP	Chapmans Plains	Pines		Containmnent	Chainsaw, quickspray	M-II
Dorrigo Plateau Area	Guy Fawkes River NP	Bobs Creek	Blackberry, Coolatai grass		Containment	Quadbike foliar spray	M-II
Macleay	Willi Willi NP	Carrai/Coachwood Roads	Blackberry		Containment	Quickspray, backpack,	M-II
Clarence South	Yuraygir NP	1829 - Nthn YNP	*Baccharis halimifolia, Lantana camara*	Swamp Sclerophyll Forest on Coastal Floodplains (TSC-e) and Sub-tropical Coastal Floodplain Forest EECs (TSC-e); BPWW – CC2	Asset protection	High and low volume foliar, hand removal, cut and stump	L-LP
Clarence South	Munro Island NR	1809 - Munro Island NR	*Anredera cordifolia, Araujia sericifera, Aristolochia elegans, Cardiospermum grandiflorum, Ipomoea alba, Ipomoea cairica, Lantana camara, Ligustrum lucidum, Ligustrum sinense, Macfadyena unguis-cati, Ricinis communis, Rivina humilis, Tradescantia fluminensis*	Swamp Oak Floodplain Forest EEC (TSC-e), Lowland Rainforest on Floodplain EEC (TSC-e); BPWW – CC6	Asset protection	Bush regeneration techniques including, overspray; cut and paint; cut, scrape and paint; stem injection	L-PP
Clarence South	Yuraygir NP	Back Beach Minnie Waters	Bitou bush, lantana, Senna pendula, coastal morning glory, glory lily	*Stackhousia spathulata* (Bitou Bush TAP – high)	Asset protection	Quickspray, backpack spray, cut paint, hand pull	L-PP

Area	Reserve(s)	Site name	Target pest or weed	Asset at risk	Aim of control	Action	Priority
Clarence South	Yaegl NR	2067 - Yaegl NR	*Lantana camara, Ageratina adenophora, Anredera cordifolia, Bachcaris halimifolia, Aristolochia elegans, Ambrosia artemisiifolia*	Swamp Sclerophyll Forest EEC, Coastal Saltmarsh (TSC-e); BPWW – CC3	Asset protection	Bush regeneration techniques including, overspray; cut and paint; cut, scrape and paint; stem injection	L-PP
Dorrigo Plateau	Bagul Waajaarr NR	Harveys access, track to Silent pool	Giant Parramatta grass	Grassy woodland	Asset protection	Boom spray	L-PP
Dorrigo Plateau	Guy Fawkes River NP	Broadmeadows Road, Liberation and Jordans Trail	Giant Parramatta grass	Grassy woodland	Asset protection	Boom spray	L-PP
Dorrigo Plateau	Guy Fawkes River NP	Chaelundi Road	Giant Parramatta grass, roadside spraying	Grassy woodland	Asset protection	Boom spray	L-PP

* Not yet ranked as of June 2012

Consultation

The North Coast Region pest management strategy was developed through consultation with the community and internal staff. A Pest Management Strategy Stakeholder Forum was conducted at Coffs Harbour on 8 September 2011. A diverse range of community representatives were present including members of local councils, Livestock Health and Pest Authorities (LHPAs), NSW Farmers Association, Catchment Management Authorities and several other stakeholder groups. Key issues raised from this forum, with reference to the state strategy, were:

- the need for appropriate and long term resources to be available for pest management programs (Goal 3 Objective 3.1)
- the requirement for cooperation and landscape scale pest management programs (Goal 2 Objective 2.2)
- the need for a risk assessment approach to pest management (Goal 2 Objective 2.1)
- the requirement that high priority pest management programs be those that prevent the establishment of new pest populations (Goal 1 Objective 1.1)
- the development of staff, communities and volunteers skills in order to build the capacity of NPWS to identify and treat pests (Goal 3 Objective 3.3)
- the need for communication and education of stakeholders (Goal 3 Objective 3.2)
- the requirement to measure the effectiveness of the Pest Management Strategy (Goal 3 Objective 3.4).

Many other issues were identified with a variety of views and opinions expressed. The report detailing these is available from the North Coast regional office or any of the attendees. Where possible this feedback is incorporated as identified above or into the approaches for managing specific pests (refer to sections 4 and 6). Some suggestions were outside the scope of this strategy, such as those requiring a legislative or policy response while other issues at a broader level, such as environmental pest management across the landscape, were discussed at the state level forum.

Workshops were also conducted within each national park Area with managers, rangers and field staff in order to collaboratively identify and prioritise pest management programs for each Area using the practical knowledge and experience of staff. Following the preparation of this draft regional pest management strategy, the document was placed on public exhibition and comments were invited from the community, other government agencies and stakeholder groups.

Ongoing stakeholder engagement with pest management in North Coast Region occurs in a number of ways. These include direct contact with neighbours, agencies such as LHPAs, local governments, Landcare coordinating groups such as Macleay Landcare network, and volunteer groups; information in local media outlets informing or publicising programs and activities such as baiting programs; and participation in various organisations. These include:

- North Coast Weeds Advisory Committee
- Mid-North Coast weeds Advisory Committee
- North East Pest Animal Advisory Committee
- North Coast Vertebrate Pest Working Group
- Guy Fawkes Horse Management Reference Group
- Mid-North Coast Indian Myna Working Group
- Halfway Creek Horse Management Working Group.

5 Pest species overviews

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

Wild dog (*Canis lupus* sspp.)

Distribution and abundance

Wild dog refers to any wild-living dog in NSW, including dingoes (*Canis lupus dingo*), feral dogs (*Canis lupus familiaris*) and their hybrids. Populations of wild dogs (including dingoes) occur mainly along the Great Dividing Range, coastal hinterlands and in north-western NSW. Wild dogs are present in low to medium densities throughout the North Coast Region on private, Forests NSW and NPWS lands.

Impacts

Wild dogs can cause significant livestock losses to the pastoral industry. Livestock affected include sheep, goat, and cattle. As a result, wild dogs have been declared a pest under the *Rural Lands Protection Act 1998* (RLP Act). Under the Act, managers of controlled land have an obligation to eradicate wild dogs by any lawful method. All land in NSW is identified as controlled land under the current Pest Control Order for Wild Dogs.[3] This Act requires NPWS to eradicate (continuously suppress and destroy) wild dogs to the extent necessary to minimise the risk of the pest causing damage on any land.

Wild dogs can also have both positive and negative impacts on biodiversity. Predation by wild dogs can suppress the abundance of both native and exotic herbivores. Wild dogs may also suppress smaller exotic predators (cats and foxes) with potential benefits for a broad suite of small to medium-sized ground-dwelling mammals and ground-nesting birds. Conversely, under certain circumstances predation by wild dogs may have significant direct impacts on threatened species, for example feral dogs impacting koalas at Port Stephens.

The dingo was introduced into Australia from Asia around 4000 years ago. As it was introduced prior to European settlement it is eligible to be listed as a threatened species under the NSW *Threatened Species Conservation Act 1995* (TSC Act). Although the dingo has not been listed as a threatened species in NSW, predation and hybridisation by feral dogs (*Canis lupus familiaris*) has been listed as a key threatening process (KTP) under the TSC Act.

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

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

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

Wild dog habituation and aggression towards park visitors has been identified as a potential risk in popular camp grounds in Yuraygir, Limeburners Creek and Goolawah national parks in the North Coast Region. NPWS has produced a policy and procedures document to control the risk to humans from wild dogs (DECCW 2009).

Control

Integrated pest management techniques will be used to manage wild dogs in the Region. Wild dog control will be undertaken in partnership with the local LHPA, wild dog control associations and individual landholders.

Strategic control options to minimise the impact of wild dogs on livestock operations include:

- 1080 poison baits, M44 ejectors and trapping in accessible areas
- exclusion or barrier fencing along the boundaries of reserves such as Guy Fawkes River and Cathedral Rock national parks, where the terrain is suitable and there is sufficient funding and support from neighbouring landholders
- aerial baiting in rugged inaccessible areas where other control techniques may not be suitable.

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

- 1080 poison baiting and M44 ejectors
- trapping using either NPWS staff or contract trappers
- 'howling up' and shooting.

The policy and procedures for the control of risks to humans from wild dogs (DECCW 2009) details the risk controls that will be implemented where a risk to humans has been identified. Risk controls include signage at camp sites, brochures, public education programs, restricting access to food waste, hazing (aversion training), modification of washing and fish cleaning facilities and removal of aggressive animals.

Priorities for control

Priority areas for strategic wild dog control in North Coast Region are New England, Willi Willi, Guy Fawkes River, Yuraygir and Cathedral Rock national parks, and Boonanghi and Bagul Waajaarr nature reserves. Reactive wild dog control programs are also implemented when required in an additional 16 national parks and nature reserves (see priority program table).

Wild dog management plans are prepared in conjunction with the local LHPAs and wild dog control associations. The plans include the dual aims of minimising livestock predation and the conservation of the dingo in reserves listed under Schedule 2 of the Wild Dog Pest Control Order. In North Coast Region 28 national parks and nature reserves are listed under Schedule 2 of the Wild Dog Pest Control Order.

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

NPWS will continue to work with the Northern Tablelands, Northern Rivers and Mid Coast LHPAs to develop, review and implement wild dog management plans. NPWS

commitments in these plans include both strategic and reactive control including cooperative 1080 baiting programs in conjunction with neighbours in problem areas.

Monitoring

North Coast Region maintains a database of stock loss reports, wild dog activity and results from DNA sampling of wild dogs. Stock loss information is essential in planning and evaluating the effectiveness of control programs. Wild dog and prey fauna activity is measured annually using sandpads in priority reserves.

DNA samples are analysed from all wild dogs trapped in North Coast Region programs. This program is directed by a standard operating procedure with the goal being to deliver a coordinated approach to identifying the genetic composition of wild dogs and dingoes to inform wild dog control and the management of Schedule 2 lands for dingo conservation. In North Coast Region pure dingoes and dingo populations of conservation significance have been identified in New England, Cathedral Rock, Guy Fawkes River and Limeburners Creek national parks. DNA results for north-east NSW show hybridisation with domestic dogs is occurring with 90% of the broader wild dog population, with greater than 50% dingo.

Dingoes in high visitor use areas will be monitored using techniques including sandpads, wildlife cameras, unique identification markers, and satellite and radio tracking. North Coast Region works cooperatively with the Invasive Animals CRC and PhD research projects that study wild dog impacts, effectiveness of wild dog control techniques and dingo ecological function.

Cane toad (*Bufo marinus*)

Distribution and abundance

Cane toads are restricted to the northern region of NSW, with well-established colonies occurring in the Tweed River Valley, Byron Bay and Lismore areas and as far south as the Richmond Valley, contiguous with the species' distribution throughout tropical regions of northern Australia. This includes established colonies west of Kyogle/Casino and south to the Bungawalbin–Woodburn–Evans Head area. A discontinuous metapopulation occurs in and around Yamba, with isolated colonies around Angourie, Mororo-Ashby, Townsend and Brooms Head. A former colony at Port Macquarie is considered to be eradicated as there have been no sightings in the last three years. 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 and nursery supplies, or along railway or highway corridors reflecting their transport vector.

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 8000–35,000 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 Commonwealth (*Environment Protection and Biodiversity Act 1999* – EPBC Act) threatened species legislation.

The native species most likely to be impacted at the population level in North Coast Region include tiger quoll, goannas, frog-eating snakes and certain bird species. Native invertebrates are predated.

Priorities for control

Priorities for control are guided by the 2011 NPWS Cane Toad Plan. This plan proposes a containment line (outside North Coast Region) within which the approach is asset protection where key assets at risk are identified and managed. Populations outside the containment line including populations in North Coast Region at northern Yuraygir National Park (Angourie and Brooms Head), Yaegl and Clarence Estuary Nature Reserves) will be targeted for intensive control efforts aimed at their eradication.

Preventing the establishment of new populations and maintaining and developing community interest and awareness in cane toad control is also important in managing this pest species. In the absence of any other agency or organisation willing to undertake this important function, NPWS will continue to provide an initial response to new reports of cane toads outside of NPWS-managed areas and undertake community awareness programs associated with on-park programs or new incursions.

Control

Cane toad management in North Coast Region is largely undertaken by NPWS staff, contractors and volunteers, with assistance from the Department of Primary Industries, local government and, in the Clarence Valley, Landcare. Raising public awareness and encouraging members of the public to hand in suspected live toads minimises the likelihood of native frogs being accidentally killed. Sightings and reports from the public are crucial in providing a quick response to new incursions. Control methods include nocturnal surveying and collecting with limited use of traps. Novel methods such as the use of detection dogs are also being explored. NPWS is also providing support to The University of Sydney in a research project aimed at identifying biodiversity impacts in northern NSW and assessing the applicability of newer control techniques developed by the university.

Monitoring

North Coast Region will attempt to confirm and document any new sighting of a cane toad in national parks in the Region. Survey and collection data will be entered into the Wildlife Atlas and reviewed annually for distribution to key stakeholders.

Red fox (*Vulpes vulpes*)

Distribution and abundance

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

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 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 TSC Act. Foxes are also significant predators of domestic stock including poultry and lambs with the potential to reduce lambing rates significantly.

Native species most likely to be impacted at the population level in North Coast Region include little terns, beach stone-curlews, pied oystercatchers, bush stone-curlews, brolgas, emus, rufous bettongs, brush-tailed rock-wallabies and freshwater turtles. A range of other species including wedgetailed shearwaters, bandicoots, brush turkeys and brushtail possums are also impacted.

Priorities for control

The NSW Fox TAP identifies critical priority sites for fox control in North Coast Region. These are:

- Yuraygir National Park, middle – to protect beach stone-curlew, pied oystercatcher, little tern
- Yuraygir National Park Wooli -to protect beach stone-curlew, pied oystercatcher, little tern,
- Yuraygir National Park, south – to protect beach stone-curlew, pied oystercatcher, little tern, brolga
- Sawtell (Bongil Bongil National Park) – to protect little tern
- Hearnes Lake (Coffs Coast Regional Park) – to protect little tern
- Nambucca Heads (Gaagal Wanggaan National Park) – to protect little tern, beach stone-curlew.

A Chaelundi-Kangaroo River site and Ramornie site (rufous bettongs) were removed as a priority due to very low density of foxes and low density of rufous bettongs in the latter; The Grange and Glenugie (rufous bettongs, Forests NSW) sites are non-treatment sites, where no control is carried out.

Fox impacts on breeding wedgetailed sheartwaters on the Muttonbird Island Nature Reserve are addressed through den fumigation on adjoining lands and 1080 baiting when required.

Fox control for general biodiversity conservation in other reserves will occur if resources are available and the program does not impact on existing priority programs. Fox control to assist agricultural production will be considered on a case–by-case basis; however, NPWS assistance will be limited to participation in cooperative baiting schemes.

Control

Regular systematic baiting using 1080 is the preferred method of fox control and is used throughout the Region. This is supplemented by soft-jaw trapping, den fumigation and shooting.

Monitoring

The impact of fox predation on the priority species and, conversely, the effectiveness of the fox control program are being assessed through long-term monitoring of priority species at the sites and fox populations. Rufous bettong populations are being measured annually via cage trapping. Shorebirds are monitored by counting adults, eggs and fledglings. Fox and other medium-sized mammal populations are being measured biannually via track counts on sandpads at rufous bettong sites. At shorebird sites fox activity is monitored through a combination of bait take and

sandpads. Data is analysed by the NPWS Pest and Ecological Management Unit and published periodically as part of the review of the Fox TAP.

Feral cat (*Felis catus*)

Distribution and abundance

Cats have been present in Australia at least since European settlement, and may have arrived as early as the 17th century. Today the distribution of feral cats is nationwide, and cats exploit a wide variety of habitats including open plains, tropical, subtropical and temperate forests, alpine and subalpine regions, deserts, and rural and peri-urban landscapes.

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 have 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, dryer habitats such as grasslands. Although no specific systematic surveys have been undertaken for feral cats in North Coast Region, it is believed that they are present to varying degrees in all reserves, particularly near main urban centres. Sandpad surveys are conducted in priority reserves to monitor introduced predator densities including feral cats. Feral cats have been identified as posing a biodiversity threat in Bongil Bongil National Park, Coffs Coast Regional Park, Cascade National Park, Mount Hyland Nature Reserve, Dorrigo National Park, New England National Park and Yuraygir National Park.

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. The Commonwealth TAP for predation by feral cats (DEWHA 2008) lists 36 mammal, 35 bird, seven reptile and three amphibian native species that are threatened and are known or perceived to be under threat from cats. Mammals most vulnerable to predation by cats are species weighing less than 200 g (Denny and Dickman 2010).

Threatened species recorded in North Coast Region known to be predated by feral cats include Hastings River mice (*Pseudomys oralis*), little terns (*Sterna albifrons*) and brush-tailed rock-wallabies (*Petrogale penicillata*).

Feral cats 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 EPBC Act and TSC Act. Direct predation probably has the greatest impact on native species, but competition, transmission of parasites and diseases, and indirect interactions with natives are also likely (Denny and Dickman 2010).

Priorities for control

In North Coast Region feral cat control programs will be conducted as required at endangered shorebird nesting sites in Bongil Bongil National Park, Coffs Coast

Regional Park and Yuraygir National Park. The Region will continue to implement opportunistic control and cooperative programs with concerned neighbours and undertake trapping in other identified problem areas.

The Region will continue to support research into feral cat control and use any appropriate new control techniques.

Control

Control of feral cats is problematic as cats are hard to trap, do not readily take baits unless during periods of food shortage, and are generally difficult to shoot as they avoid human contact. Even if cats are removed from an area, it is quickly recolonised.

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.

Monitoring

Sandpads 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 TAP.

Feral deer (family Cervidae)

Distribution and abundance

Six deer species are known to have formed feral populations in Australia. These are fallow deer (*Dama dama*), red deer (*Cervus elaphus*), sambar deer (*Cervus unicolour*), chital deer (*Axis axis*), rusa deer (C*ervus timorensis*) and hog deer (*Axis porcinus*).

All deer species in NSW have patchy distributions in forest and woodland in eastern NSW, with two species (red and fallow deer) extending west of the Great Dividing Range.

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, 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 acclimatisation herds and possibly, in some areas, deliberate translocation by hunters.

Deer are nocturnal or seminocturnal, 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.

Feral deer are known in Guy Fawkes River National Park (rusa deer), New England National Park (red and fallow deer), Bellinger River National Park (red and fallow deer) and Dunggir National Park (fallow deer). Feral deer (chital deer) are present on private and Forests NSW lands in the Bruxner Park area north of Coffs Harbour. Feral deer have also recently been reported near Sherwood Nature Reserve.

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 and reserves by:

- destroying native plants by trampling plants, grazing and ringbarking young trees, with a major impact on the variety and abundance of plant species where deer populations are high
- fouling waterholes
- causing soil erosion
- transmitting diseases such as foot-and-mouth disease
- spreading weeds.

High densities of feral deer have been found to reduce understorey plant species in the Littoral Rainforest EEC by as much as 70%. Feral deer populations elsewhere in the state have had significant impacts on the rare temperate and subtropical Illawarra rainforest, the threatened species *Syzigium paniculatum*, littoral rainforest around Port Macquarie, and trampling and browsing of threatened species in the Oxley Wild Rivers National Park. Deer have been found to browse on lantana, Crofton weed, mistflower and mother-of-millions. 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

Feral deer on roads have caused several major car accidents in NSW in recent years. On the Pacific Highway and local roads in the Port Macquarie area feral deer are recorded as causing up to seven road crashes per year, with the highest incidence occurring in the winter months.

Control

A number of techniques are available for the control of feral deer, including shooting by OEH staff and contractors, fencing trapping using feed-based lures, oral sedation, mustering, and judas control. However, in remote areas and difficult habitat (e.g. wetlands), there are few viable cost-effective options available. Shooting is the most preferred humane option.

Given the current population level of wild deer, there is a window of opportunity to control the current population before it expands. However, as the population is widely dispersed, control programs will be labour intensive and require adequate funding and resources.

NPWS works cooperatively with other stakeholders through the Mid North Coast Wild Deer Working Group which formed in 2001 and includes LHPA, Forests NSW, NSW Police, local government, RSPCA, NSW Game Council, Deer Farmers Association, FAWNA, local veterinarians and recreational shooters. The NSW Game Council has formed the Port Macquarie – Hastings Hunting Group who undertake culling of nuisance wild deer off-park in consultation with NSW Police and local RSPCA officers.

Priorities for control

- Ensure no new populations of feral deer establish on NPWS lands.
- Investigate and, where appropriate, implement species-specific control programs to remove feral deer populations from NPWS lands; Guy Fawkes River National Park is a priority site for deer control.

- Implement reactive control programs for wild deer in response to a significant impact on a reserve's values or neighbours.

Monitoring

The occurrence and distribution of feral deer will be monitored within the Region. Survey results, deer incidents and culling data will be collected and mapped. The Port Macquarie – Hastings Hunting Group will continue to report control efforts. The recording of incidence will be undertaken cooperatively by stakeholder members of the Mid North Coast Wild Deer Working Group.

Feral goat (*Capra hircus*)

Distribution and abundance

Goats occur through the Great Dividing Range, in the semi-arid rangelands of NSW, Queensland, Victoria and Western Australia, and in the highlands of Tasmania. Their distribution is limited by adequate water supplies and to where the dingo is absent or uncommon.

In North Coast Region limited sightings of feral goats have been made in Guy Fawkes River and Cathedral Rock national parks. There is potential for feral goats to occur in other reserves in the Region.

Impacts

Feral goats compete with fauna and livestock for fodder, water and shelter, cause damage to heritage sites, and are potential vectors of livestock diseases (for example internal parasites and diseases such as foot-and-mouth and foot-rot).

Grazing and browsing by feral goats has significant impacts on native vegetation. It can lead to changes in species composition as more palatable species are eaten and removed, as well as changes in vegetation structure. Areas with a high density of goats have a conspicuous browse line, as all foliage within their reach is consumed. Feral goats can survive on highly fibrous, low nutrient herbage, provided sufficient water is available and will consume litter, fruit fall, bark and sticks. This can lead to a decrease in overall cover and an increase in bare ground, which, combined with trampling and soil surface damage caused by their hooves, may result in significant increases in soil erosion. These habitat changes in turn affect native fauna through competition for food and shelter.

Competition and habitat degradation by feral goats has been listed as a KTP under the TSC Act.

Priorities for control

Monitor populations and control as required in Cathedral Rock and Guy Fawkes River national parks.

Control

Effective control of feral goats requires an integrated approach using several complementary control techniques. In North Coast Region, the main control techniques will be aerial and ground shooting and trapping programs. In addition, if adjoining landholders adjacent to reserve boundaries have feral goats they will be encouraged to reduce feral goat numbers through mustering and trapping. The maintenance of native dingo populations is likely to assist in controlling feral goat populations in North Coast Region reserves. The potential window of opportunity will

be implemented should drought conditions see an aggregation of goat herds. Trials using cyanide-based pelletised baits may be carried out to assess the suitability of this control technique for feral goat control.

Monitoring

Sightings are to be monitored and strategies implemented as appropriate. Maintain liaison with neighbours and LHPAs.

Rabbit (*Oryctolagus cuniculus*)

Distribution and abundance

Rabbits are found in most habitats throughout Australia below the tropic of Capricorn where there is suitable harbour or soil for digging warrens. They do not generally occur above 1500 m altitude, or in dense forests, or on black soil plains. Moderate densities of rabbits occur in a number of reserves. Most reserves however in the North Coast Region are not ideal habitat for rabbits.

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 scratches out seedlings and damages 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 feral European rabbits has been listed as a KTP under the TSC Act and rabbits are a declared pest animal under the RLP Act. Rabbits can also cause damage to Aboriginal heritage sites, compete with neighbouring livestock and impact forestry operations. The impact of rabbits hs been reduced since the release of myxomatosis and, more recently, rabbit haemorrhagic disease (RHD); however, even at low densities rabbits can prevent the regeneration of impacted plant species and recent reports suggest rabbit numbers may be increasing again.

Priorities for control

The highest priority sites in North Coast Region are Guy Fawkes River National Park, Dorrigo National Park and Yuraygir National Park. Densities of rabbits in these reserves are generally low; however, where numbers have increased, control programs have been implemented in these locations.

Other prioritiy areas for control are:

- high public use areas such as picnic areas where the lawns are favoured by rabbits
- where opportunistic surveys in known locations highlight an increase in densities and associated negative impacts
- where rabbit populations have the potential to impact on threatened flora and fauna species.

Control

Effective control of feral rabbits requires an integrated approach using several complementary control techniques. In North Coast Region, the main control techniques are 1080 baiting, pindone baiting, and RHD baiting. Warren fumigation is only used occasionally and warren ripping rarely, due to the remote nature of most populations and as rabbits do not always use warrens in coastal areas.

Monitoring

During field inspections, GPS will be used to collect raw data, such as the location of warrens and above-ground harbours where rabbits are seen to shelter. This data will be incorporated into management maps generated using GIS.

As most significant rabbit populations within North Coast Region are found in remote areas, rabbit population abundances will be monitored using opportunistic recordings of warrens and counts of active entrances.

Feral pig (*Sus scrofa*)

Distribution and abundance

Domestic pigs were introduced into Australia at the time of European settlement as a food source, and by the 1880s were regarded as a pest in several areas of western NSW and Victoria. Today there are estimated to be between 13 million and 23 million pigs in Australia. Significant populations occur in all states and territories except Tasmania.

Feral pigs are mainly found along watercourses and floodplains and, in hot weather, they are usually found within two kilometres of water. Densities vary depending on conditions, with about one feral pig per square kilometre in eucalypt woodland, forest and grazing land, and as many as 10–20 in wetlands and seasonally inundated floodplains. Feral pigs are active from late afternoon to early morning. They eat a wide range of foods including plants and small animals, and they will scavenge on dead animals. Adult male feral pigs (boars) generally roam alone over an area of up to 43 square kilometres, while females (sows) range over areas smaller than 20 square kilometres.

In North Coast Region pigs are most common in the New England tableland area and in the lower Clarence floodplain. Populations of pigs occur in Cathedral Rock National Park, Guy Fawkes River National Park and Yuraygir National Park. Feral pigs are also known to occur in Yarriabini National Park, Limeburners Creek National Park, Maria National Park, Carrai National Park, Goolawah National Park, Kumbatine National Park and Willi Willi National Park. Feral pigs are believed to have been released recently into Bongil Bongil National Park.

Impacts

Feral pigs are a serious environmental and agricultural pest. Predation, habitat degradation, competition and disease transmission by feral pigs is listed as a KTP through the relevant Commonwealth (EPBC Act) and NSW (TSC Act) legislation. Feral pigs are listed as a declared pest under the RLP Act.

Feral pigs have significant impacts on the environment, including:

- eating or destroying native plants and animals
- wallowing in, fouling and disturbing soils in dams, waterholes and other moist or swampy areas

- creating drainage channels in swamps
- digging for food, which can have major impacts on vegetation and forest litter, particularly along drainage lines and around swamps and lagoons, or after rain when the ground is softer, causing destabilising of stream banks and acceleration of erosion
- eating frogs, reptiles, birds and small mammals
- spreading weeds and possibly disease.

Spread of the soil-borne pathogen *Phytophthora cinnamomi* belonging to the water mould group (*Oomycetes*). *P. cinnamomi* is thought to be present in areas of Willi Willi National Park. Infection of native plants by *P. cinnamomi* is listed as a KTP under the TSC Act and the EPBC Act. *P. cinnamomi* may contribute to plant death where there are other stresses present such as waterlogging, drought, and perhaps wildfire.

Feral pigs can be a serious agricultural pest. They eat and destroy grain crops and improved pastures, and damage fences. They have been known to kill and eat up to 40% of newborn lambs. Feral pigs carry endemic diseases such as leptospirosis, brucellosis and meliodosis.

Priorities for control

Cooperative control programs with park neighbours and the LHPA will continue to be supported by NPWS. Control programs focus on trapping and baiting in areas of current activity. On the Dorrigo Plateau and Ebor area, traps have been built by NPWS staff and loaned to park neighbours to improve the success of off-park control programs.

High priority sites for control programs include Cathedral Rock National Park, where a long-term program has been in place to reduce pig impacts on EECs in the park, and Yuraygir National Park to reduce pig impacts on native flora and fauna, watercourses and wetlands in the area. Feral pig control will also be undertaken in Willi Willi national park when required to complement programs undertaken by Northern Tablelands Region in Oxley Wild Rivers National Park. Other pig control programs will be reactive in association with local LHPAs.

Control

Techniques available to control feral pigs include shooting, trapping and baiting. Traps built near areas where pigs are active, such as watering holes, can be successful when baited with grain. 1080 baiting is also used in some areas.

In Cathedral Rock National Park the 'Judas pig' technique has been utilised, where pigs' gregarious nature enables pigs fitted with radio collars to guide shooters to the location of other feral pigs. The maintenance of native dingo populations is likely to assist in controlling feral pig populations in North Coast Region reserves.

Illegal hunting of pigs on NPWS lands is discouraged as it can result in the escape of pig dogs, release of domestic pigs by shooters, damage to traps being used by NPWS and safety concerns to the general public. Extended drought can provide a window of opportunity for control of wild pigs due to their need for regular water.

Monitoring

The number of pigs trapped or shot is recorded during control programs. Feral pig sightings and evidence of rooting behaviour are recorded by NPWS staff. Reports from park neighbours are also recorded.

Feral horse (*Equus caballus*)

Distribution and abundance

In NSW, feral horses are a significant problem in a number of conservation reserves along the Great Dividing Range and eastern seaboard, where there are estimated to be more than 8000 horses. Conservation reserves in NSW where horses are a significant problem include Guy Fawkes River in Kosciuszko National Park, Oxley Wild Rivers in Yuraygir National Park, Barrington Tops, Blue Mountains and Kanangra-Boyd national parks, and Yerranderie State Conservation Area. Feral horses are also present on lands adjoining most of these reserves.

A significant population of feral horses occur in Guy Fawkes River National Park. A survey in 2010 calculated the horse population as in excess of 1000. Feral horses also occur in Yuraygir National Park, and on the adjoining state forests and private properties.

Impacts

Feral horses accelerate erosion through trampling, compaction and grazing. They also impact on native vegetation and ground-nesting birds, foul water holes and contribute to the spread of weeds. In Guy Fawkes River National Park a four-year study into the impact of feral horses found horses in the park compete with kangaroos, displacing them from prime feeding habitats. Horse trampling significantly reduced the stability of the soil surface and the infiltration and nutrient cycling capacity of the soils (Lenehan 2010). At a landscape scale feral horses altered the spatial organisation and patterning of landscapes over several spatial scales, resulting in a significant loss of functional integrity. The study also found that in areas occupied by feral horses the resources on hillslopes and spurs that normally sustain or enhance ecosystem production and function via feedback loops, such as seeds, litter, organic matter and rainfall, were more likely lost down-slope rather than retained and recycled (Lenehan 2010).

In high altitude alpine herb fields trampling and grazing of bog and fen communities creates gully lines along horse trails that drain these sensitive communities. In water catchment areas, feral horse impacts accelerate soil erosion that increases sedimentation and potential transference of dangerous pathogens into water supplies. As horse density within conservation reserves increases, feral horse impacts on the environment become more significant.

Priorities for control

The removal of feral horses from Guy Fawkes River National Park to reduce ecological damage and competition with native grazers is a high priority in North Coast Region. A staged control program to create horse-free management zones in the park is occurring with the ultimate aim of removing all horses from the reserve. Control of feral horses in Yuraygir National Park to minimise environmental impacts and reduce risk to vehicular traffic and impacts on neighbouring private property, is also a priority.

Control

Different horse control techniques are required depending on factors such as season, feed availability, site accessibility and horse density. A fully integrated suite of control techniques have been considered and combinations of techniques have been assessed and are used to control feral horses. In North Coast Region the initial control involves the use of feed-based lures to draw horses into portable trap yards. Captured horses are then transported from the park and made available to identified

horse-interest groups for re-homing. Other control techniques will be developed and may be used later in the program as required. All feral horse control will be carried out in accordance with endorsed codes of practice and standard operating procedures.

Monitoring

The overall effectiveness of horse removal programs will be assessed by measuring the reduction over time of the horse population in the park, monitoring the reduction of feral horse populations within identified horse management zones, and reduction in feral horse density and distribution.

Introduced rodents

Distribution and abundance

Two species of introduced rodents are recorded in North Coast Region: the black rat (*Rattus rattus*) and house mouse (*Mus musculus*). The black rat and house mouse are widely distributed across all of North Coast Region, and are particularly abundant in Muttonbird Island Nature Reserve and other semi-urban and urban reserves. The brown rat (*R. norvegicus*) is likely to be present along coastal break walls on major rivers in the region.

Impacts

Introduced rodents prey on many native animals including nesting birds, reptiles and insects. They also compete with native wildlife for food, and can prevent plant regeneration by consuming seeds and damaging seedlings. Predation by *Rattus rattus* on Lord Howe Island is listed as a KTP under the TSC Act where it has already been responsible for the extinction of five species of birds and numerous invertebrates. These rats also cause substantial economic loss to the island's palm seed industry. The black rat is a known carrier of several diseases, including leptospirosis and salmonellosis, transmitted to humans through its urine and faeces.

In North Coast Region introduced rodents have an impact on Muttonbird Island Nature Reserve at Coffs Harbour, where black rats and house mice are significantly affecting the breeding success of wedge-tailed shearwaters (*Puffinus pacificus*).

The populations of black rats in campgrounds in Arakoon National Park can pose a public health risk to visitors, and in Trial Bay Goal (Arakoon National Park) they cause damage to heritage property. At Dorrigo Rainforest Centre infestations of black rats are an ongoing issue.

Priorities for control

The control of introduced rodents to minimise their impact on the breeding success of nesting seabirds on Muttonbird Island Nature Reserve is a priority. Rodent control will be implemented in Arakoon National Park and Dorrigo Rainforest Centre as required.

Control

Rodent control on Muttonbird Island Nature Reserve will be implemented in accordance with the strategy detailed in a NPWS Conservation Risk Assessment. An Integrated Management Plan for the control of the black rat in Trial Bay Camp Ground in Arakoon National Park (NPWS 2001) has been prepared to minimise the potential impacts of any control programs on the brush-tailed phascogale (*Phascogale tapoatafa*) which also occurs at this location. Introduced rodent control programs will be implemented as required in other reserves and off-park situations.

All programs will be implemented in an environmentally responsible manner to minimise potential non-target impacts. First generation multidose rodenticides such as Coumatetralyl and Diphacinone will be used to minimise the off-target impacts of all rodent control programs.

Monitoring

Monitoring of nesting seabird breeding success in response to rodent control will be monitored on Muttonbird Island Nature Reserve. Damage caused by rodents at heritage sites and campgrounds will be monitored and rodent control effort adjusted accordingly. The amount of bait taken by rodents will be recorded. On Muttonbird Island Nature Reserve rodent activity, distribution and abundance will be monitored using chew tags and Elliot trapping.

Feral birds

Distribution and abundance

Feral birds are generally found in association with human habitation with medium to high densities in urban and rural areas, and those areas fringing reserves. Indian mynas (*Sturnus tristis*) and common starlings (*Sturnus vulgaris*) have increased and expanded their habitat to include open pasture lands and open forest.

Feral birds, including the house sparrow (*Passer domesticus*) and spotted dove (*Streptopelia chinensis*), are now distributed throughout North Coast Region, particularly in the coastal areas adjoining major towns and cities. Indian mynas are a relatively new incursion in North Coast Region. They have only been recorded in the Region since 2005, but have rapidly expanded and are now present in most towns in in the Region. There is an isolated population of Indian mynas in the Upper Darkwood addition to New England National Park.

Impacts

The impacts of feral birds include competition for hollow-nesting sites of birds, bats and mammals, spread of weed species and competition for food resources. Indian mynas are very intelligent and aggressive birds that are known to evict native birds – parrots, kookaburras and magpie-larks – from their nests, dump their eggs, chase them away from their nests and drive them from the area. In urban habitats they are considered to be a threat to the long-term survival of native birds. Common starlings additionally contaminate nesting sites by filling hollows with deep linings that attract parasites and become unusable for other species that use little lining. Both Indian mynas and starlings are well known for their impact on human habitation where serious infestations of bird lice can occur.

Priorities for control

Control programs will be implemented where feral birds impact on significant species or EECs.

Control programs may also be implemented where feral birds are impacting on recreational and aesthetic values at high profile public visitor areas.

North Coast Region will encourage community groups through their local Landcare groups, non-government organisations and council to undertake control programs to reduce the spread of the birds in their areas.

The region will continue to support Environmental Trust-funded programs for Indian myna control operating in the Coffs Harbour, Bellingen, Nambucca, and Macleay areas.

Control

Trapping using specially designed cage traps in conjunction with feed based lures and decoy birds is the most effective control method. Control programs coordinated by local Landcare groups and non-government organisations are being implemented off park in all council areas in the Region.

Monitoring

Feral bird sightings and population spread will be monitored, and liaision undertaken with relevant stakeholders. NPWS will assist in the design of off-park Indian myna control program monitoring techniques.

Feral honeybee (*Apis mellifera*)

Distribution and abundance

Feral honeybees are known to exist in many reserves across North Coast Region; however, their distribution has not been mapped. Anecdotal evidence suggests that they are more abundant in urban and coastal reserves than in rural and inland areas.

Impacts

Honeybees impact on biodiversity via competition for tree hollows, competition for floral resources, such as pollen and nectar, and alterations to floristic composition by decreasing the effective pollination of some plants and favouring others. The loss of tree hollows via occupation by feral honey bees reduces the number of hollows available for native animals to breed and shelter. This is of particular concern for species which are threatened. Hollows are an extremely important resource for many Australian animals, particularly birds and mammals.

Threatened species which are likely to be affected by competition from honeybees for hollows include the brush-tailed phascogale (*Phascogale tapoatafa*), squirrel glider (*Petaurus norfolcensis*), yellow-bellied glider (*Petaurus australis*) and glossy black-cockatoo (*Calyptorhynchus lathami*). Populations of protected species that may become threatened include the common brushtail possum (*Trichosurus vulpecular*), greater glider (*Petauroides volans*) and sugar glider (*Petaurus breviceps*). Competition from feral honeybees is listed as a KTP under the TSC Act.

Priorities for control

Priority sites for control will be feral honeybee hives inhabiting hollow-bearing trees at locations where threatened hollow-dependent fauna have been recorded.

Control

A professional pest controller will be consulted. In most situations control will be via the application of a registered insecticide. In some situations it may be appropriate to engage a local apiarist to remove the feral honeybee population.

Monitoring

Visual inspections will be undertaken following treatments to confirm hive destruction.

Feral fish

Distribution and abundance

Feral fish include plague minnow or gambusia (*Gambusia holbrooki*), koi carp (*Cyprinus carpio koi*), rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), redfin perch (*Perca fluviatilis*) and goldfish (*Carassius auratus*).

Many fish species have been introduced into NSW waters over the past 200 years, both intentionally and accidentally. Feral fish species can threaten native aquatic and terrestrial life directly as predators or competitors for food or indirectly by altering their natural habitat.

In freshwater aquatic habitats the introduction of exotic fish species to areas outside their natural range, have occurred widely for the purposes of recreational fishing, mosquito control (plague minnow) and aquaculture. There have also been an increasing number of introductions through the intentional or accidental release of aquarium fish.

Four feral fish species are currently of concern in North Coast Region: plague minnow, koi carp, rainbow trout and brown trout. Redfin perch have been recorded in the Macleay catchment, and goldfish have been recorded in both the Macleay and Manning catchments, although it is not known whether these species occur on NPWS reserves (S. Kaye 2008, pers. comm.).

Predation by plague minnow is listed as a KTP under the TSC Act. This species is recorded in a number of coastal and near-urban reserves (Yarrahapinni Wetlands National Park, Hat Head National Park, and Yuraygir National Park). A survey of relic dams from the post-sandmining era in coastal parks recorded their presence in the majority of dams.

Brown trout and rainbow trout are highly likely to be present in the streams of most of the Region's escarpment parks from release and restocking programs prior to reserve dedication, or due to more recent releases into streams outside park boundaries.

Impacts

Some of these species, most notably trout, are seen as having social and economic benefits for recreational fisheries and have been actively maintained through stocking. However, their impact on aquatic biodiversity in North Coast Region waterways is not fully understood. Further research is required to better understand the terrestrial and aquatic species likely to be at most risk from predation by trout, with a particular emphasis on threatened stream dwelling frogs.

Koi carp and the plague minnow are now considered as pests in the wild, as they alter or degrade the natural environment and compete with native species for food, habitat or spawning grounds.

The plague minnow has been colloquially described as the animal weed of our aquatic environment, because of its ability to rapidly reproduce, disperse widely and occupy diverse habitats, to the detriment of native species. This small fish is highly aggressive and predatory.

Carp are listed as a Class 1 noxious species in NSW under the noxious species provisions of the *Fisheries Management Act 1994*. Carp are widely believed to have detrimental effects on native aquatic plants, animals and general river health, particularly through their destructive feeding habits. Some probable impacts of carp include reducing water quality, increasing the likelihood of algal blooms, causing

erosion, impacting on invertebrates and aquatic plants, potential disease outbreaks, and reduction in native fish numbers.

Priorities for control

Due to the complexity and difficulty of effectively controlling plague minnows, any control will only be attempted where a potential effective outcome is possible, or the site has some priority in relation to threatened species.

Brown trout and rainbow trout, or other associated recreational fish, will only be controlled in line with policy or further direction from NPWS. In some cases it may be necessary to prevent the introduction and reduce populations of non-native fish in streams where vulnerable native animal species occur (R. Haering 2008, pers. comm.).

Control

There are presently no species-specific methods to control plague minnow (draining a waterbody or using the pesticide 'rotenone' will destroy the target species but neither method is species-specific). Once established in a waterway, plague minnow are almost impossible to eradicate. Control becomes more difficult where there are connected waterways such as creeks, rivers and streams, and large permanent water bodies. A number of physical, chemical and biological approaches have been trialled with varying degrees of success and inherent risks. Actions identified in the Plague Minnow TAP are targeted predominantly towards ameliorating the impacts on frogs, particularly threatened species. In North Coast Region this particularly applies to threatened species such as the green and golden bell frog, giant burrowing frog and wallum froglet. There are many other species potentially impacted in North Coast Region as detailed in the TAP.

Monitoring

Research will be supported to better understand the terrestrial and aquatic species at risk from predation by trout, with a particular emphasis on threatened stream dwelling frogs.

Bitou bush (*Chrysanthemoides monilifera* ssp. *rotundata*)

Distribution and abundance

Bitou bush is widespread in all coastal reserves in the North Coast Region. Most foredunes and hind dunes are or have been heavily infested. It has established in coastal heath and woodlands, littoral rainforest and grassy headlands.

Impacts

Bitou bush is a highly competitive weed that smothers native plant communities and destroys natural habitat and food sources for native animals. It threatens over 180 native plant species, populations and ecological communities in NSW. Bitou bush invades dunes, coastal heathlands, grasslands, woodlands and forests. Bitou bush can also disturb cultural heritage sites by destroying the fabric of the site. It can provide food and shelter to feral animals, such as the red fox.

Bitou bush is a Weed of National Significance (WoNS), and is declared Class 4 under the *Noxious Weeds Act 1993* in the five coastal councils in North Coast Region (Kempsey, Nambucca, Bellingen, Coffs Harbour, Clarence Valley). National, state and regional strategies have been prepared. The invasion of native plant

communities by bitou bush is listed as a KTP under the TSC Act, and the Bitou Bush TAP was prepared in 2006 and subsequently implemented.

Bitou bush infestations threaten the conservation values of EECs such as littoral rainforests and Themeda grassy headlands in Coffs Coast Regional Park, in Bongil Bongil, Yuraygir, Hat Head, Goolawah, and Limeburners Creek national parks, and in Moonee Beach nature reserve. Invasion by bitou bush is the key threat to several endangered plants in North Coast Region including *Thesium australe*, *Chamaesyce psammogeton*, *Zieria prostrata*, *Acronychia littoralis* and *Sophora tomentosa*. Forty sites are identified in the NSW Bitou Bush TAP. Of these, 30 are listed as Category 1 (highest priority) sites.

Priorities for control

The Bitou Bush TAP identifies 35 priority sites for control in North Coast Region:

- Yuraygir National Park – Bare Point-Wilsons Headland, Sandon Bluffs, Sandon north and south beaches, Sandon River, Redcliff, Station Creek Beach, Rocky Point, Shelley Headland, Plumbago Headland, Pebbly to Freshwater, Angourie Point, Angourie Back Beach, Dirragan Lookout Track.
- Clarence Estuary Nature Reserve
- Coffs Coast Regional Park – Diggers Head, Woolgoolga Beach and Headland, Macauleys Headland, Cabins Beach, Arrawarra Headland, Woolgoolga to Sandy Beach and north east of Korora
- Moonee Beach Nature Reserve – Look At Me Now Headland, Dammerels Head, Diggers Point, Bare Bluff
- Bongil Bongil National Park
- Yarriabini National Park – Middle Head
- Arakoon National Park
- Hat Head National Park – Big Smoky, Conners-Hat Head, East of Town and Headland, O'Connors Beach
- Limeburners Creek National Park
- Clybucca Historic Site and Aboriginal Area.

Control programs are being implemented at all of these sites and vary between initial works to follow up and expansion of treatment areas as resources become available. Requirements have changed at some sites due to control success, re-infestation or need to treat other weeds. Many of these programs involve working with other stakeholders such as community groups.

Other control priorities include:

- treatment of isolated infestations especially along roadsides such as Diggers Camp and Sandon roads in Yuraygir National Park and as part of ongoing bush regeneration programs such as in Coffs Coast Regional Park
- support for programs involving community groups
- programs around visitor areas
- programs when a window of opportunity for control becomes available, for example implementing ground or aerial spraying programs within 12 months of a bushfire as has occurred south of the Wooli River after the 2009 fire.

Importantly, where bitou bush is part of a multi-species weed infestation, or other weeds are likely to invade after bitou bush control, then concurrent control of these other species is required.

Control

Bitou bush is controlled using an integrated approach. A number of different techniques include physical removal, cut and paint, and herbicide treatment from backpack, vehicle and helicopter. Two biocontrol agents, tip moth (*Comostolopsis germana*) and seed fly (*Mesoclanis polana*) have effectively established in all coastal reserves.

Monitoring

Bitou bush density and distribution mapping were undertaken in 2000 and 2007 in all coastal reserves. Monitoring transects and photopoints have been established in selected areas of various reserves. Some data dates back to the mid-1990s with a variety of methods used. The Bitou Bush Monitoring Manual released in 2009 has facilitated standardised monitoring that has been a requirement of TAP site programs and externally funded programs. Spatial records of bitou bush control programs are maintained on ArcGIS and program effort will be recorded through the Asset Management System.

Blackberry (*Rubus fruticosus* agg.)

Distribution and abundance

There are 26 known introduced *Rubus* species in Australia. Sixteen of these are from the European blackberry (*R. fruticosus* agg.). The other 10 are classed as other introduced weedy *Rubus* species and originate from either North America or Asia. *Rubus anglocandicans* is the main species in the Region.

Blackberry rarely invades pristine bushland but readily establishes in disturbed areas on agricultural land, 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 widespread on the slopes and tablelands of NSW.

In North Coast Region substantial blackberry infestations are found in Guy Fawkes River, New England, Cathedral Rock, Chaelundi and Nymboi-Binderay national parks. Isolated infestations occur in all other reserves on the Dorrigo Plateau in Willi Willi National Park, the Carrai Plateau and Hat Head National Park.

Impacts

Blackberry is a WoNS 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. It 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. Blackberry can provide significant harbour for rabbits, foxes, feral pigs and other pest animal species.

Priorities for control

Blackberry has been a high priority for control on reserves within elevated parts of North Coast Region for many years. There have been major control programs in Guy Fawkes River National Park, Guy Fawkes River Nature Reserve, Chaelundi National Park, New England National Park and Cathedral Rock National Park. Priorities for control include:

- new or emerging infestations, or where the current distribution is limited, such as Willi Willi National Park and The Castles Nature Reserve
- areas where high conservation values are threatened
- areas where public access to significant natural features is restricted
- previously treated areas that require adequate follow-up control to prevent reinfestation.

Control

- Update distribution maps of blackberry on NPWS estate.
- Reduce distribution and potential to spread by treatment with herbicide.
- Carry out follow-up treatment as required for a minimum of 10 years or until there is no further regrowth.
- Trial biocontrol agents to determine effectiveness as a control measure.

Monitoring

- Establish photopoints to monitor re-establishment.
- Map blackberry distribution and abundance in key locations such as Guy Fawkes River National Park to note changes in distribution and density and to ensure all infestations are treated two out of three years.
- Monitor the quantity of herbicide used at each location, as the program proceeds.

Lantana (*Lantana camara*)

Distribution and abundance

Lantana infests over four million hectares east of the Great Dividing Range from Eden in the south to Cape York Peninsula in the north, with isolated infestations found elsewhere in Australia. Although favouring warm humid environments, lantana is able to survive long droughts and frost by temporarily shutting down, losing its leaves before reshooting from the base following rainfall.

Lantana is the most common weed in the North Coast Region and is present to varying degrees in all reserves below 800 m above sea level. Lantana favours disturbance and hence is particularly common in previously logged or cleared areas and along drainage lines and roadsides. It is a significant factor in many bell miner associated dieback (BMAD) areas.

Heavy lantana infestations occur in parts of Bongil Bongil National Park, Dorrigo National Park, Bellinger River National Park, New England National Park, Chaelundi National Park, Bindarri National Park, Yuraygir National Park, Sherwood Nature Reserve, Valla Nature Reserve, Ngambaa Nature Reserve, Yarriabini National Park, Ramornie National Park, Kumbatine National Park/State Conservation Area, Willi Willi National Park, Boonanghi Nature Reserve, Willi Willi Caves Nature Reserve, Yessabah Nature Reserve, parts of Hat Head National Park, and the Babadaga group of reserves (Ganaaay, Jaaningga, Bowraville, Bollanolla, and Juugawaarri). A successful control program has significantly reduced lantana infestations in Guy Fawkes River National Park while other successful programs have been implemented in Clybucca Historic Site, Susan Island Nature Reserve and parts of Yuraygir National Park.

Impacts

Lantana readily invades forest edges, coastal woodlands, riparian zones, disturbed rainforest and open eucalypt woodland; particularly following soil or vegetation disturbance. Its dense thickets exclude native plant species through smothering and allelopathic effects. It can dramatically alter forest structure and fauna habitat, and restrict the movement of native fauna. Lantana thickets can increase the intensity of wildfires in some conditions (van Oosterhout 2004).

Lantana was listed as one of the initial 20 Weeds of National Significance, a KTP under the TSC Act and a declared noxious weed throughout Australia. Site priorities for EECs and threatened species conservation have been determined in the National Plan to Protect Environmental Assets from Lantana.

Priorities for control

Priorities for control include:

- Themeda Grassland on Headlands, Littoral Rainforest, Subtropical Floodplain Forest, Lowland Subtropical Rainforest on Floodplain and Swamp Sclerophyll Forest EECS.
- sites where threatened species are at risk
- parts of the Gondwana Rainforests of Australia World Heritage Area and Yessabah Dry Rainforest
- bush regeneration projects where a number of weeds are being targeted.

Control

Specific techniques include foliar spraying with herbicide (by back pack, quad bike, tractor-mounted quick spray unit or by splatter gun), cut and paint, hand removal and release of biological control agents. Mechanical techniques can be effective at controlling lantana and encouraging native regeneration; however, care must be taken to minimise impacts on native vegetation, and follow-up is required due to soil disturbance.

Effective herbicide or biological control is made more difficult by the plant's habit of temporarily "shutting down" during dry periods or after frost. Effective herbicide applications require the plant to be actively growing.

Monitoring

The National Plan to Protect Environmental Assets from Lantana recommends the use of the Monitoring Manual for Bitou Bush Control and Native Plant Recovery, as it can easily be adapted for this weed. Therefore, programs focused in EECs or adjacent to threatened species are monitored through mapping and in some cases photo points and/or transects. This is particularly the case where lantana is being controlled at Bitou Bush TAP sites.

Exotic grasses

These include:

- giant Parramatta grass (*Sporobolus fertilis*)
- hairy panic (*Panicum maximum* var. *trichoglume*)
- spiny burrgrass (non-native *Cenchrus* spp.)
- pigeon grasses (*Setaria* spp.)
- kikuyu (*Pennisetum clandestinum*)

- whisky grass (*Andropogon virginicus*)
- broad leafed paspalum (*Paspalum mandiocanum*)
- Coolatai grass (*Hyparrhenia hirta*)
- buffalo grass (*Stenotaphrum secundatum*)
- molasses grass (*Melinis minutiflora*)
- African lovegrass (*Eragrostis curvula*)
- pampas grass (*Cortaderia sellona*)
- elephant grass (*Arundo donax*)
- giant paspalum (*Paspalum urvillei*)
- carpet grass (*Axonopus affinis*).

Distribution and abundance

Infestations of most exotic grass species are along roads, tracks and trails and previously disturbed areas in many reserves of the North Coast Region. Giant Parramatta grass is present almost exclusively along roadsides, often growing in dense swards (for example in Ramornie National Park, Clybucca Historic Site and Limeburners Creek National Park). Large areas of Yuraygir National Park were previously sown with the pasture species of pigeon grass and it still dominates much of the landscape. Kikuyu is present on headlands in Hat Head, Goolawah, Limeburners Creek and Yuraygir NPs, Moonee Beach Nature Reserve and Coffs Coast Regional Park.

Buffalo grass also occurs on many these headlands as well as in saltmarsh areas. Hairy panic out-competes understorey species in Coffs Coast Regional Park, preventing natural rainforest regeneration. A large infestation of whisky grass occurs west of Sandon in Yuraygir National Park on roads, trails and sites previously disturbed by sand mining operations, and it also occurs along roadsides in other coastal reserves such as Hat Head and Yuraygir NPs.

Broad leafed paspalum and Coolatai grass are increasing problems in coastal reserves. Molasses grass is present in dense infestations in disturbed areas in Coffs Coast Regional Park, and scattered infestations in Yarriabini National Park. In addition there are often localised but dense infestations of other grasses such as elephant grass (*Arundo donax*), giant paspalum (*Paspalum urvillei*) and carpet grass (*Axonopus affinus*) and pampas grass (*Cortaderia sellona*) in other reserves.

Temperate climate grasses such as African lovegrass (*Eragrostis curvula*) occur along roadsides in various parks and reserves and around visitor areas in the southern part of the region, serrated tussock (*Nassella trichotoma*) and Chilean needlegrass (*Nassella neesiana*) threaten reserves in elevated areas such as Guy Fawkes River National Park, Cathedral Rock National Park and New England National Park.

Impacts

Exotic grasses are vigorous, persistent and invasive weeds in disturbed areas. Once established they can displace low vegetation and native grasses, and provide a seed source for dispersal by vehicular and pedestrian traffic. Pigeon grasses and kikuyu form dense mats, elevating fuel loads that place woody native species at risk in wildfire. Kikuyu inhibits seed germination and seedling establishment in all vegetation communities, with regenerating rainforest of particular concern.

On headlands in Moonee Beach Nature Reserve, kikuyu and giant paspalum control is undertaken as a recovery action for the endangered *Zieria prostrata* populations.

Spiny burrgrasses and kikuyu have interfered with the nesting success of ground-nesting seabirds in Muttonbird Island Nature Reserve, in addition to spiny burrgrass being an irritant for animals and park visitors.

Broad leafed paspalum is becoming invasive, dominating ground cover layers in full sun to shade. Buffalo grass can carpet the ground in the saltmarsh/swamp oak and grassy headland EECs. Whisky grass is a threat to swamp sclerophyll forest and heaths/sedgelands. Coolatai grass has proven very invasive in open woodlands on the slopes and tablelands and is a threat to heath lands, especially the graminoid clay heaths which are a feature of Yuraygir National Park.

Serrated tussock and Chilean needlegrass were listed in the initial 20 Weeds of National Significance and invasion of native plant communities by exotic perennial grasses is listed as a KTP under the TSC Act. Site priorities for widespread weed management (including exotic grasses) for EECs and threatened species conservation have been determined in BPWW.

Priorities for control

- Littoral Rainforest and Grassy Headlands EECs in Moonee Beach Nature Reserve, Coffs Coast and Goolawah Regional Parks and Arakoon, Hat Head, Goolawah, Limeburners Creek and Yuraygir National Parks
- Shorebird nesting habitat, Muttonbird Island Nature Reserve and in the Solitary Islands group of reserves
- Isolated and new infestations in all reserves with emphasis on Coolatai grass in Hat Head, Bongil Bongil and Yuraygir National Parks and broad leafed paspalum in Bongil Bongil and Yuraygir National Parks and Coffs Coast Regional Park
- Where control of grasses are required as part of a bush regeneration program.

Control of large long standing infestations of whisky grass and pigeon grass in previously disturbed areas of Yuraygir National Park is being addressed by the exclusion of fire as much as practical to allow for the recovery of native shrubland/forest to overshade and exclude the grasses. This is currently the only realistic control technique given the extent of infestations.

Control

Most grass infestations are treated with herbicide and/or hand removed depending on their location.

Monitoring

NPWS will continue to record and map all occurrences and treatments of exotic grasses. Treatments will be assessed for their effectiveness.

Exotic vines

These include:

- cat's claw creeper (*Macfadyena unguis-cati*)
- Madeira vine (*Anredera cordifolia*)
- morning glory (*Ipomoea* spp.)
- balloon vine (*Cardiospermum grandiflorum*)
- Dutchman’s pipe (*Aristolochia elegans*)
- moth vine (*Araujia sericifera*)
- asparagus ferns (*Asparagus* spp.)

- Japanese honeysuckle (*Lonicera japonica*)
- passionfruits (*Passiflora* spp.)
- Mysore thorn (*Caesalpinia decapetala*)
- climbing nightshade (*Solanum seaforthianum*)
- turkey rhubarb (*Acetosa sagittata*).

Distribution and abundance

Vine weed infestations occur in all major catchments within the North Coast Region. As most vine weeds are readily spread by water movement, riparian zones are particularly threatened.

Cat's claw creeper, Madeira and balloon vines are widespread within the region, infesting extensive areas of most river systems, as well as many tributaries. Most infestations occur on other lands outside of the national parks estate. Ongoing control programs for cat's claw creeper are undertaken in Susan Island Nature Reserve and Coramba Nature Reserve. Elsewhere in the region it has an isolated occurrence and any infestations are a high priority for control. Cat's claw creeper is declared a Class 4 noxious weed in Bellingen Shire.

Madeira and balloon vines are readily spread by water, especially floods. Infestations occur in Coffs Coast Regional Park, Bellinger River National Park, Yarrahapinni Wetlands National Park, Susan Island Nature Reserve and an isolated infestation in Muttonbird Island Nature Reserve. An eradication program for Madeira vine and balloon vine is currently being implemented in Dorrigo National Park.

Infestations of coastal morning glory (*Ipomoea cairica)* occur in all coastal reserves while species such as *Ipomoea purpurea* are a problem near urban areas including Bongil Bongil National Park and Coffs Coast Regional Park. An infestation of moonflower (*Ipomoea alba*) on Susan Island Nature Reserve and adjoining crown land is of concern.

Asparagus spp. are common garden escapes that readily invade many coastal reserves. Significant climbing asparagus (*A. plumosus*) infestations have been controlled in Susan Island Nature Reserve. Ground asparagus (*A. aethiopicus*) occurs in Coffs Coast Regional Park, Susan Island Nature Reserve, and Yuraygir, Arakoon, Hat Head, Goolawah and Limeburners Creek National Parks. Dutchman's pipe occurs in Susan Island Nature Reserve.

Japanese honeysuckle is a significant weed on the Dorrigo plateau and infestations occur in Nymboi-Binderay National Park, Chaelundi National Park, Dorrigo National Park, Junuy Juluum National Park, Muldiva Nature Reserve and Deer Vale Nature Reserve. Moth vine has an isolated occurrence in some coastal reserves.

Turkey rhubarb is a prolific seeder and is fortunately restricted to a few reserves including Susan Island Nature Reserve. This plant grows up and through understorey vegetation and can be a major problem on sand dunes.

Impacts

Vine weeds have been ranked by the NSW North Coast Weeds Advisory Committee as having the most impact on biodiversity of all weeds species present in the region. Vine weeds are easily transported, grow quickly and many are capable of climbing to the top of trees and stripping branches due to their weight. This leads to mass germination of vine weeds and other weeds with the increased sunlight reaching the forest floor and hence the destruction of floristic and structural diversity and fauna habitat. Heavy infestations result in trees being transformed to poles, often falling down in future flood events.

Substantial *Asparagus* infestations often create impenetrable thickets of thorny vine between the ground and 4 m in height. Morning glory commonly occurs in coastal heaths, woodlands and swamp forests where it outcompetes, smothers and displaces native species.

Mysore thorn is a vigorous growing thorny plant capable of climbing and engulfing native vegetation, fences, road signs, sheds, bridges and other infrastructure. It especially favours creek lines where it forms dense thickets restricting water flows, access and downstream movement of flood debris; leading to increased flood damage (NCWAC, 2004).

Mysore thorn severely impacts on biodiversity through restricting germination, reducing forest biomass through smothering, and severely restricting movement of native animals. The sharp barbs on its branches can also injure native wildlife and humans. The sprawling thickets provide habitat for foxes, cats and rabbits. Mysore thorn is known to have carcinogenic properties and therefore care needs to be taken when disposing of and/or burning plant material

Vine weeds reduce human access and can impact on physical infrastructure such as fencelines and picnic facilities.

In 2012, Madeira vine, cat's claw creeper and *Asparagus* weeds became listed as Weeds of National Significance and the "Invasion and establishment of exotic vines and scramblers" is listed as a KTP under the TSC Act. Site priorities for widespread weed management for Endangered Ecological Communities and threatened species conservation have been determined in the BPWW.

Priorities for control

- Endangered ecological communities such as lowland subtropical rainforest on floodplain, coastal floodplain forest, littoral rainforest, Themeda grassland on headlands and swamp forest
- Near threatened species and known threatened species habitat including flying fox camps
- New and isolated infestations
- Bush regeneration programs targeting the most upstream infestations
- Maintenance of existing long-term control programs (eg Mysore Thorn), particularly following a window of opportunity such as after flood events
- Ongoing distribution and monitoring of the leaf-feeding beetle *Plectonycha correntina* for control of remote madeira vine infestations

Control

The first priority for control in most vine weed infestations is to control the vine in the upper canopy. This is generally achieved through cutting and painting or scraping and painting, depending on the species, with herbicide. For Madeira vine and balloon vine infestations, aerial tubers and seed pods should be bagged and composted. Release of biological control agents for madeira vine control can be useful in remote hard to access locations such as at South Solitary Island Historic Site.

Follow up control generally involves foliar spraying seedlings and regrowth or hand removal of isolated plants.

In heavy *Asparagus* infestations there may be a need for physically clearing away stems tangled in trees before foliar spraying the remaining plants with herbicide. Light infestations can be controlled through crowning.

Monitoring

Vine weed infestations need to be controlled at least three times per year to ensure native regeneration is not adversely affected, and for Madeira / balloon vine, that tubers and seed pods are not produced within that time. Isolated infestations are controlled immediately where possible, however it is important that their location is mapped to ensure adequate follow up control occurs.

Monitoring the effectiveness of key vine weed programs is undertaken through mapping the size and density of infestations, and establishing photo points. In some locations, quadrats are used to record the number and diversity of native and introduced plants.

Glory lily (*Gloriosa superba*)

Distribution

Glory lily occurs in dunal areas and headlands, with highest densities found in disturbed areas and/or where bitou bush control has been undertaken. Major infestations occur in Bongil Bongil National Park, with moderate infestations in Yuraygir National Park and Arakoon National Park and minor infestations in Hat Head National Park, Jagun Nature Reserve and Coffs Coast Regional Park.

Impacts

Glory lily is an aggressive perennial scrambler or climber that spreads by seed and vegetative means. It is suspected of heavy competition for water and nutrients, and contains harmful alkaloids that can cause fatal poisoning of mammals, including humans. It invades coastal plant communities from the incipient foredune to littoral rainforest.

Priorities for control

- Endangered ecological communities littoral rainforest and grassy headlands in Coffs Coast Regional Park, Bongil Bongil National Park, Yuraygir National Park, Arakoon National Park and Hat Head National Park
- Isolated and new infestations in coastal reserves
- Maintain existing successful long term program in central Yuraygir National Park around Sandon and Bare Point-Wilsons Headland Bitou Bush TAP sites and in Coffs Coast Regional Park
- Where populations are likely to increase in response to other weed control.

Control

Thorough manual control of isolated plants with few stems is the most effective control option but is of limited practicality for any larger infestations. Herbicide application has shown variable success with the most effective option currently a mixture of glyphosate and metsulfuron methyl (used in accordance with Permit 9907) and applied early in the growing season with a follow up treatment late summer/early autumn.

A problem with herbicide application is the potential for off target damage, particularly in heavy infestations, and careful application is needed. Control trials (commenced in 2007) comparing a range of different herbicide treatments are continuing in Bongil Bongil National Park.

Monitoring

Existing infestations are treated biannually. New infestations are recorded and treated within that growing season.

Groundsel bush (*Baccharis halimifolia*)

Distribution and abundance

Groundsel bush occurs in many reserves in the North Coast Region, generally on poorly drained soils or adjacent to estuarine areas, watercourses, coastal wetlands and swamp forest areas. Major infestations are found on former farmland in Yuraygir National Park in the Brooms Head and Station Creek areas, in former farmland in Clybucca Historic Site and Yarrahapinni Wetlands National Park and a moderate infestation in Moonee Beach Nature Reserve.

Impacts

Groundsel bush is an aggressive invader of disturbed areas and readily invades and proliferates in undisturbed low-lying areas. It has a rapid growth rate and produces vast quantities of windborne seed, which germinates readily. It successfully out-competes and shades native species, prohibiting natural regeneration, and often forms dense thickets that grossly alter the structure and floristic composition of native plant communities (including important coastal wetlands). Groundsel bush is a Class 3 weed under the Noxious Weeds Act throughout the LGAs in North Coast Region. Groundsel bush can readily invade farmland, thereby imposing additional costs for farm management and is toxic to horses.

Priorities for control

- Continue and expand control programs in the endangered ecological communities; coastal saltmarsh, swamp oak floodplain forest, sub tropical coastal floodplain forest and swamp sclerophyll forest. These occur in Yarrahapinni Wetlands National Park, Yuraygir National Park, Moonee Beach Nature Reserve, Bongil Bongil National Park (including habitat of *Alexfloydia repens)* and Clybucca Historic Site.
- Isolated and new occurrences.
- Infestations near neighbouring properties.
- Large infestations with existing programs where ongoing effort is required to maintain previous benefits.

Control

Herbicide control programs involving aerial and vehicle based spraying and cut stump have been used extensively within Yuraygir National Park and Moonee Beach Nature Reserve since the mid 1990s. Infestations have either been eradicated or reduced significantly where follow up treatments have occurred. More recently control programs in Yarrahapinni Wetlands National Park and Clybucca Historic Site are showing good results. Biological control agents such as the gall fly and stem borer are present throughout the area but generally only have minor impacts at the population level.

Monitoring

NPWS will continue to record and map all occurrences and treatments of groundsel bush.

Herbaceous weeds

These include:

- mistflower (*Ageratina riparia*)
- Crofton weed (*Ageratina adenophora*)
- trad (*Tradescantia fluminensis*)
- coral berry (*Rivinia humilis*)
- Formosa lily (*Lilium formosanum*)
- painted spurge (*Euphorbia cyathophora*)
- mother-of-millions (*Bryophyllum delagoense*)
- Noogoora burr (*Xanthium occidentale*)
- St John's wort (*Hypericum perforatum*)
- spear thistle (*Cirsium vulgare)*
- nodding thistle (*Carduus nutans*)
- silver-leaf desmodium (*Desmodium uncinatum*)
- pennywort (*Hydrocotyle bonariensis*).

Distribution and abundance

All of the herbaceous weeds (listed as a high priority for control with the exception of silver-leaf desmodium) have been deliberately introduced to Australia as ornamental garden plants. They produce large numbers of bird or wind-dispersed seeds and grow vigorously in the warm humid environment of eastern Australia. At a landscape level, most of the herbaceous weeds listed above are beyond control, however important control programs are undertaken in specific locations or as part of programs focused on a number of weeds due to their significant adverse environmental impacts.

Herbaceous weeds are widespread in disturbed areas of the North Coast Region, especially in riparian zones, areas previously cleared and adjacent to urban areas.

Mistflower is a widespread weed in moister areas of many reserves in the North Coast Region, preferring disturbed areas in damp gully lines such as Dunggir National Park and shingle banks of major waterways in New England National Park, Dorrigo National Park, Bellinger River National Park and Juugawaarri Nature Reserve.

Crofton weed commonly occurs on well-drained soils where rainfall exceeds 1200 mm/year and frosts are rare. It has an isolated distribution in reserves with disturbed areas along roadsides.

Trad and coral berry occur in most reserves in the region that support rainforest and moister forest types, particularly following disturbance.

Formosa lily and painted spurge are generally limited to coastal reserves, particularly adjacent to villages and urban areas, access tracks and visitor areas though their prevalence has been increasing. Silver-leaf desmodium is an escaped pasture plant and is particularly a problem in disturbed moist hinterland areas adjacent to roads and farmland.

Pennywort is widespread on sand dunes and also occasionally in swamp oak and swamp sclerophyll forests adjacent to lower reaches of coastal waterbodies.

Impacts

Heavy herbaceous weed infestations can totally cover the forest floor and exclude all native regeneration from an area. Mistflower, trad and coral berry thrive in shady rainforest and moist forest areas, forming dense infestations that smother groundcover and understorey species and inhibit seed germination and regeneration. Mistflower, trad and coral berry out-compete native rock orchids, riparian and rainforest species. Mistflower and coral berry produce large amounts of easily dispersed seed. Trad spreads by vegetative means. Crofton weed produces large quantities of wind and water borne seed and is toxic to stock. Silver-leaf desmodium infestations can quickly smother native groundcovers, shrubs and regenerating trees and is easily spread by sticky seed pods.

Before major bush regeneration works commenced in Coramba Nature Reserve in the late 1990s, the forest floor was almost completely covered with a severe trad infestation reaching heights of up to 80–100 cm. The infestation had virtually stopped all native regeneration and restricted native fauna and human access in the reserve.

Pennywort can reach high densities in seasonally inundated coastal habitats, outcompeting and replacing native groundcover vegetation.

The loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants is listed as a KTP under both the TSC Act and EPBC Act.

Priorities for control

- Maintain and expand where possible existing successful long term control programs in Coramba Nature Reserve, New England National Park, Coffs Coast Regional Park, Yuraygir National Park and Arakoon National Park.
- Protection of important assets such as Lowland Subtropical Rainforest on Floodplain EEC and threatened species habitat.
- High profile locations around key visitor use areas and cultural heritage precincts, for example Trial Bay Gaol.
- Where control of herbaceous weeds are required as part of a bush regeneration program.

Control

Control is firstly targeted towards protecting significant plants and habitats before expanding to adjoining areas. Although the main control technique used is foliar spraying with glyphosate, great care is required to ensure that native plants and fauna such as threatened frog species are not adversely affected. In moist creek and riparian environments, hand removal techniques such as rolling back of trad and removing from the site can be very effective and not too labour intensive for light and scattered infestations. Where mistflower is removed by hand, it must be securely hung up to ensure that it does not regrow. Where foliar spraying is required, herbaceous weeds should first be manually removed from around native species.

The recent biological control release of the white smut fungus *Entyloma ageratinae* in the region is showing great promise with large-scale death of mistflower plants, including in more remote locations, in reserves such as New England National Park, Dorrigo National Park and Bongil Bongil National Park.

Monitoring

Monitoring programs have been established in key herbaceous weed control sites and where herbaceous weeds are being controlled as part of larger bush

regeneration programs such as in Coramba Nature Reserve, New England National Park. Monitoring usually consists of photo points and either transects or quadrats through the affected area and adjoining areas to compare native and weed species distribution and abundance as well as rates of recruitment.

Pines

These include slash pine (*Pinus elliottii*), radiata pine (*P. radiata*) and other exotic conifers

Distribution

Major pine infestations occur as dense stands and individual wildlings that have spread from plantations and other plantings in or adjacent to reserves, e.g. southern Yuraygir National Park, Bongil Bongil National Park, Maria National Park (all slash pine) and Cascade National Park (radiata pine). Residual wildlings and older individuals from a *Pinus patula* plantation, along with exotic cypresses occur in Cunnawarra National Park.

Some parks include small trial plantations, including a plot in southern Yuraygir National Park also containing Queensland kauri pine (*Agathis robusta*) and cypress pine (*Cupressus* spp.), in addition to slash and radiata pines, and a dense stand of bunya pine (*Araucaria bidwillii*) in Sherwood Nature Reserve. The most significant of these, which is also considered to have some historic significance, is the former Banda Banda arboretum in Willi Willi National Park, planted in 1964, which includes seven species of conifers.

Impacts

Pine species invade native plant communities, displacing native species. Plantations provide seed source for dispersal by wind and birds to neighbouring areas. Pine infestations are readily established, even in undisturbed environments, due to prolific rates of growth and seed production. Dense stands radically alter the structural and floristic characteristics of vegetation, creating dense shade, altering soil chemistry, depleting nutrients and displacing native species.

Priorities for control

Control of new and isolated infestations is a high priority in all reserves. The ongoing program in southern Yuraygir National Park to contain and reduce the pine population will continue. In northern Bongil Bongil National Park, ongoing suppressive control of isolated pines will continue. In Sherwood Nature Reserve, the harvesting of the bunya pine plantation followed by active regeneration and wildling control will be undertaken. In Cunnawarra National Park, ongoing suppressive control of pine wildlings will occur. At the Banda Banda arboretum in Willi Willi National Park, monitoring of exotic conifer seedling spread will be undertaken, as will their control if necessary. In accordance with the plan of management for Willi Willi National Park, a detailed site management plan will be prepared, which will consider whether the pines should be removed, and interpretation of the site.

Control

Pines are usually controlled by felling or by tree injection. Younger trees and seedlings can be treated by spraying with herbicide.

Monitoring

New infestations are recorded and controlled where feasible.

Woody weeds

These include:

- narrow-leaved privet (*Ligustrum sinense*)
- large-leaved privet (*Ligustrum lucidum*)
- camphor laurel (*Cinnamomum camphora*)
- winter senna (*Senna pendula* var*. glabrata*)
- ochna / Mickey Mouse plant (*Ochna serrulata*)
- coastal tea-tree (*Leptospermum laevigatum*) north of Nambucca
- willow wattle (*Acacia saligna*)
- mulberry (*Morus alba*, *M. nigra*)
- smooth senna (*Senna* x *floribunda*)
- umbrella tree (*Schefflera actinophylla*)
- polygala (*Polygala myrtifolia*).

Distribution and abundance

Woody weeds are widespread in many urban, private forest and agricultural environments in the North Coast Region. Most woody weed infestations on National Park estate have originated from adjoining urban plantings, abandoned habitation, or from major disturbances during previous land uses, for example, sand mining or clearing.

Privets are widespread on the Dorrigo and Comboyne Plateaux and scattered throughout moister hinterland areas. Within the NPWS estate they are common in many disturbed areas, riparian zones and along roadsides in Dorrigo National Park, Cascade National Park, Junuy Juluum National Park, Nymboi-Binderay National Park, and Muldiva and Deervale Nature Reserves. Elsewhere in the region they occur in Bellinger River National Park, Bindarri National Park, Coffs Coast Regional Park, Coramba Nature Reserve, Susan Island Nature Reserve.

Camphor laurel mostly occurs as isolated infestations in reserves located on floodplains or near urban centres. Winter senna is common in coastal areas such as Coffs Coast Regional Park, Moonee Beach Nature Reserve, Yuraygir National Park, Arakoon National Park, Hat Head National Park, and Goolawah National Park. Smooth senna occurs sporadically in disturbed moist forest areas of many reserves. Scattered ochna and umbrella tree infestations occur in coastal parks especially close to urban areas.

Dense stands of coastal tea-tree and willow wattle have resulted from deliberate introductions during post-sandmining rehabilitation efforts in Yuraygir National Park, Bongil Bongil National Park, and Moonee Beach Nature Reserve. A dense mulberry stand occurs on Susan Island Nature Reserve. Polygala is an increasing problem in coastal reserves south of the Macleay River.

Impacts

Woody weeds can be invasive in native plant communities and in some areas they can dominate; restricting natural regeneration and the expansion of rainforest and other forest types. Examples include privets in Coramba Nature Reserve, Dorrigo National Park and Bindarri National Park, mulberry in Susan Island Nature Reserve, ochna, willow wattle and coastal tea-tree in Yuraygir National Park

Most high priority woody weeds are capable of growing in semi-shade, are fast growing and are prolific seeders. Some have long-lived seed. Dense infestations

alter the structural and floristic characteristics of native vegetation, displacing native canopy species, dominating the understorey and reducing the regeneration of native species. As an example, camphor laurel-dominated sites produce large quantities of fruit for three months of the year compared to a healthy diverse subtropical rainforest that may be dominated by over 100 individual species that fruit throughout the year.

Priorities for control

Priorities for control include:

- high conservation value locations such as EECs and adjacent to threatened species and their habitats
- new and isolated infestations
- existing successful long-term woody weed control programs
- bush regeneration programs focused on a number of weeds.

Control

Woody weeds are either controlled as part of larger scale bush regeneration programs undertaken in all reserves, or single-species focused where significant infestations of a single species occurs; particularly where they threaten the conservation values of that area or reserve.

Specific control techniques vary depending on the individual weed species, however, most woody weed trees are controlled through stem-injection or in some cases cut, scrape and paint with herbicide. Woody shrub species may also be controlled through foliar spraying with herbicide or physical removal. Follow up control of seedlings and regrowth generally consists of foliar spraying, or hand removal of isolated plants.

Monitoring

Mapping of woody weeds has been undertaken as part of specific reserve-based weed control strategies such as Coffs Coast Regional Park and Moonee Beach Coastal Weeds Strategy, Junuy Juluum Weed Control Strategy and Bindarri National Park Pest Control Strategy. For other locations monitoring in the form of photo points, transects and/or quadrats is undertaken occasionally.

Aquatic weeds

These include:

- salvinia (*Salvinia molesta*)
- cabomba (*Cabomba caroliniana*)
- parrot's feather (*Myriophyllum aquaticum*)
- water hyacinth (*Eichhornia crassipes*)
- sharp rush (*Juncus acutus*).

Distribution and abundance

Salvinia – a heavy infestation occurrs in the Swanpool wetland within Hat Head National Park; and there is a heavy infestation in Goolawah National Park, This weed also occurs at several off-park locations within the major floodplain catchments within North Coast Region.

Water hyacinth – occurs as a medium to heavy infestation in the Swanpool within Hat Head National Park and as a heavy infestation in Goolawah Lagoon in Goolawah

National Park. It also occurs at several off-park locations within the major floodplains of the Hastings, Macleay and Clarence catchments.

Sharp rush – infestations are recorded in the lower Macleay posing a threat to Yarrahapinni Wetlands National Park and Fishermans Bend Nature Reserve.

A number of other important aquatic weeds such as alligator weed and sagittaria occur within the region but are not known to occur within any reserves. The more significant of these species are discussed in Appendix 1.

Impacts

Salvinia disrupts aquatic ecosystems, seriously affecting native animals and plant life; decreases the quality of water by causing odours, accumulation of organic matter and stagnation of streams; degrades the aesthetic values of waterways; reduces or prevents the use of waterways for recreation and transport; and interferes with the functioning of river control structures, especially during flooding. Salvinia is declared Class 3 under the *Noxious Weeds Act 1993* in all LGAs in North Coast Region. Salvinia is listed as a Weed of National Significance in Australia.

Cabomba is an aggressive invader of freshwater systems, particularly if they are nutrient rich. It is a fully submerged aquatic plant that out-competes native freshwater plants and has similar impacts to salvinia. It can impede aquatic recreational activities and drowning is a risk for entangled swimmers. Cabomba is a Class 5 weed under the *Noxious Weeds Act 1993* in all LGAs in North Coast Region. Cabomba is listed as a Weed of National Significance in Australia.

Parrot's feather forms dense stands and is capable of totally choking water ways, excluding all other flora and fauna.

Water hyacinth can form a dense, impenetrable mat over the water surface. Specific damage includes destroying natural wetlands; eliminating native aquatic plants; reduced infiltration of sunlight; changing the temperature, pH and oxygen levels of water; reducing gas exchange at the water surface; increasing water loss through transpiration; altering the habitats of aquatic plants and animals; reducing aesthetic values of waterways; and reducing water quality. Water hyacinth is declared Class 3 under the *Noxious Weeds Act 1993* in all LGAs in North Coast Region except Clarence Valley where it is a Class 4. In 2012, water hyacinth was listed as a Weed of National Significance.

Sharp rush displaces native rushes and sedges. It can rapidly spread through wetlands, river systems and creeks. Recreational quality of habitat is greatly reduced due to sharply pointed leaves and stems. *Juncus acutus* is closely related to the native *J. kraussii* and there documented cases that where the two are growing together that they have hybridised. The hybrid is potentially more dangerous than the straight *J. acutus*.

Priorities for control

Salvinia – Swanpool wetland in Hat Head National Park; Goolawah Lagoon in Goolawah National Park ..

Water hyacinth – Swanpool wetland in Hat Head National Park Goolawah Lagoon in Goolawah National Park.

Sharp rush – monitoring for presence in lower Macleay reserves.

Control

Aquatic weed control is problematic due to rapid growth of aquatic weeds and the impact dead and decaying material can have on water quality. As new biological

control agents become available for aquatic weeds these will be incorporated into the integrated aquatic weed control program.

Salvinia – successful management of salvinia relies on early detection, action and implementation of an integrated control program. Varying infestations may require a different method or a combination of biological, mechanical or herbicide control techniques. Detailed information on integrated control is available in DPI's Salvinia Control Manual. An ant-sized weevil (*Cyrtobagous salviniae*) has been released in the Swanpool wetland in Hat Head National Park and Goolawah Lagoon.

Cabomba – once established it is extremely difficult to control. Mechanical removal of small infestations can be attempted, if practical. All fragments of the weed must be removed and disposed of carefully. Excavators may be used to remove larger infestations. Draining or 'draw down' of a water body can also be effective. A new herbicide has recently been registered for cabomba control in NSW.

Parrot's feather – physical removal of isolated plants, removing all plant material. Dry out all material on the ground in the sun. Never dispose of any parrot's feather in ditches or creeks.

Water hyacinth – integrated control (mechanical, biological and chemical). Physical removal of isolated seedlings/plants.

Sharp rush – mechanical removal in areas already disturbed or invaded with weeds. Physical removal of isolated infestations. Due to hybridisation, successful programs are potentially limited at this stage.

Monitoring

NPWS will continue to record and map all aquatic weed infestations in North Coast Region. The effectiveness of control techniques will be monitored together with various water quality parameters. NPWS will liaise with relevant councils prior to undertaking aquatic weed control programs.

Plant pathogen (*Phytophthora cinnamomi*)

Distribution and abundance

Phytophthora cinnamomi (Phytophthora) is a soil-borne pathogen belonging to the water mould group whose growth and reproduction is favoured by moist soil conditions and warm temperatures. The spores can be dispersed over relatively large distances by surface and subsurface water flows and can also be readily transported in contaminated soils. Humans have the potential to spread *Phytophthora cinnamomi* further and faster than any other vector through the movement of infested soil, water or plant material. Once inside a host plant Phytophthora spores colonise the vascular tissue and restrict the uptake of water and nutrients, killing the host plant.

The pathogen is well-known in Western Australia, Victoria and Tasmania having caused significant impacts to native forest timber resources. It is also present in coastal Queensland and eastern NSW however disease expression in these areas is more cryptic and the extent of the threat is not known.

In North Coast Region, the pathogen has been identified in a number of parks within the Gondwana Rainforests World Heritage Area, including New England National Park. It has also been detected in other reserves, including Junuy Juluum National Park. Although not yet known from any of the Clarence Valley sandstone reserves, it is known from nearby areas, including the Shannon Creek Dam.

Impacts

Phytophthora cinnamomi is the most widespread and destructive of the 32 *Phytophthora* species that occur in Australia and is listed as key threatening process under both State and Federal legislation. Susceptible species display a range of symptoms; some are killed, some are damaged but endure, and some show no apparent symptoms. In some circumstances, *P. cinnamomi* may contribute to plant death where there are other stresses present (e.g. waterlogging, drought, and wildfire). Infection of native plants by *Phytophthora cinnamomi* has been identified as a key threatening process for a number of threatened species resulting in a national threat abatement plan for Phytophthora being prepared in 2001 and a Statement of Intent being prepared for NSW in 2008[4].

Priorities for control

- Identify presence of Phytophthora by conducting surveys and sampling areas of poor tree health or dieback.
- Identify and implement appropriate containment and hygiene protocols for affected areas.

Control

- Containment through the use of quarantine areas, signage and hygiene facilities.
- Protection of key areas through signage and hygiene facilities prior to entry.
- Possible treatment of key individual plants.

Monitoring

- Soil sampling in key locations to determine movement.
- Monitoring of vegetation in key locations to determine impacts on vegetation and key species.

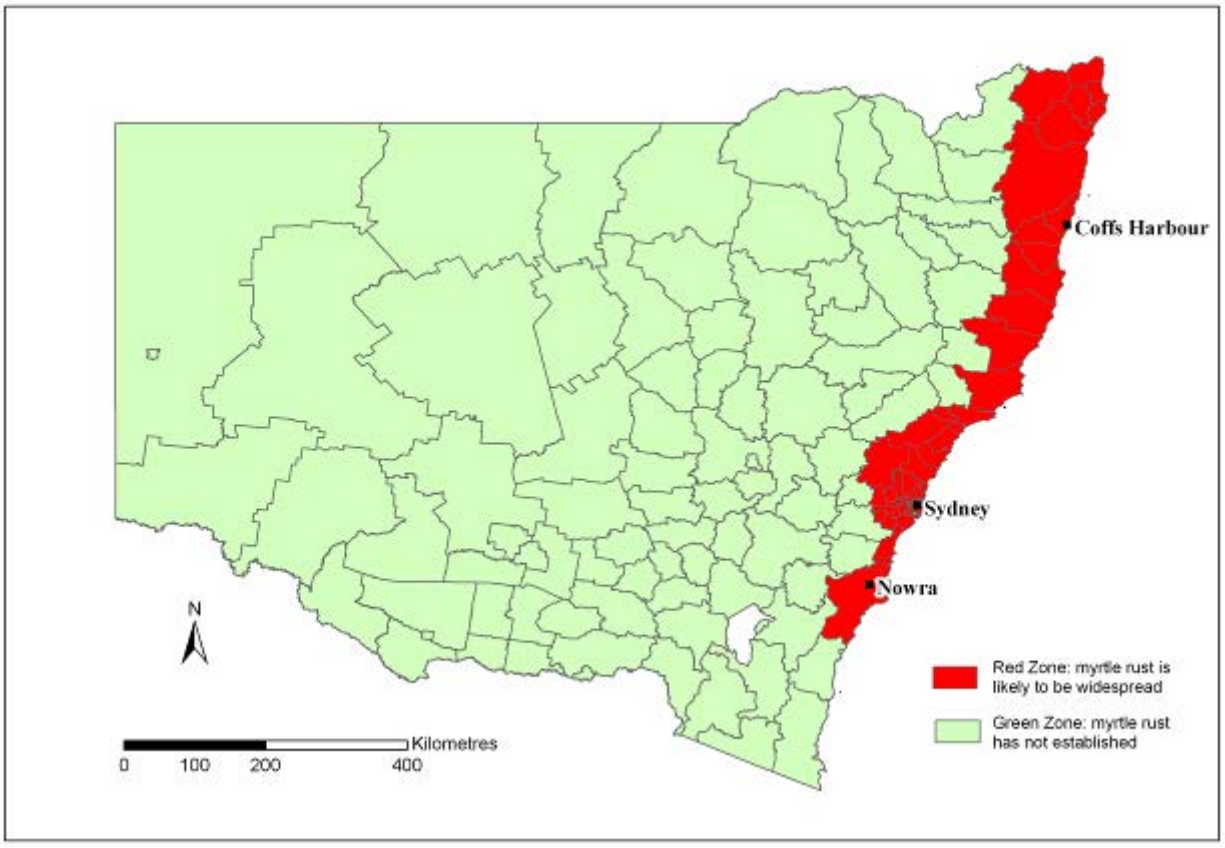
Myrtle rust (*Uredo rangelii*)

Distribution and abundance

Myrtle rust is a plant disease caused by the exotic fungus *Uredo rangelii*. It was first detected in Australia on 23 April 2010 on the NSW Central Coast. It has established in coastal NSW from the Clyde River north into Queensland. Myrtle rust is likely to spread rapidly to the extent of its biological range as the spores are dispersed readily by wind. Eradication is unfeasible.

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

[4] http://www.environment.gov.au/biodiversity/threatened/publications/tap/phytophthora.html



Approximate distribution of myrtle rust *Uredo rangelii* as of 24 January 2011.

Data from NSW Department of Primary Industries (www.dpi.nsw.gov.au/biosecurity/plant/myrtle-rust); local government boundaries from the Land and Property Management Authority.

Impacts

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

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

The 'Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae' is listed as a KTP under the TSC Act

Priorities for control

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

The objectives of the plan are to:

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

Control

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

- Identify high value assets at risk
- Limit the spread of myrtle rust
- Monitor the spread of myrtle rust
- Manage infections
- Research the impacts of myrtle rust
- Training, extension and external communication
- Record the incidence of myrtle rust
- Liaise and report on the spread and impacts of myrtle rust

North Coast Region will be implementing this plan as far as practical during 2012.

Monitoring

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

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

Dieback associated with over-abundant psyllids and bell miners

Distribution and abundance

Bell miner associated dieback (BMAD) is found in a number of eucalypt forest types between Victoria and southern Queensland. The current spatial distribution of BMAD throughout NSW is not known in detail. Significant areas of forests in North Coast Region are at risk or have already been affected by BMAD. Areas of BMAD are known in Kumbatine National Park, Nymboida National Park, the Babadaga reserves and some parts of New England National Park. There are areas of adjoining state forest and private forested lands that are also vulnerable or affected in the Region.

Impacts

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

Avifauna are known to be affected by the presence of over-abundant bell miners. A number of eucalypt species such as *Eucalyptus dunnii, E. saligna*, *E. grandis, E. siderophloia, E. acmenoides, E. punctata, E. paniculata*, are vulnerable to BMAD. EECs that are affected or potentially threatened by BMAD include Blue Gum High Forest of the Sydney Basin Bioregion, Blue Mountains Shale Cap Forest of the Sydney Basin Bioregion, White Gum Moist Forest of the North Coast Bioregion and Grey Box – Grey Gum Wet Sclerophyll Forest of the North Coast Bioregion. The group of fauna at highest risk of BMAD are the eucalypt dependent arboreal species and large forest owls. Koalas, greater gliders, squirrel gliders, yellow-bellied gliders and brush-tailed phascogales 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

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

Control

Control of BMAD is a difficult challenge in the absence of empirical evidence to confirm the causes. Current operational activities to prevent spread and assist ecosystem recovery include 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 present. Actions outlined in the Draft Statement of Intent for this KTP will be implemented by NPWS (or other parts of OEH). The previous unfinished trial of fire in Kumbatine National Park will resume if sufficient resources are found.

Monitoring

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

Amphibian chytrid fungus (*Batrachochytrium dendrobatidis*)

Distribution and abundance

Chytridiomycosisis is an infectious disease caused by the amphibian chytrid fungus.[5] Believed to have evolved in Africa, the earliest recorded case of the infection was in South Africa in 1938. Evidence indicates the fungus was introduced into Australia in the late 1970s and has since spread to four major geographic areas including a large east coast zone from northern Queensland to Victoria. The majority of reported chytridiomycosis cases in this zone have been between the Great Dividing Range and the coast with high altitude populations appearing to be more severely affected.

Impacts

The disease affects amphibians worldwide and has been identified as a major cause of the decline and extinction of species (Skerratt et al. 2007). It has caused the extinction of one species of Australian frog and has been implicated in the extinction of three others. Some 20 species in NSW have been found to be infected, almost a quarter of the total number of species in the state. Of these, 13 are listed as threatened[6] under the EPBC Act, and 15 are listed as threatened under the TSC Act. Chytridiomycosis also has the potential to cause a number of NSW frog species which are currently not listed as threatened to become threatened.

As no methods are yet available to treat amphibian populations in the field, susceptible populations may persist only where conditions are not favourable for disease outbreaks, or when they can evolve an evolutionary response to the threat imposed by the emergence of chytridiomycosis.

Priorities for control

- Containment
- Manage the threat of chytridiomycosis posed to threatened species and populations of frogs at key locations
- Undertake research and monitoring of the pathogen to further investigate effective management approaches.

Control

Promote and implement effective hygiene protocols, and institigate threat abatement for key threatened species or populations including habitat modification, captive breeding programs, translocations and treatment of individuals.

Monitoring

Monitor key threatened frog populations to investigate transmission and dispersal of *B. dendrobatidis* to improve understanding of the disease.

Support research into understanding species resistance to *B. dendrobatidis,* both innate and acquired, to assess evolutionary responses and potentially improve the success of re-introduction programs.

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[5] Information extracted from the NSW *Statement of Intent 2: Infection of frogs by amphibian chytrid causing the disease chytridiomycosis* http://www.environment.nsw.gov.au/resources/threatenedspecies/09479soi2chytrid.pdf

[6] www.environment.nsw.gov.au/resources/nature/hyprfrog.pdf

Appendix New and emerging pest species

New pest species

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

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

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

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

Emerging pest species

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

should be reported to the regional pest management officer, who will decide upon the appropriate course of action.

Alligator weed (*Alternanthera philoxeroide*)

Alligator weed occurs in several off park locations on the North Coast, including one infestation in close proximity to Bongil Bongil National Park near Sawtell. Alligator weed is a WoNS and a class II weed in Northern Rivers Region.

Alligator weed produces masses of creeping and layering stems over land and water. It is an aggressive invader that responds to high nutrient levels and is a major threat to wetlands, rivers and irrigation systems. New plants regenerate readily from plant fragments which facilitate rapid spread and increase the difficulty of control. Control techniques include physical removal of plant biomass followed by treatment with metsulfuron-methyl (terrestrial growing plants) and glyphosate (aquatic growing plants).

Sagittaria (*Sagittaria platyphylla*)

Sagittaria is WoNS. Off-park infestations are found in the Mann and Orara catchments near Grafton and it is highly likely there are further infestations on the North Coast.

Sagittaria is a perennial aquatic plant which grows to about 1.2 m high with tubers commonly formed. It is spread by seed, rhizomes, tubers and floating entire plants. It has been grown as an ornamental and this has aided spread. It is now widespread and common in southern Australia and around Sydney, Newcastle and south-east Queensland. It is found in irrigation supply channels, drains, shallow creeks and wetlands. It is shade tolerant and forms dense patches, obstructing water flow and producing luxuriant growth in enriched conditions. It competes vigorously with native waterplants.

Water lettuce (*Pistia stratiotes*)

Water lettuce is a Class 1 noxious weed throughout NSW. While water lettuce is not established in NSW, there have been outbreaks in northern NSW. It has been recently recorded in the Clarence Valley at several sites - these infestations were removed and eradicated. No known infestations are known to occur on parks in North Coast Region.

Under favourable conditions, water lettuce will produce abundant growth, expand rapidly and form obstructive mats. These large dense floating mats can have negative impacts on native aquatic plants and animals. They can also interfere with irrigation, boating and water sport activities and harbour disease-causing mosquitoes.

Water lettuce is dispersed as broken pieces, buoyant seedlings or whole plants. Seeds can float downstream, providing a seed reserve in uninfested areas and also create ongoing problems in infested areas.

Tropical soda apple (*Solanum viarum*)

Tropical soda apple is an aggressive, prickly, perennial shrub 1–2 m high. It invades open to semi-shaded areas including pastures, forests, riparian zones, roadsides, recreational areas, horticulture and cropping areas. It reduces biodiversity by displacing native plants and disrupting ecological processes.

Tropical soda apple is a Class 3 weed within North Coast Region. It was first identified in Australia in the upper Macleay Valley in NSW in August 2010; however, it is believed to have been present in this area for a number of years. Subsequent

surveys found infestations at Wingham, Grafton, Bellingen, Coffs Harbour, Bonalbo, Casino and Wauchope. The smaller infestations have been eradicated and the larger infestations are subject to active control programs. There is only one known infestation of tropical soda apple in North Coast Region with two plants found in 2011 near Hickey Creek in New England National Park. Further searches are planned for this area.

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