



Regional Pest Management Strategy 2012–17: Far South Coast Region

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

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ISBN 978 1 74293 624 6
OEH 2012/0373
August 2013

This plan may be cited as:

OEH 2012, *Regional Pest Management Strategy 2012–17, Far South Coast Region: a new approach for reducing impacts on native species and park neighbours*, Office of Environment and Heritage, Sydney.

Cover photos, main: view south along coastline (M Van Ewijk/OEH); small: arum lilies in Nadgee Nature Reserve (L Evans/OEH); feral cat in Wadbilliga National Park (M Davis); sea sponge in Ben Boyd National Park (L Evans/OEH); female dingo (E Etie/OEH).

Summary

Pests are among the greatest threats to biodiversity throughout Australia, and in NSW they have been identified as a major threat to 70% of species, populations and communities listed under the *Threatened Species Conservation Act 1995*. Therefore, minimising the impact pests have on biodiversity, as well as on neighbouring agricultural enterprises, remains two of the main objectives in Far South Coast Region.

We are very fortunate in this Region to possess some of the most pristine coastal areas in south-eastern Australia that, up until now, have largely escaped many of the population pressures currently impacting other NSW coastal regions. These pressures inevitably bring a host of concerns, including the ever increasing problems posed by pests and weeds. We have prioritised our programs according to the criteria listed in this strategy, focusing resources where we can have the most effective, long lasting results. Our critical priority programs are programs which target pest species that:

- impact upon threatened species, populations or communities
- are associated with health and disease risks
- impact upon economic enterprises.

The Region is a major stakeholder in many successful pest programs in the south-east. Working cooperatively with landholders, agencies and other stakeholders, and using a landscape approach to managing pests, is essential in gaining effective results. Listed below are examples of successful programs undertaken in recent years.

Threatened species management: The Region has many rare or threatened species that inhabit many of our coastal and escarpment ecosystems. One successful program is our threatened shorebird program that aims to protect species including little terns, hooded plovers and pied oystercatchers from fox predation. Sustained fox control, utilising a number of control techniques over many years, has assisted to increase the fledgling success of little terns while maintaining the fledgling success of hooded plovers and pied oystercatchers.

Wild dog control: Efforts to reduce the impacts of wild dogs in the south-east has been a major focus over the last 12 years. All National Parks and Wildlife Service managed estate is now covered by cooperative wild dog management plans that have been successful in two major areas: firstly, reducing wild dog impacts to neighbouring agricultural enterprises, and secondly, bringing together all stakeholders in order to address the social components to wild dog management.

Weed control: Sea spurge is a coastal weed native to Europe that has taken over many beach areas in southern Australia. The Region has had an active program in place for close to 10 years that has seen the infestations reduced dramatically. An example is Jane Spiers Beach in Nadgee Nature Reserve that had 25,000 plants hand pulled and then airlifted off the beach in 2001. In the most recent survey of this beach in March 2011, only 198 plants were removed.

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Abbreviations

BPWW	Biodiversity Priorities for Widespread Weeds (BPWW CC1-6 refers to control categories within BPWW Statewide Framework ¹)
CMA	catchment management authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
KTP	key threatening process
LHPA	Livestock Health and Pest Authority
NP	National park
NPWS	NSW National Parks and Wildlife Service
NR	Nature reserve
OEH	Office of Environment and Heritage
POM	Plan of Management
PWIS	Pest and Weed Information System
RLP Act	Rural Lands Protection Act 1998
SCA	State conservation area
SEPP	State environmental planning policy
TAP	Threat Abatement Plan
TSC Act	<i>Threatened Species Conservation Act 1995</i>
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 Far South 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

Far South Coast Region covers approximately 17,223 km² of the southern and south-east forest areas of NSW stretching between Batemans Bay in the north to the Victorian border in the south. The Region extends inland to include the southern escarpment and parts of the Southern Tablelands including the major towns of Bombala and Braidwood (see Regional map).

Regional context

The reserve system within the Region covers 505,056 ha and includes 15 national parks, 22 nature reserves, seven state conservation areas and one historic site. The reserve system protects a spectacular diversity of eucalypt forest types, including remnant old growth and rare forest communities, as well as a host of threatened, vulnerable and endemic plant and animal species and critical habitat. A string of coastal reserves protects large areas of coastal woodland and heath communities and important wildlife breeding grounds. The Region contains eight wilderness areas totalling over 157,000 ha, including Nadgee NR, one of only two coastal wilderness areas in NSW. Over 100 Voluntary Conservation Agreements have been established throughout the Region with private landholders seeking to protect priority conservation values on private lands which are under represented in the public reserve system.

The Region covers five local government areas, two state and one federal electorate and ten local Aboriginal Land Councils. The NPWS regional structure comprises four geographic management units including the Northern, Central, Merimbula and Bombala Areas, each with staffing and infrastructure located at office and workshop centres throughout the Region to provide support and direct access to staff for the local communities. A Regional Operation Coordination and Support Unit complements on-ground operations in the four areas. The unit provides strategic planning and reporting, administrative and technical support, as well as managing off-park programs, including pest species management coordination.

Historic heritage sites provide glimpses of early European settlement and previous land use are scattered throughout the Region, represented by the Green Cape and Montague Island Light Stations, Davidson Whaling Station and the Moruya Pilot Station. The Region is also rich in Aboriginal heritage with a wealth of sites illustrating examples of occupation dating back many thousands of years and complementing a vibrant contemporary Aboriginal culture. The hand back of Biamanga and Gulaga national parks in May 2006 and the management of Aboriginal cultural heritage across the landscape present ongoing challenges for regional management.

Park management

The number of regional pest control programs has increased over the past 10 years targeting a range of pest species. The Region has worked with neighbours and other agencies to increase the number of collaborative programs, implementing control programs that protect threatened species and increase the involvement of community, landcare and catchment groups in coastal reserves.

The critical priority pest programs in the Region are focused to either protect threatened species, populations and communities declared under the NSW *Threatened Species Conservation Act 1995* (TSC Act), or to target pests that

significantly impact upon the viability of neighbouring economic enterprises. Examples of critical priority programs include:

- reducing the impact of foxes on populations of threatened shorebird species
- minimising the impact wild dogs on neighbouring economic enterprises
- reducing the impacts of weeds in endangered ecological communities (EECs), or where they impact upon threatened species
- reducing the impact of foxes on populations of southern brown bandicoots and long-nosed potoroos.

OEH and Sydney Catchment Authority jointly sponsor the management of the Special Areas through the Special Areas Strategic Plan of Management, through which they aim to provide high quality water in reservoirs by protecting the ecological integrity and natural and cultural values of the Special Areas. Pest species management within the Special Areas aims to protect and optimise water quality in the storages and conserve ecosystem integrity and natural and cultural values by reducing and minimising the impact of pest species on water quality and addressing the critical threats to ecological integrity and conservation values. As joint manager of the Special Areas, Sydney Catchment Authority is both a major adjacent landholder and key stakeholder with similar values in environment protection. Under the Joint Management Arrangements for the Special Areas, the Executive Steering Group (ESG) and the Special Areas Operations Group (SAOG) provide opportunities for OEH and Sydney Catchment Authority to discuss, coordinate and cooperatively implement pest species management programs across land tenures within the Special Areas.

Community engagement

Effective community engagement has real benefits for both the government and the community alike through access to new ideas, sharing of skills, experiences and knowledge, and consequently developing a clearer understanding of each other's priorities, needs and expectations. The Region undertakes consultation when planning or undertaking works for a number of pest species and is committed to working with all relevant stakeholders to promote and increase the number of pest programs in and around national park reserves.

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

Pest management highlights within the FSC region include:

- Ongoing involvement in the three cooperative wild dog management plan areas that cover the entire FSC region. These plan areas involve both government agencies and private landholders to coordinate programs on a nil tenure basis

across the landscape. The programs on park utilise best practice techniques and are implemented in conjunction with South East LHPA contractors that undertake almost all wild dog control within parks.

- Control programs for foxes are undertaken in the coastal and escarpment reserves to reduce the impact of fox predation on several threatened species such as the little tern, hooded plover, pied oystercatcher, southern brown bandicoot, long-footed potoroo and smoky mouse. These programs implement actions from the Fox Threat Abatement Plan (TAP) and recovery plans for the above listed species. Rangers from South East LHPA carry out the majority of baiting and trapping in areas adjacent to shorebird breeding sites.
- Bitou bush control programs are a high priority for FSC Region, and a range of programs have been undertaken in several coastal reserves. A major portion of this work has been undertaken in Eurobodalla NP where a combination of control measures, including aerial spraying, ground spraying, hand pulling and biological control agent releases, have been employed. Experimental burns have also been conducted to determine if fire is a viable tool to control bitou bush. Many programs are undertaken in cooperation with surrounding landholders and community groups. The Region is now well south of the National Bitou Bush Containment Line, therefore all programs are aimed at eradicating this species.
- Long-term kikuyu control on Montague Island NR has resulted in a significant restoration of nesting habitat for a range of sea birds and the iconic little penguin. A mixture of control methods and a successful revegetation program with endemic native species has greatly reduced the risk of birds being displaced or dying from kikuyu-related issues.



3 Regional prioritisation

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

Critical priority

C-TSC (Threatened Species Conservation)

Programs targeting pests which are, or are likely to be, significantly impacting on threatened species, populations or communities. These include the highest priorities identified in the threat abatement plans (TAPs), Priorities Action Statements (PAS) and Biodiversity Priorities for Widespread Weeds (BPWW). For example, undertake fox control in Mimosa National Park for protection of threatened shorebird species as identified in the Fox TAP.

C-HD (Health and Disease)

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

C-EC (Economic)

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

C-NE (New and Emerging)

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

High priority

H-IH (International Heritage)

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

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; 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).

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	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Bombala	South East Forests NP	2432 – <i>E. parvula</i> site – New line road	Blackberry, sweet briar, nodding thistle	<i>E. parvula</i> (EPBC-e), Montane peatlands and swamp, Natural temperate grasslands, Snowgum grassy woodlands EECs (BPWW – CC1)	Asset protection	Spray, hand pull	C-TSC
Bombala	South East Forests NP	2445 – Genoa river	Blue periwinkle, willows, blackberry, soapwort	Genoa wilderness values, key threatening process to long-nosed potoroo (BPWW – CC1)	Asset protection	Spraying, cut and paint, felling	C-TSC
Bombala	Bondi Gulf NR	Bondi Gulf	Feral cats	Olive whistler, Eastern pygmy possum	Asset protection	Trapping, opportunistic shooting	C-TSC
Bombala	South East Forests NP	South East Forests	Feral cats	Long-footed potoroo, white-footed dunnart, southern brown bandicoot, olive whistler, scarlet, flame and pink robins, long-nosed potoroo	Asset protection	Trapping, opportunistic shooting, mound baiting, M44 ejectors	C-TSC
Bombala	South East Forests NP	Genoa	Feral cats	Southern brown bandicoot	Asset protection	Trapping, opportunistic shooting	C-TSC

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Bombala	Coolumbooka NR	Coolumbooka	Feral deer	Browsing, soil compaction and erosion issues to riparian vegetation corridors, casuarina nana community, Tablelands Frost Hollow Grassy Woodland, Natural Temperate Grasslands of Southern Tablelands EECs.	Asset protection	Shooting	C-TSC
Bombala	South East Forests NP	Tantawanglo	Feral deer	Montane peatlands and swamp, Natural temperate grasslands, Snowgum grassy woodlands EECs	Asset protection	Shooting	C-TSC
Bombala	Coolumbooka NR	Coolumbooka	Feral pigs	Riparian vegetation corridors, casuarina nana community, Tablelands Frost hollow Grassy Woodland, Natural Temperate Grasslands of Southern tablelands EECs.	Asset protection	Trapping, baiting, shooting	C-TSC
Bombala	South East Forests NP	South East Forests	Feral pigs	Montane peatlands and swamp, Natural temperate grasslands, Snowgum grassy woodlands EECs, Long footed potoroo	Asset Protection	Trapping, baiting, shooting	C-TSC

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Bombala	South East Forests NP	South East Site Plan	Foxes	Long-footed potoroo, Southern brown bandicoot	Asset protection	Mound bait, trapping, M44 ejectors, shooting	C-TSC
Bombala	South East Forests NP	2515 – Nunnock Swamp	Nodding thistle, blackberry, sweet briar	Montane peatlands and swamp, Natural temperate grasslands, Snowgum grassy woodlands EECs (BPWW – CC2)	Asset Protection	Spray, mechanical removal, hand pull	C-TSC
Bombala	South East Forests NP	Tantawangalo	Phytophthora	Montane Peatlands and Swamp, Natural Temperate Grasslands, Snowgum Grassy Woodlands EECs	Asset protection	Monitor	C-TSC
Bombala	South East Forests NP	2444 – Genoa	Pine wildlings, fireweed, St John's wort, Patterson's curse	Native vegetation and floristic structure, Genoa wilderness values, habitat in potoroo management zone. (BPWW – CC2)	Asset protection	Felling	C-TSC
Bombala	South East Forests NP	2623 – Coolangubra – Dry Rainforest	Prickly pear	Dry Rainforest EEC, native vegetation communities, neighbouring properties. (BPWW – CC2)	Asset protection	Spray, stem injection, fruit collection	C-TSC
Bombala	South East Forests NP	Nunnock Swamp/Mountain Top	Rabbits	Montane peatlands and swamp, Natural temperate grasslands, Snowgum grassy woodlands EECs	Asset protection	Shooting, baiting, trapping	C-TSC

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Bombala	Ironmungy NR	2464 – Ironmungy NR	Serrated tussock	Box Gum Woodland EEC (BPWW – CC3)	Asset protection	Foliar spray	C-TSC
Central	Wadbilliga NP	Escarpment areas	Feral pigs	River-Flat Eucalypt Forest EEC (TSC-e), riparian vegetation	Asset protection	Trapping, baiting, shooting	C-TSC
Central	Gulaga NP	Gulaga	Foxes	Long-nosed potoroo, hooded plovers, pied oyster-catcher, little tern	Asset protection	Baiting, trapping, shooting, fumigation	C-TSC
Central	Gulaga NP, Eurobodalla NP	Tilba/Wallaga	Foxes	Long-nosed potoroo, hooded plovers, pied oyster-catcher, little tern	Asset protection	Baiting, trapping, shooting, fumigation	C-TSC
Central	Mimosa Rocks NP	Tathra/Mimosa	Foxes	Long-nosed Potoroo, Hooded plovers, pied oyster-catcher, little tern	Asset protection	Baiting, trapping, shooting, fumigation	C-TSC
Central	Montague Island NR	2493 – Montague Island NR	Kikuyu	Nesting seabird communities (BPWW – CC3)	Asset Protection	Spray, revegetate, burning	C-TSC
Central	Gulaga NP	2435 – lower slopes Gulaga Mtn	Lantana	<i>Warty ziera</i> (BPWW – CC3)	Asset protection	Spray	C-TSC
Central	Wadbilliga NP	2385 – Brogo catchment	Willows	Riparian vegetation – River-Flat Eucalypt Forest EEC (TSC-e); recently declared a wild river part of the Brogo Wilderness (BPWW-CC1)	Asset protection	Cut and paint, felling	C-TSC
Merimbula	Bell Bird Creek NR	2367 – Bell Bird Creek	Crofton weed	Coastal Rainforest (BPWW – CC1)	Asset protection	Spray	C-TSC
Merimbula	South East Forests NP	Yowaka	Feral cats	Smokey mouse	Asset protection	Trapping and shooting programs	C-TSC

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Merimbula	Bournda NP	Wallagoot Lake	Foxes	Hooded plovers, little terns, pied oyster-catchers	Asset protection	Baiting, trapping, shooting, fumigation	C-TSC
Merimbula	Nadgee NR	Nadgee	Foxes	Potoroos, shorebirds	Asset protection	Monitoring, nil treatment	C-TSC
Merimbula	Ben Boyd NP, Nadgee NR, Mount Imlay NP, South East Forests NP and Egan Peaks NR	South East Forests	Foxes, feral cats	Long-nosed potoroo, southern brown bandicoot, pied oyster-catchers, little terns, hooded plovers, green and golden bell frog	Asset protection	Baiting, trapping, shooting, fumigation, monitoring	C-TSC
Merimbula	My Imlay NP	Imlay Summit	Phytophthora	<i>Eucalyptus imlayensis</i>	Asset protection	Monitor, and spray	C-TSC
Merimbula	South East Forests NP	Yowaka	Phytophthora	Smokey mouse habitat	Asset protection	Monitor, and spray	C-TSC
North	Eurobodalla NP	2531 – Potato Point and Sth Tuross	Arum lily, prickly pear	Littoral Rainforest, Bangalay Sand forest, Swamp Oak Floodplain EECs, <i>Correa baeuerlenii</i> (TSC-v), (BPWW – CC1)	Asset protection	Spray, hand pull	C-TSC
North	Broulee Island NR	2386 – Broulee Island	Asparagus fern, bridal creeper, blackberry, star thistle, African olive	Littoral Rainforest (EPBC-ce; TSC-e), Bangalay Sand forest EECs (TSC-e) (BPWW – CC1)	Asset protection	Spraying, digging, cut and paint, biological control	C-TSC
North	Eurobodalla NP	2504 – Nargal Lake	Blackberry, mother-of-millions, moth vine, arum lily	Littoral Rainforest, Bangalay Sand forest (TSC-e), Swamp Oak Floodplain EECs (TSC-e) (BPWW - CC1)	Asset protection	Spraying	C-TSC

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
North	Majors Creek SCA	2485 – Majors Creek	English broom, blackberry	Lowland Grassy Woodland EEC (TSC-e), riparian vegetation – eucalypt and casuarina, <i>E.kartzoifiana</i> (EPBC-v, TSC-v), (BPWW – CC2)	Asset protection	Spraying	C-TSC
North	Deua NP	Upper Shoalhaven	Feral pigs	Tableland Swamp Meadow EEC, riparian vegetation and water quality along rivers and streams	Asset protection	Baiting, trapping, shooting	C-TSC
North	Deua NP	Lower Deua River	Feral pigs	Lowland Grassy Woodland EEC, riparian vegetation	Asset protection	Baiting, trapping, shooting	C-TSC
North	Deua NP	Bendethera	Feral pigs	Lowland Grassy Woodland EEC, riparian vegetation	Asset protection	Trapping, baiting, shooting	C-TSC
North	Deua NP	Alpine Canoolie	Feral pigs	Riparian vegetation and water quality along rivers and streams	Asset protection	Baiting, trapping, shooting	C-TSC
North	Eurobodalla NP	2380 – Bingi/Meringo and Kelly's Beach	Fireweed, asparagus fern, bridal creeper	Swamp Oak Floodplain Forest, Themeda Grasslands on Headlands; Littoral Rainforest, Lowland Grassy Woodland EECs (BPWW – CC1)	Asset protection	Spray, hand pull	C-TSC
North	Eurobodalla NP	Tilba/Wallaga	Foxes	Hooded plovers, pied oyster-catchers, long-nosed potoroo	Asset protection	Baiting, trapping, shooting	C-TSC

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
North	Eurobodalla NP	Tuross – Brou	Foxes, feral cats	Little terns, Hooded plovers, Pied oystercatchers	Asset protection	Baiting, trapping, shooting, fumigation	C-TSC
North	Tallaganda NP	Montane peatlands and swamps	Feral goats	Montane Peatlands and Swamps EEC	Asset protection	Monitoring, aerial shooting	C-TSC
North	Araluen NR	Araluen	Feral goats	Lowland Grassy Woodland EEC (TSC-e)	Asset protection	Ground shooting, Judas Goat	C-TSC
North	Tallaganda NP	Montane Peatlands and Swamps	Feral pigs	Montane Peatlands and Swamps EEC	Asset protection	Monitoring, ground baiting	C-TSC
North	Tallaganda NP	1214 – Montane Peatlands and Swamps	Thistle	Montane Peatlands and Swamps EEC (BPWW – CC1)	Asset protection	Foliar spray	C-TSC
North and Central	Eurobodalla NP	Narooma	Foxes	Hooded plovers, pied oyster-catchers	Asset protection	Baiting, trapping, shooting	C-TSC
Bombala	South East Forests NP	Nunnock Swamp	Fireweed	Neighbouring pasture	Asset protection	Hand pulling	C-EC
Bombala	South East Forests NP	Coolangubra	Fireweed	Neighbouring pasture	Asset protection	Hand pull, spray	C-EC
Bombala	Dangelong NR	Wadbilliga Cooperative Wild Dog and Fox Control Plan 2003–04	Wild dogs, foxes	Neighbouring livestock	Asset protection	Ground baiting, trapping, M44	C-EC
Bombala	Kybeyan SCA	Wadbilliga Cooperative Wild Dog and Fox Control Plan 2003–04	Wild dogs, foxes	Neighbouring livestock	Asset protection	Ground baiting, trapping, M44	C-EC
Bombala	Merriangaah NR	Cooperative Wild Dog/Fox Plan Corrowong/Tombong/Merriangaah Areas	Wild dogs, foxes	Neighbouring livestock	Asset protection	Aerial baiting, ground baiting, trapping, monitoring	C-EC
Bombala	Quidong NR	Cooperative Wild Dog/ Fox Plan Corrowong/Tombong/Merriangaah Areas	Wild dogs, foxes	Neighbouring livestock	Asset protection	Aerial baiting, ground baiting, trapping	C-EC
Bombala	Bondi Gulf NR	Bombala/South Coast WDP	Wild dogs ,foxes	Neighbouring livestock	Asset protection	Mound bait, trapping, M44 ejectors, shooting	C-EC

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Bombala	Coolumbooka NR	Bombala/Far South Coast WDP	Wild dogs, foxes	Neighbouring livestock	Asset protection	Mound bait, trapping, M44 ejectors, shooting	C-EC
Bombala	South East Forests NP	Bombala/Far South Coast WDP	Wild dogs, foxes	Neighbouring livestock	Asset protection	Mound bait, trapping, M44 ejectors, shooting	C-EC
Central	Mimosa Rocks NP	Wadbilliga WDP	Wild dogs, foxes	Neighbouring livestock	Asset Protection	Baiting, trapping, shooting, fumigation	C-EC
Central	Wadbilliga NP	Wadbilliga Wild dog plan area	Wild dogs, foxes	Neighbouring livestock	Asset protection	Mound bait, trapping, M44 ejectors, shooting	C-EC
Merimbula	South East Forests NP	Bombala/far south Coast WDP	Wild dogs, foxes	Neighbouring livestock	Asset protection	Baiting, trapping and shooting programs	C-EC
North	Araluen NR	Braidwood/South Coast WDP	Wild dogs, foxes	Neighbouring livestock	Asset protection	Trapping, baiting as required	C-EC
North	Deua NP	Central Far South Coast/East Monaro WDP	Wild dogs, foxes	Neighbouring livestock	Asset protection	Baiting, trapping, shooting, fumigation	C-EC
North	Deua NP	Braidwood/South Coast WDP	Wild dogs, foxes	Neighbouring livestock	Asset protection	Baiting, trapping, shooting, fumigation	C-EC
North	Majors Creek SCA	Braidwood/South coast WDP	Wild dogs, foxes	Neighbouring livestock	Asset protection	Baiting, trapping, shooting, fumigation as required	C-EC
North	Monga SCA	Braidwood/South Coast WDP	Wild dogs, foxes	Neighbouring livestock	Asset protection	Baiting, trapping, shooting	C-EC
North	Nadgigomar NR	Braidwood/South coast WDP	Wild dogs, foxes	Neighbouring livestock	Asset protection	Baiting, trapping, shooting, fumigation	C-EC
Bombala	South East Forests NP	Nunnock Swamp	Phytophthora		Containment	Spray	C-NE
Central	Gulaga NP	Snake island	Bitou bush		Eradication	Spray	C-NE
Central	Mimosa Rocks NP	Mimosa	Bitou bush		Eradication	Spray, hand pull	C-NE

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Central	Mimosa Rocks NP	Bithry	<i>Juncus acutus</i>		Eradication	Spray, manual removal	C-NE
Central	Kooraban NP	Kooraban	Lantana		Containment	Spray	C-NE
Central	Biamanga NP	All reserve	Sea spurge		Containment	Hand pull, Spray	C-NE
Central	Mimosa Rocks NP	Goalon Head	Sea spurge		Containment	Hand pull, spray	C-NE
Central	Mimosa Rocks NP	Beach areas	Sea spurge		Containment	Spray, hand pull	C-NE
Merimbula	Ben Boyd NP	Greencape	Arum lily		Containment	Spray, stem injection, hand digging	C-NE
Merimbula	Ben Boyd NP	Behind Pambula caravan park	Bitou bush		Eradication	Spray, hand pull	C-NE
Merimbula	Bournda NP	2473 – Kianniny	Bitou bush		Eradication	Spray	C-NE
Merimbula	Ben Boyd NP	North Leatherjacket Bay	Blue hound's tongue		Eradication	Spray	C-NE
Merimbula	Mount Imlay NP	Towamba	Feral deer		Containment	Shooting	C-NE
Merimbula	South East Forests NP	Mitchells Creek Area	Feral deer		Containment	Shooting	C-NE
Merimbula	Bournda NP	2414 – coastal strip	Sea spurge		Containment	Hand pull, spray	C-NE
Merimbula	Ben Boyd NP	2412 – Beaches	Sea spurge, beach daisy		Eradication	Hand pull	C-NE
Merimbula	Nadgee NR	2413 – Coastal strip	Sea spurge, beach daisy		Containment	Physical control	C-NE
Merimbula	Ben Boyd NP	Pambula Lands – electricity easement along Arthur Kane Drive	Spanish heath		Eradication	Hand pull	C-NE
North	Broulee Island NR	Broulee Island	Bitou bush		Eradication	Spraying, hand pulling, cut and paint	C-NE
North	Eurobodalla NP	Eurobodalla	Bitou bush		Containment	Spray, hand pull, aerial spray	C-NE

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
North	Illawong NR	Illawong bitou	Bitou bush		Eradication	Spray, hand pull	C-NE
North	Eurobodalla NP	Eurobodalla	Lantana		Containment	Spray, hand pull, aerial spray	C-NE
North	Broulee Island NR	Broulee Island	Sea spurge		Containment		C-NE
North	Eurobodalla NP	All beach areas	Sea spurge		Containment	Hand pulling	C-NE
North	Eurobodalla NP	Eurobodalla	Winter senna		Containment	Cut and paint, spraying	C-NE
Merimbula	Nadgee NR	Nadgee	Arum lily, Coastal morning glory	World Biosphere Reserve	Asset protection	Physical control, cut and paint	H-IH
Merimbula	Davidson Whaling Station HS	Historic precinct	Arum lily, <i>leonotis leonurus</i> (lion's ear), stinking roger, various bulbs	Whaling station historic gardens	Asset protection	Hand-pull weeds, shooting plan for deer	H-CH
Merimbula	Davidson Whaling Station HS	Historic precinct	Feral deer	Whaling station historic gardens	Asset protection	Shooting and possible fencing and trapping	H-CH
Merimbula	Davidson, Whaling Station HS	Historic precinct	Rabbits		Containment	Baiting	H-CH
Bombala	South East Forests NP	Coolangubra	European wasps		Containment	Bait stations	M-RA
Bombala	Bondi Gulf NR	Bondi Gulf	Feral deer		Containment	Shooting	M-CP
Bombala	South East Forests NP	South East Forests	Feral deer		Containment	Shooting	M-CP
Bombala	South East Forests NP	Tantawangalo	Feral goats	Browsing and trampling of native vegetation	Asset protection	Ground shooting, Judas programs	M-CP
Bombala	Bondi Gulf NR	Bondi Gulf	Feral pigs		Containment	Trapping, baiting, shooting	M-CP

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Bombala	South East Forests NP	Coolangubra	Feral pigs	Trampling and disturbance to soils and native vegetation	Asset protection	Trapping, baiting, shooting	M-CP
Bombala	South East Forests NP	Waalimma	Fireweed, St John;s wort, blackberry, willow		Containment	Hand pull, spray	M-CP
Bombala	Bondi Gulf NR	Bondi Gulf	Fireweed, St John;s wort, pine wildlings		Containment	Hand pulling, spray, felling	M-CP
Bombala	Ironmungy NR	Ironmungy NR	Foxes	Neighbours' Sheep	Asset protection	Ground baiting	M-CP
Bombala	Dangelong NR	Dangelong NR	Feral pigs	Neighbours' agriculture	Asset protection	Trapping, ground shooting, ground baiting	M-CP
Bombala	Kybeyan SCA	Kybeyan SCA	Feral pigs	Neighbours	Asset protection	Trapping, ground shooting, ground baiting	M-CP
Bombala	Dangelong NR	Dangelong NR	Serrated tussock		Containment	Foliar spray	M-CP
Bombala	South East Forests NP	Coolangubra	Serrated tussock		Containment	Spray	M-CP
Bombala	Quidong NR	Quidong NR	Willows		Containment	Cut and paint, foliar spray, physical/mechanical control	M-CP
Bombala	Bondi Gulf NR	Bondi Gulf riparian corridors	Willows, blackberry	Riparian vegetation corridors, e.g. Genoa River	Asset Protection	Spraying, felling	M-CP

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Bombala	Coolumbooka NR	2420 – Coolumbooka River	Willows, blackberry, pine wildlings	Riparian vegetation corridors, casuarina nana community, Tablelands Frost hollow Grassy Woodland, Natural Temperate Grasslands of Southern Tablelands EECs. (BPWW – CC3)	Asset protection	Felling, spraying	M-CP
Central	Wadbilliga NP	Wadbilliga	Blackberry		Containment	Spray	M-CP
Central	Bermagui NR	Interface with neighbours	Blackberry, dolichos pea, South African daisy		Containment	Spray, hand pull	M-CP
Central	Biamanga NP	Interface with neighbours	Blackberry, fireweed		Containment	Spray	M-CP
Central	Gulaga NP	2547 – Snake island	Bridal creeper, blackberry		Containment	Spray, biological control	M-CP
Central	Wadbilliga NP	All reserves	Feral deer		Containment	Shooting	M-CP
Central	Mimosa Rocks NP	All reserves	Rabbits		Containment	Baiting	M-CP
Merimbula	South East Forests NP – Yurammie section	Power-line easements eastern end of section	African love grass, fire-weed		Containment	Foliar spray	M-CP
Merimbula	Ben Boyd NP	Pambula	Asparagus fern, bridle creeper, African lovegrass		Containment	Spray, biological control	M-CP
Merimbula	Mount Imlay NP	Towamba River	Blue hound's tongue		Containment	Foliar spray	M-CP
Merimbula	Ben Boyd NP	All reserves	Feral deer		Containment	Shooting	M-CP
Merimbula	Mount Imlay NP	Towamba River	Feral deer	.	Containment	Shooting	M-CP

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Merimbula	Bournda NP	All reserves	Fireweed		Containment	Hand pull	M-CP
Merimbula	Bournda NP	Bournda	Rabbits		Containment	Baiting, fumigation	M-CP
North	Illawong NR	2460 – Illawong NR	Asparagus fern, bridal creeper	SEPP wetlands, yellow bellied glider habitat (BPWW – CC4)	Asset protection	Spray, digging	M-CP
North	Eurobodalla NP	biological control	Bridal creeper		Containment	Biological control, spraying	M-CP
North	Majors creek SCA	Majors creek	Feral goats		Containment	Shooting	M-CP
North	Nadgigomar NR	Nadgigomar	Feral goats	Under-represented forest types, tablelands woodland forest – many different alliances	Asset protection	Aerial shooting	M-CP
North	Monga SCA	Monga	Feral pigs		Containment	Trapping, shooting, baiting	M-CP
North	Nadgigomar NR	Nadgigomar	Feral pigs	Under-represented forest types, tablelands woodland forest – many different alliances, particularly along riparian areas	Asset protection	Trapping, shooting, baiting	M-CP
North	Tallaganda NP	Tallaganda NP	Feral pigs	Neighbours	Asset protection	Trapping	M-CP
North	Berlang SCA	Berlang	Feral pigs, feral goats		Containment	Trapping, shooting, baiting	M-CP
North	Eurobodalla NP	Eurobodalla	Rabbits	Beach strand grassland community, Congo campground	Asset protection	Pindone baiting, Shooting	M-CP

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
North	Araluen NR	2362 – Araluen	Serrated tussock, African love grass, tree of heaven, thistle, prickly pear, bridal creeper		Containment	Spray, biological control	M-CP
North	Monga SCA	Monga	Serrated tussock, blackberry		Containment	Spray	M-CP
North	Deua NP	2372 – Bendethera	Serrated tussock, blackberry, St John's wort, Patterson's curse, thistles, fruit trees		Containment	Spray, digging	M-CP
North	Deua NP	2360 – Alpine Canoolie	Serrated tussock, blackberry, tree of heaven		Containment	Spray, cut and paint	M-CP
North	Deua NP	2545 – Upper Shoalhaven	Serrated tussock, English broom, blackberry, thistles		Containment	Spray	M-CP
North	Deua NP	2481 – Lower Deua River	Tree of heaven, blackberry, Patterson's curse, privet, willows, Madeira vine, prickly pear		Containment	Spray, cut and paint, biological control	M-CP
North	Monga NP	Monga NP	Willows, blackberry, tree of heaven, English broom		Containment	Spray, cut and paint	M-CP
Bombala	Dangelong NR	Dangelong NR	Feral goats		Containment	Ground shooting	M-II
Bombala	Kybeyan SCA	Kybeyan SCA	Feral goats		Containment	Ground shooting	M-II
Bombala	Quidong NR	Quidong NR	Feral goats, feral deer		Containment	Aerial shooting, ground shooting	M-II

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Bombala	Merriangaah NR	Merriangaah NR	Feral goats, feral deer, feral pigs		Containment	Aerial shooting, ground shooting	M-II
Bombala	Ironmungy NR	Ironmungy NR	Feral goats		Containment	Ground shooting	M-II
Bombala	Merriangaah NR	Serrated Tussock	Serrated tussock		Containment	Foliar spray	M-II
Bombala	Kybeyan SCA – Dangelong NR	Kybeyan SCA and Dangelong NR – general	St John's wort, serrated tussock		Containment	Foliar spray	M-II
Bombala	Meringo NR	Meringo NR	St John's wort, serrated tussock		Containment	Foliar spray	M-II
Bombala	South East Forests NP	Tantawangalo	Tree of heaven, blue periwinkle, fireweed		Containment	Spray, hand pull	M-II
Bombala	Kybeyan SCA – Dangelong NR	Miralles boundary	Viper's bugloss		Containment	Foliar spray, physical/mechanical control	M-II
Bombala	South East Forests NP	2569 – Towamba River	Willow, blackberry, blue periwinkle		Containment	Spray, cut and paint	M-II
Bombala	South East Forests NP	2580 – Wog River	Willow, blackberry, blue periwinkle		Containment	Spray, cut and paint	M-II
Central	Mimosa Rocks NP	Hidden Valley	Arum lily		Containment	Spray, hand-pull	M-II
Central	South East Forests NP	Brown Mountain	Crofton weed		Eradication	Spray, hand pull	M-II
Central	Mimosa Rocks NP	Fords headland	Red hot poker, pines, arum lily, South African daisy		Containment	Spray, hand-pull	M-II
Central	Mimosa Rocks NP	2446 – Goalon Head	African box-thorn, blackberry, maram grass, African lovegrass, cacti, fireweed		Containment	Spray, cut and paint	M-II

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Merimbula	Ben Boyd NP	Mowarry point	Agar, blackberry, thistles		Containment	Spray	M-II
Merimbula	Ben Boyd NP	2452 – Haycock Point and Severs Beach area	Arum lily, bridal creeper, thistle, pines		Containment	Spray, cut and paint, physical removal	M-II
Merimbula	Bournda NP	Bournda	Beach daisy, polygala, tree of heaven, cassinia, thistles, agaves		Containment	Hand pull, spray	M-II
Merimbula	Ben Boyd NP	North Leatherjacket Bay	Crofton weed		Containment	Spray	M-II
Merimbula	South East Forests NP – Yurammie section	Myrtle Mt. fire trail northern edge of section	Crofton weed		Containment	Hand pull	M-II
Merimbula	Nadgee NR	2501 – Nadgee River Flat	Dolichos pea, small-leaf privet, moth vine, cordyline, pampas grass, blackberry, thistles, yuccas		Containment	Foliar spray, cut and paint, physical removal, stem injection	M-II
Merimbula	Bournda NR	Merimbula Tip	Polygala, cobblers peg		Containment	Spray	M-II
Merimbula	Ben Boyd NP	Pambula River	South African daisy, <i>Crassula multicava</i> , bridle creeper, asparagus fern, polygala, fishbone fern, cotoneaster		Containment	Foliar spray, cut and paint, physical removal,	M-II

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Merimbula	Ben Boyd NP	Behind Pambula caravan park	South African daisy, polygala, asparagus fern, whisky grass, African lovegrass, moth vine, bridle creeper		Containment	Foliar spray, cut and paint, physical removal,	M-II
North	Eurobodalla NP	Eurobodalla	African olive		Eradication	Cut and paint, stem injection	M-II
North	Tallaganda NP	Tallaganda NP	Feral goat, feral deer		Containment	Aerial shooting	M-II
North	Tallaganda SCA	Tallaganda SCA	Feral goats, feral deer		Containment	Aerial shooting	M-II
North	Tallaganda NP	Plantation	Pine wildings		Containment	Cut and paint, basal or stem injection, foliar spray	M-II
North	Eurobodalla NP	Bingie	Serrated tussock		Containment	Spraying	M-II
North	Tallaganda NP	Wild Cattle Flat area	Serrated tussock		Containment	Foliar spray	M-II
North	Tallaganda NP	Ballinifad and Mulloon creeks	Willow		Containment	Cut and paint, basal or stem injection, foliar spray	M-II
North	Tallaganda SCA	Ballinifad and Mulloon creeks	Willow		Containment	Cut and paint, basal or stem injection, foliar spray	M-II
Central	Kooraban NP	Kooraban	Blackberry, fireweed		Containment	Spray, hand-pull	L-LP

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Central	Montague Island NR	Mainly around lighthouse	Dolichos pea, Cape ivy, fireweed, mile-a-minute, arum lily, blackberry nightshade, chinese gooseberry, New Zealand Christmas bush		Containment	Spray	L-LP
North	Eurobodalla NP	Eurobodalla NP	Aloe cacti, thistles, Paterson's curse, fireweed, arum lily, mother-of-millions, coral tree, asparagus fern		Containment	Spraying, digging, cut and paint, hand pulling	L-LP
North	Scott NR	Scott NR	Serrated tussock, St John's wort, thistle, Paterson's curse		Containment	Foliar spray	L-LP
Bombala	South East Forests NP	Coolangubra	Feral deer		Containment	Shooting	L-PP
Bombala	South East Forests NP	Coolangubra	Feral goats	Trampling and browsing of native vegetation, potential browsing to Dry Rainforest EEC.	Asset protection	Ground shooting, Judas programs	L-PP
Bombala	South East Forests NP	Waalimma	Feral goats		Containment	Judas programs	L-PP
Bombala	South East Forests NP	Coolangubra	Pine wildlings		Containment	Fell	L-PP
Bombala	South East Forests NP	Coolangubra	St John's wort, Paterson's curse		Containment	Spray, hand pull	L-PP
Bombala	South East Forests NP	Genoa	Feral goats		Containment	Judas programs	L-PP

Area	Reserve	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Central	Wadbilliga NP	Escarpment areas	Feral goats		Containment	Shooting	L-PP
North	Nadgigomar NR	2503 – Nadgigomar NR	Pines		Containment	Fell, hand pull	L-PP

5 Consultation

This regional pest management strategy was developed through consultation with the community, key stakeholders and internal staff. A pest management strategy stakeholder forum was conducted at Narooma on 12 August 2011. A range of community representatives was present for the forum, including members from local councils, South East LHPA, Southern Rivers Catchment Management Authority (CMA), wild dog management plan members, Forests NSW, Department of Primary Industries, advisory committee members and park neighbours. Key issues that were raised from this forum are listed below (with reference to the state strategy):

- The need for national parks to understand and address community values of pest and weed issues. Ensuring this process is transparent, and that all stakeholders are involved and have input into the decision making process (Goal 3, Objective 3.2).
- The requirement for a landscape approach to pest management. Pest planning should involve a nil tenure approach and include all relevant land managers (Goal 2, Objective 2.2).
- Increased training for staff in weed identification in order to quickly deal with new incursions as they occur (Goal 1, Objective 1.1).
- Many sites where invasive weeds are establishing and where they are most likely to establish are highly predictable. Programs should target these 'portals or conveyor belt sites' (Goal 2, Objective 2.2).
- The need for communication to and the education of stakeholders regarding our pest programs (Goal 3, Objective 3.2).
- Focus must be kept to 'winnable battles', particularly when resources are limited (Goal 2, Objective 2.1).
- Identify and assist key drivers and volunteer involvement by the community, to assist with program implementation and cooperation (Goal 3, Objective 3.2).

Workshops were also conducted with NPWS staff from operational areas within the Region in order to accurately identify and prioritise pest management programs. Following the preparation of the 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 consultation during the implementation of this strategy will include discussion of issues and information relating to pest management programs to the FSC Regional Advisory Committee and other groups such as the coastal weeds steering committee and the four wild dog management groups. These groups are comprised of a number of stakeholders that lead and have input into pest management programs across all land tenures.

In addition, staff regularly attend and provide advice and information at a range of meetings across the Region. These smaller, Area-specific meetings include liaison and consultation with stakeholders such as councils, CMAs, LHPAs and neighbours.

Pest forum table

The following table lists some of the key issues from the forum. Participants raised a host of important social and institutional issues which will need to be considered for future discussions with other agencies and the community. The table provides a preliminary list of actions, with some of the issues requiring a multi-agency or multi-tenure approval for which NPWS may not be the lead agency.

Identified forum issue	Action	Timeframe
The need for national parks to understand and address the community values of pest and weed issues. Ensuring this process is transparent, and that all stakeholders are involved and have input into the decision making process.	<p>Wild dog management plan process has identified and deals with community values, ensuring all members of those planning bodies have input into the decision making process.</p> <p>Pest and weed information days held in cooperation with the CMA and the conservation management network.</p> <p>Look for additional opportunities for community engagement, in particular with the CMA, neighbours, community groups and other stakeholders</p>	<p>Ongoing</p> <p>Two held over the past 18 months, as needed.</p>
The requirement for a landscape approach to pest management. Pest planning should involve a nil tenure approach and include all relevant private and public land managers.	<p>The Region is a major stakeholder and driver of the cooperative wild dog plans.</p> <p>Rabbit management in the Eurobodalla coastal areas through partnerships with a range of stakeholders.</p> <p>Deua Valley feral pig program involves agency and private landholders.</p> <p>NPWS is part of the coastal weeds planning team that drives weed control along the coastline, irrespective of tenure.</p> <p>We have an opportunity to develop many other programs similar to how the wild dog issue is currently being managed. Weed programs in particular could benefit from adopting a similar approach that looks at the problem on a landscape level using a nil tenure strategy.</p>	<p>Ongoing</p> <p>Ongoing</p> <p>Ongoing</p> <p>Ongoing</p> <p>To be developed</p>
Increased training for staff in weed identification in order to quickly deal with new incursions as they occur.	<p>Agency weeds identification training day.</p> <p>More training days to be held that focus on other areas of the Region</p>	<p>December 6, 2011</p> <p>To be planned</p>
Many sites where invasive weeds are establishing and where they are most likely to establish are highly predictable. Programs should target these 'portals or conveyor belt' sites.	<p>Prioritising programs by utilising the information gathered in pest strategy process.</p>	<p>Ongoing</p>
The need for communication and sharing of information between NPWS and stakeholders regarding pest programs.	<p>Pest and weed information days held in cooperation with the CMA and the conservation management network.</p>	<p>Ongoing</p>
Focus must be kept to 'winnable battles', particularly when resources are limited.	<p>Prioritising programs by utilising the information gathered in the pest strategy planning process.</p>	<p>Ongoing</p>
Identify and assist key drivers and volunteer involvement by the community, to assist with program implementation and cooperation.	<p>Shorebird protection program, training and informing local residents and volunteers to assist with site protection.</p> <p>Weed control programs led by park staff and aided by volunteers for a number of programs within the Region.</p>	<p>Summer months</p> <p>Ongoing</p>

6 Pest species overviews

Red fox (*Vulpes vulpes*)

Distribution and abundance

The red fox is widely distributed throughout the southern half of the mainland and can survive in habitats ranging from arid through to alpine as well as urban. The only limitation appears to be the tropical climate experienced in the northern parts of Australia. In non urban environments it appears to be most abundant in fragmented habitats typically found around agricultural landscapes. These offer a wide variety of cover, food and den sites. Foxes are also widespread in areas in and around urban environments (Saunders et al. 1995).

Red foxes are widespread throughout urban, rural and bushland areas in Far South Coast Region. Densities in the coastal reserves are expected to be higher than those in the escarpment country and populations are expected to be artificially high in semi-urban centres adjacent to some of the coastal reserves.

Impacts

The introduction of foxes into Australia has had a devastating impact on native fauna, particularly among critical weight range species (35–5500 g) of ground-dwelling and semi-arboreal mammals, ground-nesting birds and freshwater turtles (Burbidge and McKenzie 1989). Recent studies have shown that predation by foxes continues to suppress remnant populations of many such species. Foxes have also caused the failure of several attempts to reintroduce native fauna into areas of their former range. Predation by foxes was the first key threatening process (KTP) to be listed under the TSC Act. Foxes are also significant predators of domestic stock including lambs and poultry; predation by foxes has the potential to reduce lambing rates significantly. Foxes also assist in the dispersal of several weed species including bitou bush and blackberry.

The species of greatest concern are southern brown bandicoot, long-footed potoroo, long-nosed potoroo, smokey mouse and several threatened shorebird species listed as endangered under the TSC Act.

Priorities for control

Fox control in the Region is guided by the Fox TAP which aims to direct fox control to areas where impacts on threatened species are likely to be greatest and ensure that these fox control programs are effective in reducing such impacts (NPWS 2001). Fox TAP programs in the Region are targeted to protect little terns, hooded plovers, pied oystercatchers, long-nosed potoroos, southern brown bandicoots and smoky mice.

Control methods

The most widely used method in the Region is 1080 mound baiting. Baiting is carried out in all site plan areas all year round. Baits are changed throughout the year in an effort to avoid caching. Meat baits are used wherever possible; however, commercially manufactured meat baits are preferred in the summer months as they last longer than non-commercial meat baits.

Soft jaw trapping and shooting are used in conjunction with baiting programs where particular foxes are not taking baits or are suspected of caching baits.

Fumigation of dens occurs if dens are located during the fox breeding season. NPWS also aims to trial fox den detection dogs to target dens in areas close to threatened species sites during the breeding season.

Monitoring

The impact of fox predation on southern brown bandicoots and, conversely, the effectiveness of the control program, are being assessed through long-term monitoring of southern brown bandicoot and fox populations. Bandicoot populations are being measured biannually using sandplot monitoring. Fox and other medium-sized mammal populations are being measured biannually via track counts on sandplots. Potoroo monitoring is being undertaken via the use of remote area cameras.

In the case of threatened shorebirds, the effectiveness of programs is measured in part by fledgling success. A shorebird coordinator, along with staff and volunteers, monitor nests sites weekly during the breeding season. All other control work including baiting and trapping is monitored using PWIS to gauge changes in fox activity.

Wild dogs (*Canis lupus* spp.)

Distribution and abundance

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

Wild dogs are widely distributed across Far South Coast Region. The majority of populations are located in the reserves of the forested escarpment country such as the South East Forests, Wadbilliga, Kooraban, Deua and Monga national parks.

Wild dogs have also been reported from several coastal reserves including Ben Boyd, Bournda, Mimosa Rocks, Gulaga and Biamanga national parks. A long-term monitored population is also present in Nadgee NR.

Several reserves experience problems with roaming domestic dogs and many areas in the Region have problems with dogs released or lost by pig hunters, e.g. Deua and Monga NPs.

Impacts

Wild dogs can have significant impacts on livestock, especially sheep. As a result, wild dogs have been declared as a pest under the *Rural Lands Protection Act 1998*. Under the Act, managers of controlled land have an obligation to eradicate wild dogs by any lawful method. All land in NSW is identified as controlled land under the current Pest Control Order for Wild Dogs.²

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

² www.gazette.nsw.gov.au/pdfs/2009/11th_September.pdf

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

In order to balance the need for wild dog control with the conservation of dingoes, the Pest Control Order for Wild Dogs (within the *Rural Lands Protection Act 1998* - RLP Act) 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 (DEC 2005).

Priorities for control

Wild dog management plans are prepared in conjunction with the local LHPA and wild dog working groups. The plans must include the dual aims of minimising livestock predation and the conservation of the dingo in all reserves listed under Schedule 2 of the Wild Dog Pest Control Order. While the overarching management plans are developed by the LHPAs, operational plans are negotiated with all stakeholders as part of each local wild dog management plan group. Far South Coast Region has four wild dog plan areas which entirely cover the Region: Bombala/Far South Coast, Central south coast/east Monaro and the Braidwood/South Coast plan areas.

Priorities for wild dog control on reserves in FSCR are based primarily on the level of livestock predation reported by adjoining landholders and historical records in accord with wild dog management plans. Control will be focused on areas of reserves such as the escarpment area of the South East Forests NP, Wadbilliga and Deua NPs where there are current and/or historic records demonstrating significant impact on livestock from wild dogs emanating from the reserves. There is close liaison with the local LHPA and landholders when developing control programs.

Priority may also be given to protection of the long-footed potoroo in the South East Forests NP Genoa Unit. If research indicates that predation by wild dogs does pose a significant threat, control will be undertaken to ensure the long-term viability of these populations.

Control

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

- Mound baiting and trapping in accessible areas by NPWS staff, LHPA contractors and Forests NSW contractors, and coordinated and strategic mound-baiting programs on NPWS managed lands, where the need has been identified.
- Review of wild dog management plans (at least yearly) in cooperation with LHPAs, Forests NSW and landholders as detailed in the RLP Act.
- Maintenance of a coordinated approach in conjunction with Forests NSW, LHPAs, Department of Sustainability and Environment (Victoria), Parks Victoria, Interstate Pest Animal Working Group, neighbours and other stakeholders.
- Aerial baiting in Wadbilliga NP in accordance with policy and legislation.
- Enhancement of communication and cooperation with local LHPAs adjoining landholders.
- Development of a remote camera monitoring program to determine the effectiveness of current programs.

- The use of M44 ejectors on NPWS managed land. The ejectors use a 1080 capsule that shoots into the mouth of a dog or fox when a bait head is pulled from the ejector cylinder.
- Undertaking of reactive programs, both on and adjacent to reserve areas, where necessary as per the wild dog policy. Reactive programs should be based on confirmed stock losses, and in such cases response time should be as short as possible.
- Reactive control in response to reports of livestock predation or dog activity is almost always carried out using traps by either NPWS staff or South East LPHA contractors.

Monitoring

Stock losses caused by wild dogs in FSCR are recorded by South East LPHA. Such measures are essential in planning and evaluating the effectiveness of control programs included in wild dog management plans. Wild dog abundance and activity is measured annually via sand plot monitoring, bait takes from mound bait stations and trapping results in the various reserves. The use of remote cameras is now also assisting areas to gauge wild dog activity and numbers. This data is used to refine wild dog control programs and control plans.

Feral pigs (*Sus scrofa*)

Distribution and abundance

Feral pigs are now widely distributed in Queensland, New South Wales, the Northern Territory and the ACT. Isolated populations occur elsewhere in Australia. The distribution and spread of feral pigs is directly related to the location of inland watercourses and their associated flood plains (Choquenot et al. 1996). Numerous isolated populations of feral pigs have appeared in NSW over the past 30 years, particularly in the tablelands and coastal areas. In many cases the founding animals for these populations were probably deliberately released by hunters, rather than being a product of natural dispersal (Hone and Waithman 1979).

Feral pigs are found in many areas in the Region. The highest densities have been reported from the wetter escarpment areas of the South East Forests NP, particularly the Nungatta and Nunnock and Packers Swamp areas, and the Bega and Badja Swamps of Wadbilliga NP and Badja Swamp NR. Pigs are known to occur, or have been reported in, Coolumbooka NR, Bondi Gulf NR, Mount Imlay NP, Gourock NP, Deua NP and Monga NP and SCA. An area of concern is the recent reporting of feral pig activity in the southern end of Nadgee NR in the vicinity of the Victorian border.

Impacts

Predation, habitat degradation, competition and disease transmission by feral pigs is listed as a KTP under the TSC Act. Feral pigs can cause severe environmental damage by uprooting native seedlings in their search for food and eating bulbs and roots. Feral pigs are omnivorous and can eat a wide range of vegetable and plant to animal matter, and have been known to feed on small frogs, reptiles, birds and their eggs, and small marsupials (Hone 2002).

Feral pigs can act as vectors for diseases such as tuberculosis and foot and mouth disease; these diseases can cause major economic losses for neighbouring farmers and disease outbreak in humans. Public safety can also be at risk from cars striking feral pigs crossing major arterial roads that surround many of the parks, such as the

Pacific Highway. Feral pigs also act as a vector for the spread of weeds through faecal deposition after consumption of the fruits of the weed.

Priorities for control

Critical priority programs are in place where feral pig populations impact upon threatened species or EECs, such as in Deua National Park, South East Forests National Park and Coolumbooka Nature Reserve. Other priorities for control include maintaining pressures on known populations through existing control programs with constant refinement and review, and programs associated with the cooperation of neighbours and prevention of cross-tenure movement, especially in border areas.

Control

Trapping and shooting are currently the preferred methods of control. In Bombala Area, control programs have used the Judas collar system to assist in locating pigs, and these have proved highly successful. Inter-agency and cross-border control programs help maximise effectiveness, such as the interagency pest animal working group, through better coordination of works. Other methods include 1080 poison baiting, exclusion fencing and aerial shooting.

Monitoring

Investigate and record the extent of feral pig distribution and abundance on NPWS managed lands in the Region through records in PWIS. Monitoring of feral pigs will be undertaken for both survey purposes and the investigation of reports and control programs.

Records for the trapping programs include:

- the GPS location of traps, recorded in PWIS
- details of individuals caught (sex, weight and reproductive status)
- ongoing reports of feral pig presence/absence throughout the Region.

Rabbit (*Oryctolagus cuniculus*)

Distribution and abundance

Rabbits occur in scattered populations throughout the Region. Abundance is generally low. However, densities have increased sharply in some areas since 2010, particularly in the coastal zones.

Impacts

Competition and grazing by European rabbits has been listed as a KTP under the TSC Act, and rabbits are also a declared noxious pest under the RLP Act. Rabbits have significant impacts on native vegetation. Selective grazing and browsing of more palatable species lead to changes in species composition and habitat structure. Even at low densities, rabbits can prevent the regeneration of impacted species through consumption of seed and seedlings. During drought, rabbits will also eat the bark and roots of native species, resulting in the death of large numbers of plants.

Their digging activities also scratch out seedlings and damage root systems; together with the damage they cause to both above and below ground vegetation these activities can increase 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 and hence elevated levels of predation on native prey species.

Rabbits can also cause damage to Aboriginal heritage sites, compete with neighbouring livestock and impact on forestry operations. The impacts of rabbits have been reduced since the release of myxomatosis and more recently rabbit haemorrhagic disease (RHD); however, even at low densities rabbits can prevent the regeneration of impacted plant species and recent reports suggest that rabbit numbers may be increasing again.

Priorities for control

- Areas where rabbit populations are or have the potential to impact on threatened flora and fauna species.
- Coastal parks that have high visitor use and high population densities.
- Control programs that are undertaken as part of a wider cooperative program with neighbouring agencies or private landholders.
- Areas where disturbance from rabbit activity may cause erosion problems or damage recreation facilities in parks or Aboriginal heritage sites.

Control

Various methods are used for rabbit control. They include trapping, shooting, poisoning, fumigation, warren ripping and bio-control agents. The most effective rabbit control programs use a combination of these techniques. Effective methods favoured locally are fumigation and poisoning.

Monitoring

Field observation by staff and contractors is used to identify when control works are required. Field staff monitor locations regularly. Recorded works are entered into PWIS.

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. Feral cats are now found throughout Australia. There are estimated to be 400,000 feral cats in NSW and around 12 million across Australia. Feral cats are solitary and predominantly nocturnal. Studies in western NSW have shown that males usually occupy a home range of 280 hectares, while females have smaller ranges of about 150 hectares, but these ranges may be larger if food supplies are scarce. Cats are less common in closed forests, preferring open, drier habitats such as grasslands. Although no specific systematic surveys have been undertaken in the Region, feral cats have been recorded during sand padding surveys undertaken for Fox TAP and wild dog control programs. It is believed that feral cats are present to varying degrees in all parks and reserves. It is also possible that roaming domestic cats, rather than feral cats, are observed in parks that adjoin private property and are located in close proximity to urban areas.

Impacts

Predation by feral cats is listed as a KTP under the Commonwealth EPBC Act and the TSC Act. The Predation by Feral Cats TAP has been produced under the EPBC Act and is currently being produced under the TSC Act.

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

Priorities for control

Far South Coast Region will continue to implement strategic control as part of threatened species management, continue to support research into feral cat control and use appropriate new control techniques where possible.

Control

Control of feral cats is problematic as they are difficult to trap, do not readily take baits except during periods of food shortage, and are difficult to shoot as they avoid human contact. Even if feral cats are removed from an area, it is often quickly recolonised (DEH 2004). There are no vertebrate pesticides registered for the control of feral cats. Audible recorded lures for feral cats and other predators are available through a number of sources. 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 (DNRW 2006).

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

Monitoring

Monitoring is ongoing in areas where threatened species exist and are the subject of recovery plans. Long-term monitoring has been occurring in selected locations since 2008, giving indications about control program impacts.

Feral goat (*Capra hircus*)

Distribution and abundance

In Far South Coast Region, feral goats are generally restricted to the inland escarpment areas. Populations are known from the Tantawangalo, Coolangubra, Yowaka and Glenbog sections of the South East Forests NP. Populations are generally isolated and small in number.

Populations are also found in Deua NP, Nadgigomar NR, Wadbilliga NP, Araluen NR, Berlang Creek SCA, and Majors Creek SCA, though numbers are unknown.

Impacts

Competition and habitat degradation by feral goats has been listed as a KTP under the TSC Act. A range of species listed as endangered or vulnerable under the TSC Act can be impacted upon by feral goats. These include mammals, reptiles and plants, as well as EECs. Feral goats can damage Aboriginal heritage sites, compete with neighbouring livestock and are potential vectors of livestock diseases.

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 to 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 they 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, which may also be impacted by feral goats through competition for food and shelter. Feral deer seem to inhabit similar areas.

Priorities for control

The highest priority sites in the Region are in South East Forests NP, Araluen NR, Deua NP, Majors Creek SCA and Wadbilliga NP.

Control

Effective control of feral goats requires an integrated approach using several complementary control techniques. The main control technique has been Judas collar programs and ground hunting. In addition, landholders adjacent to reserve boundaries are cooperating and being encouraged to reduce feral goat numbers through mustering and trapping. Therefore, for areas such as South East Forests, Deua and Wadbilliga NPs, migration across boundaries is constant. Aerial shooting programs have been considered; however, given the dense forest cover in most areas, the program would be generally ineffective.

Monitoring

Changes in the relative abundance of feral goats are assessed during Judas goat programs. The impacts of feral goats on vegetation and erosion have not been fully investigated in the Region.

Feral deer

Distribution and abundance

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

Deer live in herds with complex social organisation, often involving considerable competition between males in the breeding season. Deer are generally cryptic and, although there is no state-wide census of numbers, deer populations in NSW are believed to have increased dramatically in recent years. This is mainly attributed to escapes from deer farms and expansion due to acclimatisation of herds. They are nocturnal or semi-nocturnal, sheltering by day in forest or woodland and emerging

to graze from late afternoon to early morning in native grassland, improved pasture, cropping or other agricultural land.

There are populations of deer species in South East Forests NP, Mount Imlay NP, Bondi Gulf NR and Coolumbooka NR, Wadbiiliga NP, Ben Boyd NP and Nadgee NR. The main species found throughout the Region include sambar, red, fallow and rusa.

Impacts

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

- destroying native plants; they trample and graze plants, ringbark young trees, and can have 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 sub-tropical Illawarra rainforest, the threatened species *Syzigium paniculatum*, littoral rainforest around Port Macquarie, and trampling and browsing of threatened species in the Oxley Wild Rivers NP (Adam 2004). Deer have been found to browse on lantana, Crofton weed, mistflower and mother-of-millions (Moriarty et al. 2000). The dietary overlap between rusa deer and the swamp wallaby (*Wallabia bicolor*) is estimated to be 15–50%, with one deer eating approximately the same amount of vegetation as three swamp wallabies (DEC 2005). Feral deer on roads have caused several major car accidents in NSW in recent years.

Control methods

Techniques available for the control of feral deer on national parks including shooting by OEH staff and approved contractors, fencing, trapping using feed-based lures, mustering, and potentially Judas control. However, in remote areas on NPWS lands there are few viable cost-effective options available.

Priorities for control

- Improve knowledge of the distribution and abundance of deer populations and their impact on reserves and target control where there are threatened plant species.
- Research and trial control techniques and assess impacts of private hunting on populations in neighbouring tenures.
- Deer population management programs and expertise is to be developed where required.

Monitoring

All sightings and information gathered using sand plots are entered into PWIS for planning control programs.

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

Distribution and abundance

Bitou bush is an introduced plant in NSW. It was widely planted along the coast between 1946 and 1968 to reduce dune erosion, but spread rapidly. It is now found along 80% of the state's coastline and is listed as noxious in all coastal districts.

Bitou bush is restricted to coastal environments in the FSC Region and is present in Ben Boyd NP, Bournda NP, Mimosa Rocks NP, Broulee Island NR, Eurobodalla NP and Illawong NR.

Impacts

Bitou bush is declared noxious in NSW (Control Class 3 in Bega Valley Shire Council and Control Class 4 in Eurobodalla SC) and is listed as a Weed of National Significance (WoNS) and is regarded as one of the worst weeds in Australia. Invasion of vegetation communities by bitou bush and boneseed is listed as a KTP under the TSC Act.

Bitou bush forms dense shrub layers which can obscure entire sand dunes and change views of headlands and beaches. The most important impact of bitou bush is reduction of coastal biodiversity in infested areas. Bitou bush affects a number of threatened species and plant communities. Over 150 native plant species, three endangered plant populations and 24 ecological communities are under threat from bitou bush invasion in NSW alone (DEC 2006).

Bitou bush in the Region has the potential to impact adversely upon a number of EECs including Littoral Rainforest and Bangalay Sand Forest, as well threatened animal species including little terns, pied oystercatchers and red-capped plovers.

Bitou bush can also create a favourable environment for other highly invasive species, such as asparagus ferns, lantana and glory lily (CRC 2003). It is difficult to determine an accurate estimate of the costs of environmental weeds. However, the cost of managing bitou bush in NSW in 2006–07 exceeded \$4.3 million (Cherry 2008).

Priorities for control

The Bitou Bush TAP identifies priority sites for control. Far South Coast Region is south of the southern containment line. Therefore, the priority for bitou bush control in this Region is containment leading to eradication from all reserves. Reserves that currently have bitou bush control programs in place and are listed as critical priorities are Eurobodalla NP, Broulee Island NR, Ben Boyd NP, Gulaga NP, Bournda NP and Mimosa Rocks NP.

Control methods

Various methods have been combined to control bitou bush in the Region, including mechanical removal, chemical spraying from the ground and air, and hand removal. Biological control agents have been used in the past, primarily the tip moth, seed fly and several others.

Monitoring

Monitoring involves documenting the distribution and abundance in the Region, mapping on GIS, and evaluating the effectiveness of control programs.

Serrated tussock (*Nassella trichotoma*)

Distribution and abundance

Serrated tussock is a very invasive weed widespread in south-eastern Australia, covering more than 1.1 million ha. The area is increasing since control techniques have failed to contain its spread. In NSW it is widespread on the tablelands where it causes serious impacts on pastures and native habitats, but it also grows on the coast and is moving further west of the tablelands every year (CRC 2003).

Known infestations of serrated tussock in the Region are in Deua NP on cleared river flats adjacent to the Shoalhaven and Deua rivers (Alpine – Canoolie and Bendethera) and in Monga SCA. The weed continually re-infests from private lands to the west so complete removal is unlikely. Scattered infestations are also known from the vicinity of Peppers Swamp. It is also known from the Pericoe and Mataganah Fire Trail area of the South East Forests NP. Work in recent years has reduced the infestation in the South East Forests NP to a low abundance. An infestation exists in the recently gazetted Araluen NR and in Eurobodalla NP in the Bingie area.

Some plantation areas adjacent to Mataganah Area of South East Forests NP are infested, and fuel reduction burning in these areas is avoided to minimise invasion potential.

Impacts

Serrated tussock is listed as a KTP under the invasion of native plant communities by exotic perennial grasses. It is also a WoNS and a Control Class 4 noxious weed in all parts of the Region. It is regarded as one of the worst weeds in Australia because of its invasiveness, potential for spread, and economic and environmental impacts. In NSW alone it is estimated that the weed has cost more than \$40 million in lost production (CRC 2003). In native grasslands, serrated tussock reduces biodiversity as dense infestations can outcompete and eliminate most other plants over large areas. It can also pose a threat as a fire hazard (CRC 2003).

Serrated tussock has no grazing value because of its high fibre and low protein content. Infestations result in significant loss in livestock production and serrated tussock probably accounts for a greater reduction in pasture than any other weed species in Australia (Parsons and Cuthbertson 2001).

It is an aggressive invader of grassland and pasture areas. It seeds prolifically and is readily dispersed by wind, water, animals and humans.

Dense infestations of this plant may eliminate most other plant species, thereby reducing the biodiversity of an area, and be a source of reinfestation.

Priorities for control

Serrated tussock has been identified in BPWW as a priority widespread weed impacting on biodiversity in Southern Rivers CMA region. BPWW has identified site priorities to reduce the impact on biodiversity. All other priorities should be guided by the revised WoNS strategy for serrated tussock. This includes continuing to control the spread of existing populations while maintaining and enhancing existing programs in the Khan Unis, Alpine-Canoolie and Bendethera areas of Deua NP, Araluen NR and South East Forests NP.

Control

Control is generally undertaken by spot or boom spraying with appropriate chemicals. Aerial spraying has been used in the past in Deua NP and surrounding properties to

control dense infestations. Most work is now undertaken by spot spraying due to low densities while chipping of isolated plants also occurs. Control works are generally undertaken before the September–December flowering period.

Where possible undertake control activities in conjunction with programs implemented by neighbouring landholders, Landcare groups, councils and interstate groups.

Investigate the potential of revegetating areas to prevent further infestation, particularly on the open river flats along the Deua and Shoalhaven rivers.

Avoid fire management operations where possible in and adjacent to known populations to prevent further spread and invasion of burnt areas.

Monitoring

Continual monitoring of potential new areas of infestation is to be done to allow for early responses should an infestation occur. Yearly pre-work inspections of infested areas are carried out by staff and contractors. Work completed will be recorded in the Asset Maintenance System.

Willow (*Salix* spp.)

Distribution and abundance

Willows are confined to the south-east regions of Australia, from south-east Queensland through the northern, central and southern tablelands and some coastal areas of NSW. They are widespread in eastern and central Victoria and also found in areas of South Australia, particularly along the Murray River.

Willow infestations in the Region are restricted to riparian areas in the South East Forests NP, Wadbilliga NP, Monga NP, Nadgigomar NR and Coolumbooka NR.

There are many different species, varieties, cultivars and hybrids of willows in Australia. They are all deciduous trees or shrubs, with four distinctive growth habits recognisable among the group.

All willows form large, dense shallow root masses. The leaves of most species are long and narrow with fine-toothed margins. The flowers are unisexual and group together in what is called a catkin, with male catkins and female catkins usually formed on separate plants. The small seeds develop quickly inside a capsule. Each seed has long silky hairs at one end which aids in wind dispersal. The seeds are short lived, usually surviving for less than 10 days (CRC 2003).

Impacts

Willows are declared noxious in NSW and are declared as a Control Class 5 weed throughout the Region. They are also listed as a WoNS (except weeping and hybrid pussy willows). Willows have been identified in BPWW as priority widespread weeds impacting on biodiversity in the Southern Rivers CMA region.

Willow populations are severely modifying riparian environments across the Region. They colonise river and stream beds with potentially severe environmental and biological effects through the formation of dense stands of structurally unstable trees or shrubs with extensive, dense root mats. Willows alter ecological processes, including energy fluxes, nutrient cycling, water temperature and water quality, as a result of breakdown of the massed autumn leaf fall. This can have dramatic impacts on aquatic flora and fauna communities.

Priorities for control

- Follow up programs in Genoa and Wadbilliga catchments.
- Continue with control in South East Forests NP along the Genoa River and its tributaries in conjunction with other agencies as part of the Genoa River Interstate Liaison Committee.
- Undertake follow-up along the Towamba River in South East Forests NP.
- Monitor areas of previous control along the Brogo River in Wadbilliga NP and remove new or established plants that were missed previously.
- Develop a control program for willow infestations on the western boundary of Monga NP.
- Map locations of willows along the section of the Coolumbooka River that bounds Coolumbooka Nature Reserve.
- Investigate the potential for developing a control program along the Coolumbooka River in conjunction with neighbours and other stakeholders, including maintenance of areas where control has been undertaken to prevent re-infestation.
- Control new and isolated infestations as they occur.

Control

Control programs have been undertaken in South East Forests NP along the Genoa River in conjunction with similar programs conducted by Parks Victoria and Landcare as part of a whole-of-catchment approach. These programs have seen a substantial decrease in the population of willows along the river, and only monitoring and follow-up work is required. Work is now focusing on the tributaries of the Genoa River (White Rock River, Nungatta and Yambulla creeks) to broaden these results across the catchment.

A major control program was undertaken along the Brogo River in Wadbilliga NP in 1996. This resulted in a major reduction in the distribution of willows, and now only monitoring and follow-up works are underway.

Willow control is generally undertaken using poison applied by the cut and paint method. Other control methods include foliar spraying and stem injection. In remote areas, such as the Brogo and Genoa Wilderness, staff may be deployed by helicopters in order to undertake control works.

Monitoring

Annual aerial monitoring of all rivers with known willow populations and recording in PWIS.

Lantana (*Lantana camara*)

Distribution and abundance

Lantana is found across four million hectares of land east of the Great Divide, from Mount Gulaga in southern NSW to Cape Melville in northern Queensland. There are isolated infestations in the top end of the Northern Territory, around Perth in Western Australia, and on Lord Howe Island and Norfolk Island (CRC 2003).

Although the southern containment line is north of the Region, infestations are increasing in Gulaga NP and in Eurobodalla NP. Large infestations also occur on private property in the Tilba area and around Narooma.

Lantana is a sprawling scandent shrub or vine normally 1–3 m in height, and on rare occasions to 6 m in height in favourable conditions, often growing in dense thickets. The stems and branches are quadrangular in cross section when young, often with short recurved prickles and sometimes with gland or glandular hairs. The leaves are arranged in opposite pairs on the stem, with successive pairs at right angles to each other. The leaves are ovate to oblong, about 4–10cm in length, 3–6cm wide, and are often covered with rough coarse hairs on the upper surface and strongly aromatic due to glandular hairs. The fruit has many berries which ripen from green to shiny purple-black and contain one or two pale seeds (CRC 2003).

Impacts

Invasion, establishment and spread of *Lantana camara* is listed as a KTP under the TSC Act. Lantana is also declared noxious in NSW (Control Class 3 in Bega Valley and Eurobodalla SC areas and Control Class 4 in Palerang, Cooma-Monaro and Bombala SC areas). It is also listed as a WoNS and is regarded as one of the worst environmental weeds in Australia because of its invasiveness, potential for spread, and economic and environmental impacts.

Lantana is an aggressive invader of a range of environments. It eventually dominates and replaces natural vegetation leading to a reduction in biodiversity. Infestation can result in major changes to floristic composition. It forms a dense impenetrable thicket that smothers native vegetation and also provides shelter for animal pests.

Lantana dominance appears to adversely affect the species richness of soil fauna assemblages, such as ants, and decreases the diversity of soil fungi. It can also affect flora diversity by reducing seedling germination and by increasing the chances and severity of fire in plant communities. Lantana has been identified as a potential threat to many threatened and endangered plants and animals and a number of endangered ecological communities (DECC 2007).

Priorities for control

This species is subject to the influence of climate change and may spread more readily under climate change scenarios, making eradication a high priority. Priorities should be guided by the Revised WoNS Strategy 2012-2017 for lantana which details the southern containment line in the Far South Coast Region. Therefore, priorities should include the eradication of lantana from the Region (except the infestation discussed above). For this infestation, BPWW, which has incorporated site priorities from the National Plan to Protect Environmental Assets from Lantana, has prioritised areas for management to reduce the impact of this weed on biodiversity. Therefore, priorities include the continuation and enhancement of current control programs in Eurobodalla NP and Gulaga NP to vigorously suppress and remove known infestations. Any new occurrences are to be identified and programmed for eradication. Continued work with councils and landholders to reduce infestations in the Gulaga area in particular is a priority.

Control

Single plants are generally removed by hand or mechanical device. Large infestations require an integrated approach using a combination of spraying with an appropriate herbicide, burning or biological control. Burning must be undertaken when the plants are actively growing. Control programs must include a follow-up component as lantana can quickly regenerate in treated areas.

Monitoring

Monitor treated areas to prevent re-infestation as well as monitoring infestations adjacent to NPWS lands to prevent them from entering reserve areas. The National Plan to Protect Environmental Assets from Lantana recommends the use of the Monitoring Manual for Bitou Bush Control and Native Plant Recovery (Hughes et al. 2009), as it can easily be adapted for this weed.

Sea spurge (*Euphorbia paralias*)

Sea spurge is a long-lived plant with upright or semi-upright stems. It usually grows 20–70 cm high, but may occasionally reach one metre. The stems die off after flowering and are replaced by new shoots from the woody base of the plant. The crowded bluish-green leaves are stalkless and are borne in densely overlapping arrangements along the stem. These are relatively small leaves and vary from being elongated to oblong (Navie and Adkins 2007).

Distribution and abundance

Sea spurge is widely naturalised in the coastal districts of central and southern NSW, Victoria, Tasmania, South Australia and southern and south-western Western Australia. It has also recently become naturalised on Lord Howe Island.

It has spread rapidly since its appearance in southern NSW and Victoria, and by 2001 it had increased its range to Jervis Bay in the north. Sea spurge is now the dominant coastal weed of the northern and western coastlines of Tasmania, and large populations are also present on Bass Strait islands (Rudman 2003).

Infestations of sea spurge in the Region are known from Nadgee NR, Ben Boyd NP, Biamanga NP, Bournda NP, Eurobodalla NP, Broulee Island NR and Mimosa Rocks NP. All beach areas both on and off park are susceptible to sea spurge invasion.

Impacts

Sea spurge is regarded as a significant environmental weed throughout the coastal districts of southern Australia. It has successfully invaded many open coastal communities, quickly establishing large and dense infestations. Populations of this species may reach tens of thousands where beaches are free of other vegetation or have a low level of plant cover.

Sea spurge initially colonises the fore dunes at the back of the beach. These infestations tend to stabilise the dunes, preventing natural sand movement inland, and creating a different dune structure to that created by native species (Rudman 2003). This can also decrease the availability of beach nesting sites for nesting shorebird species, which may contribute to their decline in some heavily infested areas (Navie and Adkins 2007).

Each sea spurge plant can produce up to 5000 salt-tolerant seeds which can survive for a number of years on the ocean currents, spreading from beach to beach. Once established, a sea spurge colony can rapidly spread, displacing native vegetation and changing the structure of the beach.

Management objectives

- Prevent known populations from spreading and remove small infestations
- Continue to suppress populations of plants from beach and dune areas

- Maintain programs with the assistance of Conservation Volunteers Australia and continue cross-tenure coordination and liaison with council, Landcare and coast care groups
- Record and map known and new locations.

Priorities for control

Nadgee and Ben Boyd areas have been the priority in past seasons, however all beaches in national parks will be monitored, with coordinated programs with councils and community groups taking place as required. Control will be followed up with regular maintenance due to continual seed spread from the south.

Control methods

Plants are generally removed manually by hand, including the root. Use of gloves is required as the plant exudes a milky latex sap that may cause extreme skin irritation. The plant is then bagged and removed. In some circumstances, particularly around estuary entrances, spraying may be required due to sand build-up around plants that inhibits hand pulling.

Monitoring

Monitoring on park programs is undertaken by the relevant rangers for each reserve. Coordination off park has been undertaken through the coastal weeds program. This program has mapped current distribution of almost all affected beaches off-park.

Ground asparagus (*Asparagus aethiopicus*)

Distribution and abundance

Ground asparagus (also known as asparagus fern, although asparagus fern usually relates to *A. scadens*) has naturalised in south-eastern Queensland and along the coast of NSW. It is common along the NSW coast from the Queensland border to around Batemans Bay. It is found along the coastal reserves of the Region, particularly in Broulee Island NR and Eurobodalla NP.

Impacts

Asparagus fern forms dense blankets of growth above the ground and a profusion of rhizomes and tubers below the ground which suppress other ground flora and reduce available soil moisture and nutrients. It is well-adapted to tolerate dry periods due to its well developed rhizomes and numerous tubers.

This plant has the potential to become one of the biggest environmental threats to the coastal reserves if left untreated. This species is included under the KTP listing of invasion and establishment of exotic vines and scramblers and has been identified in BPWW as a priority widespread weed impacting on biodiversity in Southern Rivers CMA. In 2012, this species and five other asparagus species were listed as WoNSs.

Priorities for control

Priorities for control are identified in BPWW. Therefore, treatment will be undertaken on known populations in coastal reserves, where threatened species or EECs are located. An example is Broulee Island NR with three EECs that are under threat. A great deal of control is being undertaken on the island through 'find it and fix it' funding.

Control

Infestations can be controlled by removing above-ground parts and tubers, where practicable, with continued monitoring of regrowth. Larger infestations can be controlled by spot spraying or brushing with herbicide. This is more practicable as soil disturbance can destabilise fragile coastal soils leaving sites open to reinvasion.

Monitoring

Appropriate recording of size and location of infested sites is to be mapped by area ranger. The infestation on Broulee Island NR is being monitored via a number photo points that have been set up across the island to gauge the effectiveness of the current control program. The Monitoring Manual for Bitou Bush Control and Native Plant Recovery (Hughes et al. 2009) provides guidance on this monitoring methodology and can easily be adapted for this weed.

Bridal creeper (*Asparagus asparagoides*)

Bridal creeper has annual, climbing shoot growth from a perennial root system consisting of many tubers grouped along a central rhizome. Twisting stems grow up to 3 m in length, with leaves borne in groups on short side branches. Bridal creeper produces pea-sized green berries which ripen to red and usually contain two or three black seeds.

Distribution and abundance

Bridal creeper is widespread in south-western Western Australia, southern South Australian and southern Victoria. It is still spreading throughout areas of NSW.

Infestations are known to occur in the northern section of Ben Boyd NP, Snake Island and Dignams Creek in Gulaga NP, in Broulee Island NR, Illawong NR and several localities in Eurobodalla NP.

Impacts

This species is included under the KTP listing of invasion and establishment of exotic vines and scramblers, and has been identified as a priority widespread weed impacting on biodiversity in BPWW in Southern Rivers CMA region. Bridal creeper is declared noxious in NSW (Control class 5 in Bega Valley SC and Control Class 4 in the Cooma-Monaro, Palerang, Eurobodalla and Bombala SC areas), and is listed as a WoNS. Bridal creeper threatens native vegetation by competing for light, space, water and nutrients. Its shoots form a dense canopy that shades indigenous vegetation, and its tubers create a thick barrier just below the soil surface that can inhibit the establishment of native seedlings. Bridal creeper poses a major threat to biodiversity and conservation due to the potential loss of indigenous species.

Priorities for control

Treatment should be undertaken on known populations in coastal reserves where there are threatened species or EECs as guided by BPWW.

Control

Control of bridal creeper is generally undertaken by spot spraying with a suitable herbicide. In recent years biological control has been trialled in several areas on the coast, mainly in Ben Boyd NP, Eurobodalla NP and Broulee Is NR. Some localities use bush regeneration methods.

Monitoring

Monitoring involves appropriate recording of size and location of infested sites and bio-control releases in PWIS.

Scotch or English broom (*Cytisus scoparius*)

Distribution and abundance

Scotch or English broom is an erect, deciduous shrub to 4 m in height, with five angled branchlets. Leaflets are narrow-elliptical to oval with the broadest part in the upper half. Young leaves are often silky hairy on both surfaces, but sometimes hairless. Flowers are usually one or two per junction between the stem and leaf stalk and deep yellow. The fruit is narrow, 25–60mm long, 8–10mm wide, flattened, silky hairy, turning black at maturity, with 6–18 seeds released explosively when ripe (Webb et al. 1988; Jeanes 1996; Spencer 2002).

In NSW it is widely naturalised in the cooler, wetter areas of the state south from Glen Innes, including the Central Coast, Northern Tablelands, Central Tablelands, and Central West Slopes (Parsons and Cuthbertson 1992).

Broom infestations are known from the Berlang area of Deua NP, the northern section of Ben Boyd NP and Majors Creek NR.

Impacts

The invasion and establishment of Scotch broom is listed as a KTP and in 2012 Scotch broom became a WoNS. It is declared noxious in NSW (Control Class 4) and has been identified in BPWW as a priority widespread weed impacting on biodiversity in Southern Rivers CMA region. In Australia, Scotch broom is mainly an environmental weed, and is highly invasive in the cooler, higher rainfall areas. The total area of infested land in Australia is estimated as over 200,000 hectares and spreading.

Broom is a highly invasive species and can completely smother surrounding vegetation. It is highly competitive and can inhibit the growth of many native species. Its seed remains viable for up to 80 years and rapidly germinates following disturbance. It also spreads after fire. Dense thickets of broom provide harbour for animal pests such as feral pigs, foxes and rabbits.

Control

Control of broom is generally undertaken by spraying with an appropriate herbicide. Small infestations can be removed by hand. Advances have been made in recent years with regard to biological control; however, in most cases, spraying is the most widely used and effective means of control.

Priorities for control

Maintenance of programs in Majors Creek NR, Berlang and Deua NPs is ongoing. Infestations in the Majors Creek area are in inaccessible gorge country and therefore difficult to treat. Programs that work with neighbours and councils upstream of this area that focus on the seed source need to be undertaken.

Monitoring

All known infestations are recorded and mapped and previously unknown populations recorded. Regular recorded inspection of sites to monitor regeneration from seed.

Blue periwinkle (*Vinca major*)

Distribution and abundance

A garden escapee, this species is usually found in association with derelict places. There are three known infestations in South East Forests NP: one in the vicinity of Genoa River, one along Tantawangalo Mountain Road at the lookout, and one at Six Mile Creek. There is also a small infestation in Yurramie State Conservation Area.

Impacts

Blue periwinkle forms a dense mat of vegetation, which outcompetes other vegetation and can lead to it dominating the understorey. Dense infestations can reduce plant diversity and significantly alter animal habitats. This species is included under the KTP listing of invasion and establishment of exotic vines and scramblers, and has been identified as a priority widespread weed impacting on biodiversity in BPWW in Southern Rivers CMA region.

Priorities for control

Continue with current control programs in the Genoa section of South East Forests NP.

Continue to monitor treatment sites.

Control

Control of this species is undertaken by spot spraying. Individual plants can be hand-removed.

Monitoring

Monitor treatment sites. Photo point monitoring has been established in the Genoa section of South East Forests NP. Continue survey and mapping of distribution extent. The Monitoring Manual for Bitou Bush Control and Native Plant Recovery (Hughes et al. 2009) provides guidance on this monitoring methodology and can easily be adapted for this weed.

Crofton weed (*Ageratina adenophora*)

Crofton weed is a many-stemmed, perennial herb 1–2 m tall with white-purplish, erect, smooth stems which are shortly branched towards the apex. Its roots are pale yellow and have a carrot-like smell when broken. The stems are glandular hairy when young. Leaves are opposite, dark green, somewhat diamond-shaped or trowel-shaped, 3–10 cm long with toothed margins. White flowers about 3.5 mm long are grouped together in clusters at the end of branches (Parsons and Cuthbertson 2001).

Distribution and abundance

Crofton weed is most common in coastal and subcoastal areas of south-east Queensland and central parts of southern NSW. It has established in many other subtropical and tropical regions of the world.

Occurrences of Crofton weed are known in Bellbird NR as well as North Head, Eden Tip and Hegarty's Bay areas of Ben Boyd NP, Deua NP and Brown Mountain in South East Forests NP.

Impacts

This weed has been identified in BPWW as a priority widespread weed impacting on biodiversity in the Southern Rivers CMA region and is declared noxious in the Bega Valley SC (Class 4).

Crofton weed is an aggressive weed of pastures, affecting the carrying capacity of grazing lands, and also affecting crop yields. It is an aggressive weed on cleared lands. In ungrazed lands, such as public reserves and native bush, it reduces the ecological value of bushland (Parsons and Cuthbertson 2001). Once established, seedlings tolerate shade and grow rapidly. It produces a large volume of windborne seed that can be carried long distances, and is highly toxic to horses.

Priorities for control

Map all known infestations and treat new infestations as a priority. Expand current programs and spray with residual herbicide.

Control

Small areas of scattered plants are generally removed by hand. Larger infestations are treated by spraying with an appropriate herbicide.

Monitoring

Monitor treatment sites, record in PWIS and follow up if required.

Arum lily (*Zantedeschia aethiopica*)

Arum lily is a robust, clump-forming, perennial herb growing to 1.5 m high. It has a stout rootstock or short, thick underground stem with white, somewhat fleshy, finely branched roots. There is often a dense cluster of several large, knobbly tubular rhizomes and many smaller tuber-like nodules. The large arrowhead-shaped leaf blades are glossy dark green to somewhat dull, leathery in texture, to 60 cm long and 30 cm wide, with a prominent midrib and a tip that is bent downwards or curls towards the underside of the leaf. The flower has a central spike to 9 cm long bearing tiny, tightly packed pale yellow to orange flowers (Jessop 1986).

Distribution and abundance

Arum lily is naturalised in temperate regions of Australia, found mainly south of Gosford in coastal areas in NSW and many other areas in southern Australia. It is well adapted to the Mediterranean climate in southern Australia where it grows and spreads vigorously. It is a particularly serious weed along creek lines and in wet areas, pastures and native bushland (Hay 1993).

Arum lily infestations are known from the Haycock, Mowarry and Green Cape areas of Ben Boyd NP, Davidson Whaling Station HS and the Nadgee River flats in Nadgee NR. It also is currently being controlled in areas of Mimosa Rocks NP and Eurobodalla NP.

Impacts

Arum lily competes with existing vegetation for nutrients, light and space. Dense infestations can replace ground cover species thereby reducing biodiversity. The plant is toxic to animals and humans.

Priorities for control

Continue and enhance current control programs along coastal reserves. Particular priorities include areas of Nadgee NR, Mimosa Rocks NP and Eurobodalla NP.

Control

Control of arum lily can be treated by spraying and cut and paint, or hand pulling in areas where the infestations are in or adjacent to waterways hand. Trials of stem injection of infestations in certain areas are being considered.

Monitoring

Monitor treatment sites to prevent further infestations and survey potential areas for new infestations.

Prickly pears (*Opuntia* spp.)

Prickly pears belong to the genus *Opuntia*, several species of which are considered weeds or potential weeds in most areas of Australia. These species are shrubs or small trees with jointed, succulent stems that are cylindrical, club shaped or compressed. The areoles are tufted with barbed bristles and with usually one or more stout spines. The petals of the species found in Australia vary in colour from yellow, orange, red to purple. The fruits bear areoles, sometimes with spines (Telford 1984). In 2012, prickly pears were listed as WoNSs.

Distribution and abundance

Infestations of prickly pear are present in Araluen NR, Deua NP, Eagle's Claw NR, South East Forests NP and Eurobodalla NP.

Impacts

Prickly pears are declared noxious in NSW and are listed as a Control Class 4 in all Shire Council areas. Prickly pear species can form dense patches that are virtually impenetrable to stock and native wildlife, and can harbour pest species such as rabbits. Furthermore, the fruits of some species can harbour fruit fly. Although scattered plants have little effect on native ecosystems, dense infestations can affect biodiversity by hindering the growth and regeneration of native plants, particularly small shrubs and ground flora (Muyt 2001).

This plant is particularly invasive, and patches of prickly pear grow densely, forming impenetrable barriers that can dominate the understorey of bushland areas. The sharp spines can cause injury to animals. Patches provide harbour for pest animals such as rabbits.

Priorities for control

Continue to strategically release control agents into the Region as needed and treat small infestations in conjunction with other programs. Areas of concern are infestations on the edge of Tuross Estuary in Eurobodalla NP and in South East Forests NP.

Control

Biological control has been used throughout the Region with varying success. Physical removal or herbicide application can also be employed. Stem injection will be trialled in the Tuross infestation.

Monitoring

Photo points have been established to monitor the spread of biological control (cochineal) in Deua NP. The Monitoring Manual for Bitou Bush Control and Native Plant Recovery (Hughes et al. 2009) provides guidance on this monitoring methodology and can easily be adapted for this weed. Regularly check for re-establishment, and record works in PWIS.

Tree of heaven (*Ailanthus altissima*)

Tree of heaven was introduced to Australia from eastern Asia by Chinese workers as an ornamental and shade plant.

Distribution and abundance

Infestations of tree of heaven occur in Deua, Monga and Bournda national parks. This species may also be present on a small holding along Tantawangalo Mountain Road in South East Forests NP.

Impacts

Tree of heaven is regarded as a weed because of its suckering ability and its competition with other desirable plant species. It is suited to both clay and sandy soils and is often found around old homesteads, gullies, rubbish tips and roadsides.

Tree of heaven is a deciduous tree or shrub which rapidly invades disturbed land, and can grow up to 20 m in height. It forms dense thickets from underground suckers that grow from the shallow lateral roots and exclude native vegetation.

Priorities for control

Continue with current control programs and investigate potential occurrence in South East Forests NP. Continue programs with adjoining freehold lands along the Deua River.

Control

Control is generally undertaken using cut and paint for larger trees; however, spray thickets and smaller plants with an appropriate herbicide.

Monitoring

Map area and works in PWIS.

Fireweed (*Senecio madagascariensis*)

Fireweed is a highly invasive, opportunistic weed native to south-eastern Africa that can quickly colonise disturbed areas (Johnson 2007).

Distribution and abundance

Fireweed is largely restricted to the south-eastern coast of Australia and has established along the entire NSW coastline. First recorded in the Hunter Valley in 1918, it spread into Victoria and occurs as far north as central Queensland. It grows on a wide range of soil types, from high fertility, self-mulching clay soils to low fertility acidic sandy soils. It is most prolific in well-drained, lighter textured acid soils to low to medium fertility soils. It will not survive in poorly drained or waterlogged situations (Parsons and Cuthbertson 2001).

Fireweed is found in most of the coastal areas of the Region, as it prefers open, disturbed country with bare soil. The heaviest infestations occur along the coast in Mimosa Rocks, Bournda and Eurobodalla national parks. It has also started to impact escarpment parks and has established in areas of South East Forests NP in the areas of Tantawanglo and Nunnock Swamp.

Impacts

In 2012 fireweed became a WoNS and is classed as a Control Class 4 noxious weed. Fireweed is a serious pasture weed of coastal NSW, forming persistent seed banks that in time can rapidly overtake areas and outcompete pasture and native grasses. The plant seeds prolifically and grows to maturity quickly.

Priorities for control

As guided by BPWW, control in areas in South East Forests NP, including Nunnock Swamp and Tantawanglo, where native swamps and grasslands are under threat from fireweed invasion. Also, infestations on roads and other conduits from the coastal strip onto the escarpment need to be controlled.

Control

In almost all areas, infestations along the coast are widespread and have been established for many years. Management of these areas should include a variety of methods to ensure best control of the weed. Hand pulling is the most widely used technique in park areas. However, for large infestations where hand pulling is not feasible spraying may need to be undertaken. Currently, there are no effective biological control agents available for fireweed control.

Monitoring

Continue to monitor infestations in priority areas and in other reserves that abut the escarpment.

African boxthorn (*Lycium ferocissimum*)

African boxthorn is a dense woody shrub up to 4 m high and 3 m wide, without any hairs on any of the parts. Rigid branches end in long spines, up to 15 cm long. Leaves are small and often clustered in groups. The fruit is red to orange on a short down-turned stalk, round, 5–10mm in diameter and slightly wider at the end away from the green calyx which envelops the base of the fruit.

Distribution and abundance

African boxthorn is found across southern Australia in agricultural and pastoral areas and waste places around towns and cities. It tolerates most soil types and some salinity. It is especially abundant in high rainfall areas. Where distribution enters drier regions the plants are generally found close to permanent or seasonal water supplies (Haegi 1976).

Infestations in the Region primarily occur in areas of Ben Boyd NP, Eagles Claw Nature Reserve and Mimosa Rocks NP around the coastal cliff area.

Impacts

In 2012, this weed became a WoNS. African boxthorn is also declared noxious in NSW (Control Class 4) and can spread quickly if left unchecked. Having established it can rapidly form impenetrable, spiny thickets reducing stock and native wildlife

movements. Since birds are often the dispersing agent, infestations are commonly found around the base of trees. Dense infestations may also provide habitat for feral animals such as rabbits, sparrows and foxes. African boxthorn can be an aggressive invader in areas of soil disturbance. High soil reserves of dormant seeds can germinate under ideal conditions.

Priorities for control

All known infestations have been treated and require continual monitoring for new plants. Coastal headlands and cliff areas are of particular concern due to inaccessibility issues and plants being difficult to initially locate.

Control

Physical removal and burning is the most effective technique for removal. Sprayed plants may die but can still provide harbour to pests such as rabbits. If physical removal is not possible then the cut and paint method can be employed.

Monitoring

Monitor treatment sites yearly with records updated in PWIS.

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 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 where it has 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.

Impacts

Phytophthora cinnamomi is the most widespread and destructive of the 32 phytophthora species in Australia, and infection of native plants by *Phytophthora cinnamomi* is listed as a KTP under the TSC Act and EPBC Act. 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). A national threat abatement plan for *Phytophthora* was prepared in 2001³ and a Statement of Intent was prepared for NSW in 2008⁴.

³ <http://www.environment.gov.au/biodiversity/threatened/publications/tap/phytophthora.html>

⁴ <http://www.environment.nsw.gov.au/resources/threatenedspecies/08119soipc.pdf>

Priorities for control

- Continue to monitor and treat areas of Mount Imlay NP.
- 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.

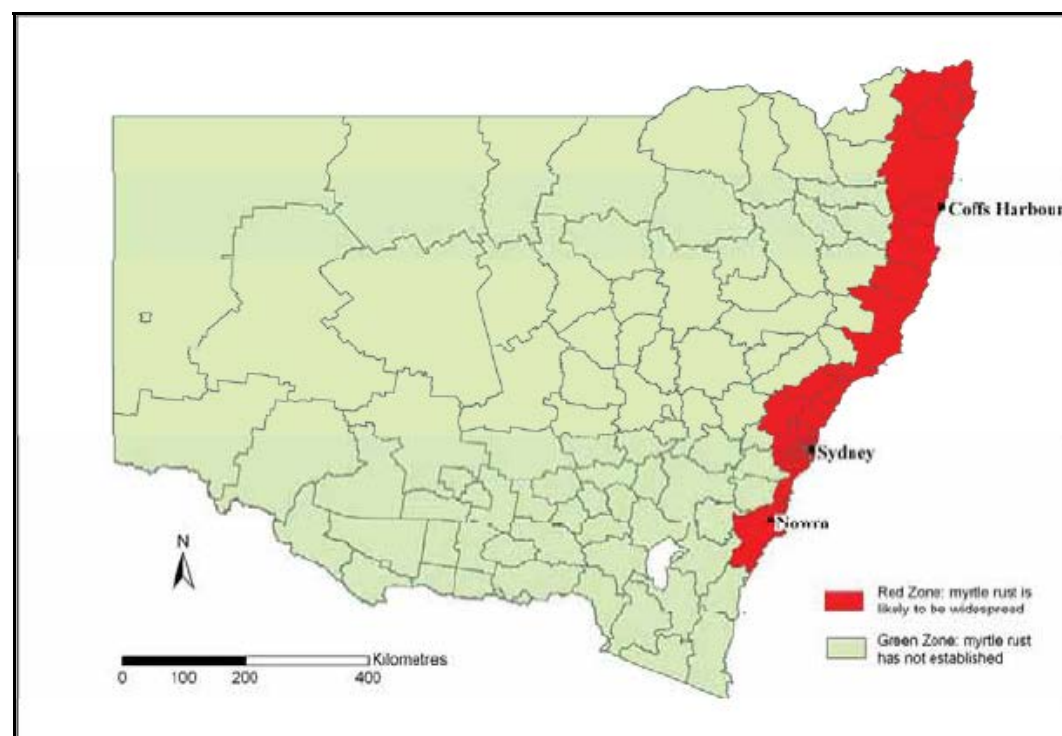
Monitoring

- 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.



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.

Impact

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.

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 psidioides*), but the number of species 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.

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 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 actions to manage myrtle rust:

- 1 Identify high value assets at risk.
- 2 Limit the spread of myrtle rust.
- 3 Monitor the spread of myrtle rust.
- 4 Manage infections.
- 5 Research the impacts of myrtle rust.
- 6 Training, extension and external communication.
- 7 Record the incidence of myrtle rust.
- 8 Liaise and report on the spread and impacts of myrtle rust.

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 be kept for all control programs in accordance with the *Pesticides Act 1999*. 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.

Appendix 1 New and emerging pest species

New pest species

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

Species	Contact	Website
All species	Report sightings to Wildlife Atlas	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*. This means that you must notify the local control authority within 3 days of becoming aware that the notifiable weed is on the land.

Emerging pest species

In Far South 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.

Feral Horses

Current infestations of feral horses are known in Wadbilliga NP. While the exact number is unknown, there are small populations living in areas along the escarpment.

Generally, horse populations can cause both economic and environmental impacts. Economic impacts can include damaging fences and infrastructure such as water points, competing with livestock for pasture and being a potential carrier of exotic diseases. Environmental impacts can include soil erosion from tracks and pads, damage to native vegetation from trampling and browsing and disturbance of water points (Berman 2006).

Spiny rush (*Juncus acutus*)

Spiny rush is a large, tough perennial rush growing to 1.5 m tall in distinctive clumps and with short rhizomes. It has hard, narrow cylindrical leaves about 130 cm long and 4 mm wide. Leaves are dark green with sharply pointed tips. It bears dense clusters of small reddish brown flowers, or small reddish brown nut-like fruits, near the tops of the stems, and flowers in spring and summer. It is found in wide range of soils, from saline coastal flats to inland swamps and irrigation drains, and tends to favour depressions and moist soils, particularly when establishing.

There is an incursion at Bithry Inlet in Mimosa Rocks NP which is being treated and will be continually monitored for potential spread. It has not yet been identified in any other reserves; however, it is known along beach areas south of Bateman's Bay.

Boneseed

Boneseed is a WoNS. It is regarded as one of the worst weeds in Australia because of its invasiveness, potential for spread, and its economic and environmental impacts. For example, a recent study has shown that almost all of Victoria is potentially suitable for infestation by boneseed.

Boneseed is an erect, perennial shrub which grows up to 3 m high and reproduces from seed. It is relatively short lived (10–20 years) and has woody branched stems and oval shaped leaves with irregularly serrated edges. New growth is typically covered by white downy cotton-like material. The yellow flowers have 5–8 petals and are up to 30 mm in diameter. The round, fleshy green fruit turn black when mature and contain a single smooth round seed. The seed is bone coloured when dry, hence the name boneseed.

Although there are no known infestations within Far South Coast Region reserves, there are known infestation at the mouth of Nullica River at Boydtown and north of the Clyde River.

Madeira vine

Madeira vine is a native of South America. It was imported because of its attractive white flowers and strong, vigorous growth. Adapting to a vast range of soils and conditions, Madeira vine has spread along waterways and forest ecosystems, and is considered to be one of the major weed threats to rainforests and waterways. This destructive, prolific, persistent vine reduces the host tree to vine-shrouded poles. Because of its weight due to thick, fleshy leaves and masses of tubers, it can break branches. The stems of this plant can grow up to one metre per week. Madeira vine reproduces prolifically from multitudes of both underground and aerial tubers. These tubers spread in a number of ways and stay fertile for up to five years.

There are small infestations of Madeira vine at Fairhaven, Tathra and Eden, and further inland at Bega. There is also a small infestation along the Deua River in Deua National Park. Continued vigilance is needed to control its spread.

Its full invasive potential in the Region has not been observed, which may indicate that local conditions are not fully suitable at this stage. However, given its impact elsewhere and the likely impacts of climate change, it is vital these small isolated infestations are monitored closely and given a high priority of control.

Balloon vine

Balloon vine is a large climber with compound leaves consisting of nine leaflets arranged in groups of three, with each leaflet coarsely toothed. The stems, leaflets and leaf stalks are finely hairy, particularly on new growth. The flowers are white, about 1 cm across, with four petals, and carried in dense clusters on a long stalk in the axel of each leaf.

It prefers moist soils and can tolerate flooding, so it thrives along creeks and damp areas. It can grow in shaded areas but is most vigorous in full sun. It has the potential to smother and kill trees, shrubs and groundcover plants.

It is known to occur in areas in close proximity to national parks in the northern section of the Region around Batemans Bay. There are no known infestations in national parks; however, large infestations occur in the shire areas to the north.

Blue hound's tongue

Blue hound's tongue is on the National Environmental Alert List.⁵ It is a biennial plant that grows to 600 mm high with stems densely covered with fine hairs. It has dark green leaves, up to 200 mm long, covered with long course hairs. The base of the leaf is heart shaped and clasps at the stem. The leaves are alternately placed and decrease in size up the stem. Blue hound's tongue has a long tap root which it uses to store energy reserves.

There are relatively few infestations in the country; however, one of the major infestations is in the southern section of the Region around the Eden–Towamba areas. Most of the plants are in off-park areas, however small numbers of plants have been found at Davidson Whaling Station. It is therefore imperative that continued monitoring and control are implemented to minimise the chance of this species spreading to other areas.

St John's wort

St John's wort is a long-lived perennial herb that grows 30–70 cm and occasionally up to 1 m high. The root system extends to 1 m deep, and horizontal rhizomes just

⁵ www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/alert.html

below the surface produce buds from which new growth develops each year. The flowers are bright yellow with black glands dotted along the margins of the petals, and grow in numerous clusters at the end of the branches. The fruit is a sticky capsule containing numerous, dark brown or black cylindrical seeds.

St John's wort is increasing in abundance in the Region, particularly in the coastal areas where it is still at relatively low levels. Given its impact in other areas close to the Region, close monitoring, early detection and control of new infestations is critical. There are heavy infestations in the neighbouring Cooma–Monaro Shire and in Kosciusko National Park.

Other species

Other new and emerging weeds are:

- golden dodder
- sagittaria
- salvinia
- giant Parramatta grass
- Chilean needle grass
- banana and black passionfruit
- bluebell creeper
- Coolatai grass
- panic veldtgrass
- German ivy
- climbing groundsel
- Mickey Mouse plant.

Regional achievements

Pest	Achievement
Wild dogs	Cooperative, effective control implemented throughout all relevant reserves in the Region. Four cooperative wild dog management plans have been in place for some years and cover the entire Region
Foxes	Increased control efforts in all threatened species site plan areas within the Region.
Bitou bush	Ongoing control and monitoring over many years has reduced the infestation of bitou bush along the coastal managed reserves considerably.
Feral pigs	Effective cooperative programs in the Deua and Nungatta valleys with neighbouring landholders, CMA and South East LHPA.
Rabbits	Effective cooperative control between landholders and other agencies in affected coastal reserves
Sea spurge	Significant reduction in plants along all coastal reserves.
Serrated tussock	Suppression and containment of infestations in Deua National Park.

Appendix 2 Noxious weeds as at June 2012

Classes 1, 2 and 5 are notifiable weeds: an occupier must notify the LCA within 24 hours, a public authority must notify the LCA within three days. For any notifiable weed a permit must be obtained if moving or transporting it. As noxious weed listings change refer to the DPI website for up to date listings.⁶

Schedule 1 – Class 1 Noxious Weeds

Throughout NSW these plants must be eradicated from the land and the land must be kept free of the plant.

Common name	Scientific name	Alternative scientific name
Anchored Water Hyacinth	<i>Eichornia azurea</i>	
Black knapweed	<i>Centaurea nigra</i>	
Broomrapes	<i>Orobanche</i> species except the native <i>O. cernua</i> var. <i>Australiana</i> and <i>O. minor</i>	
Chinese violet	<i>Asystasia gangetica</i> subspecies <i>micrantha</i>	
East Indian hygrophila	<i>Hygrophila polysperma</i>	
Eurasian water milfoil	<i>Myriophyllum spicatum</i>	
Hawkweed	<i>Hieracium</i> species	
Horsetail	<i>Equisetum</i> species	
Hymenachne	<i>Hymenachne amplexicaulis</i>	
Karoo thorn	<i>Acacia karroo</i>	
Kochia	<i>Bassia scoparia</i> except <i>B. scoparia</i> subspecies <i>trichophylla</i>	<i>Kochia scoparia</i>
Lagarosiphon	<i>Lagarosiphon major</i>	
Mexican feather grass	<i>Nassella tenuissima</i>	<i>Stipa tenuissima</i>
Miconia	<i>Miconia</i> species	
Mimosa	<i>Mimosa pigra</i>	
Parthenium weed	<i>Parthenium hysterophorus</i>	
Pond apple	<i>Annona glabra</i>	
Prickly acacia	<i>Acacia nilotica</i>	
Rubbervine	<i>Crypostegia grandiflora</i>	
Senegal tea plant	<i>Gymnocoronis spilanthoides</i>	
Siam weed	<i>Chromolaena odorata</i>	
Spotted knapweed	<i>Centaurea maculosa</i>	
Water caltrop	<i>Trapa</i> species	
Water lettuce	<i>Pistia stratiotes</i>	
Water soldier	<i>Stratiotes aloides</i>	
Witchweed	<i>Striga</i> species except native species and <i>Striga parviflora</i>	
Yellow burrhead	<i>Limnocharis flava</i>	

⁶ www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles

Schedule 2 – Class 2 Noxious Weeds

The plant must be eradicated from the land and the land must be kept free of the plant.

Common name	Scientific name	Area
Alligator weed	<i>Alternanthera philoxeroides</i>	Palerang C, Bega Valley SC, Cooma – Monaro SC, Bombala SC
Cape broom	<i>Genista monspessulana</i>	Eurobodalla SC, Bega Valley SC, Bombala SC
Gorse	<i>Ulex europaeus</i>	Eurobodalla SC, Bega Valley SC
Salvinia	<i>Salvinia molesta</i>	Whole of NSW except the local control areas listed in Class 3 for this species
Water hyacinth	<i>Eichhornia crassipes</i>	Eurobodalla SC, Palerang C, Cooma – Monaro SC, Bombala SC
Blue Hounds tongue	<i>Cynoglossum creticum</i>	Bega Valley SC

Schedule 3 – Class 3 Noxious Weeds

The plant must be fully and continuously suppressed and destroyed.

Common name	Scientific name	Area
Giant Parramatta grass	<i>Sporobolus fertilis</i>	Eurobodalla SC, Bega Valley SC
Gorse	<i>Ulex europaeus</i>	Palerang C, Cooma – Monaro SC, Bombala SC
Green cestrum	<i>Cestrum parqui</i>	Eurobodalla SC, Palerang C, Bega Valley SC, Bombala SC
Groundsel bush	<i>Baccharis halimifolia</i>	Eurobodalla SC, Bega Valley SC
Lantana	<i>Lantana species</i>	Eurobodalla SC, Bega Valley SC
St John's wort	<i>Hypericum perforatum</i>	Eurobodalla SC, Palerang C, Bega Valley SC
Bitou bush	<i>Chrysanthemoides monilifera</i> <i>ssp rotunda</i>	Bega Valley SC
Boneseed	<i>Chrysanthemoides monilifera</i> <i>ssp monilifera</i>	Bega Valley SC

Schedule 4 – Class 4 Noxious Weeds

The growth and spread of the plants must be controlled according to the measures specified in a management plan published by the LCA. The plants may not be sold, propagated or knowingly distributed.

Common name	Scientific name	Area
African lovegrass	<i>Eragrostis curvula</i>	Bega Valley SC, Eurobodalla SC, Palerang C, Cooma – Monaro SC, Bombala SC

Bathurst/Noogoora/California/Cockle burrs	<i>Xanthium</i> species	Bega Valley SC, Eurobodalla SC, Palerang C, Cooma – Monaro SC, Bombala SC
Blackberry	<i>Rubus fruticosus</i> aggregate species	Whole of NSW
Chilean needlegrass	<i>Nassella neesiana</i>	Whole of NSW except for local control areas in class 3 for this species
Crofton weed	<i>Ageratina adenophora</i>	Bega Valley SC
Fireweed	<i>Senecio madascariensis</i>	Eurobodalla SC, Palerang C, Cooma – Monaro SC, Bombala SC
Nodding thistle	<i>Carduus nutans</i>	Bega Valley SC, Eurobodalla SC, Palerang C, Cooma – Monaro SC, Bombala SC
Pampas grass	<i>Cortaderia</i> spp	Bega Valley SC, Eurobodalla SC, Palerang C, Cooma – Monaro SC, Bombala SC.
Paterson's curse	<i>Echium</i> ssp	Bega Valley SC, Eurobodalla SC, Palerang C, Cooma – Monaro SC. Bombala SC
Perennial ragweed	<i>Ambrosia psilostachya</i>	Bega Valley SC
Prickly pear	<i>Cylindropuntia</i> sp.	Whole of NSW
Prickly pear	<i>Opuntia</i> ssp excluding <i>O.</i> <i>ficus-indica</i>	Whole of NSW
Rhus tree	<i>Taxicondendron</i> <i>succedanae</i>	Whole of NSW
Scotch broom/English broom	<i>Nassella trichotoma</i>	Whole of NSW except the local control areas listed in Class 3 for this species
African boxthorn	<i>Lycium ferocissimum</i>	Eurobodalla SC, Palerang C, Cooma – Monaro SC, Bombala SC
Bitou bush	<i>Chrysanthemoides</i> <i>monilifera</i> subspecies <i>rotundata</i>	Eurobodalla SC
Boneseed	<i>Chrysanthemoides</i> <i>monilifera</i> subspecies <i>monilifera</i>	Eurobodalla SC
Golden Dodder	<i>Cuscuta campestris</i>	Eurobodalla SC, Palerang C, Bombala SC
Hemlock	<i>Conium maculatum</i>	Eurobodalla SC, Palerang C, Bombala SC
Scotch thistle, Stemless thistle, Illyrian	<i>Onopordum</i> sp.	Eurobodalla SC,

thistle, Taurian thistle		Palerang C, Cooma – Monaro SC, Bombala SC
Spanish broom	<i>Spartium junceum</i>	Eurobodalla SC
Sweet briar	<i>Rosa rubiginosa</i>	Palerang C, Cooma – Monaro SC, Bombala SC
Horehound	<i>Marrubium vulgare</i>	Cooma – Monaro SC, Bombala SC
Perennial thistle/Canada thistle	<i>Cirsium arvense</i>	Cooma – Monaro SC
Spiny burgrass	<i>Cenchrus incertus</i>	Cooma – Monaro SC
Spiny burgrass	<i>Cenchrus longispinus</i>	Cooma – Monaro SC
St John's wart	<i>Hypericum perforatum</i>	Cooma – Monaro SC, Bombala SC
Harrisia cactus	<i>Harrisia</i> Spp	Cooma – Monaro SC, Bombala SC
Serrated Tussock	<i>Nassella trichotoma</i>	Whole of NSW except the local control areas listed in Class 3 for this species
Star thistle	<i>Centaurea calcitrapa</i>	Bombala SC

Schedule 5 – Class 5 Noxious Weeds

The requirements of the Noxious Weeds Act 1993 for a notifiable weed must be complied with. The weed control order applies to the whole of NSW.

Common name	Scientific name
African feather grass	<i>Pennisetum macrourum</i>
African turnip weed	<i>Sisymbrium runcinatum</i>
African turnip weed	<i>Sisymbrium thellungii</i>
Annual ragweed	<i>Ambrosia artemisiifolia</i>
Arrowhead	<i>Sagittaria montevidensis</i>
Artichoke thistle	<i>Cynara cardunculus</i>
Athel tree/Athel pine	<i>Tamarix aphylla</i>
Bear-skin fescue	<i>Festuca gautieri</i>
Bridal creeper	<i>Myrsiphyllum asparagoides</i>
Burr ragweed	<i>Ambrosia confertiflora</i>
Cabomba	<i>Cabomba caroliniana</i>
Cayenne snakeweed	<i>Stachytarpheta cayennensis</i>
Clockweed	<i>Gaura lindheimeri</i>
Clockweed	<i>Gaura parviflora</i>
Corn Sowthistle	<i>Sonchus arvensis</i>
Dodder	All <i>Cuscuta</i> species except the native species <i>C. australis</i> , <i>C. tasmanica</i> and <i>C. victoriana</i> .
Espartillo	<i>Achnatherum brachychaetum</i>
Fine-bristled burr grass	<i>Cenchrus brownie</i>

Fountain grass	<i>Pennisetum setaceum</i>
Gallon's curse	<i>Cenchrus biflorus</i>
Glaucous star thistle	<i>Carthamus glaucus</i>
Golden thistle	<i>Scolymus hispanicus</i>
Lantana	<i>Lantana</i> species
Long-leaved willow primrose	<i>Ludwigia longifolia</i>
Mexican poppy	<i>Argemone Mexicana</i>
Mossman river grass	<i>Cenchrus echinatus</i>
Onion grass	All <i>Romulea</i> species and varieties except <i>R. rosea</i> var. <i>australis</i>
Oxalis	All oxalis species and varieties except the native species <i>O. chnoodes</i> , <i>O. exilis</i> , <i>O. perennans</i> , <i>O. radicata</i> , <i>O. rubens</i> , and <i>O. thompsoniae</i> .
Red rice	<i>Oryza rufipogon</i>
Sagittaria	<i>Sagittaria platyphylla</i>
Sand oat	<i>Avena strigosa</i>
Smooth-stemmed turnip	<i>Brassica barrelieri</i> subspecies <i>oxyrrhina</i>
Soldier thistle	<i>Picnoman acarna</i>
Texas blueweed	<i>Helianthus ciliaris</i>
Willows	<i>Salix</i> species except <i>S. babylonica</i> , <i>S. x reichardtii</i> , <i>S. x calodendron</i>
Yellow nutgrass	<i>Cyperus esculentus</i>

Appendix 3 Key threatening processes under the TSC Act

Threat	Threatened species	Additional Listings
Predation by the European red fox	Critical weight range species including little tern, hooded plovers, long footed potoroo.	EPBC Act
Predation, habitat degradation, competition and disease transmission by feral Pigs (<i>Sus scrofa</i>)	Montane peatlands and swamps. Wallowing and rooting causes direct disturbance to critical habitats.	EPBC Act RLP Act
Predation by feral cats	Critical weight range species including Smokey mouse	EPBC Act
Herbivory and environmental degradation caused by feral deer	Montane peatlands and swamps, browsing of threatened plant species.	
Competition and habitat degradation by feral goats .	Trampling and browsing of native and threatened plant species, montane peatlands and swamps.	EPBC Act
Competition and grazing by the feral European rabbit	Coastal vegetation communities and natural temperate grasslands	EPBC Act
Infection of native plants by <i>Phytophthora cinnamomi</i>	Appears to be widespread in coastal forests, <i>Eucalyptus imlayensis</i>	
Invasion of native plant communities by <i>Chrysanthemoides monilifera</i>	Affects a number of communities and species including frontal dune vegetation complex and littoral rainforest	
Invasion, establishment and spread of <i>Lantana camera</i>	Lantana can smother patches of Warty Ziera, a threatened plant species only found in the Tilba area	
Invasion and establishment of exotic vines and scramblers	Impacting on EEC's within the FSC region. Some of these species have the potential to totally take over native stands of vegetation	
Invasion and establishment of Scotch broom		
Invasion of native plant communities by African olive		
Predation and hybridisation of feral dogs		
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants , including aquatic plants.		EPBC Act

References

- Adam, P. (2004) – Final determination: Herbivory and environmental degradation caused by feral deer – key threatening process listing. NSW Scientific Committee.
- Berman, D. (2006) – Feral Horse Management, Greenbank Military Academy. Consultant Report.
- Biosecurity Queensland on behalf of the National Lantana Management Group (2010) Plan to Protect Environmental Assets from Lantana. Department of Employment, Economic Development and Innovation, Yeerongpilly, http://www.weeds.org.au/WoNS/lantana/docs/Lantana_Plan_Final_low_res.pdf.
- Burbidge, A. A. and McKenzie, N.L. (1989) Patterns in the modern decline of Western Australia's vertebrate fauna: causes and conservation implications. *Biological Conservation* 50: 143-98.
- Cherry, H. (2008). *Eradication versus long term surveillance and removal: contrasting approaches to Chrysanthemoides monilifera (L) Norlindh management in Australia.* In: Proceedings of the 16th Australian weed Conference(eds. Van Klinken RD, Osten VA, Panetta FD, and Scanlan JC). Queensland Weeds Society Brisbane, pp 427-429.
- Choquenot, D. and Mclroy, J. and Korn, T. (1996). *Managing Vertebrate Pests: Feral Pigs*. Australian Government Publishing Service, Canberra.
- Corbett, L. K. (2008). *Canis lupus ssp. Dingo*. In 2008 IUCN Red List of Threatened Species. Retrieved 10 November 2008, from <http://www.icunredlist.org/details/41585>.
- CRC for Australian Weed Management (2003). *Serrated Tussock (Nassella trichotoma) Weed Management Guide*.
- DEC (2005). *Deer Management Plan 2005 – 2008 for Royal National Park and NPWS Parks and Reserves in the Sydney South Region*. Department of Environment and Conservation.
- DEC (Department of Environment and Conservation) (2006). *NSW Threat Abatement Plan – Invasion of native plant communities by Chrysanthemoides monilifera (bitou bush and boneseed)*. Department of Environment and Conservation (NSW), Hurstville.
- Department of Environment and Climate Change (DECC). New South Wales (2007) *Lantana camera – key threatening process listing*.
- DEH (2004). *The feral cat (Felis catus): Invasive species fact sheet*. Department of Environment and Heritage, Canberra.
- French, K. and Zubovic, A. (1997). *Effect of the weed Chrysanthemoides monilifera on bird communities*. *Wildlife Research* 24: 727-735.
- Haegi, L. (1976). *Taxonomic account of Lycium (Solanaceae) in Australia*. *Australian J. Botany* 24: 669-679.
- Hay, A. (1993) The genus *Typhonium* (Araceae-Araeae) in Australasia. *Blumea* 37: 345-376.
- Hone, J. (2002). *Feral Pigs in Namadgi National Park, Australia: dynamics, impacts and management*. *Biological Conservation* 105: 231 – 242.
- Hone, J. and Waithman, J. (1979). *Feral Pigs are spreading*. *Agricultural Gazette of NSW* 90: 2-13.

- Hughes, N. K., Burley, A. L., King, S. A. and Downey, P. O. (2009) Monitoring Manual for Bitou Bush Control and Native Plant Recovery. Department of Environment, Climate Change and Water, Sydney, NSW, <http://www.environment.nsw.gov.au/bitouTAP/monitoring.htm>.
- Jeanes, J. A. (1996). *Cytisus*, in Walsh, N. G. and Entwisle, T. J. (eds), *Flora in Victoria* Vol 3. Inkata Press, Melbourne.
- Jessop, J.P. 1986. Araceae. Pp. 1995–1997. In: J. P. Jessop & H. R. Toelken (eds.), *Flora of South Australia*. 4th Ed. Government Printer, Adelaide.
- Johnson, W. H. (2007). Scoping a management program for fireweed on the South Coast of NSW. Meat and Livestock Australia, North Sydney.
- Moriarty, A. and English, A. and Mulley, R. and Priddel, D. and Richardson, B. (2000). *Status, distribution and potential impact off feral deer in Australia: a case study – Rusa Deer in Royal National Park, NSW*. Abstract, Australian Wildlife Management Conference, Queenstown, New Zealand 2000.
- Muyt, A. (2001). Bush invaders of South-east Australia. A guide to the identification and control of Environmental Weeds Found in South-eastern Australia. R. G. and F. J. Richardson Victoria.
- NSW DPI and OEH (2011). Biodiversity Priorities for Widespread Weeds. Report prepared for the 13 Catchment Management Authorities (CMAs) by NSW Department of Primary Industries and Office of Environment and Heritage, Orange <http://www.environment.nsw.gov.au/cmaweeds/index.htm>.
- Navie SC and Adkins SW (2007). Environmental Weeds of Australia. Centre for Biological Information and Technology, The University of Queensland, Brisbane, Queensland [CD-ROM].
- Parsons, W. T. and Cuthbertson, E. G. (2001). *Noxious Weeds of Australia* edn 2. CSIRO Publishing: Collingwood.
- DNRW (2006). Pest Series. *Feral cat ecology and control*. Queensland Department of Natural Resources and Water, Brisbane.
- Saunders, G. and Coman, B. and Kinnear, J. and Braysher, M. (1995). *Managing Vertebrate Pests: Foxes*. Australian Government Publishing Service, Canberra
- Spencer, R. D. (2002). *Horticultural Flora of South-eastern Australia* vol. 3. Royal Botanic Gardens Melbourne. University on New South Wales Press.
- Victorian Scientific Advisory Committee (2008). *Canus lupus* *sspp*. *Dingo* (Meyer 1973) Dingo. Retrieved 11 November, 2008, from <http://www.dpi.vic.gov.au/CA256F310024B628/0/>
- Webb, C. J., Sykes, W. R. and Garnock and Jones, P. I. (1998). *Flora of New Zealand* vol. IV., DSIR Christchurch, New Zealand.

