

South Coast Region

Draft Regional Pest Management Strategy

Part B: 2012-2015



This plan should be cited as follows:

Office of Environment and Heritage. (2011). Draft South Coast Regional Pest Management Strategy Part B: 2012-2015. OEH, Sydney, NSW

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Published by:
Office of Environment and Heritage
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ISBN 978 1 74293 409 9
OEH 2011/0897

December 2011

Contents

Summary	iv
Acronyms	v
1. Introduction	1
2. Regional overview	1
3. Regional map	3
4. Regional prioritisation	4
5. Table of prioritised regional pest programs	6
6. Consultation	30
7. Pest species overviews	31
8. Pest distribution tables	53
9. References	60
10. Appendices	61

Summary

The vision for the NPWS Regional Pest Management Strategies is to minimise adverse impacts of pests on biodiversity, protected areas and the community. The strategies achieve this through identifying and focusing on the highest priority programs, ensuring that actions are achievable and delivering measurable outcomes. The Regional Pest Management Strategies (RPMS) are divided into Part A and Part B. Part A provides the broader planning framework for the management of pests by NPWS. This Part B describes the local circumstances within South Coast Region (SCR) and applies the Part A framework to prioritise specific management programs.

The SCR undertakes a variety of pest management programs in order to protect the reserves that are managed by the Region. Important aspects of this control are not only for the protection of biodiversity, flora and fauna but also include the protection of off-park assets such as surrounding agricultural enterprises and recreational values.

Some of the highest priorities for the SCR over the next four years will be effective and coordinated management of wild dogs, control of expanding pest species and Class 1 and 2 noxious weeds, pest management to protect threatened species, and improving on existing programs.

Threatened species such as the Brush-tailed Rock-wallaby (BTRW) and threatened shorebirds are iconic species for the SCR which have overwhelming support and cooperation from the community to continue the work that enables these species to persist.

Within the SCR there are a number of wild dog management plans that take a nil tenure approach so that management is not limited by property boundaries. In recent times there has been an increase in an effective cooperative approach that has led to positive outcomes. Over the life of this RPMS, further refining of this approach will be undertaken to ensure the preservation of the Dingo in Schedule 2 areas while effectively and efficiently controlling the impacts of wild dogs on adjacent rural properties.

There are numerous additional pest species programs undertaken by NPWS throughout the SCR. The main priority in relation to these programs will be the adoption of adaptive management approaches that are cooperative, effective and efficient.

Acronyms

The following acronyms are used throughout this document.

Acronym	Expanded Text
AA	Aboriginal Area
AMS	Asset Maintenance System
APZ	Asset Protection Zone
BPWW	Biodiversity Priorities for Widespread Weeds
BTRW	Brush-tailed Rock-wallaby
CAP	Catchment Action Plan
CMA	Catchment Management Authority
DECCW	NSW Department of Environment, Climate Change & Water
EEC	Endangered Ecological Community
ESFM	Ecologically Sustainable Forest Management
LGA	Local Government Area
LHPA	Livestock Health and Pest Authority
KPI	Key Performance Indicator
KTP	Key Threatening Process under the TSC Act
MER	Natural Resource Management Monitoring, Evaluation and Reporting
NP	National Park
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NPWS	NSW National Parks and Wildlife Service
NR	Nature Reserve
NRM	Natural Resource Management
NSW	New South Wales
OEH	Office of Environment and Heritage
PAS	Priorities Action Statement

PMP	Park Management Program
POM	Plan of Management
PWG	Parks and Wildlife Group, the internal name within OEH for NPWS
PWIS	Pest and Weed Information System
RLP Act	<i>Rural Lands Protection Act 1998</i>
ROP	Regional Operations Plan
ROTAP	Rare or Threatened Australian Plants
RP	Regional Park
RPMS	Regional Pest Management Strategy
SCA	State Conservation Area
SCR	South Coast Region
SFAZ	Strategic Fire Advantage Zone
SOP	Standard Operating Procedure
TAP	Threat Abatement Plan
TSC Act	<i>Threatened Species Conservation Act 1995</i>

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.*
- The *NSW Invasive Species Plan* provides specific goals, objectives and actions in relation to Invasive Species management.

This document is Part B of the SCR Regional Pest Management Strategy and contains the regionally specific components of the strategy including the Region's prioritised pest programs.

Part A of the strategy provides the broader planning framework for the management of pests by NPWS. It documents the corporate environment, legislation and policy context and describes the logic used for identifying, prioritising and monitoring pest management programs. It also establishes Service-wide pest management goals, objectives and actions.

This Part B describes the local circumstances within the Region and applies the Part A framework to prioritise specific pest management programs. These priorities will be included in Regional Operations Plans (ROPs) and implemented through the Assets Maintenance System (AMS). It also broadly identifies pest distribution and associated impacts across the Region.

2. Regional overview

South Coast Region covers 1.36 million hectares, extending from Stanwell Park in the north to Batemans Bay in the south, and west of Goulburn along the tablelands. The Region broadly covers three distinctive geographic areas - the Tablelands and the Coastal Plain, separated by the Great Eastern Escarpment.

The Region's varied landscapes and altitude range are reflected in its high biodiversity. Vegetation communities comprise all the major types of rainforest occurring in NSW (subtropical, warm temperate, cool temperate, littoral and dry), numerous different eucalypt communities of tall open forest, forest and woodland, coastal and upland heath and freshwater and estuarine wetland. A large number of threatened plant and animal species occur including several endemic plant species. The Region is of major conservation importance for several threatened fauna species including the Ground Parrot, Eastern Bristlebird, Glossy Black-cockatoo, Tiger Quoll, BTRW, Green and Golden Bell Frog and Broad-headed Snake.

The Region is divided into four management areas; Illawarra, Ulladulla, Nowra and Highlands Areas (see Regional map in Chapter 3). Contained within these management areas there is approximately 348,000 hectares within 61 protected areas, including 16 National Parks, 34 Nature Reserves, 7 State Conservation Areas, 2 Regional Parks and 2 Aboriginal Areas.

The Areas are primarily responsible for implementation of works and activities within their geographical areas. An Operations and Support Co-ordination Unit provides professional support to the Areas and coordinates Region-wide functions and

responsibilities, including the strategic planning and coordination of pest management.

The Region coincides with 11 local government areas; Shellharbour, Kiama and Shoalhaven, and parts of Wollongong, Campbelltown, Wollondilly, Wingecarribee, Goulburn Mulwaree, Palerang, Upper Lachlan, Eurobodalla and overlaps with three Livestock Health and Pest Authority districts; Tablelands, Cumberland and South-East. Jervis Bay National Park shares a border with the Commonwealth managed Booderee National Park.

There is an extensive reserve interface with numerous villages, towns and cities such as Wollongong, Wedderburn, Bomaderry/Nowra, Bundanoon, Jervis Bay villages, Cudmirrah/Berrara, Burrill Lake, Lake Tabourie, Merry Beach, Depot Beach, Durras, Maloneys Beach and Surfside. Adjacent land uses include residential, industrial, agricultural, forestry and recreational uses. These various interfaces influence weed and pest animal occurrence as well as control methods.

Pest issues in the rural interfaces are primarily associated with vertebrate pests. Many of these areas contain management challenges between preserving the Dingo as a species on the Schedule 2 lands and controlling wild dogs to protect the adjacent agricultural enterprises. As a result, the SCR is committed to coordinated cooperative approaches with stakeholders outlined in the three wild dog management plans of which the SCR is a stakeholder and signatory.

The implementation of the NSW Fox TAP has led to programs to protect threatened and endangered species such as the BTRW and shore birds such as the Little Tern, Hooded Plover, Sooty Oystercatcher and the Pied Oystercatcher. These programs include monitoring of the species at risk and the pests that threaten their existence. Often, control techniques take an active adaptive management approach to utilise the most effective control techniques suited to that particular time and location.

An emerging critical priority for the SCR is the expanding populations and new incursions of deer species into reserves and bushland on other land tenures within the region. Many of these deer are not only impacting on the rural interface but also encroaching on the urban interfaces. Future monitoring and innovative, coordinated control techniques will be essential to control these pests.

In recent years, the SCR has supported and worked collaboratively with other agencies to trial and undertake new control technologies in order to better control pests. These include Tarlo River NP being one of the trial sites that aided M44 ejectors being registered for use in national parks. The M44 ejector is an additional tool that has been extremely effective in reducing fox numbers. Furthermore, the satellite tracking of goats that has been undertaken over the last three years has aided in controlling their numbers. Information gathered will also be used to map the pests impacts on different vegetation types.

Currently, the SCR has many active weed programs and utilises a number of techniques such as ground spraying, aerial spraying and bush regeneration techniques. Contained within the SCR are two containment lines to help stop the spread of the particular weeds. The National Containment Zone for Lantana is located at Ulladulla and the National Southern Containment Line for Bitou Bush is just south of Sussex Inlet.

The management priorities for the SCR in relation to pests align with state and local priorities under the *Noxious Weeds Act 1993* and the *Rural Lands Protection Act 1998*. In relation to pests, the SCR is committed to utilising best practice control and monitoring techniques. Additionally, the SCR is committed to undertaking and assisting in research and programs that enable more effective and humane control of pests.

3. Regional map



4. Regional prioritisation

The following key factors are considered when determining priorities for pest management within the Region. However, a precautionary approach using risk management (as described in the risk management policy) will be applied where there is uncertainty about the impacts of the pest to 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/communities. These include the highest priorities identified in the TAPs, PAS and BPWW e.g. undertake fox control at the Kangaroo Valley priority sites for BTRW 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 e.g. 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 e.g. 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), programs to control Class 1 and 2 noxious weeds, programs to control several species of deer that have only been discovered in some areas.

High priority

H-IH (International Heritage)

Programs that target pests that impact significantly on sites with international heritage values e.g. control of foxes at migratory shorebird nesting sites such as Lake Wollumboola;

H-CH (Cultural Heritage)

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

Medium priority

M-WNH (Wilderness and National Heritage)

Programs that target pests that impact significantly on Wilderness or other important listed values e.g. control of Blackberries within the Ettrema Wilderness Area;

M-RA (Recreation and aesthetic values)

Programs that target pests that impact significantly on recreation, landscape or aesthetic values, e.g. 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), e.g. control of Bitou Bush across boundaries as part of a regional control plan prepared by a regional weeds advisory committee and supported by NPWS.

Lower priority

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 e.g. 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 e.g. the maintenance of areas treated previously for Serrated Tussock to continue keeping them weed free.

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

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

5. Table of prioritised regional pest programs

Live versions of this table will be kept on the OEH intranet and updated annually over the four year period of the strategy.

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Highlands	Morton National Park	Shoalhaven River and tributaries	Feral goats and feral pigs	Illawarra Subtropical Rainforest EEC	Asset protection	Aerial shooting and ground shooting	C-TSC
Highlands	Bungonia National Park	Shoalhaven River and tributary	Feral goats and feral pigs		Containment	Aerial shooting	L-PP
Highlands	Bungonia State Conservation Area	Shoalhaven River and tributaries	Feral goats and feral pigs		Containment	Aerial shooting	L-PP
Highlands	Tarlo River National Park	Tarlo River & Kerrawarry Creek	Feral goats and feral pigs		Containment	Aerial shooting	L-PP
Highlands	Tarlo River National Park	Tarlo	Wild dogs	Livestock	Asset protection	Ground baiting, trapping and monitoring	C-EC
Highlands	Bungonia National Park	Bungonia	Wild dogs	Livestock	Asset protection	Ground baiting, trapping and monitoring	C-EC
Highlands	Bungonia State Conservation Area	Bungonia	Wild dogs	Livestock	Asset protection	Ground baiting, trapping and monitoring	C-EC
Highlands	Morton National Park	Adit Hill	Wild dogs	Livestock	Asset protection	Ground baiting, trapping and monitoring	C-EC
Highlands	Nadgigomar Nature Reserve	Sunset Mountain	Wild dogs and feral pigs	Livestock	Asset protection	Ground baiting, trapping and monitoring	C-EC
Highlands	Budderoo National Park	Budderoo fire trail/ Jamberoo Rd	Foxes	Long-nosed Potoroo	Asset protection	Ground baiting, monitoring and trapping	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Highlands	Barren Grounds Nature Reserve	Barren Grounds	Foxes	Long-nosed Potoroo, Spotted-tailed Quoll	Asset protection	Ground baiting, monitoring and trapping	C-TSC
Highlands	Kangaroo River Nature Reserve	Kangaroo Valley and Illaroo baiting programs	Foxes and feral goats	Brush-tailed Rock-wallaby	Asset protection	Ground baiting, monitoring, trapping, ground shooting	C-TSC
Highlands	Cambewarra Range Nature Reserve	Kangaroo Valley and Illaroo baiting programs	Foxes and feral goats	Brush-tailed Rock-wallaby	Asset protection	Ground baiting, monitoring, trapping and ground shooting	C-TSC
Highlands	Morton National Park	Kangaroo Valley and Illaroo baiting programs	Foxes and feral goats	Brush-tailed Rock-wallaby	Asset protection	Ground baiting, monitoring, trapping and ground shooting	C-TSC
Highlands	Bugong National Park	Kangaroo Valley and Illaroo baiting programs	Foxes and feral goats	Brush-tailed Rock-wallaby	Asset protection	Ground baiting, monitoring, trapping and ground shooting	C-TSC
Highlands	Barren Grounds Nature Reserve	Barren Grounds NR	Feral cats	Long-nosed Potoroo, Eastern Bristlebird, Ground Parrot	Asset protection	Monitoring and trapping	C-TSC
Highlands	Budderoo National Park	Budderoo NP	Feral cats	Long-nosed Potoroo Eastern Bristlebird, Ground Parrot	Asset protection	Monitoring and trapping	C-TSC
Highlands	Morton National Park	Kimberley Park and Lake Yarunga foreshore, Gales Flat, Griffins Farm	<i>Ligustrum sinense</i> , <i>Lantana camara</i> , <i>Acetosa sagittata</i> , <i>Tradescantia fluminensis</i> , <i>Araujia sericifera</i> , <i>Ageratina riparia</i>	<i>Irenephapsus trypherus</i> (EPBC-e; TSC-e)	Asset protection	Hand weeding, spray, cut and paint	C-TSC
Highlands	Kangaroo River Nature Reserve	Nelsons Creek	<i>Ageratina riparia</i> , <i>Trascantia fluminensis</i> , <i>Senna floribunda</i> , <i>Delairea odorata</i> ,		Containment	Hand weeding, cut and paint, spray	L-LP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Highlands	Bungonia National Park	Camping area and surrounds	<i>Nassella trichotoma</i>		Containment	Spray	L-LP
Highlands	Bungonia State Conservation Area	Becks Gully	<i>Ailanthus altissima</i>		Containment	Cut and paint	L-LP
Highlands	Tarlo River National Park	Kerrawary Creek	<i>Nassella trichotoma, Echium plantagineum</i>		Containment	Spray	L-LP
Highlands	Bangadilly National Park	Bangadilly NP	<i>Nassella trichotoma, Echium plantagineum</i>	White Box, Yellow Box, Blakely's Red Gum Woodland EEC	Asset protection	Spray	C-TSC
Highlands	Budderoo National Park	Budderoo NP	<i>Ageratina adenophora, Ageratina riparia, Anredera cordifolia, Araujia sericifera, Delairea odorata, Erythrina sykesii, Ipomoea spp., Lantana camara, Ligustrum sinense, Pennisetum clandestinum, Tradescantia fluminensis</i>	Sub-tropical, Coachwood and Featherwood Cool and Warm Temperate Rainforest EECs (TSC-e), <i>Irenepharsus trypherus</i> (TSC-e, EPBC-e)	Asset protection	Hand weeding, cut and paint and spray	C-TSC
Highlands	Budderoo National Park	Irenepharsus site on escarpment of upper Kangaroo River	<i>Lantana camara, Delairea odorata, Ageratina riparia</i>	<i>Irenepharsus trypherus</i> (EPBC-e; TSC-e)	Asset protection	Hand removal, cut and paint	C-TSC
Highlands	Budderoo National Park	Minnamurra Rainforest	<i>Lantana camara, Tradescantia fluminensis, Ageratina adenophora, Ageratina riparia, Acetosa sagittata, Delairea odorata</i>	Illawarra Subtropical Rainforest EEC (TSC-e), <i>Cynanchum elegans</i> (EPBC-e; TSC-e), <i>Daphnandra</i> sp. "Illawarra" (EPBC-e; TSC-e), <i>Irenepharsus trypherus</i> (EPBC-e; TSC-e), <i>Zieria granulata</i> (EPBC-e; TSC-e)	Asset protection	Hand removal, cut and paint	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Highlands	Cambewarra Range	Red Rock section	<i>Lantana camara</i>	<i>Solanum celatum</i> (TSC-e); Illawarra Subtropical Rainforest EEC (TSC-e); <i>Irenepharsus trypherus</i> (TSC-e, EPBC-e)	Asset protection	Hand removal, spray cut and paint spray	C-TSC
Highlands	Rodway Nature Reserve	Rodway NP	<i>Lantana camara</i>	<i>Solanum celatum</i> (TSC-e); Illawarra Subtropical Rainforest EEC (TSC-e); <i>Irenepharsus trypherus</i> (TSC-e, EPBC-e)	Asset protection	Hand removal, spray cut and paint	C-TSC
Highlands	Macquarie Pass National Park	Clover Hill Precinct	<i>Ageratina adenophora</i> , <i>Ageratina riparia</i> , <i>Anredera cordifolia</i> , <i>Araujia sericifera</i> , <i>Delairea odorata</i> , <i>Erythrina sykesii</i> , <i>Ipomoea spp.</i> , <i>Lantana camara</i> , <i>Ligustrum sinense</i> , <i>Pennisetum clandestinum</i> , <i>Tradescantia fluminensis</i>	Illawarra Subtropical Rainforest EEC (TSC-e)	Asset protection	Hand removal, spray, cut and paint	C-TSC
Highlands	Macquarie Pass National Park	Irenepharsus site on roadside	<i>Lantana camara</i> , <i>Ageratina adenophora</i> , <i>Ageratina riparia</i> , <i>Alairea odorata</i>	<i>Irenepharsus trypherus</i> (EPBC-e; TSC-e)	Asset protection	Hand removal, cut and paint	C-TSC
Highlands	Macquarie Pass National Park	Southern Highlands Shale Woodland	<i>Ageratina riparia</i> , <i>Ageratina adenophora</i> , <i>Anredera cordifolia</i> , <i>Acetosa sagittata</i> ,	Southern Highlands Shale Woodlands EEC (TSC-e)	Asset protection	Hand removal, cut and paint	C-TSC
Highlands	Macquarie Pass State Conservation Area	Southern Highlands Shale Woodland	<i>Ageratina riparia</i> , <i>Ageratina adenophora</i> , <i>Anredera cordifolia</i> , <i>Acetosa sagittata</i> ,	Southern Highlands Shale Woodlands EEC (TSC-e)	Asset protection	Hand removal, cut and paint	C-TSC
Highlands	Morton National Park (north & west)	Western Part of Morton NP (same as Bungonia site)	<i>Nassella trichotoma</i>	Box Gum Woodland EEC (EPBC-ce; TSC-e)	Asset protection	Spray	C-TSC
Highlands	Morton National Park	McCallums Flat	<i>Nassella trichotoma</i> , <i>Salix spp.</i>		Eradication	Aerial and ground spray, cut and paint	L-PP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Highlands	Nadgigomar Nature Reserve	East Nadgigomar section	<i>Pinus radiata</i>		Containment	Cut and paint	C-TSC
Highlands	Nadgigomar Nature Reserve	Sunset Mountain section	<i>Nassella trichotoma</i>	Box Gum Woodland EEC (EPBC-ce; TSC-e)	Asset protection	Spray	C-TSC
Highlands	Robertson Nature Reserve	Robertson NR	<i>Ligustrum spp.</i> , <i>Rubus fruticosus</i> , <i>Tradescantia fluminensis</i> , <i>Ilex aquifolium</i> , <i>Pinus radiata</i>	Robertson Rainforest EEC (TSC-e),	Asset protection	Cut and paint, manual removal and revegetation	C-TSC
Highlands	Cecil Hoskins Nature Reserve	Cecil Hoskins NR	<i>Salix cinerea</i> , <i>Rubus fruticosus</i> , <i>Hedera helix</i> , <i>Crataegus monogyna</i> , <i>Ulex europaeus</i>	Southern Highlands Shale Woodlands on the talus slopes and patches of Illawarra Sub-tropical Rainforest	Asset protection	Spray, cut and paint and hand removal	M-CP
Ulladulla	Bees Nest Nature Reserve	Shoalhaven River and tributaries	Feral goats and feral pigs		Containment	Aerial shooting	L-PP
Ulladulla	Bees Nest Nature Reserve	Around in-holdings	Wild dogs and foxes	Livestock	Asset protection	Baiting, trapping, shooting and aerial baiting	C-EC
Ulladulla	Conjola National Park	Fox TAP site Conjola, 4km radius from coastal shorebird nesting sites	Foxes	Hooded Plover, Little Tern and Pied Oystercatcher	Asset protection	Baiting, shooting, trapping and den fumigation	C-TSC
Ulladulla	Narrawallee Nature Reserve	Fox TAP site Conjola, 4km radius from coastal shorebird nesting sites	Foxes	Hooded Plover, Little Tern and Pied Oystercatcher	Asset protection	Baiting, shooting, trapping and den fumigation	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ulladulla	Murramarang National Park	Fox TAP site Murramarang 4km radius from coastal shorebird nesting sites	Foxes	Hooded Plover, Little Tern and Pied Oystercatcher	Asset protection	Baiting, shooting, trapping and den fumigation	C-TSC
Ulladulla	Murramarang Aboriginal Area	Fox TAP site Murramarang 4km radius from coastal shorebird nesting sites	Foxes	Hooded Plover, Little Tern and Pied Oystercatcher	Asset protection	Baiting, shooting, trapping and den fumigation	C-TSC
Ulladulla	Meroo National Park	Fox TAP site Meroo 4km radius from coastal shorebird nesting sites	Foxes	Hooded Plover, Little Tern and Pied Oystercatcher	Asset protection	Baiting, shooting, trapping and den fumigation	C-TSC
Ulladulla	Murramarang National Park	Whole park	Wild dogs and foxes	Livestock	Asset protection	Baiting and trapping	C-EC
Ulladulla	Meroo National Park	Whole park	Wild dogs and foxes	Livestock	Asset protection	Baiting and trapping	C-EC
Ulladulla	Conjola National Park	Whole park	Wild dogs and foxes	Livestock	Asset protection	Baiting and trapping	C-EC
Ulladulla	Conjola National Park	Whole Park	Feral cats		Containment	Trapping	L-LP
Ulladulla	Bimberamala National Park	Around in-holdings	Wild dogs and foxes	Livestock	Asset protection	Baiting and trapping	C-EC
Ulladulla	Bimberamala National Park	Around in-holdings	Feral deer		Containment	Shooting	C-NE
Ulladulla	Morton National Park	Kingman	Wild dogs and foxes	Livestock	Asset protection	Baiting, trapping, shooting and aerial baiting	C-EC
Ulladulla	Morton National Park	12 Mile Rd	Wild dogs and foxes	Livestock	Asset protection	Baiting, trapping, shooting and aerial baiting	C-EC
Ulladulla	Morton National Park	Sassafras	Wild dogs and foxes	Livestock	Asset protection	Baiting, trapping, shooting and aerial baiting	C-EC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ulladulla	Morton National Park	Nerriga	Wild dogs and foxes	Livestock	Asset protection	Baiting, trapping, shooting and aerial baiting	C-EC
Ulladulla	Morton National Park	Mongarlowe River	Wild dogs and foxes	Livestock	Asset protection	Baiting, trapping, shooting and aerial baiting	C-EC
Ulladulla	Budawang National Park	Western boundary	Wild dogs and foxes	Livestock	Asset protection	Baiting, trapping and shooting,	C-EC
Ulladulla	Morton National Park	Endrick River	Feral pigs		Containment	Trapping, baiting, and shooting	L-LP
Ulladulla	Morton National Park	Alum Creek	Feral pigs		Containment	Trapping, baiting and shooting	L-LP
Ulladulla	Murramarang National Park	Whole park	Feral pigs		Containment	Trapping, baiting and shooting	L-LP
Ulladulla	Budawang National Park	Mongarlowe	Feral pigs		Containment	Trapping, baiting and shooting	L-LP
Ulladulla	Meroo National Park	Bush Mission	<i>Chlorophytum comosum</i> , <i>Erythrina crista-galli</i>		Containment	Herbicide spraying	M-RA
Ulladulla	Meroo National Park	Pot Holes car park	<i>Buchloe dactyloides</i> , <i>Lonicera japonica</i> , <i>Chlorophytum comosum</i> , <i>Erythrina crista-galli</i>	Bangalay Sand Forest EEC	Asset protection	Herbicide spraying and hand pulling	C-TSC,
Ulladulla	Bees Nest Nature Reserve	Cleared areas in reserve	<i>Nassella trichotoma</i>		Containment	Herbicide spraying	M-CP
Ulladulla	Brush Island Nature Reserve	Patches, southern end of island	<i>Pennisetum clandestinum</i>	Threatened shorebird habitat, sooty oystercatcher (TSC-v)	Asset protection	Herbicide spraying	C-TSC
Ulladulla	Brush Island Nature Reserve	Northern end of island	<i>Opuntia spp.</i>		Containment	Herbicide spraying, and hand pulling	M-CP
Ulladulla	Brush Island Nature Reserve	Beach on southern end of island	<i>Euphorbia paralias</i> , <i>Rubus fruticosus agg.</i>	Impacting on threatened species habitat, sooty oystercatcher	Asset protection	Herbicide spraying and hand pulling	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ulladulla	Clyde River National Park	Patches along river bank, islands and tributaries	<i>Juncus acutus</i>	Coastal Saltmarsh EEC (TSC-e)	Asset protection	Herbicide spraying and hand pulling	C-TSC
Ulladulla	Clyde River National Park	Clyde River riverbanks and islands	<i>Asparagus asparagoides</i> , <i>Buchloe dactyloides</i> , <i>Delairea odorata</i> , <i>Lantana camara</i> , <i>Juncus acutus</i> , <i>Asparagus scandens</i> , <i>Rubus fruticosus</i> agg., <i>Solanum nigrum</i> , <i>Conzya</i> spp.	Mudflats, saltmarshes, Swamp Oak Floodplain Forest EEC (TSC-e), Coastal Saltmarsh EEC (TSC-e)	Asset protection	Herbicide spraying and hand pulling	C-TSC
Ulladulla	Clyde River National Park	Big Island	<i>Sporobolus fertilis</i>	Impacting on EEC, Swamp Oak Floodplain Forest	Asset protection	Herbicide spraying	C-TSC
Ulladulla	Clyde River National Park	River edge	<i>Solanum pseudocapsicum</i> , <i>Verbena bonariensis</i> , <i>Sida Rhombifolia</i> , <i>Passifora</i> spp., <i>Solanum mauritianum</i>	Impacting on EEC, Swamp Oak Floodplain Forest	Asset protection	Herbicide spraying, hand pulling	C-TSC
Ulladulla	Clyde River National Park	Little Island and adjacent foreshore	<i>Tradescantia fluminensis</i>		Containment	Herbicide spraying and hand pulling	C-TSC
Ulladulla	Clyde River National Park	Edge of Kings Highway	<i>Andropogon virginicus</i>		Containment	Herbicide spraying	L-PP
Ulladulla	Conjola National Park	The Haven/Alamein Track and Walter Hood (coastal disturbed sites)	<i>Bryophyllum</i> spp., <i>Asparagus africanus</i> , <i>Solanum mauritianum</i> , <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> , <i>Stenotaphrum secundatum</i>	Bangalay Sand Forest	Asset protection	Herbicide spraying and hand pulling	C-TSC,
Ulladulla	Conjola National Park	Monument Beach, Berrara Beach, Swanhaven, Conjola Beach, Buckleys Beach	<i>Asparagus scandens</i> , <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> , <i>Asparagus africanus</i> , <i>Bryophyllum</i> spp., <i>Euphorbia paralias</i>	Dry Coastal Sand Forest, swamp forest and heathlands, Littoral Rainforest	Asset protection	Herbicide spraying, hand pulling	C-TSC,
Ulladulla	Conjola National	Monument Beach,	<i>Euphorbia paralias</i>	impacting on threatened species	Asset	Herbicide spraying	C-TSC,

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
	Park	Berrara Beach		habitat, pied oystercatcher and hooded plover	protection	and hand pulling	
Ulladulla	Cullendulla Creek Nature Reserve	Square Head	<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i>	Littoral Rainforest EEC (EPBC-ce; TSC-e)	Asset protection	Herbicide spraying and hand pulling	C-TSC ,
Ulladulla	Cullendulla Creek Nature Reserve	Cullendulla Creek	<i>Asparagus aethiopicus</i> , <i>Asparagus asparagoides</i> , <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> , <i>Delairea odorata</i> , <i>Senna spp.</i> , <i>Juncus acutus</i>	Rainforest, <i>E. tereticornis/botryoides</i> forest, <i>Banksia serrata understorey</i> , Saltmarsh	Asset protection	Herbicide spraying and hand pulling	C-TSC ,
Ulladulla	Cullendulla Creek Nature Reserve	Throughout Reserve	<i>Acetosa sagittata</i> , <i>Oputunia</i> , spp	Invading EEC, Swamp Oak Floodplain forest	Asset protection	Herbicide spraying and hand pulling	C-TSC,
Ulladulla	Cullendulla Creek Nature Reserve	Throughout low lying areas of the reserve	<i>Juncus acutus</i>	Impacting on EEC, Coastal Saltmarsh, Swamp Oak Floodplain Forest	Asset protection	Herbicide spraying	C-TSC,L-PP
Ulladulla	Meroo National Park	Meroo Head	<i>Asparagus scandens</i>	Invading EEC, Bangalay Sand Forest	Asset protection	Herbicide spraying and hand pulling	C-TSC,
Ulladulla	Meroo National Park	Highway - along powerlines	<i>Amsonia hubrichtii</i>		Containment	Herbicide spraying	C-NE
Ulladulla	Meroo National Park	Invading bushland from established camp grounds and day use areas	<i>Buchloe dactyloides</i> , <i>Panicum sp.</i>	Invading EEC, Bangalay Sand Forest	Asset protection	Herbicide spraying	C-TSC,
Ulladulla	Meroo National Park	At ex-pine forest sites	<i>Cortaderia jubata</i> , <i>Pinus radiata</i>		Containment	herbicide spraying, hand pulling	M-CP,
Ulladulla	Meroo National Park	Burrill Lake - fringes	<i>Asparagus scandens</i> , <i>Buchloe dactyloides</i> , <i>Onopordum acanthium</i>	Swamp Oak Floodplain Forest EEC (TSC-e)	Asset protection	Herbicide spraying	C-TSC,
Ulladulla	Meroo National Park	Meroo coastal communities (Willinga Beach, Meroo Beach,	<i>Euphorbia paralias</i> , <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> , <i>Asparagus aethiopicus</i> , <i>Araujia sericifera</i> ,	Impacting on threatened species habitat, pied oystercatcher (TSC-e) and Hooded Plover (TSC-ce), Invading Bangalay Sand Forest	Asset protection	Herbicide spraying and hand pulling	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
		Termeil Beach, Tabourie Beach)	<i>Anredera cordifolia</i> , <i>Euphorbia paralias</i> , <i>Acetosa sagittata</i>	EEC (TSC-e)			
Ulladulla	Meroo National Park	Crampton Island	<i>Acetosa sagittata</i> , <i>Stenotaphrum secundatum</i>	Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e)	Asset protection	Herbicide spraying and hand pulling	C-TSC,
Ulladulla	Murramarang National Park	Northern Murramarang beaches (north of Mt Durras)	<i>Zantedeschia aethiopica</i> , <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> , <i>Rubus fruticosus</i> agg., <i>Anredera cordifolia</i> , <i>Araujia sericifera</i> , <i>Euphorbia paralias</i> , <i>Senna</i> spp.	Impacting on Threatened Species Habitat, Pied Oystercatcher (TSC-e) and Hooded Plover (TSC-ce), Impacting on Swamp Oak Floodplain Forest EEC (TSC-e) and Freshwater Wetlands on Coastal Floodplains EEC (TSC-e)	Asset protection	Herbicide spraying	C-TSC
Ulladulla	Murramarang National Park	Judges property	<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i>	Bangalay Sand Forest EEC (TSC-e)	Asset protection	Herbicide spraying, hand pulling	C-TSC,
Ulladulla	Murramarang National Park	Pebbly Beach	<i>Rubus fruticosus</i> , <i>Aristea ecklonii</i> , <i>Anredera cordifolia</i> , <i>Ipomoea jalapa</i> , <i>Solanum crispum</i> , <i>Solanum pseudocapsicum</i> , <i>Conzuya</i> spp., <i>Erythrina crista-galli</i> , <i>Sida rhombifolia</i> <i>Zantedeschia aethiopica</i>	Impacting on prominent day use area and Littoral Rainforest EEC	Asset protection	Herbicide spraying	C-TSC
Ulladulla	Murramarang National Park	Mt Durras	<i>Aristea ecklonii</i> , <i>Solanum mauritianum</i>	Invading rainforest, excluding native vegetation	Asset protection	Herbicide spraying	C-NE
Ulladulla	Murramarang National Park	Invading bushland from established camp grounds and day use areas	<i>Buchloe dactyloides</i>		Containment	Herbicide spraying	M-RA,
Ulladulla	Murramarang National Park	Durras, Depot Beach, Durras Mountain	<i>Erythrina crista-galli</i>		Containment	Herbicide spraying	L-PP
Ulladulla	Murramarang National Park	Quiriga Beach/Reef Point-Three Islet Point	<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i>	Swamp Sclerophyll Forest on Coastal Floodplains EEC (TSC-e)	Asset protection	Herbicide spraying, hand pulling	C-TSC,

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ulladulla	Murramarang National Park	Pebbly Beach, Durras Mountain	<i>Sida rhombifolia</i>		Containment	Herbicide spraying	L-PP
Ulladulla	Murramarang National Park		<i>Opuntia</i> spp		Containment	Herbicide spraying and hand pulling	M-CP
Ulladulla	Murramarang National Park	Pebbly Beach, Durras Mountain	<i>Onopordum acanthium</i> <i>Sida rhombifolia</i>		Containment	Herbicide spraying	L-PP
Ulladulla	Murramarang National Park	North Head Beach, Oaky Beach, Richmond Beach, Myrtle Beach, Emily Miller Beach, Durras Beach, Pebbly Beach, Island Beach, Pretty Beach	<i>Cassia</i> spp		Containment	Herbicide spraying and hand pulling	C-NE
Ulladulla	Murramarang National Park	Murramarang Resort, Pebbly Beach	<i>Juncus acutus</i>		Containment	Herbicide spraying and hand pulling	L-PP
Ulladulla	Murramarang National Park	Along creek lines behind sand dunes and low lying areas throughout park	<i>Chrysanthemoides monilifera</i> subsp. <i>Rotundata</i> <i>Euphorbia paralias</i> , <i>Acetosa sagittata</i>	Swamp Oak Floodplain Forest EEC (TSC-e), Freshwater Wetlands on Coastal Floodplains EEC (TSC-e), Coastal Saltmarsh EEC (TSC-e)	Asset protection	Herbicide spraying	C-TSC
Ulladulla	Narrawallee Creek Nature Reserve	Buckleys Beach	<i>Chrysanthemoides monilifera</i> subsp. <i>Rotundata</i> <i>Euphorbia paralias</i> , <i>Acetosa sagittata</i>	Bangalay Sand Forest, Coastal Banksia Woodlands (<i>Banksia integrifolia</i>)	Asset protection	Herbicide spraying and hand pulling	C-TSC,
Ulladulla	Narrawallee Creek Nature Reserve	Narrawallee inlet	<i>Lantana camara</i> , <i>Juncus acutus</i> , <i>Acetosa sagittata</i>	Swamp Oak Floodplain Forest EEC (TSC-e), Freshwater Wetlands on Coastal Floodplains EEC (TSC-e), Coastal Saltmarsh EEC (TSC-e)	Asset protection	Herbicide spraying and hand pulling	C-TSC,
Ulladulla	Narrawallee Creek Nature Reserve	Conjola Beach	<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> , <i>Euphorbia paralias</i>	Pied Oystercatcher and Hooded Plover	Asset protection	Herbicide spraying and hand pulling	C-TSC,

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ulladulla	Narrawallee Creek Nature Reserve	Pattimores lagoon	<i>Juncus acutus</i>	Coastal Saltmarsh EEC (TSC-e), Swamp Oak Floodplain Forest EEC (TSC-e)	Asset protection	Herbicide spraying	C-TSC,
Ulladulla	Narrawallee Creek Nature Reserve	Narrawallee beach	<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> , <i>Lantana camara</i> , <i>Euphorbia paralias</i> , <i>Acetosa sagittata</i> , <i>Asparagus scandens</i>	Impacting on Threatened Species Habitat, Pied Oystercatcher (TSC-v) and Hooded Plover (TSC-ce), Impacting on Bangalay Sand Forest EEC (TSC-e)	Asset protection	Herbicide spraying	C-TSC,
Ulladulla	Tollgate Islands Nature Reserve	Tollgate Islands Cliffs and plateaus of island	<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> , <i>Euphorbia paralias</i>	Impacting on Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e)	Asset protection	Herbicide spraying, hand pulling and aerial spraying	C-TSC,
Ulladulla	Tollgate Islands Nature Reserve	Gullies	<i>Acetosa sagittata</i>	Potentially impacting on EEC, Themeda Grassland on Seacliffs and Coastal Headlands	Asset protection	Herbicide spraying and hand pulling	C-TSC,
Ulladulla	Yattheyattah Nature Reserve	Yattheyattah Rainforest	<i>Rubus fruticosus</i> agg., <i>Asparagus asparagoides</i> , <i>Senna artemisioides</i> , <i>Anredera cordifolia</i> , <i>Macfadyena unguis-cati</i>	Impacting on Milton Ulladulla Sub-tropical Rainforest EEC (TSC-e)	Asset protection	Herbicide spraying, hand pulling and biological control	C-TSC,
Ulladulla	Yattheyattah Nature Reserve	Yattheyattah Rainforest - Lantana	<i>Lantana camara</i>	Milton Ulladulla Subtropical Rainforest EEC (TSC-e)	Asset protection	Herbicide spraying, hand pulling, biological control	C-TSC,
Ulladulla	Yattheyattah Nature Reserve	Grassy woodland	<i>Olea europea</i> subsp. <i>cuspidata</i>	<i>E. terricornis</i> Grassy Woodland	Containment	Herbicide spraying	M-CP
Ulladulla	Yattheyattah Nature Reserve	Cleared areas within reserve	<i>Senecio madagascariensis</i>		Containment	Herbicide spraying and hand pulling	M-CP
Ulladulla	Yattheyattah Nature Reserve	Powerlines	<i>Sporobolus fertilis</i>		Containment	Herbicide spraying	M-CP
Ulladulla	Yattheyattah Nature Reserve	Along Currowar Creek and adjoining properties	<i>Anredera cordifolia</i> , <i>Ipomoea jalapa</i> , <i>Solanum crispum</i> ,	Impacting on EEC, Milton Ulladulla Sub-tropical Rainforest	Asset protection	Herbicide spraying and hand pulling	C-TSC
Ulladulla	Yattheyattah Nature Reserve	Yattheyattah NR	<i>Tradescantia fluminensis</i> , <i>Solanum pseudocapsicum</i> , <i>Araujia hortorum</i> <i>Ligustrum sinense</i> , <i>Passiflora spp</i> <i>Cassia</i>	Impacting on EEC, Milton Ulladulla Sub-tropical Rainforest	Asset protection	Herbicide spraying and hand pulling	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
			<i>spp.</i> , <i>Macfadyena unguis-cati</i> <i>Wataonia spp</i> , <i>Erythrina crista-galli</i> , <i>Lonicera japonica</i> <i>Asparagus asparagoides</i> , <i>Zantedeschia aethiopica</i> , <i>Canna</i> <i>spp.</i>				
Ulladulla	Yattheyattah Nature Reserve	In open areas and adjoining neighbours	<i>Solanum mauritianum</i>	Impacting on EEC, Milton Ulladulla Sub-tropical Rainforest	Asset protection	Herbicide spraying and hand pulling	L-PP
Nowra	Jervis Bay National Park	North Jervis Bay,	<i>Chrysanthemoides monilifera subsp. rotundata</i>	Swamp Oak Floodplain Forest EEC (TSC-e), Bangalay Sand Forest EEC (TSC-e), Littoral Rainforest EEC (EPBC-ce; TSC-e), Freshwater Wetlands EEC (TSC-e)	Asset protection	Ground spraying	C-TSC
Nowra	Jervis Bay National Park	North Jervis Bay-Lake Wollumboola	Foxes, ravens and silver gulls	Little Tern	Asset protection	Ground baiting, trapping and shooting	C-TSC
Nowra	Jervis Bay National Park	Bherwerre Peninsula	Foxes and wild dogs	Eastern Bristlebird, Eastern Chestnut Mouse, Ground Parrot	Asset protection	Ground baiting	C-TSC
Nowra	Jervis Bay National Park	Carama Inlet (Area 3)	<i>Lantana camara</i> , <i>Chrysanthemoides monilifera subsp. rotundata</i> , <i>Senna spp</i> , <i>Erythrina x sykesii</i>	Swamp Oak Floodplain Forest EEC (TSC-e), Bangalay Sand Forest EEC (TSC-e), Littoral Rainforest EEC (EPBC-ce; TSC-e), Freshwater Wetlands EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Jervis Bay National Park	Vincentia (Area 7)	<i>Chrysanthemoides monilifera subsp. rotundata</i> , <i>Senna pendula</i> , <i>Rubus fruticosus agg.</i> , <i>Ageratina riparia</i> , <i>Pinus radiata</i> , <i>Lonicera japonica</i> , <i>Passiflora spp.</i> , <i>Asparagus aethiopicus</i> , <i>Hedera helix</i> , <i>Billardiera heterophylla</i> , <i>Crocasmia x crocosmiiflora</i> , <i>Erythrina x sykesii</i> , <i>Crassula sp.</i>	Freshwater Wetland EEC (TSC-e), Swamp Sclerophyll Forest EEC (TSC-e), Bangalay Sand Forest EEC (TSC-e), Coastal Saltmarsh EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Nowra	Jervis Bay National Park	Hyams Beach (area 8)	<i>Chrysanthemoides monilifera subsp. rotundata</i> , <i>Dipogon lignosus</i> , <i>Passiflora spp.</i> , <i>Asparagus aethiopicus</i> , <i>Senna pendula</i> , <i>Watsonia sp.</i> , <i>Erythrina x sykesii</i>	Blackbutt forest, heath, open forest, Bangalay Sand Forest EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Jervis Bay National Park	Huskisson (part of Area 6)	<i>Senna pendula</i> , <i>Ageratina riparia</i> , <i>Rubus fruticosus agg.</i> , <i>Lonicera japonica</i> , <i>Dipogon lignosus</i> , <i>Ligustrum sinense</i> , <i>Salix spp.</i>	Freshwater Wetlands EEC (TSC-e), Swamp Sclerophyll Forest EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Woollamia Nature Reserve	Woollamia NR	Foxes and wild dogs	Eastern Bristlebird, Eastern Chestnut Mouse, Ground Parrot	Asset protection	Ground baiting	C-TSC
Nowra	Bomaderry Creek RP	Bomaderry Creek Bushland	<i>Bryophyllum delagoense</i> , <i>Lantana camara</i> , <i>Ageratina adenophora</i> , <i>Ageratina riparia</i> , <i>Cortaderia selloana</i> , <i>Eragrotis curvulaligustrum sinense</i> , <i>Acetosa sagittata</i> , <i>Anredera cordifolia</i> , <i>Andropogon virginicus</i> , <i>Allanthus altissima</i>	<i>Zieria baeuerlenii</i> (EPBC-e; TSC-e), <i>Eucalyptus langleyi</i> (EPBC-v; TSC-v), Coastal Tall Wet Heath Swamp Forest	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Triplarina Nature Reserve	Flat Rock Creek	<i>Lantana camara</i> , <i>Rubus fruticosus agg.</i> , <i>Chlorophytum comosum</i> , <i>Bryophyllum delagonense</i> , <i>Erythrina x sykesii</i>	Riparian vegetation - <i>melaleuca</i> ; <i>Cryptostylis hunterinana</i> (EPBC-v; TSC-v), <i>Triplarina nowraensis</i> (EPBC-e; TSC-e), River Flat Eucalypt Forest EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Worrigea Nature Reserve	Worrigea NR	<i>Ageratina adenophora</i> , <i>Cinnamomum camphora</i> , <i>Rubus spp</i>	Illawarra Lowlands Grassy Woodland EEC (E3, TSC-e), Green and Golden Bell Frog (EPBC-v; TSC-e), Illawarra Greenhood Orchid (<i>Pterostylis gibbosa</i>)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Colymea State Conservation Area	Colymea Creek	<i>Lantana camara</i> , <i>Rubus fruticosus agg.</i> , <i>Ageratina riparia</i>	River Flat Eucalypt Forest EEC (TSC-e), Illawarra Subtropical Rainforest EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
						ground spraying	
Nowra	Wogamia Nature Reserve	Riverflat	<i>Lantana camara</i> , <i>Rubus fruticosus</i> agg., <i>Tradescantia fluminensis</i> , <i>Ageratina riparia</i> , <i>Ligustrum sinense</i> ,	River Flat Eucalypt Forest EEC (TSC-e), <i>Casuarina cunninghamii</i> Forest	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Bamarang Nature Reserve	Bamarang NR	<i>Lantana camara</i>	River Flat Eucalypt Forest EEC (TSC-e), <i>Casuarina cunninghamii</i> Forest	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Brundee Swamp Nature Reserve	Brundee Swamp NR	<i>Lantana camara</i> , <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> , <i>Araujia sericifera</i>	<i>E. robusta</i> Swamp Forest, Coastal Saltmarsh EEC (TSC-e), Swamp Oak Floodplain Forest EEC (TSC-e), Freshwater Wetland EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Saltwater Swamp Nature Reserve	Saltwater Swamp NR	<i>Lantana camara</i> , <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> , <i>Araujia sericifera</i>	<i>E. robusta</i> Swamp Forest, Coastal Saltmarsh EEC (TSC-e), Swamp Oak Floodplain Forest EEC (TSC-e), Freshwater Wetland EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Seven Mile Beach National Park	North Seven Mile Beach	<i>Lantana camara</i> , <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> , <i>Ageratina adenophora</i> , <i>Ageratina riparia</i> , <i>Erythrina x sykesii</i> , <i>Araujia sericifera</i> , <i>Pennisetum clandestinum</i> , <i>Tradescantia fluminensis</i> , <i>Acetosa sagittata</i> , <i>Anredera cordifolia</i> , <i>Asparagus</i> spp.	Littoral Rainforest EEC (EPBC-ce; TSC-e) and transitional Rainforest, Bangalay Sand Forest EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Seven Mile Beach National Park	Coomanderry Swamp	<i>Lantana camara</i> , <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> , <i>Pennisetum clandestinum</i>	Freshwater Wetlands on Coastal Floodplain EEC (TSC-e), Swamp Oak Floodplain Forest EEC (TSC-e), Bangalay Sand Forest EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Seven Mile Beach National Park	South Seven Mile Beach	<i>Lantana camara</i> , <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> , <i>Acetosa</i>	Bangalay Sand Forest EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
			<i>sagittata</i> , <i>Araujia sericifera</i>			ground spraying	
Nowra	Comerong Island Nature Reserve	Comerong Island NR	<i>Anredera cordifolia</i> , <i>Asparagus spp.</i> , <i>Chrysanthemoides monilifera subsp. rotundata</i> , <i>Lantana camara</i> , <i>Juncus acutus</i>	Grey-headed Flying-fox colony (EPBC-v; TSC-v), <i>E.botryoides/B. serrata</i> Sand Forest, Littoral Rainforest EEC (EPBC-ce; TSC-e), Grey Mangrove and Coastal Saltmarsh EEC (TSC-e),	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Comerong Island Nature Reserve; Seven Mile Beach National Park	Shoalhaven River mouth and fore dunes	Foxes, cats, ravens and dogs	Pied Oyster Catcher (<i>Haematopus longirostris</i>), Little Tern (<i>Sterna albifrons</i>)	Asset protection	Ground baiting, trapping and shooting	C-TSC
Nowra	Bugong National Park	Old quarry sites (Lower Bugong Road), along Abernathy Creek	<i>Ageratina riparia</i> , <i>Lantana camara camara</i> , <i>Cirsium vulgare</i> , <i>Rubus fruticosus agg</i> <i>Ageratina adenophora</i>	Illawarra Sub-tropical Rainforest in the Sydney Bioregion (E3), Riparian River Oak Acacia Shrub-Grass-Herb Forest	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Bugong National Park	Lower Bugong	Foxes	Brush-tailed Rock-wallaby	Asset Protection	Ground baiting, trapping and shooting	C-TSC
Nowra	Morton National Park	Shoalhaven River and tributaries	Feral goats	Brush-tailed Rock-wallaby TSC Act (direct competition)	Containment	Ground shooting and aerial shooting	C-LPP
Nowra	Morton National Park	Tolwong, Touga, Sassafras	Wild dogs	Livestock	Asset Protection	Ground baiting, trapping, ejectors and monitoring	C-EC
Nowra	Morton National Park	Yalwal Creek / Shoalhaven River - junction	<i>Ailanthus altissima</i> <i>Lantana camara camara</i> , <i>Ligustrum sinense</i> , <i>Tradescantia fluminensis</i> , <i>Acetosa sagittata</i> , , <i>Senna spp.</i> , <i>Araujia sericifera</i> , <i>Rubus fruticosus agg</i>	EEC (River Flat Eucalypt Forest)	Asset protection	Ground spraying and cut and paint	C-TSC
Nowra	Morton National Park	Shoalhaven River	<i>Lantana camara</i> , <i>Ligustrum sinense</i> , <i>Tradescantia fluminensis</i> , <i>Acetosa sagittata</i> , <i>Ailanthus altissima</i> , <i>Senna spp.</i> ,	River Flat Eucalypt Forest EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
			<i>Araujia sericifera</i>				
Nowra	Morton National Park	Iron pot clearing and Tolwong	<i>Nassella trichotoma</i>	Tableland Basalt Forest EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Morton National Park	Ettrema Creek	<i>Lantana camara, Ailanthus altissima, Rubus fruticosus agg.</i>	River Flat Eucalypt Forest EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Morton State Conservation Area	Gassy Gully Creek and Shoalhaven River	<i>Rubus fruticosus agg., Lantana camara, Araujia sericifera, Ligustrum sinense, Ageratina riparia, Tradescantia fluminensis</i>	River Flat Eucalypt Forest EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Parma Creek Nature Reserve	Areas adjacent to rural properties primarily in the eastern section of both reserves.	Wild dogs and foxes	Livestock	Asset Protection	Ground baiting and trapping	C-EC
Nowra	Jerrawangala National Park	Areas adjacent to rural properties primarily in the eastern section of both reserves.	Wild dogs and foxes	Livestock	Asset Protection	Ground baiting and trapping	C-EC
Nowra	Jerrawangala National Park	Adjoining another property	<i>Lantana camara</i>	Coastal Hinterland Ecotonal Gully Rainforest	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Nowra	Corramy State Conservation Area	Four Ways	<i>Stenotaphrum secundatum, Lilium formosanum</i>	Swamp Oak Floodplain Forest EEC (TSC-e); Coastal Saltmarsh EEC (TSC-e)	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Nowra	Cullunghutti Aboriginal Area	Coolangatta Mountain	<i>Lantana camara</i> , <i>Delairea odorata</i> , <i>Olea europea subsp. cuspidata</i> , <i>Ageratina adenophora</i>	Illawarra Subtropical Rainforest EEC (TSC-e), Red Gum Forest	Asset protection	Hand pulling, cut and paint and ground spraying	C-TSC
Illawarra	Dharawal State Conservation Area	Upland swamps and boundaries	Foxes	Endangered: Broad-headed Snake, Eastern Bristlebird, Regent Honeyeater. vulnerable: Koala, Yellow-bellied Glider, Eastern Pygmy-Possum, Southern Brown Bandicoot, Ground Parrot	Asset protection	Ground baiting	C-TSC
Illawarra	Dharawal Nature Reserve	Upland swamps and boundaries	Foxes	Endangered: Broad-headed Snake, Eastern Bristlebird, Regent Honeyeater. vulnerable: Koala, Yellow-bellied Glider, Eastern Pygmy-Possum, Southern Brown Bandicoot, Ground Parrot	Asset protection	Ground baiting	C-TSC
Illawarra	Illawarra Escarpment State Conservation Area	Upland swamps and boundaries	Foxes	Endangered: Broad-headed Snake, Eastern Bristlebird, Regent Honeyeater. vulnerable: Koala, Yellow-bellied Glider, Eastern Pygmy-Possum, Southern Brown Bandicoot, Ground Parrot	Asset protection	Ground baiting	C-TSC
Illawarra	Illawarra Escarpment State Conservation Area	Moist Forest corridor & boundaries	Foxes	Eastern Pygmy-possum, Green & Golden Bell Frog, Southern Brown Bandicoot	Asset protection	Ground baiting	C-TSC
Illawarra	Illawarra Escarpment State Conservation Area	Upland Swamps, Moist Forests, Maddens Plains & Boundaries	Rusa deer	EEC - Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion, Illawarra Sub-tropical Rainforest, Illawarra Coastal Grassy Woodland.	Asset protection	Ground shooting	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
				Endangered: <i>rthropteris palisotii</i> , <i>Cynanchum elegans</i> , <i>Daphnandra sp. Illawarra</i> , <i>Zieria granulate</i> , <i>Pomaderris adnata</i> , <i>Irenepharsus trypherus</i> . Vulnerable: <i>Syzygium paniculatum</i> , <i>Pultenaea aristata</i> , <i>Haloragis exalata subsp. Exalata var. exalata</i> . <i>Callitris endlicheri</i> . Regenerating forest.			
Illawarra	Dharawal State Conservation Area	Boundaries	Rusa deer	EEC - Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion, Illawarra Sub-tropical Rainforest, Illawarra Coastal Grassy Woodland. Endangered: <i>Arthropteris palisotii</i> , <i>Cynanchum elegans</i> , <i>Daphnandra sp. Illawarra</i> , <i>Zieria granulate</i> , <i>Pomaderris adnata</i> , <i>Irenepharsus trypherus</i> . Vulnerable: <i>Syzygium paniculatum</i> , <i>Pultenaea aristata</i> , <i>Haloragis exalata subsp. Exalata var. exalata</i> . <i>Callitris endlicheri</i> . Regenerating forest.	Asset protection	Ground shooting	C-TSC
Illawarra	Upper Nepean State Conservation Area	Southern boundaries	Rusa deer	EEC - Shale/Sandstone Transition Forest, Southern Highlands Shale Woodland, Robertson Basalt Tall Open Forest, Robertson Rainforest, O'Hares Creek Shale Forest, Montane Peatland and Swamp, Cumberland Plain Woodland. Endangered <i>Persoonia bargoensis</i> , <i>P. glaucescens</i> , Vulnerable <i>Epacris purpurascens var. purpurascens</i> , <i>Melaleuca</i>	Asset protection	Ground shooting	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
				<i>deanei</i> and <i>Grevillea parviflora</i>			
Illawarra	Dharawal State Conservation Area	Boundaries	Feral goats	EEC - Shale/Sandstone Transition Forest, Southern Highlands Shale Woodland, Robertson Basalt Tall Open Forest, Robertson Rainforest, O'Hares Creek Shale Forest, Montane Peatland and Swamp, Cumberland Plain Woodland. Endangered: <i>Callitris endlicheri</i> . Aboriginal shelters	Asset protection	Ground and aerial shooting	M-CP
Illawarra	Dharawal Nature Reserve	Boundaries	Feral goats	EEC - Shale/Sandstone Transition Forest, Southern Highlands Shale Woodland, Robertson Basalt Tall Open Forest, Robertson Rainforest, O'Hares Creek Shale Forest, Montane Peatland and Swamp, Cumberland Plain Woodland. Endangered: <i>Callitris endlicheri</i> . Aboriginal shelters	Asset protection	Ground and aerial shooting	M-CP
Illawarra	Upper Nepean State Conservation Area	Boundaries	Feral goats	EEC - Shale/Sandstone Transition Forest, Southern Highlands Shale Woodland, Robertson Basalt Tall Open Forest, Robertson Rainforest, O'Hares Creek Shale Forest, Montane Peatland and Swamp, Cumberland Plain Woodland. Endangered: <i>Callitris endlicheri</i> . Aboriginal shelters	Asset protection	Ground and aerial shooting	M-CP
Illawarra	Illawarra Escarpment State Conservation Area	Mt Kembla; Maddens Plains	Feral goats	Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion, Illawarra Sub-tropical Rainforest, Illawarra Coastal Grassy Woodland. Endangered: <i>Arthropteris palisotii</i> , <i>Cynanchum elegans</i> , <i>Daphnandra sp.</i>	Eradication	Ground shooting	C-NE

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
				<i>Illawarra, Zieria granulate, Pomaderris adnata, Irenepharsus trypherus.</i> Vulnerable: <i>Syzygium paniculatum, Pultenaea aristata, Haloragis exalata subsp. Exalata var. exalata.</i> Regenerating forest.			
Illawarra	Illawarra Escarpment State Conservation Area	Mt Kembla and Mt Keira	<i>Lantana camara, Ageratina adenphora, Ageratina riparia, Ipomoea spp., Araujia sericifera, Passiflora spp</i>	Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion, Illawarra Sub-tropical Rainforest, Illawarra Coastal Grassy Woodland. Endangered: <i>Arthropteris palisotii, Cynanchum elegans, Daphnandra sp. Illawarra, Zieria granulate, Pomaderris adnata, Irenepharsus trypherus.</i> Vulnerable: <i>Syzygium paniculatum, Pultenaea aristata, Haloragis exalata subsp. Exalata var. exalata.</i> Regenerating forest	Asset Protection	Ground spraying and bush regeneration	C-TSC
Illawarra	Illawarra Escarpment State Conservation Area	Mt Keira	<i>Caesalpinea decapetala</i>		Eradication	Ground spraying	C-EC
Illawarra	Dharawal Nature Reserve	Maddens Plains	<i>Cortaderia selloana</i>	EEC - O'Hares Creek Shale Forest	Asset protection	Ground spraying	C-TSC
Illawarra	Dharawal Nature Reserve	Maddens Plains	<i>Cortaderia selloana</i>	Upland Swamps	Asset protection	Ground spraying	C-NE
Illawarra	Dharawal Nature Reserve	Various sites	<i>Eragrostis curvula</i>		Containment	Ground spraying	L-LP
Illawarra	Illawarra Escarpment State	Maddens Plains	<i>Cortaderia selloana</i>	EEC - Southern Sydney Sheltered Forest on Transitional	Asset protection	Ground spraying	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
	Conservation Area			Sandstone Soils in the Sydney Basin Bioregion; Upland swamps			
Illawarra	Illawarra Escarpment State Conservation Area	Thirroul-Stanwell Park	<i>Cortaderia selloana</i>	Moist Forest Corridor	Asset protection	Ground spraying	M-CP
Illawarra	Dharawal State Conservation Area	Roads, utility easements and boundaries	<i>Andropogon virginicus</i>	O'Hares Creek Shale Forest; Upland Swamps	Asset protection	Ground spraying	C-TSC
Illawarra	Dharawal Nature Reserve	Roads, utility easements and boundaries	<i>Andropogon virginicus</i>	O'Hares Creek Shale Forest; Upland Swamps	Asset protection	Ground spraying	C-TSC
Illawarra	Illawarra Escarpment State Conservation Area	Roads, utility easements and boundaries	<i>Andropogon virginicus</i>	EEC - Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion. Upland Swamps	Asset protection	Ground spraying	C-TSC
Illawarra	Berkeley Nature Reserve	Gooseberry Island	<i>Alternanthera philoxeroides</i> , <i>Lantana camara</i> , <i>Anredera cordifolia</i> , <i>Bryophyllum delagoense</i> , <i>Tradescantia fluminensis</i> , <i>Ageratina adenophora</i> , <i>Asparagus spp.</i> , <i>Chrysanthemoides monilifera subsp. rotundata</i> , <i>Ipomoea cairica</i> , <i>Delairea odorata</i>	EEC - Illawarra Subtropical Rainforest; Swamp Oak Floodplain Forest	Asset protection	Bush regeneration	C-TSC
Illawarra	Berkeley Nature Reserve	Hooka Island	<i>Alternanthera philoxeroides</i> , <i>Lantana camara</i> , <i>Anredera cordifolia</i> , <i>Bryophyllum delagoense</i> , <i>Tradescantia fluminensis</i> , <i>Ageratina adenophora</i> , <i>Asparagus spp.</i> , <i>Chrysanthemoides monilifera</i>	EEC - Illawarra Subtropical Rainforest; Swamp Oak Floodplain Forest	Asset protection	Bush regeneration	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
			<i>subsp. rotundata, Ipomoea cairica, Delairea odorata</i>				
Illawarra	Berkeley Nature Reserve	Gooseberry Island	<i>Alternanthera philoxeroides</i>	EEC - Coastal Saltmarsh	Eradication	Ground spraying	C-TSC
Illawarra	Berkeley Nature Reserve	Hooka Island	<i>Alternanthera philoxeroides</i>	EEC - Coastal Saltmarsh	Eradication	Ground spraying	C-TSC
Illawarra	Upper Nepean State Conservation Area	Southern boundaries	<i>Rubus fruticosus agg., Ulex europaeus, Andropogon virginicus, Cortaderia selloana, Eragrostis curvula, Ipomoea indica, Cirsium vulgare, Asparagus asparagoides, Pinus radiata, Nassella trichotoma, Agapanthus praecox, Ligustrum sinense, Watsonia sp., Acetosa sagittata, Gomphocarpus fruticosus, Agave americana, Nerium oleander, Hypericum sp., Genista monspessulana</i>	EEC - Shale/Sandstone Transition Forest, Southern Highlands Shale Woodland, Robertson Basalt Tall Open Forest, Robertson Rainforest, O'Hares Creek Shale Forest, Montane Peatland and Swamp, Cumberland Plain Woodland. Endangered: <i>Persoonia bargoensis, P. glaucescens</i> . Vulnerable: <i>Epacris purpurascens var. purpurascens, Melaleuca deanei, Grevillea parviflora</i>		Ground spraying	
Illawarra	Five Islands Nature Reserve	Big Island	<i>Pennisetum clandestinum, Ipomoea purpurea, Coprosma repens, Chrysanthemoides monilifera subsp. rotundata</i>	Migratory species (EPBC Act): Wedge-tailed & Short-tailed Shearwaters	Asset protection	Burning, Ground spraying and bush regeneration	C-TSC
Illawarra	Five Islands Nature Reserve	Flinders Island	<i>Chrysanthemoides monilifera</i>	Migratory species (EPBC Act): Wedge-tailed & Short-tailed Shearwaters	Eradication	Ground spraying and hand pulling	C-TSC
Illawarra	Berkeley Nature Reserve	Gooseberry Island	<i>Chrysanthemoides monilifera</i>	EEC: Swamp Oak Floodplain Forest;	Eradication	Ground spraying and hand pulling	C-TSC
Illawarra	Berkeley Nature	Hooka Island	<i>Chrysanthemoides monilifera</i>	EEC: Swamp Oak Floodplain	Eradication	Ground spraying and hand pulling	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
	Reserve			Forest;			
Illawarra	Illawarra Escarpment State Conservation Area	Urban interface	Feral cats	Eastern Bristlebird, Eastern Pygmy Possum, ground dwelling birds, mammals, reptiles & amphibians	Asset protection	Trapping	C-TSC
Illawarra	Illawarra Escarpment State Conservation Area	Utility corridors	Feral cats	Eastern Bristlebird, Eastern Pygmy Possum, ground dwelling birds, mammals, reptiles & amphibians	Asset protection	Trapping	C-TSC
Illawarra	Dharawal State Conservation Area	Urban interface and utility corridors	Feral cats	Eastern Bristlebird, Eastern Pygmy Possum, ground dwelling birds, mammals, reptiles & amphibians	Asset protection	Trapping	C-TSC

6. Consultation

The South Coast Regional Pest Management Strategy was developed through consultation with the community and internal staff. A Pest Management Strategy Stakeholder forum was conducted at Nowra Showground Room on 6 September 2011. A diverse range of community representatives were present at the forum including representatives from the NPWS South Coast Region Advisory Committee, Game Council of NSW, local councils, Southern Rivers Catchment Management Authority, NSW Farmers Association, State Forests NSW, Department of Defence, Livestock Health and Pest Authorities, Illawarra Noxious Weeds Authority and several other stakeholder groups. Key issues raised from this forum were:

- Identifying and taking strategic and adequate action to control pest species such as wild dogs and deer as part of coordinated programs (refer to Goal 3, Objective 3.1 in Part A)
- Proactively incorporating volunteers into pest programs where possible (refer to Goal 3, Objective 3.2 in Part A)
- Undertaking research to address where there is a paucity of information in relation to the ecology and control techniques of pests. Once this information is obtained, make it available and use it to enhance control programs (refer to Goal 3, Objective 3.1 in Part A)
- A need for additional resources to adequately control pest species (refer to Goal 3, Objective 3.1 in Part A)
- Prioritising where funds should be directed and where pest programs should be undertaken (refer to Goal 2, Objective 2.1 in Part A)
- Managing pests at a landscape scale. Planning should take a nil tenure approach (refer to Goal 2, Objective 2.2 in Part A)
- More effective communication and education of the community and stakeholders (refer to Goal 3, Objective 3.2 in Part A)
- Increased monitoring and reporting (refer to Goal 3, Objective 3.4 in Part A).

Detailed recommendations made during the forum have been incorporated into the body of the Strategy where appropriate.

Consultation with each operational Area's key staff within the Region was conducted to assist with the identification and prioritisation of key pest management programs. Following the preparation of the draft Pest Management Strategy, the document is to be placed on public exhibition, with comments invited from the community, other government agencies and stakeholder groups for consideration in finalising the Strategy.

7. Pest species overviews

Information about high profile pests for this Region is summarised below. More details regarding the distribution, impacts and management options for these and other pest species can be found in other reference documents including the following web pages:

<http://www.dpi.nsw.gov.au/agriculture/pests-weeds/vertebrate-pests/general-information/pest-animal-survey>

<http://environment.gov.au/biodiversity/invasive/publications/humane-control.html>

<http://www.invasiveanimals.com/>

<http://www.environment.gov.au/biodiversity/invasive/ferals/index.html>

<http://www.environment.nsw.gov.au/threatenedspecies/KeyThreateningProcessesByDoctype.htm>

<http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles>

<http://www.weeds.org.au/WoNS/>

http://www.rirdc.gov.au/programs/national-rural-issues/weeds/weeds_home.cfm

<http://www.weeds.gov.au/>

<http://www.environment.nsw.gov.au/CMAweeds/index.htm>

Wild Dog (*Canis spp.*)

Under the *Rural Lands Protection Act 1998* wild dogs are a declared pests except on lands listed on Schedule 2 of the *RLP Act 1998, Pest Control Order No 17* for Wild Dogs. This Pest Control Order defines a wild dog as "...any dog, including a dingo, that is, or has become wild, but excludes any dog kept in accordance with the *Companion Animal Act 1998, the Exhibited Animals Protection Act 1986, or the Animal Research Act 1985* or any legislation made in replacement of any of those Acts".

On these Schedule 2 lands, wild dogs are managed under landscape-wide, wild dog management plans to ensure the conservation of Dingo populations while protecting surrounding landholders and their enterprises from the impacts of wild dogs.

Distribution and abundance

Within the SCR, Schedule 2 areas exist for the purpose of conserving the Dingo as a species and maintaining its ecological function as a top order predator. Wild dogs do occur in other reserves and free hold land within the SCR, however, their abundance varies due to limiting factors such as food, terrain and control practices.

Impacts

Wild dogs will predate on livestock and can cause significant economic and mental health issues for land owners and managers. Furthermore, predation by wild dogs may pose a risk to remnant populations of threatened native mammals, although foxes present a significantly greater risk to the conservation of fauna in this region (NPWS 2001). Wild dog scat analyses in SCR reserves indicate a strong dietary preference for swamp wallabies and wombats (NPWS 2007). Wild dogs also compete with native carnivores for food and shelter and are known to harbour and spread diseases, including neosporin and hydatids.

Priorities for control

All wild dog control programs are a Critical Priority. Wild dog management is implemented under the following cooperative plans:

- Southern Highlands Wild Dog Management Plan
- Shoalhaven Wild Dog Management Plan
- Braidwood- South Coast Wild Dog Management Plan

Control

Within the SCR there are three wild dog management plans that have been cooperatively developed by Wild Dog Management Committees that consist of stakeholders from government agencies and landholders. All wild dog control within the SCR will be guided by these plans. This includes strategic and reactive control programs.

Methods used to control wild dogs may include but are not limited to: soft-jaw trapping, ground baiting, aerial baiting and opportunistic shooting.

Monitoring

Monitoring will be conducted as outlined in the wild dog management plans. These methods may include: sand pads, cameras, visual observation, howling reports, animals controlled, animals that have been preyed on and bait takes.

European Red Fox (*Vulpes vulpes*)

NPWS fox control is guided by the Fox Threat Abatement Plan. The plan aims to direct fox control to areas where impacts on threatened species are likely to be greatest and to ensure that these fox control programs are effective in reducing such impacts (NPWS 2001). It shows which threatened species are at greatest risk from fox predation and at which sites fox control is most critical for these species.

Distribution and abundance

Foxes are found in most Australian environments, and in rural areas are most abundant near rural residential and agricultural lands. Modified landscapes interspersed with bushland provide ideal habitat for foxes. Foxes are much rarer in remote, closed forest habitats and wilderness. They occur in the vast majority of SCR reserves.

Impacts

Foxes are known to predate on native fauna including the BTRW, Southern Brown Bandicoots and Long-nosed Potoroos (*Potorous tridactylus*) and the eggs and chicks of several threatened shorebird species.

Foxes also compete with native carnivores for food and shelter and are known to harbour and spread diseases, including sarcoptic mange and hydatids.

Priorities for control

Fox TAP sites will be a Critical Priority and they include:

1. Kangaroo Valley site for BTRW
2. Conjola, Jervis Bay, Murramarang and Seven Mile Beach NPs and Comerong Island NR for shore-nesting birds - Little Terns, Pied Oystercatchers and Hooded Plovers
3. Barren Grounds NR site for Long-nosed Potoroos
4. Dharawal reserves and Illawarra Escarpment SCA for Broad-headed Snake and endangered frog and mammal species.

Other priority sites include:

1. Jervis Bay NP in collaboration with the Commonwealth Booderee NP and Department of Defence for the protection of Eastern Bristlebirds.

Control

Ground baiting with 1080 baits and M44 ejectors are the most effective and efficient methods used to control foxes. It is important to use a variety of bait types, ejector heads and baiting locations to maximise the effectiveness of a program. Leg hold trapping can be used to trap bait shy foxes or where distance restrictions can not be met when using 1080. Den fumigation can be used only when the location of the den is known and at certain times of the year. Shooting and exclusion fencing are alternative methods of control and are best suited to specific sites and circumstances.

Monitoring

The Fox TAP outlines monitoring programs which measure the response of threatened species to fox control. Changes in fox activity will be monitored using sand pads placed across roads and tracks. At other sites, bait uptake rates will be used as a measure of changes in fox activity. In addition to this, remote cameras are now widely used throughout the SCR to monitor sites for foxes.

Feral Deer (family Cervidae)

Distribution and abundance

Rusa Deer (*Cervus timorensis*), Red Deer (*Cervus elaphus*), Chital Deer (*Axis axis*), Sambar Deer (*Cervus unicolor*) and Fallow Deer (*Dama dama*) occur in and adjacent to reserves in SCR. The distribution and density of different species vary in areas due to limiting factors and time since their incursion. However, the range and abundance of some deer species appears to be increasing significantly. New occurrences of feral deer have been reported near all major towns and localities in the region.

Impacts

Herbivory and environmental degradation by feral deer is a Key Threatening Process under the TSC Act 1995. Deer are known to have a significant impact on freshwater wetlands, river flat forests, peatlands, swamplands and rainforests in SCR. Overgrazing, trampling, wallowing, ring-barking, antler rubbing, erosion and dispersal of weeds are documented impacts of feral deer that could alter the composition and structure of these Endangered Ecological Communities.

Deer are also a significant threat to a number of EECs and rare plants in SCR reserves including Illawarra Subtropical Rainforest in the Illawarra Escarpment SCA, Illawarra Irene (*Irenepharsus trypherus*) in Budderoo NP and Illawarra Escarpment SCA and *Callitris endlicheri* in Dharawal SCA. Feral deer are known to damage agricultural crops and fences and, like goats, are potential vectors for outbreaks of animal diseases.

Priority for control

1. Collaborating in research to further investigate the ecology of deer and other forms of control techniques
2. Dharawal reserves and Illawarra Escarpment SCA for *Callitris*, upland swamps, shale/transition forests, moist forests including rainforest, *Callitris endlicheri*.
3. Bimberamala NP

Control

Ground based shooting is the primary control method available where there is vehicle access. In areas where there is no vehicle access, deer have been and will continue to be controlled opportunistically during aerial goat control programs.

Trapping efforts at other locations have generally been unsuccessful to date but remains a potential control option during rutting in specific areas.

Monitoring

Deer will be monitored via direct and indirect observation during patrols conducted by rangers and field staff of the SCR. In addition to this, the use of cameras has proved successful and will continue to be used as this monitoring has established data for new incursions of deer species in areas where they did not previously inhabit. Satellite/GPS monitoring will be undertaken to investigate the ecology and distribution of deer in SCR reserves.

European Rabbit (*Oryctolagus cuniculus*)

Distribution and abundance

Rabbits occur in low densities in most SCR reserves and use a variety of habitats including warrens, fallen timber, areas of dense vegetation and other surface habitats.

Impacts

Competition and grazing by feral European Rabbits has been listed as a Key Threatening Process under the TSC Act 1995 and the EPBC Act 1999. Rabbits are a declared pest under the *Rural Lands Protection Act 1998*.

Rabbits are known to change the structure and composition of native vegetation communities, to compete with native fauna for food and shelter, and to cause land degradation.

Priorities for Control

Where rabbits have the potential to impact on threatened species or Endangered Ecological Communities or have a significant impact on adjacent agricultural production, these areas will be Critical Priority.

Control

Integrated and cooperative control for rabbits is essential for a successful program. The primary method of control for rabbits is baiting with either 1080 or pindone, followed up by harbour destruction where necessary or possible.

Additional rabbit control methods include shooting, fumigation and biological control agents such as Rabbit Haemorrhagic Disease (calicivirus).

Monitoring

Controlling rabbits in many areas is a continual process because of the potential for rabbits to move in from neighbouring areas and their high fecundity rate. As a result, monitoring rabbit populations is essential for effective and sustained control so that control programs can target areas of reinfestation after the primary control has been undertaken. Monitoring will be undertaken by the ranger responsible for the management of that area.

Feral Goat (*Capra hircus*)

Distribution and abundance

Feral goats range through escarpment, gorge and plateau lands in the northern and north-western parts of SCR including Bungonia SCA, Bungonia, Bangadilly, Tarlo, Morton and Budderoo NPs and Barren Grounds, Jerralong, Nadgigomar and Bees Nest NRs.

Impacts

Competition and habitat degradation by feral goats is a Key Threatening Process under the *TSC ACT 1995* and the *EPBC Act 1999*. Feral goats impact several Endangered Ecological Communities and many threatened plant and animal species, including Broad-headed Snakes (*Hoplocephalus bungaroides*) and BTRW.

Feral goats are known to significantly impact biodiversity values, including threatened swamps and rainforests and rare plant and animal populations. Goats are also recognised as potential vectors for spread of disease and may significantly impact on agricultural lands.

Feral goats have been known to damage Aboriginal occupation sites in escarpment caves and degrade wilderness and water catchment values.

Priority for control

1. Escarpment lands in the northern Shoalhaven catchment to protect rainforest, including Budderoo and Morton NPs and Barren Grounds NR
2. Upper Shoalhaven River region, including Bungonia SCA and Bungonia NP
3. In key habitat areas to protect Broad-headed Snakes
4. Rock overhangs and caves in the species range to protect the Large-eared Pied Bat (*Chalinolobus dwyeri*) and Aboriginal cultural values
5. Towards the lower parts of the Corang River to achieve control on private land to protect the Pygmy Cypress Pine (*Callitris oblonga*)
6. Illawarra Escarpment SCA at Mt Kembla and Maddens Plains.

Control

Aerial shooting is the primary and most effective control method used in remote, steep and inaccessible terrain. The long standing NPWS aerial control program is enhanced by a cooperative approach with many adjacent land owners and managers. Opportunistic and ground based shooting programs are also used and incorporated into control programs where possible.

Monitoring

Goat populations in the SCR reserves have been and will continue to be monitored via the fitting of GPS collars on individual animals. This assists in understanding their behaviour and distribution, to further enhance control programs.

Data from aerial programs and information from rangers and field staff will be used to monitor the performance of the control program. Where goats are controlled to aid the recovery of threaten species or communities, performance will be measured by monitoring the response of the threaten species or community concerned.

Feral Pig (*Sus scrofa*)

Distribution and abundance

Feral pig populations occur in reserves and adjacent freehold land across the SCR, mainly in low and very low densities. Many of the affected sites have associated problems with illegal pig hunters that disturb control programs and introduce pigs into areas.

Impacts

Predation, habitat degradation, competition and disease transmission by feral pigs is a Key Threatening Process under the *TSC Act 1995* and the *EPBC Act 1999*. Box Woodland, Montane Peatland, wetlands and Riverflat Eucalypt Forest endangered ecological communities are degraded by feral pig activity. Feral pigs threaten water catchment values, may impact significantly on agricultural production and act as vectors for the spread of animal diseases. They kill or compete with many threatened birds, mammals and amphibian species. Stream dependent threatened frogs are at particular risk from habitat damage by pigs.

Feral pigs can cause severe localised environmental damage by selective feeding on plant communities, weed dispersal, creation of drainage channels in swamps, soil erosion and fouling of watering points by wallowing and rooting (West and Saunders 2003).

Priorities for control

Any areas that have new occurrence of feral pigs or where feral pigs impact on threatened species or Endangered Ecological Communities, or impact significantly on agricultural production, will be Critical Priority.

Control

Where possible, cooperative control programs will be encouraged as they enhance the efficiency and effectiveness of control programs. Trapping and 1080 baiting are the preferred methods of pig control. Feral pigs are opportunistically shot during aerial feral goat control programs.

Monitoring

Rangers and field staff will monitor for pig activity through direct observation. In addition to this, remote cameras and reports from the public and adjacent land managers will be used to determine where and when control is required.

Feral Cat (*Felis catus*)

Distribution and abundance

Feral cats are found in most Australian environments, and in rural areas may be most abundant near rural residential and agricultural land. Feral cats are found throughout many SCR reserves, though due to their cryptic nature, they often can go unnoticed.

Impacts

Predation by feral cats has been determined to be a Key Threatening Process under the *TSC Act 1995* and the *EPBC Act 1999*. Predation by feral cats has been implicated in the extinction and decline of many species of small mammals and birds on islands around Australia and on the Australian mainland.

Predation by feral cats impacts on many fauna species including threatened birds and mammals in SCR reserves. Feral cats threaten Eastern Bristlebird (*Dasyornis brachypterus*) populations at Jervis Bay NP and Barren Grounds NR, Little Terns (*Sterna albifrons*) breeding on coastal reserves and Striated Fieldwrens (*Calamanthus fuliginosus*) at Murramarang and Morton NPs and the Eastern Pygmy Possum and ground dwelling moist forest fauna in the Illawarra. Feral cats may also predate on BTRW (*Petrogale penicillata*) and on Southern Brown Bandicoots (*Isodon obesulus*) when alternative prey is scarce or absent.

Other small mammals such as rodents, dasyurids, burramyids, ground-nesting birds, amphibians and reptiles are at particular risk.

Priority for Control

1. Opportunistically control feral cats with other control programs at Fox TAP sites as a Critical Priority
2. Opportunistically control feral cats in fox and dog control programs
3. Opportunistically control feral cats during goat and deer control programs.

Control

Specifically targeting cats in a control program can be an expensive exercise fiscally and temporally, though it can be done. Mostly cats are controlled opportunistically in other control programs such as dog/fox trapping programs, and aerial and ground shooting programs. Cage traps can be used with limited success, though soft-jaw trapping can be effective when undertaken by trained personnel.

Cats caught in traps will be humanely destroyed except for domestic cats clearly identifiable by behaviour or those wearing a collar. Domestic cats will be taken to the nearest Council animal shelter.

Monitoring

The success of feral cat control programs implemented for threatened species conservation will be assessed by measuring the response of the threaten species concerned. Other monitoring methods may include using remote cameras and sandplots.

Chytridiomycosis

Distribution and abundance

Chytridiomycosis is a water-borne disease of amphibians caused by the parasitic chytrid fungus *Batrachochytrium dendrobatidis*. This disease is a global epidemic and the infection of frogs by amphibian chytrid causing the disease chytridiomycosis has been determined to be a Key Threatening Process by the NSW Scientific Committee.

It is very likely that the chytrid fungus is ubiquitous throughout frog populations in SCR.

Impacts

Not all frog species are at high risk of becoming infected and not all frogs die from the disease. In certain areas, those species at greatest risk have a strong association with streams (especially those that breed in permanent streams) rather than pond or terrestrial breeders (Kriger and Hero 2007). Queensland studies suggest that if frog populations can survive initial episodes of population decline, chytrid resistance should build up in the remnant population and it may recover (Berger et al., 1999).

Chytridiomycosis is known to kill the endangered Green and Golden Bell frogs (*Litoria aurea*). The Shoalhaven region is a stronghold for this species but populations of these frogs in SCR are considered to be at risk to the disease. Other stream breeding threatened frogs that occur in SCR include the Giant Burrowing Frog (*Heleioporus australiacus*) as well as other currently non-threatened species. The Red-crowned Toadlet (*Pseudophryne australis*) may also be susceptible.

Priorities for control

Chytridiomycosis has been detected in a remnant population of endangered Stuttering Frogs (*Mixophyes balbus*) at Macquarie Pass NP in 2004 and was believed to be the cause of the decline of the population. It has been detected in the Heath Frog (*Litoria littlejohni*) populations in Morton and Jerrawangala NPs and Parma Creek NR (P. Craven, pers.comm.).

Control

- Promote and implement effective hygiene protocols – copy available at: <http://www.environment.nsw.gov.au/resources/nature/hyprfrog.pdf>
- Threat abatement for key threatened species or populations including habitat modification, captive breeding programs, translocations and treatment of individuals
- Continue to monitor frog populations where Chytridiomycosis has been detected and collaborate with researchers to further understand the biology and its impact on frogs
- Support research into understanding species resistance to *B. dendrobatidis*, both innate and acquired to assess evolutionary responses and potentially improve the success of re-introduction programs.

Monitoring

Monitoring will be undertaken of key threatened frog populations to investigate transmission and dispersal of *B. dendrobatidis* to improve understanding of the disease.

Myrtle Rust (*Uredo rangelii*)

Distribution and abundance

Myrtle rust is a plant disease caused by the exotic fungus *Uredo rangelii*. It has established in coastal NSW from the Clyde River north into Queensland. It is likely to spread rapidly to the extent of its biological range as the spores are dispersed readily by wind. Eradication is not feasible. Within SCR, outbreaks have been recorded in the Illawarra at Stanwell Park and Mt Keira.

Impacts

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

The likely impacts of myrtle rust on biodiversity in Australia are unknown. It may cause significant mortality among younger plants, reducing recruitment into adult populations and contributing to the decline or extinction of species. This 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.

The 'Introduction and establishment of exotic rust fungi of the order *Pucciniales* pathogenic on plants of the family myrtaceae' is listed as a Key Threatening Process under the TSC Act 1995.

Priorities for control

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

The objectives of the Plan are to:

1. Slow the establishment of myrtle rust on national park estate
2. 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 8 action areas to manage Myrtle Rust on the NPWS estate:

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.

Specific actions for South Coast Region are:

- a. Monitor, record and manage outbreaks in the Illawarra
- b. Monitor the source of mulch imported to and used within reserves
- c. Surveys are required to determine the extent.

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. Before and after photos are also taken during the course of implementation of works. Where treatment is proposed, GPS locations will be taken of work site locations and records kept of the extent of myrtle rust distribution and control implemented. Sites will be re-visited periodically for follow-up treatment and maintenance.

DRAFT

Serrated Tussock (*Nassella trichotoma*)

Distribution and abundance

Within the SCR, Serrated Tussock mainly occurs on the Southern Tablelands. In some areas near reserves, Serrated Tussock is locally prolific to the point of almost forming a monoculture. Within the Upper Nepean SCA, Serrated Tussock is present in along many easements particularly railway easements. Some reserves within the SCR contain small infestations of Serrated Tussock.

Impacts

Serrated Tussock is listed as a Weed of National Significance (WONS). It is an aggressive invader of grassland and pasture areas. It seeds prolifically and is readily dispersed by wind, water, animals and human activity.

Invasion of native plant communities by exotic perennial grasses is a threat to many endangered ecological communities including box woodland at Bungonia SCA and Tarlo River NP. Dense infestations of this plant may eliminate most other plant species thereby reducing the biodiversity of an area and be a harbour for reinfestation. The invasion of native plant communities by exotic perennial grasses (including Serrated Tussock) has been declared a Key Threatening Process under the TSC Act 1995.

Priorities for control

Continue to limit the spread of existing populations while maintaining and enhancing existing programs in Bungonia NP, Bungonia SCA, Nadgigomar NR, and McCallums Flat on the Shoalhaven River in Morton NP, and Upper Nepean SCA. High priority sites identified in the BPWW where Serrated Tussock is impacting threatened assets are a critical priority.

Control

Control is generally undertaken by spot or boom spraying with appropriate chemicals.

Aerial spraying has been utilised in the past in Morton NP and surrounding properties to control dense infestations. Most work is now undertaken via spot spraying. Control works are generally undertaken before the September-December period prior to flowering.

Where possible undertake control activities in conjunction with programs implemented by neighbouring landholders, Landcare groups and councils. A Best Practice Control Manual has been prepared under the WONS program for Serrated Tussock.

Monitoring

Monitoring will be undertaken by rangers and field staff so that an early response can be initiated should an infestation be detected. Yearly pre-work inspections of known infested areas will continue to be undertaken by staff and the work recorded once undertaken.

Asparagus weeds including Bridal Creeper

Distribution and abundance

Asparagus weeds known to occur in SCR reserves include Bridal Creeper (*Asparagus asparagoides*) and Ground Asparagus (*Asparagus aethiopicus*). Bridal Creeper occupies a wide range of vegetation types and can invade and dominate undisturbed forest and riparian zones. Infestations are established in the Wollongong and Shoalhaven LGAs and the weed is steadily increasing in distribution from the south. Ground Asparagus is most abundant on coastal dunes and there is a large infestation in the Crown land adjacent to the northern end of Seven Mile Beach NP that is spreading into the park. The SCR has undertaken and is continuing control works to keep this infestation contained.

Impacts

Bridal Creeper is a declared Weed of National Significance. It is an aggressive tree-climbing weed that smothers native ground vegetation, shrubs and small trees. Both vines are listed as a Key Threatening Process under vines and scramblers under the TCS ACT 1995. These species have a potential threat to rare species as it can colonise in undisturbed ecosystems.

Ground Asparagus is a major threat to littoral rainforest in coastal reserves.

Priorities for control

1. Bridal Creeper rust release sites
2. Conjola and Clyde River NPs
3. Cullendulla Creek NRs
4. Littoral rainforest in Seven Mile Beach NP and EECs at Comerong Island NR
5. Yatteyattah NR
6. Narrawallee Beach, Narrawallee Creek NR
7. Gooseberry Island and Hooka Island in Berkeley NR.

Control

The most effective method of control has been using herbicides, though this can be difficult to undertake if the weed is growing on native species. Generally, physical removal is not effective unless the rhizomes are removed and destroyed. The CSIRO has successfully developed and implemented a biological control program using the Leafhopper *Zygina sp.* and the Rust Fungus *Puccinia myrsiphylli* and the Leaf Beetle *Crioceris sp.*

CSIRO rust and Leafhopper release sites on the south coast include Conjola and Murramarang NPs and Macquarie Pass SCA. There has also been Bridal Creeper dieback at Cullendulla Creek NR attributed to release of rust.

Monitoring

Bridal Creeper and Ground Asparagus infestations where work has been undertaken will be recorded and mapped. Inspections will be conducted for several years after control is undertaken to monitor for any follow up work that may be needed.

Rangers and field staff will inspect high priority sites regularly and continually monitor for new infestations so that an early response for control may take place. The Monitoring Manual for Bitou Bush Control and Native Plant Recovery can also be used to monitor the plants response following management of this weed.

Lantana (*Lantana camara*)

Distribution and abundance

Lantana is prolific in coastal areas, however, the eastern escarpment of the Great Dividing Range appears to be a limiting factor in the spread of Lantana to the western areas of SCR under current climatic conditions. It is an aggressive invader of disturbed forest and hind dunes but Lantana is also common in undisturbed wet forest margins in SCR reserves in the northern Shoalhaven catchments and the Illawarra Area reserves. Where established it will rapidly dominate sites where the forest canopy has been opened up, such as the foothills and midslopes of the coastal ranges. In many localities in the northern Shoalhaven and Illawarra, Lantana has spread hundreds of metres up steep terrain into reserves from cleared or disturbed land.

Impacts

Lantana is a noxious weed. It is listed as a Weed of National Significance, and the invasion, establishment and spread of lantana is a Key Threatening Process.

Lantana is a threat to rainforests, coastal eucalypt forests and swamp forests. Infestations pose a threat to populations of the perennial herb *Typhonium eliosurum* and other threatened plant species including the climber *Cynanchum elegans*, *Daphnandra* sp. 'Illawarra' trees, Illawarra Irene (*Irenepharsus trypherus*), *Solanum celatum* shrubs and Magenta Lillypilly (*Syzygium paniculatum*). Lantana can rapidly smother ground vegetation and climb into the canopy, suppress natural regeneration at disturbed sites and alter ecological processes including fire regimes.

Priorities for control

High priority sites identified in the BPWW where Lantana is impacting threatened assets are a critical priority, as the BPWW includes the priorities from the national Plan to Protect Environmental Assets from Lantana. The National Containment Zone for Lantana is also located at Ulladulla. Priority sites for the SCR include:

1. Minnamurra Rainforest in Budderoo NP
2. Macquarie Pass NP
3. Carama Inlet in Jervis Bay NP
4. Seven Mile Beach NP, Comerong Island NR
5. Bamarang NR
6. Colymea SCA
7. Bomaderry Creek RP
8. Jerrawangala NP
9. Mt Keira portion Keiraville and Mt Kembla portion in Illawarra Escarpment SCA
10. Hooka Island in Berleley NR
11. Flat Rock Creek in Triplarina NR
12. Clyde River NP
13. Narrawallee Inlet in Narrawallee NR

Control

Lantana will be controlled using manual, mechanical, chemical and biological control techniques. Herbicide application is not recommended when the infestation is under environmental stress (e.g. drought). A Best Practice Control Manual has been prepared under the WONS program.

Lantana Rust (*Prospodium tuberculatum*) has been released in many reserves of the SCR. Some of the reserves where the rust was released includes Bamerang NR, Triplarina NR, Cullunghutti AA and at Mt Keira in the Illawarra Escarpment SCA.

Monitoring

Monitoring will involve periodic updating of weed maps, involvement with state-wide mapping inventory and periodic ground checking of high priority weed sites. Maintaining follow-up programs with inspections of treated areas and high risk areas, and inspecting known sites annually will also be undertaken. The Monitoring Manual for Bitou Bush Control and Native Plant Recovery can also be used to monitor the plant response following the management of this weed.

DRAFT

Bitou Bush and Boneseed (*Chrysanthemoides monilifera*)

Distribution and abundance

Bitou Bush is found in coastal environments including Jervis Bay, Conjola and Seven Mile Beach NPs and Comerong Island, Cullendulla Creek NR, Five Islands and Berkeley NRs.

There has been a long history of control in SCR reserves, particularly in the Ulladulla Area, where infestations are now isolated and dispersed.

Impacts

Bitou Bush is a Weed of National Significance (WONS). Invasion by Bitou Bush is listed as a Key Threatening Process under the *TSC Act 1995*.

Bitou Bush displaces and overgrows rainforest, coastal sclerophyll forests, grasslands, swamp forests and saltmarshes and impacts on threatened shorebirds dependent on these Endangered Ecological Communities. Of particular concern is the impact of Bitou Bush on freshwater wetlands in Jervis Bay NP and on the perennial herb (*Chamaesyce psammogeton*) at Seven Mile Beach NP.

Priority for control

The National Southern Containment Line for Bitou Bush is just south of Sussex Inlet. Above this, high priority sites identified in the BPWW where Bitou Bush is impacting threatened assets are a critical priority, as the BPWW includes the priorities from the Bitou Bush Threat Abatement Plan. These priorities are based on protection of threatened entities as follows:

1. Seven Mile Beach NP, Jervis Bay and Conjola NPs (numerous sites) and Comerong Island NR for protection of littoral rainforest, Bangalay Sand Forest, Swamp Oak Floodplain Forest and SEPP 26 wetlands
2. Seven Mile Beach and Jervis Bay NPs for protection of *Chamaesyce psammogeton*
3. Jervis Bay NP for protection of swamp oak floodplain forest, freshwater wetlands and *Wilsonia backhousei*
4. Cullendulla Creek NR and Tollgate Islands NR
5. Gooseberry Island and Hooka Island in Berkeley NR
6. Five Islands NR.

Other sites identified for control in SCR reserves include Murramarang NP (south) Narrawallee Creek NR and Conjola NP.

Control

Bitou Bush will be controlled using manual, mechanical, chemical and biological control techniques. A Best Practice Control Manual has been prepared under the WONS program. Aerial herbicide application will continue at DPI approved sites. Biological control will include using approved biological control agents (moth, beetle and fly species), and establishment of populations of the Bitou Leaf Roller Moth (*Tortrix spp.*) will be supported.

Bitou Bush control is generally carried out as part of a co-ordinated program with adjacent landholders and other agencies.

Monitoring

Monitoring will involve maintaining a matched plot (Bitou and native) monitoring system at Seven Mile Beach NP, periodic updating of weed maps, involvement with state-wide mapping inventory and periodic ground checking of high priority weed sites. The Monitoring Manual for Bitou Bush Control and Native Plant Recovery will be used to monitor the plant response.

Sea Spurge (*Euphorbia paralias*)

Distribution and abundance

Sea Spurge is a recent coloniser of sandy beaches in the Shoalhaven and is now well dispersed along the coast from Lake Wollumboola southwards.

Populations of Sea Spurge occur on numerous beaches in SCR reserves (Mills 1998). In Nowra Area, minor infestations of Sea Spurge occur between Currarong and Culburra beaches in Jervis Bay NP. In Ulladulla Area significant infestations occur on Richmond Beach and North Head Beach in Murramarang NP and minor infestations on various beaches including Island Beach, Dawsons Beach and Oakey Beach in the same park. In Conjola NP a significant infestation exists on Monument Beach and minor infestations occur on surrounding beaches. Narrawallee Creek NR contains a minor infestation on Buckleys Beach. Elsewhere in the region Sea Spurge occurs on numerous beaches outside reserves.

Impacts

Sea Spurge plants produce small, hard seeds that are tolerant of saltwater and can be spread widely by ocean currents. Several thousand seeds per year can be released by a single plant. Plants are long-lived and can form very extensive and densely growing populations that smother and out-compete local native beach plants. Sea Spurge has the potential to threaten native plant and animal beach communities. Large populations of sea spurge may be detrimental to beach nesting shorebirds such as red-capped plovers and threatened Hooded Plovers and Pied Oystercatchers. Such densely growing Sea Spurge may also be detrimental to recreational activities on beaches. The toxic milky sap of the plant may be a human health risk.

The spread of Sea Spurge is difficult to predict because beach and dune systems where the weed proliferates are dynamic systems subject to impacts from wind and waves. As a result, seeds can occur at various levels within the dune profile and can be exposed and/or transported in significant volumes over large distances.

Priority for control

The highest priority for control will be beach sites where Sea Spurge is impacting on threatened plant or shorebird protection activities, or the removal of isolated infestations to limit the spread including:

1. Beaches in SCR reserves between Sussex Inlet and Bendalong
2. Richmond and North Head Beaches in Murramarang NP
3. Tollgate Island and Brush Island NRs.

Control

Sea Spurge will be controlled by manual and chemical control techniques. Off-label permits for other effective chemical controls may be sought if necessary.

Monitoring

Monitoring for Sea Spurge will involve regular inspections of beaches in SCR reserves. To aid this, photo points will be established at known infestation sites.

Crofton Weed (*A. adenophora*) and Mistflower (*A. riparia*)

Distribution and Abundance

These weeds are typically found in warm moist locations on the margins of rainforest and creek banks and are wide spread throughout the Illawarra Escarpment SCA where there are moisture seepages. The Nowra area is generally at the southern limit of their range and the weeds are found in SCR reserves in the northern Shoalhaven catchment. These weeds can extend into wetlands.

Both species have a profuse display of white flower clusters in spring, Crofton Weed having sticky white hairs whereas the floral hairs on Mistflower are not sticky.

Impacts

Ageratina spp. impact on rainforest communities and populations of rare plants, including the perennial herb (*Typhonium eliosurum*). They can dominate the ground cover in gullies and streambanks and may spread rapidly in moist, fertile and sheltered locations. High priority sites identified in the BPWW where these weeds are impacting threatened assets are a critical priority.

Priority for control

1. Shoalhaven River tributaries in Morton NP
2. Seven Mile Beach NP
3. Macquarie Pass NP, Clover Hill precinct
4. Mistflower at Minnamurra rainforest in Budderoo NP
5. Nelson Creek in Kangaroo River NR
6. Worrigeer NR
7. Mt Keira portion and Mt Kembla portion in Illawarra Escarpment SCA
8. Gooseberry Island and Hooka Island in Berkeley NR.

Control

Ageratina spp. will be managed using manual and chemical control techniques. SCR is also participating in biocontrol establishment of the White Smut Fungus (*Entyloma ageratina*). A biological control for Mistflower, the common White Smut Fungus (*Entyloma ageratinae*) was released by the CSIRO at sites within the SCR on the 3-5 of May 20011. This smut fungus has spread and has now been observed in reserves of the SCR.

Monitoring

Rangers responsible for management of the area are to inspect high priority sites regularly and record and map all Crofton Weed and Mistflower infestations. The Monitoring Manual for Bitou Bush Control and Native Plant Recovery can also be used to monitor the plant response at critical priority sites following management of these weeds.

Exotic perennial grasses

Distribution and abundance

The invasion of native plant communities by exotic perennial grasses is listed as a key threatening process under the TSC Act 1995. Exotic perennial grasses occur in many Highlands Area reserves and a wide variety of exotic grasses are found in coastal areas. Some are emerging problems for SCR reserves. These grasses include Chilean Needlegrass (*Nassella neesiana*), African Lovegrass (*Eragrostis curvula*), Giant Parramatta Grass (*Sporobolus fertilis*) Whiskey Grass (*Andropogon virginicus*) and Pampas Grasses (*Cortaderia* spp.).

Buffalo Grass (*Buchloe dactyloides*) and Kikuyu (*Pennisetum clandestinum*) overgrow shorebird nesting sites on offshore island reserves, including Brush Island NR and Five Islands NR.

Impacts

Invasion of native plant communities by exotic perennial grasses is a threat to many Endangered Ecological Communities including box woodland at Bungonia SCA and Tarlo River NP and woodlands, grasslands and wetlands in coastal reserves. Terrestrial orchids, rare plants, birds and reptiles are also likely to be affected. High priority sites identified in the BPWW where these weeds are impacting threatened assets are a critical priority. Another priority for the region is to limit the spread of emerging exotic grasses such as Pampas Grass (*Cortaderia* spp.) in Worrigeer NR.

Priority for Control

1. Exotic perennial grasses generally in Bangadilly, Morton and Tarlo River NPs, Bungonia SCA and Cecil Hoskins and Jerralong NRs
2. Pampas Grass east of the old tip in Bomaderry Creek RP where previous control work has occurred but follow-up is required and the Illawarra Escarpment SCA along utility and transport corridors north of Thirroul.
3. Perennial grasses on Brush Island NR
4. Newly detected Pampas Grass infestation in Worrigeer NR
5. African Lovegrass near Emery's Road in Cambewarra Range NR and the Dharawal reserves.
6. Infestations at Clover Hill precinct Macquarie Pass NP, Budderoo NP, and Coomonderry Swamp in Seven Mile Beach NP
7. Whiskey Grass along management trails and utility and transport in the Dharawal reserves and Illawarra Escarpment SCA
8. Perennial grasses on Five Islands NR.

Control

Exotic perennial grasses will be controlled using manual and chemical control techniques. All-terrain vehicles and aerial spraying may be used to increase efficiency of control at established, remote and larger infestations.

Monitoring

Rangers responsible for the management area will undertake periodic ground checking of high priority weed sites. Maintain follow-up programs with inspections of treated areas and high risk areas. Inspect known sites annually.

Exotic vines and scramblers

Distribution and Abundance

The invasion and establishment of exotic vines and scramblers is listed as a key threatening process under the TSC Act 1995. Exotic vines and scramblers are widespread and locally abundant in natural environments in eastern NSW. The worst weed infestations occur on the margins of riparian zones, rainforest and in other sheltered, fertile and moist locations. These species pose particular threats to remnant or disturbed rainforest and wet sclerophyll communities. Exotic vines are characterised by the ability to dominate and smother understorey native plants, compete with and prevent germination by native plants, and disperse widely in fertile and riparian environments.

Exotic vines known to occur in SCR reserves include Madeira Vine (*Anredera cordifolia*), Dolichos Pea (*Dipogon lignosus*), Cape Ivy (*Delairea odorata*), Cat's Claw Creeper (*Macfadyena unguis-cati*), English Ivy (*Hedera helix*), Coastal Morning Glory (*Ipomoea cairica*), Morning Glory (*Ipomoea indica* and *Ipomoea purpurea*), Japanese Honeysuckle (*Lonicera japonica*), Moth Vine (*Araujia sericifera*), Passionfruit (*Passiflora* spp.), Turkey Rhubarb or Potato Vine (*Acetosa sagittata*), Black-eyed Susan (*Thunbergia alata*), Trad (*Tradescantia fluminensis*) and Periwinkle (*Vinca major*).

Introduced vines and scramblers pose significant threats to the Illawarra moist forests and are generally prevalent along roads and the urban interface or where other disturbance and dumping of garden waste occurs. Turkey Rhubarb infestations pose a threat to populations of the ROTAP perennial herb *Typhonium eliosurum* along the Shoalhaven River downstream of Tallowa Dam and on the Kangaroo River adjacent to Kangaroo River NR (BLS 2002). *Tradescantia* is present in sheltered situations such as the rainforests at Back Run Creek and at the southeastern end of Apple Tree Flat on the Shoalhaven River in Morton NP, where it completely dominates the understorey vegetation. High priority sites identified in the BPWW where these weeds are impacting threatened assets are a critical priority.

Impacts

Exotic vines and scramblers threaten rainforests, swamp forests and tall open forests on fertile soils. Invasion and establishment of these weeds also directly threaten:

- *Cynanchum elegans* in Berkeley NR.
- *Pomaderris adnata* in the Illawarra Escarpment SCA.
- *Ireneparsus trypherus* (preliminary) at Minnamurra rainforest and the escarpment of the Upper Kangaroo River in Budderoo NP, the banks of the Kangaroo River and the Jones Creek area in Morton NP and at Bees Nest NR
- *Daphnandra* sp "C" Illawarra at Minnamurra rainforest (preliminary assessment)
- Long-nosed Potoroos (*Potorous tridactylus*) at Budderoo and Conjola NPs and Barren Grounds and Cambewarra Range NRs (preliminary assessment)
- Golden-tipped Bats (*Kerivoula paupuensis*) at Bimberamala NP
- Littoral rainforest in Seven Mile Beach NP
- EECs generally including subtropical rainforest communities and Coastal Swamp Oak Forest

Some exotic vines and scramblers form dense ground cover carpets that suppress native species (e.g. *Tradescantia fluminensis* and *Vinca major*). In sclerophyll communities, exotic vines and scramblers are more mesic than the native species and may change the nature of the fuel and thus alter fire behaviours and regimes. Invasion by exotic vines and scramblers can also alter other biotic aspects of communities such as the abundance and diversity of plant-dwelling invertebrates (Ernst and Cappuccino 2005).

Priority for Control

1. Minnamurra Rainforest in Budderoo NP
2. Established long-term control programs on the Shoalhaven River and its close tributaries in Morton NP
3. Yatteyattah NR
4. Macquarie Pass NP including Clover Hill precinct
5. Seven Mile Beach NP and Comerong Island NR
6. Kangaroo River NR
7. Illawarra Escarpment SCA
8. Cullendulla Creek NR
9. Hooka Island and Gooseberry Island in Berkeley NR
10. Hyams Beach Jervis Bay NP
11. Clyde River banks and islands Clyde River NP.

Control

Control methods vary for different vines and scramblers. A combination of manual and chemical control techniques will be used.

Monitoring

Rangers responsible for the management will undertake periodic ground checking of high priority weed sites. Conduct annual surveys of known exotic vine locations where threatened species occur. Progressively survey, map and monitor all weed infestations.

Willows (*Salix spp.*)

Distribution and Abundance

All willows are widespread and associated with the gravel beds of rivers. Willows are known to occur in the riparian areas of Cecil Hoskins NR and Tarlo River NP. Willows also occur sporadically along the Shoalhaven River corridor in Morton NP.

Impacts

Willows are WONS and can significantly modify streambank vegetation and hydrology in riparian environments. In streams, willows cause channel diversion, soil or bank erosion, loss of stream capacity, stream obstruction, increased flooding and loss of infrastructure. These impacts lead to degradations of water quality and stream health (Cremer *et al.* 1995).

Willows displace native vegetation and cause modifications to river flow that can lead to major stream bank erosion particularly during flood events, and potentially adverse effects on aquatic fauna. If infestations increase they may threaten the conservation value of adjacent rainforest and other vegetation communities (BLS 2002). High priority sites identified in the BPWW where these weeds are impacting threatened assets are a critical priority.

Priority for control

1. Shoalhaven River corridor in Morton NP
2. Cecil Hoskins NR

Control

Willows will be controlled using manual, mechanical and chemical control techniques. The main method for large trees will be stem injection with undiluted glyphosate during active growing months. A Management Guide has been prepared under the WONS program.

Monitoring

Rangers responsible for management will undertake periodic ground checking of high priority sites. Maintain follow-up programs with inspections of treated areas and high risk areas.

8. Pest distribution tables

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

- Denotes established widespread populations throughout a reserve
- Denotes scattered populations throughout a reserve
- ⊙ Denotes isolated populations restricted to a small geographic area of a reserve

Pest Animal Distribution table

	Wild dog	Fox	Feral pig	Rabbit	Plague Minnow	Feral goat	Feral deer	Feral cat	Amphibian Chytrid	Rats	Indian Mynas	Cattle
HIGHLANDS AREA												
Bangadilly NP	⊙	○	⊙			○	⊙					
Barren Grounds NR	○	○		⊙		○	⊙	⊙				
Barrengarry NR		○						⊙				
Budderoo NP	⊙	●	⊙	⊙		○	○	○				
Bungonia SCA	○	●	⊙	●		○		⊙				
Bungonia NP	○	●	⊙	●		○		⊙				
Cambewarra Range NR	○	○				⊙	⊙	●				
Cecil Hoskins NR		●		○				○				
Jerralong NR	○	○		○		⊙		⊙				
Kangaroo River NR	⊙	●						○				
Macquarie Pass NP	○	○	⊙				○	○	●			
Macquarie Pass SCA	○	○					○	○				
Morton NP (north & west)	●	○	⊙	○		●	○	○	●			
Nadgigomar NR	○	○	⊙	●		○	○	⊙				
Robertson NR		⊙						⊙				
Rodway NR								⊙				

	Wild dog	Fox	Feral pig	Rabbit	Plague Minnow	Feral goat	Feral deer	Feral cat	Amphibian Chytrid	Rats	Indian Mynas	Cattle
Tarlo River NP	○	○	○	●		○		○				
NOWRA AREA												
Bamarang NR	○	●						○				
Bomaderry Creek RP	⊙	●		⊙				●				
Brundee Swamp NR	○	○	○		⊙			⊙				
Bugong NP	○	○	⊙			⊙	⊙	⊙				
Colymea SCA	○	●				⊙		⊙				
Comerong Island NR	⊙	●		○				○				
Corramy SCA	○	○						○				
Cullunghutti Aboriginal Area		○		○				○				
Jerrawangala NP	○	○	⊙	○	⊙	⊙	⊙	○	●			
Jervis Bay NP	●	●		⊙	⊙		○	●				
Morton NP (east)	●	●	⊙	⊙		●	⊙	○	●			
Morton SCA	○	●		⊙		⊙		○				
Parma Creek NR	○	○	⊙	○	⊙			○				
Saltwater Swamp NR	⊙	○	⊙	⊙	⊙			⊙				
Seven Mile Beach NP	○	●	⊙	⊙	⊙			●				
Tapitallee NR	○	○					⊙	●				
Triplarina NR	●	●						●				
Wogamia NR	○	○				⊙		○				
Woollamia NR	○	○						○				
Worrigeer NR	○	○						○				
ULLADULLA AREA												

	Wild dog	Fox	Feral pig	Rabbit	Plague Minnow	Feral goat	Feral deer	Feral cat	Amphibian Chytrid	Rats	Indian Mynas	Cattle
Bees Nest NR	○	○				⊙		⊙				
Belowla Island NR												
Bimberamala NP	○	○					○	○				
Brush Island NR												
Budawang NP	●	●				○	⊙	○				
Clyde River NP	○	○					⊙	○				
Conjola NP	●	●	⊙	⊙			⊙	●	●			
Cullendulla Creek NR	⊙	⊙		⊙				⊙				
Meroo NP	○	○		⊙			⊙	○				
Morton NP (south)	●	●	⊙	⊙		●	⊙	○				
Murramarang AA		●		○				⊙				
Murramarang NP	○	●	⊙	⊙				●				
Narrawallee Creek NR		○						○				
Tollgate Islands NR												
Yattheyattah NR		●						○				
ILLAWARRA AREA												
Illawarra Escarpment SCA		●	⊙	○		⊙	●	○			●	
Berkley NR										⊙		
Five Islands NR												
Dharawal SCA	⊙	●		○			○	⊙		⊙	⊙	⊙
Dharawal NR	⊙	●		○		⊙	●	⊙		⊙		
Upper Nepean SCA		●	●	⊙		●		⊙				

Weed Distribution

The weed species shown in the following table are either Declared Weeds of National Significance (for which there may be a National Priority Action Framework prepared); have been determined as Key Threatening Processes or are weeds or groups of weeds of significant local or regional importance.

- Denotes established widespread infestation throughout a reserve
- Denotes scattered infestation throughout a reserve
- ⊙ Denotes isolated infestation restricted to a small geographic area of a reserve (encompassing new weed incursions)

	Asparagus weeds: Note 1	Ageratina spp.	Bitou Bush	Blackberry	Exotic vines	Ex. perennial grasses	Garden escapees	Lantana	Pinus spp.	Sea Spurge	Serrated Tussock	Willows
HIGHLANDS AREA												
Bangadilly NP				⊙	⊙	○						
Barren Grounds NR				⊙				⊙				
Barrengarry NR								○				
Budderoo NP		○		⊙	○			○				
Bungonia SCA				○		○						
Cambewarra Range NR		⊙			⊙			○				
Cecil Hoskins NR				⊙	⊙	⊙						○
Jerralong NR						○						
Kangaroo River NR		○			○							
Macquarie Pass NP		○			○			○				
Macquarie Pass SCA		○			○			○				
Morton NP (north & west)		○		⊙	○	○		○	⊙			⊙
Nadgigomar NR						○			⊙			
Robertson NR				○	○				⊙			

	Asparagus weeds: Note 1	Ageratina spp.	Bitou Bush	Blackberry	Exotic vines	Ex. perennial grasses	Garden escapees	Lantana	Pinus spp.	Sea Spurge	Serrated Tussock	Willows
Rodway NR								⊙				
Tarlo River NP				○		○			⊙			⊙
NOWRA AREA												
Bamarang NR		○		○	○			●				
Bomaderry Creek RP	○	○		⊙	○	○		○				○
Brundee Swamp NR			○	○	○	○		○				
Bugong NP		○										
Colymea SCA		○		○	○			○				
Comerong Island NR	○		○	⊙	○	○	⊙	○		⊙		
Corramy SCA												
Cullunghutti Aboriginal Area		○			○			○				
Jerrawangala NP				⊙				○				
Jervis Bay NP	○		○	⊙	○	○	○	○	⊙	⊙		
Morton NP (east)		○		⊙	○	⊙		○				⊙
Morton SCA		○		⊙	○			○				
Parma Creek NR												
Saltwater Swamp NR			○		○							
Seven Mile Beach NP	○	○	●	⊙	○	○		○				
Tapitallee NR												
Triplarina NR			⊙	⊙			○					
Wogamia NR				⊙	⊙			⊙				
Woollamia NR												
Worrigeer NR	○	○	⊙	⊙	⊙	⊙	○	⊙				

	Asparagus weeds: Note 1	Ageratina spp.	Bitou Bush	Blackberry	Exotic vines	Ex. perennial grasses	Garden escapees	Lantana	Pinus spp.	Sea Spurge	Serrated Tussock	Willows
ULLADULLA AREA												
Bees Nest NR						○						
Belowla Island NR					○							
Bimberamala NP				⊙								
Brush Island NR				⊙		⊙				⊙		
Budawang NP					○							
Clyde River NP	○			⊙	○	○		○				
Conjola NP	○	○	○	○	○	○	⊙	○		○		
Cullendulla Creek NR	○		○	⊙	○	○	⊙					
Meroo NP	⊙			⊙	⊙	○	⊙		○	○		
Morton NP (south)				⊙								
Murramarang AA			○	⊙		●						
Murramarang NP			○	○	○		⊙			○		
Narrawallee Creek NR			○		○			⊙		⊙		
Tollgate Islands NR			○		○					⊙		
Yattheyattah NR	○			⊙	○	○	○					
ILLAWARRA AREA												
Illawarra Escarpment SCA	●	●		○	●	○		●				
Berkley NR	○	○	⊙		●	○	⊙	●				
Five Islands NR			⊙		○	●	⊙					
Dharawal SCA		○	⊙	⊙	○	●	⊙	⊙	⊙		⊙	
Dharawal NR		⊙		⊙	○	●	⊙	⊙	⊙			

	Asparagus weeds: Note 1	Ageratina spp.	Bitou Bush	Blackberry	Exotic vines	Ex. perennial grasses	Garden escapees	Lantana	Pinus spp.	Sea Spurge	Serrated Tussock	Willows
Upper Nepean SCA	<input checked="" type="radio"/>		<input checked="" type="radio"/>		<input type="radio"/>	<input checked="" type="radio"/>		<input checked="" type="radio"/>			<input checked="" type="radio"/>	

Notes:

(1) Asparagus weeds known to occur in SCR reserves include Bridal Creeper and Ground Asparagus

(2) Exotic vines known to occur in SCR reserves include Madeira Vine, Dolichos Pea, Ground Asparagus, Bridal Creeper, Cape Ivy, English Ivy, Cat's Claw Creeper, Coast Morning Glory, Morning Glory, Japanese Honeysuckle, Moth Vine (moth plant), Passionfruit (*Passiflora spp.*), Turkey Rhubarb (potato vine), Black-eyed Susan, *Tradescantia fluminensis* and Periwinkle

(3) Exotic perennial grasses known to occur in SCR reserves include African Lovegrass, Kikuyu, Buffalo Grass, Panic Veldgrass, Pampas Grass, Parramatta Grass and Whiskey Grass.

9. References

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10. Appendices

Appendix 1: SCR pest management plans

The South Coast Region Operations Plan 2011/12 is an annual plan that identifies corporate level actions and how they will be implemented in SCR. There are a number of other plans that guide pest management on reserves in SCR such as reserve plans of management and recovery and threat abatement plans.

The following current Area and reserve level planning documents describe in detail the on-ground works required to implement Regional objectives:

Berkeley Nature Reserve Introduced Weed Species Management Plan

Berkeley Nature Reserve Weed Management Plan

Bomaderry Creek Regional Park Weed Management Plan

Budderoo NP (Minnamurra Rainforest and Budderoo Plateau) Weed Management Strategy

Budderoo NP (Kelly's Cottage Precinct) Weed Management Strategy

Colymea SCA, Bamarang NR and Wogamia NR Weed Management Plan

Comerong Island NR Weed Management Plan

Cullendulla Creek NR Weed Management Strategy

Cumberland LHPA Northern Illawarra Deer Management Strategy

Jervis Bay NP and Woollamia NR Weed Management Plan

Macquarie Pass NP (Clover Hill Precinct) Weed Management Strategy

Morton NP Heritage and Weed Management Assessment (Timealong Precinct)

Morton NP (Shoalhaven River Corridor) Weed Management Plan

Murramarang AA and Brush Island NR Weed Management Strategy

Nadgigomar NR Weed Management Strategy

Seven Mile Beach Weed Management Plan

Tarlo River NP Weed Management Strategy.

Appendix 2: Regional coordination and support of pest control programs

Pest control programs are coordinated by the local NPWS Area and Region in order to ensure that resources are utilised to achieve the best possible outcomes. Area and Regional assistance is also required to efficiently work with neighbours, community groups and other agencies. Education of staff and the broader community are essential requirements in integrated pest management and are also best achieved by centralised coordination.

The Region will continue to implement systems for pest program reporting and monitoring. The Region has a permanent Regional Pest Management Officer to provide support for Area pest management planning and program implementation. This assistance will include evaluating management plans, disseminating information and major program planning.

An important objective for the Region is to provide support for community-based volunteer groups who carry out pest management activities on reserves under the supervision of NPWS staff and on private property as part of NPWS threatened species conservation programs. Some of these groups include:

- The Friends of the BTRW who help to conserve local populations of this threatened species by raising funds, conducting fox control and protecting rock-wallaby BTRW habitat on private land
- The Robertson Environment Protection Society (REPS) who work to protect and enhance the natural environment in and around the Robertson area, including Robertson NR
- The Upper Minnamurra Rivercare Group who are local rural residents working on riparian restoration projects near the Minnamurra rainforest in Budderoo NP
- The Friends of Durras who are volunteers who carry out weed control and monitoring of shorebirds on the Murramarang NP coastline. The main focus of the group's work is control of Bitou Bush, Sea Spurge and Senna
- Shorebird volunteers at various locations who assist with shorebird protection works especially during the summer breeding season. Works the volunteers carry out include erecting and maintaining protective fences and signs around breeding sites, monitoring nesting sites, recording breeding information and talking to the public
- Conservation Volunteers Australia who carry out a regular program of water quality monitoring, tree planting, bush regeneration, seed collection and propagation and photopoint monitoring at Seven Mile Beach NP.

Appendix 3: Regional Achievements

The SCR has a strong pest focus and as a result undertakes many programs that are worthy of being identified as regional achievements. The following programs are a sample of the regional achievements in relations to pests.

Shore bird management and recovery programs

The South Coast Shorebird Recovery Program (SCSRP) began in 1999 to monitor and protect threatened shorebirds, being the Hooded Plover (critically endangered), Little Tern (endangered), Pied Oystercatcher (endangered) and Sooty Oystercatcher (vulnerable). The program aims to recover these species by improving breeding success through management of threats to nests and chicks. The first three species nest on beaches, around lakes and rivers on the mainland, while the last species nests on rocky offshore islands.

As part of the SCSRP and the Fox TAP, fox control is undertaken around shorebird breeding sites to protect nests and chicks from fox predation. Existing pest control programs are supplemented with the activation of extra fox bait stations close to shorebird nesting sites before and during the shorebird breeding season. Baiting programs have been effective in lowering the density of foxes and sometimes even completely removing foxes for a short critical period around nesting areas, and consequently have improved shorebird breeding success. However, it takes only one fox to decimate an entire Little Tern breeding colony up to 100 breeding pairs, predated the majority of eggs and chicks in a single night.

Baiting programs are supplemented with reactive soft jaw trapping and night shooting operations when necessary. In addition to this, fox den detection with trained dogs and subsequent den fumigation is also being trialled this season. This combination of different fox control methods including monitoring appears to be effective in improving shorebird breeding success.

The Little Tern population in NSW has recovered from 110 breeding pairs in the mid 1980s to around 500 breeding pairs. The Hooded Plover in the South Coast Region is also experiencing a slight recovery in their population due to hard work by NPWS staff, pest contractors and community volunteers.

An emerging threat to the shorebirds of the south coast is raven predation. Ravens are an intelligent bird which have learned to associate our protective nesting area fences with a food source (shorebird eggs or chicks) and are currently the biggest threat to the recovery of shorebirds on the south coast. The Lake Wollomboola Little Tern colony was decimated by ravens in 2009/10 and the terns have not nested at the site since. Ravens also harass Hooded Plovers and Pied Oystercatchers and have become serial predators, resulting in extremely low breeding success at certain sites. Alternative raven control methods need to be researched and implemented.

Community support for the SCSRP is increasing with frequent media and presentations raising awareness. There are more than 70 active SCSRP volunteers registered with NPWS in the South Coast Region. Some of their contributions include monitoring and protecting shorebird nests, identifying fox and raven tracks so that reactive control can be undertaken.

Brush-tailed Rock-wallaby (BTRW) Management Program

BTRW are listed as an endangered species in NSW under the TSC Act 1995. BTRW in the Shoalhaven region are at the southern extent of the species range with the exception of approximately 20 BTRW individuals remaining in the wild in Victoria. In 2007 it was estimated that only 30 BTRW remained in the Shoalhaven region. In order to protect the local BTRW population, intensive 1080 fox baiting began in the Kangaroo Valley area in 1995, with baiting efforts conducted by NPWS staff as well as numerous private properties. In addition, a number of local landholders formed the Friends of the BTRW to assist NPWS in raising the species profile as well as raising funds to assist NPWS in the species management.

At present NPWS baits on NPWS estate, vacant crown land, Sydney Catchment Authority estate, Shoalhaven City Council estate, Nowra LALC estate and approximately 15 private properties. A range of control techniques are being implemented by NPWS to ensure adaptive management of the local fox population – ongoing 1080 baiting using a variety of bait matrices, as well as M44 ejectors, fox shooting, fox trapping and fox den identification using fox scent detection dogs. In 2011 over 50 private properties are participating in the NPWS fox shooting efforts twice per year.

Due to the significantly low numbers of BTRW it became apparent that the species was in a predator pit. Thus despite the extensive fox control efforts being undertaken, it would only take a few foxes to stop any recruitment of BTRW young into the adult population. To date eight BTRW have been released into local colonies (with the assistance of the NSW BTRW Captive breeding program) in order to bolster numbers to levels where they could better withstand low levels of fox predation. Further releases of another 10 -15 individuals are planned in the near future. While the species recovery has been slow, successful recruitment of young into the adult population is now occurring at a number of local colonies. Over the past 12 months, there has been approximately 75% successful recruitment of young into the adult population.

Aerial Goat Control Program

Since 1984, aerial goat control has been pioneered in the Shoalhaven George and surrounding areas with a current total of 7019 goats being culled. In addition to this, 1780 goats have been culled in Tarlo River National Park and surrounding areas.

Aerial pest control is a SCR regional program undertaken in the Shoalhaven Gorge area of Morton National Park, Bungonia State Conservation Area, Bungonia National Park, Bees Nest, Jerralong and Kerrawarry Creek nature reserves and Tarlo River National Park, as well as on surrounding private property where landowner consent has been obtained.

A management plan for goat control in the SCR has been prepared which outlines management objectives, methodology proposed to monitor and evaluate the impact of the program on native flora and fauna within the reserves, management strategies and animal welfare issues.

The program includes a component of ground based shooting to recover collared goats and reduce numbers where aerial culling operations are not viable. In co-operation with the Sydney Catchment Authority, these operations include the areas of Morton National Park along the Shoalhaven Gorge west of Tallowa Dam to Fossickers Flat. Monitoring in this corridor identifies that populations of goats exist, however, the vegetation types significantly hamper the efficiency of aerial culling

operations. Reducing the number of goats by ground culling will reduce re-population rates into the reserve.

The program is conducted using NPWS helicopters and pilots along with NPWS and LHPA personnel who are trained and accredited Navigators and FAAST shooters.

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Appendix 4: Emerging pest issues

New pest threats may emerge during the life of this strategy that require planning, control and monitoring. These threats may emerge as a result of accidental or deliberate release or escape of exotic animals and plants, adaptation by exotic species to new environments, climate change and habitat modification. Recent examples of new incursions of pest species into reserves are some deer species, in particular Sambar Deer (*Cervus unicolor*).

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

A general increase in mean temperatures and fewer frost days are predicted for the future climate of Australia. All invasive plants can be expected to demonstrate a southward range shift, increased rainfall will spread weeds and temperature sensitive plants may shift into higher altitude areas (CRC 2007). However, climatic change may also assist the spread of some biological control agents and improve their effectiveness.

Some emerging pest threats have already been determined to be Key Threatening Processes. Psittacine Circoviral (beak and feather) Disease (PCD) is known to affect endangered psittacine species and populations and may threaten local populations of Gang-gang Cockatoos (*Callocephalon fimbriatum*), Glossy Black-cockatoos (*calyptorhynchus lathamii*) and Swift Parrots (*lathamus discolor*). Cane Toads (*Bufo marinus*) and Red Imported Fire Ants (*solenopsis invicta*) are other potential serious pest threats that require close monitoring. An increase in the rate of spread of some weed species may result from accidental or deliberate introduction of exotic large Earth Bumblebees (*Bombus terrestris*) from Tasmania where they are now established.

The Region is aware of the need for monitoring and control activities to be sufficiently flexible to address not only potential new pest threats but also new incursions of existing threats from elsewhere within the Region eg. the plant pathogen *Phytophthora cinnamomi* and myrtle rust.

In some circumstances, new programs may be introduced, or priority programs extended to target pests where a control “window of opportunity” is identified eg. 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 species and climate change.

Appendix 5: Operational guidelines

The following operational guidelines and conditions will be applied to all feral animal control programs on SCR reserves.

1. All feral animal control will be humane and target specific
2. An approved shooting operations plan using the standard format will be prepared for all planned shooting programs
3. Shooting will only be undertaken by shooters who are licensed, accredited by the NSW Firearms Safety Awareness Council and have successfully completed the NPWS Firearms Accreditation Level 2
4. All aerial shooting programs will be only undertaken by trained and accredited members of the Feral Animal Aerial Shooting Team
5. Planned shooting programs will not occur during school holidays, public holidays or on Friday or Saturday nights unless the shooting supervisor is satisfied that the relevant sections of the park can be closed to visitors and all potential safety issues can be addressed
6. Police will be contacted by the shooting supervisor prior to each shooting operation.
7. Park neighbours in the immediate vicinity will be notified at the commencement of each planned shooting programs. Police will be notified by the shooters at completion of each shooting operation
8. Operational briefings on procedures and target areas will occur prior to the commencement of each planned shooting program and there will be regular meetings between the shooting supervisor and shooters during the program
9. A person qualified in first aid will be present in each shooting team
10. Every person participating in chemical control (baiting) operations will be trained and competent in the use of relevant chemicals and methods
11. The program supervisor will comply with requirements for proper record keeping and the provisions of the NPWS Pesticide Use Notification Plan
12. All shooting will comply with the provisions of the NPWS Firearms Policy and NPWS Firearms Management Manual
13. A Job Safety Analysis will be prepared and a Job Safety Briefing will be conducted by the program supervisor at the commencement of each shooting program and at regular intervals over the program period
14. Following feral animal control, staff and contractors will complete and lodge report forms to Regional PMO for updating of FeralBASE (temporarily) until the changeover to AMS is fully operational during 2011-12.

The following operational guidelines and conditions will be applied to all weed control programs on SCR reserves.

1. A Job Safety Analysis will be prepared for each weed control program
2. A Job Safety Briefing will be conducted by the program supervisor at the commencement of each weed control program and at regular intervals over the program period
3. Every person participating in weed control operations will be trained and competent in the use of relevant chemicals and methods
4. The program supervisor will comply with requirements for proper record keeping and the provisions of the NPWS Pesticide Use Notification Plan
5. Following weed treatment staff and contractors will complete and lodge weed treatment forms to the Regional Pest Management Officer for updating of WeediBASE (temporarily) until the changeover to AMS is fully operational during 2011-12.

Appendix 6: List of Noxious Weeds

As discussed in Part A of the RPMS, the *Noxious Weeds Act 1993* provides for the identification, classification and control of noxious weeds in New South Wales.

Weed Control Order No. 28 (30/9/2011) specifies the control objectives for the management of noxious weeds as follows:

- a. weed control class 1 - prevent the introduction and establishment of those plants in NSW.
- b. weed control class 2 - prevent the introduction and establishment of those plants in parts of NSW.
- c. weed control class 3 - reduce the area and the negative impact of those plants in parts of NSW.
- d. weed control class 4 - minimise the negative impact of those plants on the economy, community or environment of NSW.
- e. weed control class 5 - prevent the introduction of those plants into NSW, the spread of those plants within NSW or from NSW to another jurisdiction.

Control class 1 and 2 weeds are a Critical priority within this RPMS. The class 1 and 2 weeds found across the SCR are listed in the tables below. In addition, noxious weeds under the other classes or other weeds not listed under this Act that are a risk to threatened assets and are a high priority in the BPWW are also a critical priority in the RPMS.

Update to-date declarations of noxious weed can be viewed on the DPI webpage: <http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/noxweed>

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
Anchored Water Hyacinth	<i>Eichhornia 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>
Eurasian Water Milfoil	<i>Myriophyllum spicatum</i>
Hawkweed	<i>Hieracium</i> species
Heteranthera/Kidneyleaf mud plaintain	<i>Heteranthera reniformis</i>
Horsetail	<i>Equisetum</i> species
Hydrocotyl/ Water pennywort	<i>Hydrocotyle ranunculoides</i>

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>
Koster's curse/ Clidemia	<i>Clidemia hirta</i>
Lagarosiphon	<i>Lagarosiphon major</i>
Mexican Feather Grass	<i>Nassella tenuissima</i>
Miconia	<i>Miconia</i> species
Mikania	<i>Mickania micrantha</i>
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>Cryptostegia grandiflora</i>
Senegal Tea Plant	<i>Gymnocoronis spilanthoides</i>
Siam Weed	<i>Chromolaena odorata</i>
Spotted Knapweed	<i>Centaurea stoebe</i> <i>Subspecies micranthos</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>

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>	Whole of NSW except the local authorities listed by name in Schedule 3 of the Order for this species
Boneseed	<i>Chrysanthemoides monilifera</i> sub species <i>monilifera</i>	Whole of NSW except the local authorities listed by name in Schedule 4 of the Order for this species
Cape Broom	<i>Genista monspessulana</i>	Palerang Council, Eurobodalla SC
Gorse	<i>Ulex europaeus</i>	Eurobodalla SC
Hygrophila	<i>Hygrophila costata</i>	Campbelltown CC, Wollondilly SC
Mesquite	<i>Prosopis species</i>	Upper Lachlan SC
Parkinsonia	<i>Parkinsonia aculeata</i>	Upper Lachlan SC
Salvinia	<i>Salvinia molesta</i>	Whole of NSW except the local authorities listed by name in Schedule 3 of the Order for this species
Tropical soda apple	<i>Solanum viarum</i>	Whole of NSW except the local authorities listed by name in Schedule 3 of the Order for this species
Water Hyacinth	<i>Eichhornia crassipes</i>	Whole of NSW except the local authorities listed by name in Schedule 3 and 4 of the Order for this species