



Regional Pest Management Strategy 2012–17: Metro North East Region

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

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Cover photos, main: controlling asparagus fern in an endangered ecological community at Elvina Bay in Ku-ring-gai Chase National Park (M McRae); small: fox at bait station (R Gleeson); tropical soda apple in Muogamarra Nature Reserve (M Bollinger/OEH); rabbit (R Ali/OEH); morning glory (R Nicolai/OEH).

Summary

Metro North East Region of the National Parks and Wildlife Service covers the north-easterly quarter of the Sydney Basin between Botany Bay (northside) and Broken Bay (southside) and inland from Wolli Creek in the south to Wisemans Ferry on the Hawkesbury River in the north west (see map). The Region includes a significant portion of the remaining natural landscape of the Sydney Basin including some of the best known conservation reserves and cultural heritage in the state. Many threatened species and endangered ecological communities or endangered populations occur in the Region, including some species and communities that are endemic to the Region.

With just under 37,000 hectares of managed land, Metro North East Region is responsible for the smallest land area of reserve of any region in NSW. However, the characteristics of the Region and the location of the Region's reserves in, or immediately adjacent to, the urban centre of Sydney means that they are subject to a complex planning environment and management priorities.

A number of pest species are present in Metro North East Region and their impacts can be observed in all reserves. Many common pests are widespread and, because Sydney is an importation, transport and commercial hub, it has a high potential as a point of invasion for new pest species. In addition, many common vertebrate pests (such as foxes and rabbits) have an impact across the urban landscape, but traditional control techniques cannot always be applied.

This strategy provides a framework to prioritise specific pest management programs. The prioritised regional pest programs rank sites according to their impact on park values, primarily biodiversity, cultural heritage, and recreational and landscape amenity. The table can be cross-referenced with pest species overviews for more information on regional pest programs. Resourcing commitments (recurrent funding and staff time) of priorities identified in this strategy and expected annual outcomes and timing will be included in the annual regional operations plan. Resourcing will be tracked through the Asset Maintenance System, and the Pest and Weed Information System will also be used to capture spatial data and information about pest programs.

Metro North East Region was one of the first NPWS Regions to engage community volunteers for Bushcare, and in recent years the program has expanded to also offer corporate volunteering opportunities. Volunteer contributions include significant biodiversity gains for critical pest programs; for example the conservation of Blue Gum High Forest endangered ecological community in Dalrymple–Hay Nature Reserve or the threatened Nielsen Park she-oak (*Allocasuarina portuensis*) endemic to Nielsen Park in Sydney Harbour National Park. Other programs which provide benefits to park and landscape amenity – including those in high profile locations such as the Sydney Harbour islands – also provide opportunities for the community to participate in conservation programs.

The Region is known for its safe and effective fox control program and was one of the first locations in NSW to undertake fox control in urban bushland for the benefit of biodiversity. In conjunction with the development of the NSW Fox Threat Abatement Plan, NPWS joined with local councils and other land managers via the Urban Feral Animal Action Group to implement the multi-agency landscape-wide Sydney North Regional Fox Control Program. The program won a local government excellence in the environment award for biodiversity in 2005, and in 2012 continues to be implemented for the benefit of biodiversity, including threatened fauna species and endangered populations.

The Region has had significant success in local programs for the control of isolated or new vertebrate pests and weeds, including timely and effective removal of goats and pigs in Marramarra National Park that were causing nuisance to park neighbours (orchards and businesses) as well as impacting park values, including Aboriginal cultural heritage sites and threatened plants. Similarly, in response to an alert for tropical soda apple in 2011, an isolated infestation of two plants was found and eradicated, and the site continues to be monitored. The control of this and other weeds new to the Region, including other invasive *Solanum* species, is a priority of this strategy and is also being undertaken in conjunction with neighbouring land management agencies, the Department of Primary Industries, and Sydney Weeds Committees.

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Abbreviations

AMS	Asset Maintenance System
APZ	asset protection zone
BPWW	Biodiversity Priorities for Widespread Weeds (BPWW CC1-6 refers to control categories within BPWW Statewide Framework ¹)
BMAD	bell miner associated dieback
CMA	catchment management authority
DPI	Department of Primary Industries
EEC	endangered ecological community
FIN	further information needed
HHIMS	Historic Heritage Information Management System
KTP	key threatening process
LGA	local government area
LHPA	Livestock Health and Pest Authority
NP	national park
NR	nature reserve
NPWS	NSW National Parks and Wildlife Service
NW Act	<i>Noxious Weeds Act 1993</i>
OEH	Office of Environment and Heritage
PAS	Priorities Action Statement
PWIS	Pest and Weed Information System
RHDV	rabbit haemorrhagic disease virus
RLP Act	<i>Rural Lands Protection Act 1998</i>
ROP	regional operations plan
ROTAP	rare or threatened Australian plants
RP	regional park
SCA	state conservation area
SHR	NSW State Heritage Register
SWC	Sydney weeds committees
TAP	threat abatement plan
TSC Act	<i>Threatened Species Conservation Act 1995</i>
UFAAG	Urban Feral Animal Action Group (Sydney North)
WAP	weed action program
WoNS	Weed of National Significance

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

1 Introduction

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

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

NSW Invasive Species Plan provides specific goals, objectives and actions in relation to invasive species management.

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

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

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

2 Regional overview

Metro North East Region, Metro South West Region and Blue Mountains Region form part of the NPWS Metropolitan and Mountains Branch responsible for the management of reserved lands in the greater Sydney Basin, and Blue Mountains, Southern Ranges Region is also a part of Metro and Mountains Branch. Metro North East Region is the part of Sydney that lies between Botany Bay (northside) and Wolli Creek in the south, Broken Bay in the north-east, and north-west to Wisemans Ferry. The Region comprises eight national parks (Berowra Valley, Garigal, Kamay Botany Bay, Ku-ring-gai Chase, Lane Cove, Marramarra, Sydney Harbour and Malabar Headland), seven nature reserves (Dalrymple–Hay, Dural, Lion Island, Long Island, Muogamarra, Spectacle Island and Wallumatta), three historic sites (Cadmans Cottage, Maroota and Wisemans Ferry), three regional parks (Berowra Valley, Parramatta River and Wolli Creek), and one Aboriginal area (Mount Ku-ring-gai).

Regional context

At just over 37,000 hectares Metro North East Region is responsible for the smallest land area of reserves of any NPWS region in NSW. However, the characteristics of the Region and the location of its reserves in, or immediately adjacent to, the urban centre of Sydney means that they are subject to a complex planning environment and play a critical role in delivering whole-of-government initiatives. There are 33 local government areas (LGAs) and 35 state government electorates fully or partially within the Region which falls inside the boundaries of the Hawkesbury–Nepean Catchment Management Authority (CMA) and Cumberland Livestock Health and Pest Authority (LHPA) (both are to be incorporated into the Local Land Services in 2014).

The Region includes a significant portion of the remaining natural landscape of the Sydney Basin and encompasses the built environment of metropolitan Sydney from the airport, light industrial districts and central business district to the beaches, suburbs and northern peri-urban fringe. It brings together some of the best known conservation reserves in the state and its characteristics include:

- some of world's longest established conservation reserves
- natural landscapes which preserve much of the original biodiversity of the Sydney basin, including many species, ecological communities and populations listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act)
- iconic landscape features, such as North and South heads, which frame the entrance to Sydney Harbour and promote Sydney as a green city surrounded and interspersed by bushland
- many of the key destinations for international visitors seeking national park experiences in Sydney
- Sydney's premium vantage points for outdoor celebrations and special events, ranging from weekend picnics to New Year's Eve celebrations
- nationally significant European and Aboriginal cultural heritage sites, including many listed under the *Heritage Act 1977* in readily accessible locations
- many tangible links to the Aboriginal custodians of these lands, and opportunities to partner Aboriginal communities in the management and interpretation of places and reserves
- open space amenity in an otherwise urban landscape and opportunities for outdoor enjoyment, recreation and a continuing place in community life

- the capacity to provide high quality environmental and cultural experiences for local, domestic and international visitors
- the capacity to provide opportunities for education and research.

Park management

Metro North East Region comprises three NPWS Management Areas – Harbour, Kuring-gai and Valleys.

The Region brings together the talent and experience of around 160 staff, including those involved in management, visitor services, field operations and specialist roles. The pest management officer provides support, advice and direction for the strategic management of pests against regional priorities and ensures that statutory and legislative responsibilities are met and best practice management processes are adhered to. Area staff manage projects and undertake on-ground pest control, including coordination and support of volunteer programs and overseeing contractors engaged in pest management programs. Staff participation in pest related training both on the job and via formal certification is well supported and staff keep informed of new developments and best practice by information sharing and participation in pest related conferences, seminars and workshops run by relevant committees, societies and agencies including, but not limited to, the NSW Department of Primary Industries (DPI) Vertebrate Pest Management Course and numerous weed identification and management courses and conferences, NSW Weeds Committee, Australian Association of Bush Regenerators and Sydney Weeds Committees (SWC).

The Region encompasses a wide range of topographic features, soil types and vegetation associations. It contains over 1000 known species of flora and over 200 known species of mammals, birds and reptiles. A large number of species, populations and communities have been declared under the TSC Act and the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) in the Region. Priority is given to their care, especially those wholly or largely endemic to the Region or where their status in the Region is the primary determinant of their survival or extinction in NSW.

A number of pest species are present and their impacts can be observed in all reserves. Urban development impacts heavily upon the Region's reserves as it creates conditions favourable to weed invasion (including nutrient enriched run-off, sewage overflows, high flow stormwater, soil disturbance, vegetation clearing, dumping of fill and garden waste, and garden escape plants). This is evidenced by the high densities of weeds on urban boundaries and along creeks and rivers downstream of development. Weeds listed as Weeds of National Significance (WoNSs) or on the National Alert Weed List and those declared as noxious under the *Noxious Weeds Act 1993* (NW Act) or identified in key threatening processes (KTPs) under the TSC Act pose some of the greatest threats to the conservation of biodiversity, cultural heritage and recreational and landscape values in the Region. Rabbits and foxes are the most common vertebrate pests, and while foxes occur across the landscape including in relatively undisturbed bushland, rabbits are generally confined to areas of high protein grass available in open areas, predominantly associated with the agricultural and urban interface.

Metro North East Region reserves are regularly impacted by fire both as wildfire and also through programmed hazard reduction burning. Fire may be used as a tool for conservation; many plant communities and species, including those identified as threatened, require defined fire regimes to promote health and regeneration. Fire can also be used as a means of weed control or as a window of opportunity for control. Fire can also lead to increased pest invasion, most commonly weeds, but also

increased vertebrate pest activity, including predation by foxes and increased browsing and damage to regenerating plants by rabbits. Conversely, prolonged absence of fire can also lead to degradation of native plant communities and increased weed invasion, particularly by mesic species. Staff working under the Enhanced Bushfire Management Program manage native and exotic vegetation in asset protection zones (APZs) and engage in pre- and post-fire weeding which reduces weed biomass and impacts at specific locations.

The urban interface is considerable as many reserves are small or long and narrow. The prioritisation process in this strategy will assist in determining where edge effects should and can be mitigated, and through community engagement programs neighbours will be encouraged to take joint ownership of assets and issues.

It must be recognised that because of the highly urbanised nature of Metro North East Region its bushland reserves are of high value as wildlife refuges or corridors, including those for threatened species and migratory birds. This is especially the case with Wollie Creek Regional Park, Sydney Harbour National Park, Lane Cove National Park and Berowra Valley National Park.

Resourcing commitments (recurrent funding and staff time) of priorities identified in this strategy and expected annual outcomes and timing will be included in the Region's annual regional operations plan (ROP). Resourcing will be tracked through AMS and the Pest and Weed Information System (PWIS) will also be used to capture spatial data and information about pest programs.

Regional funding is allocated on a priority basis and external funding is also sought for on-ground control of priority pests through regional and national grants and joint projects; volunteers and 'friends' groups also seek grant funding for works on parks estate for key priorities.

Barriers to effective pest control include conflicting priorities, such as routine maintenance and a range of non-pest related management priorities, events and emergency work. Although resources are used to best effect by adhering to predetermined priorities, limited resources, both in terms of adequate funding and staff availability, dictate what pest programs are implemented. Not all pests or impacts can be addressed.

Community engagement

More than 500 volunteers provide support through a diverse group of programs. Metro North East Region was one of the first regions in NSW to engage community volunteers for Bushcare and has over 60 groups and many dedicated individuals, many of whom are considered industry experts. Pest management programs in the Region also offer volunteering opportunities for business and industry, corporate groups, schools and university students; armed forces personnel also participate. The Discovery program engages and informs park visitors about the values and assets of the Region's reserves and provides a tool for interpretation and education on the impacts of pests and benefits of pest management programs. NSW Fire Brigades Community Fire Units and NSW Rural Fire Service Fire Wise initiatives may also be used to undertake weed control in APZs. Where pests impact on Aboriginal cultural heritage sites, Aboriginal heritage officers and staff liaise with the relevant Aboriginal Land Council and Aboriginal community who may be invited to participate in on-ground management. Students from universities, TAFE and high schools, and Aboriginal trainees are routinely engaged to assist in pest monitoring and management programs.

Volunteer programs address many critical and high priority actions outlined in this strategy as well as medium and lower priority localised pest impacts. The contribution

of all volunteers to pest management is highly valued by NPWS and, in turn, participants are given experiences relevant to a variety of motivations including personal satisfaction and gaining work experience. Volunteers are also provided with opportunities for on-the-job training and mentoring and the provision of training courses including an introduction to bush regeneration and plant identification. The Region has staff representatives on the Volunteer Coordinators Network which provides support and information sharing for local government, NPWS and other agency personnel supervising volunteers and ensures best practice management of volunteers; the Sydney Weeds Committees also develop educational and training opportunities and support mechanisms for staff and volunteers.

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

NPWS works in close collaboration with neighbouring agencies and landholders on coordinated pest control programs, information sharing, cost sharing and public education programs. Collaborative programs and issues pertaining to vertebrate pests north of the harbour are coordinated through the Sydney North Urban Feral Animal Action Group (UFAAG) comprising 17 land management agencies including the Cumberland Livestock Health and Pest Authority; programs south of the harbour involve direct liaison with councils and other agencies and neighbours. Successful landscape-wide vertebrate pest control programs coordinated by UFAAG include the Sydney North Regional Fox Control Program and coordinated rabbit control. Supported by DPI, the Sydney Weeds Committees (Sydney North, Sydney Central and Sydney West Blue Mountains), of which Metro North East Region is a member, provides information and support to member agencies in relation to strategic and goal-driven collaborative weed control programs, information sharing and staff and community education programs. The SWC Weed Action Program (WAP) prioritises weed control in high conservation areas, including the conservation of endangered ecological communities (EECs) and threatened species and populations and targets high priority weeds and new incursions along high risk pathways.

The CMA plays a vital role in facilitating and funding cross-tenure programs and community participation in the pest management programs in the Region and many NPWS priorities, especially in relation to biodiversity conservation and community engagement targets, objectives and outcomes of the relevant catchment action plans.

NPWS endeavours to work with individual park neighbours to manage pests; however, limited resources dictate that pests that have localised impacts will be given lower priority than regional- or catchment-wide programs.

Pest management highlights

The Region's interest in conservation of local bushland was further stimulated by the 1994 wildfires in Sydney. The Bushcare program is strong in numbers, ability and efficacy. Many Bushcare volunteers are industry experts and champions of

conservation. The contribution of these dedicated and hardworking volunteers is valued by NPWS, and works include not only improvements to local neighbourhoods and public amenity in a number of reserves, but also considerable biodiversity gains in locations identified as critical priorities for the conservation of threatened species such as in Dalrymple–Hay, Muogamarra and Wallumatta nature reserves, or in the ongoing conservation of threatened species endemic to the Region, such as Nielsen Park she-oak (*Allocasuarina portuensis*) at Nielsen Park in Sydney Harbour National Park.

In recent years the Bushcare program has expanded to offer corporate volunteering opportunities, and these events are well supported and offer a win–win scenario benefiting NPWS through funding and implementation of on-ground works and by providing opportunities to corporations to participate in meaningful conservation programs and promote team spirit. Projects have included weed control at high profile locations like Goat Island and Bradleys Head in Sydney Harbour National Park and Barrenjoey Headland in Ku-ring-gai Chase National Park.

The Region was the first in NSW to successfully and safely undertake fox control using 1080 baiting in an urban environment and, from 2000 in conjunction with the the NSW Fox Threat Abatement Plan (TAP), NPWS joined local councils and other land managers via the UFAAG to implement the multiagency Sydney North Regional Fox Control Program. The program won a local government excellence in the environment award for biodiversity in 2005, and in 2012 continued to be implemented for the benefit of biodiversity. Successes and benefits generated by the program include cost sharing, coordinated and strategically timed bait laying, a proven safe record with negligible off-target effects, and a high level of public acceptance (the latter two benefits were taken into account in the 1080 review and development of a state-wide 1080 Pesticide Control Order with more relaxed restrictions on the use of 1080 to facilitate urban fox control). There has been a reduction in foxes and in opportunities for fox recruitment into Fox TAP sites, and benefits to threatened biodiversity, an increase in common native wildlife species like swamp-wallabies, lyrebirds and quails that before fox control were believed to becoming uncommon in urban bushland, less predation of captive wildlife in zoos, research centres and refuges, and a likely reduction in predation of, and disease transmission to, domestic pets.

The Region has also had significant success in local programs for the control of isolated or new vertebrate pests. Lower Hawkesbury Area in association with Cumberland Livestock Health and Pest Authority (LHPA) and park neighbours removed a herd of feral goats from Marramarra National Park in the vicinity of Laughtondale in 2008. While local eradication cannot be confirmed, no goats have been sighted or have caused damage to commercial orchards or park assets such as threatened species and Aboriginal cultural heritage sites since that time. Monitoring and prompt reactive control of goats in Marramarra National Park remain a critical priority in this regional pest management strategy. Similarly, Cumberland LHPA assisted with the prompt capture and destruction of three feral pigs in Marramarra National Park, including pregnant sows, after a report by a park neighbour in late 2011.



3 Regional prioritisation

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

Critical priority

C-TSC (Threatened Species Conservation)

Programs targeting pests which are, or are likely to be, significantly impacting on threatened species, populations or communities. These include the highest priorities identified in the threat abatement plans (TAPs), Priorities Action Statements (PAS) and Biodiversity Priorities for Widespread Weeds (BPWW). For example, undertake fox control at the Garigal priority site for the southern brown bandicoot as identified in the Fox TAP.

C-HD (Health and Disease)

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

C-EC (Economic)

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

C-NE (New and Emerging)

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

High priority

H-IH (International Heritage)

Programs that target pests that impact significantly on world heritage or international heritage values, for example pest control in Ramsar wetlands.

H-CH (Cultural Heritage)

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

Medium priority

M-WNH (Wilderness and National Heritage)

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

M-RA (Recreation and Aesthetic values)

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

M-CP (Cooperative Programs)

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

M-II (Isolated Infestations)

Programs addressing isolated infestations of highly invasive pest species, widely distributed in other parts of the Region, with high potential for future impacts on park values, for example the control of corky passionflower in reserves where it has not yet established.

Lower priority

L-LP (Localised Programs)

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

L-PP (Previous Programs)

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

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

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

Further prioritisation mechanisms will be applied to pest control sites in the Metro North East Region including landscape management plans and site management plans. Site specific management plans are prepared for critical priority programs and include clearly defined aims, outcomes and commitments and, in the case of weeds, details of a staged approach to control to ensure efforts are targeted towards conserving the priority biodiversity.

The limitations of any system of prioritisation are recognised and it is also noted that, as on-ground or scientific knowledge changes over time, so the regional pest

management strategy and AMS will remain current and flexible to incorporate change. Some sites may move up or down in priority category over the life of this strategy.

When new weed programs (where the aim is biodiversity conservation) are introduced or when changes occur at current sites, they will also be subject to ranking and risk assessment using the BPWW system. An example is the declaration of a new EEC, or an improvement to on-ground knowledge.

When undertaking this prioritisation, thorough scrutiny of the level of impact by specific pests or KTPs to listed threatened species and vegetation communities is required – the presence of a threatened species or EEC alone is not sufficient for a critical ranking. As per the BPWW, consideration is given to the condition of the biodiversity, the value of the species or community to the long-term survival of that species or community, the level of impact by pest species, any positive impacts by pests, the feasibility of pest control and the urgency for control.

Species and communities that exist only in Metro North East Region will generally be given priority over those that occur across the state. The sites with the best and most viable examples of specific threatened species and communities will be prioritised over small occurrences or sites in very poor condition or in locations where long-term viability is poor. For example, the only known occurrence of the Nielsen Park she-oak (*Allocasuarina portuensis*) (EPBC-e; TSC-e) is at Nielsen Park within the Region, and weed control is undertaken as a critical priority to ensure the species' viability in the wild in NSW.

Littoral Rainforest EEC occurs in both Sydney Harbour National Park and Ku-ring-gai Chase National Park, but, in the former, rainforest remnants are badly impacted by weeds, stormwater flows and high nutrient loads, and examples of the EEC are generally small and degraded. Conversely, Littoral Rainforest EEC in Ku-ring-gai Chase National Park occurs in a more pristine environment and its condition, species diversity and long-term viability is much higher. Here invasive weeds are the only negative impact to the EEC so in general, greater effort will be directed to conserving Littoral Rainforest in Ku-ring-gai Chase National Park before that in Sydney Harbour National Park.

When managing sites of cultural heritage significance, only programs where pests are the primary impact will be included in the regional pest management strategy and AMS as strategic pest control programs. Where, for example, weeds and native plants are controlled to prevent damage to stone walls or buildings of cultural heritage, these programs will be captured elsewhere in AMS and defined in cultural heritage or precinct plans. Where weeds alone impact cultural heritage similar to the ranking for biodiversity, greater emphasis will be put on conserving cultural heritage of national or state significance ahead of that of local significance.

Further to this, where both weeds and native species are controlled or modified in the same way, these programs will be tracked elsewhere in AMS and not considered as strategic weed control; examples include where weeds and native plants are sprayed or slashed to keep tracks and trails clear for access or recreation, or the creation and maintenance of fire APZs, or the maintenance of landscaped or historic gardens on parks estate.

It is recognised that medium and lower priority programs are valued and will continue to be implemented to a degree, but the purpose of prioritisation is to ensure that maximum effort goes to maximum gain.

4 Prioritised regional pest programs

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

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Kamay Botany Bay NP	2738 – Henry Head	Bitou bush (<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i>), lantana (<i>Lantana camara</i>), kikuyu (<i>Pennisetum clandestinum</i>), buffalo grass (<i>Stenotaphrum secundatum</i>)	Themeda Grasslands on Seacliffs and Coastal Headlands (TSC-e), Eastern Suburbs Banksia Scrub (EPBC-e; TSC-e), Bangalay Sand Forest EECs (TSC-e), eastern bentwing-bat (TSC-v) over winter roost site (in fortifications), military fortifications 1871 and c.1940s (BPWW – CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, fire. Ensure clear flight path from eastern bentwing-bat over winter roost site.	C-TSC
Harbour	Kamay Botany Bay NP	2137 – Botany Bay NP Cape Banks and adjacent headland	Bitou bush, kikuyu	Themeda Grassland on Seacliffs and Coastal Headlands (TSC-e), Eastern Suburbs Banksia Scrub (EPBC-e; TSC-e), Estuarine Wetland Complex EECs (TSC-e). Military fortifications c.1940s on La Perouse Headland. State significance. (BPWW – CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, fire.	C-TSC
Harbour	Kamay Botany Bay NP	2204 – Botany Bay NP, Jennifer St lands	Bitou bush, kikuyu, lantana	Eastern Suburbs Banksia Scrub (EPBC-e; TSC-e), Freshwater Wetlands in the Sydney Basin Bioregion (TSC-e), Bangalay Sand Forest EECs (TSC-e), <i>Rulingia hermanniifolia</i> (uncommon), <i>Gonocarpus salsoloides</i> (ROTAP). (BPWW – CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, fire, Bushcare volunteer program.	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Kamay Botany NP	2739 – Cruwee Cove	Bitou bush, lantana	Eastern Suburbs Banksia Scrub (EPBC-e; TSC-e), Freshwater Wetlands in the Sydney Basin Bioregion EECs (TSC-e), Henry Head to Cape Banks Walk: recreational and scenic values (BPWW – CC1)	Asset Protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, fire.	C-TSC
Harbour	Kamay Botany Bay NP	2203 – Botany Bay NP, Grose St	Bitou bush, lantana, ground asparagus fern (<i>Asparagus aethiopicus</i>), blackberry (<i>Rubus fruticosus</i> agg.), kikuyu, buffalo grass	Eastern Suburbs Banksia Scrub (EPBC-e; TSC-e), Bangalay Sand Forest EECs (TSC-e). (BPWW – CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, fire.	C-TSC
Harbour	Kamay Botany Bay NP	2743 – (formerly part of 2203) Botany Bay NP, The Big House and Cemetery surrounds and Cape Banks North	Bitou bush, lantana, ground asparagus fern, blackberry, kikuyu, buffalo grass	Eastern Suburbs Banksia Scrub (EPBC-e; TSC-e), Freshwater Wetlands in the Sydney Basin Bioregion EECs (TSC-e). (BPWW – CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, fire.	C-TSC
Harbour	Malabar NP (a newly gazetted reserve, name not finalised)	2334 – Western headland	Bitou bush, lantana, ground asparagus fern, Coolatai grass (<i>Hyparrhenia hirta</i>), exotic grasses	Eastern Suburbs Banksia Scrub (EPBC-e; TSC-e), (BPWW – CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, Bushcare volunteer program, Friends of Malabar Headland.	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Sydney Harbour NP	2146 – North Head Collins Beach	Boneseed (CC2), ground asparagus fern, bridal creeper (<i>Asparagus asparagoides</i>), blackberry, camphor laurel (<i>Cinnamomum camphora</i>), coral tree (<i>Erythrina x sykesii</i>), large-leaved and small-leaved privet (<i>Ligustrum lucidum</i> and <i>L. sinense</i>), ochna (<i>Ochna serrulata</i>), tussock paspalum, trad (<i>Tradescantia fluminensis</i>), fishbone fern (<i>Nephrolepis cordifolia</i>)	Littoral Rainforest EEC (EPBC-ce; TSC-e), Manly little penguin (TSC-e), North Head long-nosed bandicoot (TSC-e), coastal sandstone foreshores forest, powerful owl (TSC-v) habitat, grey-headed flying-fox (EPBC-v; TSC-v) foraging, eastern bentwing-bat (TSC-v) foraging (BPWW – CC1)	Asset protection	Foliar spray, cut and paint, biological control, physical or mechanical control. Volunteer Bushcare Program – project penguin – for asparagus fern removal. Targeted coral tree removal by staff. Stormwater drainage works, sewer monitoring.	C-TSC
Harbour	Sydney Harbour NP	2737 – North Head Eastern Suburbs Banksia Scrub and surrounds	Boneseed (<i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i>) (CC 2), pampas grass (<i>Cortaderia selloana</i>), tussock paspalum (<i>Paspalum quadrifarium</i>), lantana	Eastern Suburbs Banksia Scrub EEC (EPBC-e; TSC-e), coastal headland banksia heath, Coastal Upland Swamp EEC (TSC-e), sunshine wattle (<i>Acacia terminalis</i> subsp. <i>terminalis</i>) (EPBC-e ;TSC-e), North Head long-nosed bandicoot (<i>Perameles nasuta</i>) (TSC-e), red-crowned toadlet (<i>Pseudophyrne australis</i>) (TSC-v), high visitation including events, iconic views (BPWW – CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, naturally occurring biological control, physical or mechanical control. Targeted exotic grass control, compensatory habitat bush regeneration, flora monitoring of rehabilitation site.	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Sydney Harbour NP	North Head Fox TAP site	Fox (<i>Vulpes vulpes</i>), feral cat (<i>Felis catus</i>), black rat (<i>Rattus rattus</i>)	Manly little penguin (<i>Eudyptula minor</i>) (TSC-e), North Head long-nosed bandicoot (<i>Perameles nasuta</i>) (TSC-e), Fox TAP.	Asset protection	Ground baiting 1080 (continuous and ongoing), ejectors 1080, ground shooting, cage trapping, habitat modification – den detection and fumigation. Monitoring fox activity (including Quarantine Station lease conditions). Monitoring native species recovery: little penguin counts and bandicoot cage trapping including population status analysis and maintenance of a mortality register. Black rat culling.	C-TSC
Harbour	Wolli Creek RP	2337 – Wolli East (Turrella to east Highcliff Road)	Japanese honeysuckle (<i>Lonicera japonica</i>), pampas grass, lantana, privet, Madeira vine, camphor laurel	Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest EECs (TSC-e), mangroves, Sydney sandstone ridgetop woodland. Wildlife and green corridor. European heritage (early 20th century farm site) (BPWW – CC1)	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control, fire, Bushcare volunteer program (two groups).	C-TSC
Harbour	Sydney Harbour NP	2742 – QS <i>Acacia terminalis</i> and <i>Eucalyptus camfieldii</i> sites	Kikuyu, buffalo grass, couch (<i>Cynodon dactylon</i>), whisky grass (<i>Andropogon virginicus</i>)	Sunshine wattle (EPBC-e; TSC-e), <i>Eucalyptus camfieldii</i> (EPBC-v; TSC-v). (BPWW – CC1)	Asset protection	Physical or mechanical control, foliar spray. Annual monitoring of impacts and recovery of threatened species at Quarantine Station. Habitat modification – plant guards.	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Sydney Harbour NP	2251 – Nielsen Park	Lantana, ground asparagus fern, African olive (<i>Olea europaea</i> subsp. <i>cuspidata</i>), balloon vine (<i>Cardiospermum grandiflorum</i>), Madeira vine (<i>Anredera cordifolia</i>)	Nielsen Park she-oak, (EPBC-e; TSC-e), sunshine wattle (EPBC-e; TSC-e), coastal headland banksia heath, coastal sandstone foreshores forest. European cultural heritage precinct: Greycliffe house. State significance HHIMs 1345. (BPWW – CC1).	Asset protection	Foliar spray, cut and paint, physical or mechanical control, Bushcare Volunteer program, ecological burning	C-TSC
Harbour	Sydney Harbour NP	2781 – Gap bluff	Lantana, senna (<i>Senna pendula</i> var. <i>glabrata</i>), African olive, pampas grass, phoenix palm (<i>Phoenix canariensis</i>)	Sunshine wattle (EPBC-e; TSC-e), Coastal headland banksia heath, wall and concrete slabs: State significance HHIMs 1347. (BPWW – CC1)	Asset protection	Foliar spray, cut and paint, physical or mechanical control, Bushcare volunteer program, ecological burning.	C-TSC
Harbour	Sydney Harbour NP	North Head	Rabbit (<i>Oryctolagus cuniculus</i>)	Eastern Suburbs Banksia Scrub EEC (EPBC-e; TSC-e), sunshine wattle (EPBC-e; TSC-e), <i>Eucalyptus camfieldii</i> (EPBC-v; TSC-v). Quarantine Station and reserve: cultural heritage SHR 1003 with high visitation. Landscape values – public open space with high visitation including high profile events.	Asset protection	Ground baiting with Pindone. Ground shooting, ground baiting RHDV, habitat modification: warren/harbour detection and destruction. Monitoring: rabbit spotlight counts and daytime rabbit density index. Monitoring impacts and native species recovery of <i>Acacia terminalis</i> subsp. <i>terminalis</i> at Quarantine Station. Habitat modification: plant guards around <i>Acacia terminalis</i> subsp. <i>terminalis</i> . Established ongoing program.	C-TSC
Ku-ring-gai Chase	Ku-ring-gai Chase NP	2745 – Mackerel Beach	Climbing asparagus fern (<i>Asparagus africanus</i>), ground asparagus fern	Swamp Oak Floodplain Forest (TSC-e) (BPWW-CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Ku-ring-gai Chase NP	2748 – Eleanor Beach to Gunya Point	Coral tree, lantana, giant reed (<i>Arundo donax</i>)	Coastal Saltmarsh EEC (TSC-e) (BPWW-CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	C-TSC
Ku-ring-gai Chase	Ku-ring-gai Chase NP	644 – Brooklyn Dam Trail and Dam surrounds	Golden wreath wattle, crofton weed, privet, whisky grass, African lovegrass	<i>Corymbia eximia</i> open forest, <i>Melaleuca deanei</i> (EPBC-v TSC-v), <i>Callistemon linearifolius</i> (TSC-v). (BPWW-CC1)	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control.	C-TSC
Ku-ring-gai Chase	Ku-ring-gai Chase NP	1028 – Tumbledown Dick Hill	Golden wreath wattle, morning glory (<i>Ipomea indica</i>), pampas grass, Coolatai grass, tussock paspalum, castor oil plant (<i>Ricinus communis</i>)	Duffys Forest Ecological Community EEC (TSC-e), <i>Grevillea caleyi</i> (EPBC-e TSC-e), <i>Pimelea curviflora</i> var. <i>curviflora</i> (TSC-v), <i>Tetradlea glandulosa</i> (EPBC-v TSC-v), <i>Lomandra brevis</i> ROTAP, <i>Hakea bakeriana</i> and <i>Persoonia grandiflora</i> locally threatened, <i>Phyllota grandiflora</i> biogeographically significant. (BPWW-CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control.	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Ku-ring-gai Chase NP	607 – Barrenjoey Headland	Ground asparagus fern, lantana, bitou bush, green cestrum (<i>Cestrum parqui</i>), coral tree, senna, Cape ivy (<i>Delairea odorata</i>), mother of millions (<i>Bryophyllum delagoense</i>), crofton weed, panic veldt grass (<i>Ehrharta erecta</i>)	Littoral Rainforest EEC (EPBC-ce, TSC-e), Themeda Grasslands EEC (TSC-e). <i>Flagellaria indica</i> twining bamboo and <i>Pararchidendron pruinosum</i> snow wood at southern limit, Newport Bangally Woodland uncommon in Pittwater LGA, Coastal scrub, Banksia scrub and <i>Allocasuarina</i> Heath uncommon in Metro North East Region, Pittwater population of the squirrel glider, <i>Petaurus norfolcensis</i> on the Barrenjoey Peninsula, north of Bushrangers Hill endangered population (TSC-e) (presence/absence unknown). European cultural heritage: state and National Heritage listing, lighthouse precinct SHR 979, customs house precinct. High visitation: scenic values. (BPWW-CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control Bushcare volunteer program, Pittwater LGA Asparagus Fern Out Days	C-TSC
Ku-ring-gai Chase	Garigal NP	2225 – Lockley Point, Middle Harbour Creek	Ground asparagus fern, lantana, exotic grasses	Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest EECs (TSC-e), Estuarine Mangrove Forest (BPWW-CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Barry Street Bushcare program.	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Ku-ring-gai Chase NP	795 – Hungry Beach	Lantana, African lovegrass, Mossman River grass (<i>Cenchrus echinatus</i>), mother of millions	Themeda (<i>Themeda australis</i>) grasslands on sea cliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner bioregions EEC (TSC-e), Casuarina Low Open Forest <i>Casuarina torulosa</i> food source for <i>Calyptorhynchus lathami</i> Glossy Black Cockatoo (TSC-v). WW11 military fortifications. (BPWW-CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	C-TSC
Ku-ring-gai Chase	Ku-ring-gai Chase NP	962 – Resolute Picnic Area to West Head Beach	Lantana, climbing asparagus fern, senna, Mossman River grass, wild tobacco	Diatreme Vegetation association on volcanic dyke (regionally significant), Coachwood – Water Gum Rainforest EEC (TSC-e). (BPWW-CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	C-TSC
Ku-ring-gai Chase	Ku-ring-gai Chase NP	940 – Porto Bay	Lantana, coral tree, crofton weed	Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest EECs (TSC-e), <i>Darwinia peduncularis</i> (TSC-v) <i>Darwinia peduncularis</i> , <i>Ancistrachne maidenii</i> (TSC-v), <i>Callistemon linearifolius</i> (TSC-v), Open Forest. Cultural heritage: oyster farm relics, huts. (BPWW-CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control,	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Ku-ring-gai Chase NP	766 – Par 3 Golf driving range Larool road, Mona Vale Road, Ryland Trail	Lantana, cotoneaster, senna, crofton weed, cestrum, wild tobacco, castor oil, whisky grass, African lovegrass	Duffys Forest Ecological Community (TSC-e), <i>Grevillea caleyi</i> (EPBC-e TSC-e), <i>Angophora crassifolia</i> , <i>Corybas undulatus</i> , <i>Lomandra brevis</i> ROTAP, <i>Eucalyptus capitellata</i> , <i>Logonia pusilla</i> and <i>Prasophyllum brevilabre</i> locally threatened, <i>Phyllota grandiflora</i> biogeographically significant, <i>Corybas undulatus</i> not known in any other Duffys Forest Ecological Community remnant (BPWW-CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	C-TSC
Ku-ring-gai Chase	Ku-ring-gai Chase NP	662 – Campbells Crater	Lantana, crofton weed	Diatreme vegetation (regionally significant) (BPWW-CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, biological control	C-TSC
Ku-ring-gai Chase	Garigal NP	2746 – Bluff Track and Engravings Track	Lantana, golden wreath wattle (<i>Acaia saligna</i>), crofton weed (<i>Ageratina adenophora</i>), whisky grass, African lovegrass (<i>Eragrostis curvula</i>), tussock paspalum	<i>Tetradlea glandulosa</i> (EPBC-v TSC-v), Coastal Upland Swamp in the Sydney Basin Bioregion (TSC-e), Duffys Forest Ecological Community EECs (TSC-e), Hornsby Sandstone Heath – Woodland (BPWW-CC3)	Asset protection	Foliar spray, splatter gun, cut and paint, physical or mechanical control	C-TSC
Ku-ring-gai Chase	Garigal NP	2306 – Seaforth Oval surrounds and Timber Getters Track and Bullock Track	Lantana, golden wreath wattle, brush box (<i>Lophostemon confertus</i>), crofton weed, African lovegrass, tussock paspalum, spider plant	<i>Prostanthera marifolia</i> (Seaforth mintbush) (TSC-ce) previously believed extinct, <i>Tetradlea glandulosa</i> (EPBC-v TSC-v), <i>Pimelia curviflora</i> var <i>curviflora</i> (TSC-v), Duffys Forest Ecological Community EEC (EPBC-e, TSC-e), Hornsby Sandstone Heath-Woodland. Historic bullock track. Local significance (BPWW-CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Monitoring: presence or absence threatened species	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Garigal NP	2300- Terreys Green Mona Vale Road	Lantana, golden wreath wattle, cotoneaster, pampas grass, Coolatai grass, tussock paspalum	Duffys Forest Ecological Community EEC (TSC-e), <i>Grevillea caleyi</i> (EPBC-e TSC-e), <i>Lomandra brevis</i> ROTAP, <i>Eucalyptus capitellata</i> and <i>Logania pusilla</i> locally threatened. (BPWW-CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Threatened species fire regime.	C-TSC
Ku-ring-gai Chase	Garigal NP	2259 – Opposite Baha'i Temple Ingleside	Lantana, golden wreath wattle, senna, <i>Cotoneaster</i> sp., prickly pear, ground asparagus fern, crofton weed, tussock paspalum	Duffys Forest Ecological Community EEC (TSC-e), <i>Grevillea caleyi</i> (EPBC-e TSC-e), <i>Lomandra brevis</i> ROTAP, <i>Eucalyptus capitellata</i> , <i>Kennedia prostrata</i> , <i>Phyllota grandiflora</i> locally threatened. (BPWW-CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Threatened species fire regime. Annual monitoring one quadrat and photopoint July.	C-TSC
Ku-ring-gai Chase	Ku-ring-gai Chase NP	699 – Cowan waterways Beaches and sites Bobbin Head to Hawkesbury River	Lantana, ground asparagus fern, coral tree, bamboo (<i>Phyllostachys</i> spp.), crofton weed, <i>Agave</i> sp., garden escapes, <i>Senecio</i> sp.	Coastal Saltmarsh EEC (TSC-e), significanceSwamp Oak Floodplain Forest (TSC-e), Littoral Rainforest (TSC-e Narabeen slopes, sandstone gully forest, <i>Callistemon linearifolius</i> (TSC-v). Archaeological remains of dwellings, stone walls, foundations of local cultural heritage (BPWW-CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control,	C-TSC
Ku-ring-gai Chase	Ku-ring-gai Chase NP	1025 – Towlers Bay – Lovett Bay	Lantana, ground asparagus fern, turkey rhubarb, senna, bamboo, tree of heaven (<i>Ailanthus altissima</i>), exotic grasses	Pittwater and Wagstaff Spotted Gum Forest (TSC-e), Littoral Rainforest (EPBC-ce TSC-e), Coastal Saltmarsh EECs (TSC-e). <i>Isodon obesulus obesulus</i> southern brown bandicoot (EPBC-e TSC-e), <i>Petaurus norfolcensis</i> squirrel glider (TSC-v), <i>Ninox strenua</i> powerful owl (TSC-v). Cultural heritage – aboriginal repatriation site. (BPWW-CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program, Corporate or YHA volunteer program. Aboriginal repatriation site any work undertaken to be in accordance with Country Cultural Heritage Division.	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Ku-ring-gai Chase NP	1052 – West Head Headland (lookout and Forts)	Lantana, mother of millions, senna, Mossman River grass	Themeda Grassland EEC (TSC-e), Casuarina Low Open Forest <i>Casuarina torulosa</i> food source for <i>Calyptorhynchus lathamii</i> Glossy Black Cockatoo (TSC-v), Grey Ironbark-Mahogany Open Forest. WW11 military fortifications and infrastructure. West head lookout high visitation, scenic and landscape values. (BPWW-CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program.	C-TSC
Ku-ring-gai Chase	Ku-ring-gai Chase NP	691 – Cockle Creek catchment Warringah to Bobbin Head	Lantana, pampas grass, castor oil plant, coral tree, elodea (<i>Elodea Canadensis</i>), senecio (<i>Senecio petasitis</i>)	<i>Persoonia mollis</i> supsp. <i>maxima</i> (EPBC-e TSC-e), Swamp Oak Floodplain Forest (TSC-e), Sydney Sandstone Gully Forest, Estuarine complex. Aquatic biodiversity. (BPWW-CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, biological control	C-TSC
Ku-ring-gai Chase	Ku-ring-gai Chase NP	1045 – Warrimoo Track Timbarra Ave St Ives Chase	Lantana, pampas grass, ground asparagus fern, senna, <i>Watsonia sp</i> garden escapes	Duffys Forest Ecological Community EEC (TSC-e). (BPWW-CC3)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, biological control	C-TSC
Ku-ring-gai Chase	Ku-ring-gai Chase NP	2747 – DFEC Area 27 (Smith and Smith) Perimeter Trail	Lantana, pampas grass, whisky grass, African lovegrass, exotic grasses, coral tree, crofton weed	Duffys Forest Ecological Community (TSC-e), <i>Cardamine paucijuga</i> , <i>Gahnia radula</i> , <i>Logania pusilla</i> , <i>Prostanthera denticulata</i> , <i>Pultenaea hispidula</i> and <i>Pultenaea scabra</i> var. <i>biloba</i> locally threatened, <i>Astrotricha floccosa</i> and <i>Phyllota grandiflora</i> biogeographically significant, <i>Amperea xiphoclada</i> var. <i>papillata</i> , <i>Cardamine paucijuga</i> not known in other Duffys Forest Ecological Community (BPWW-CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control Duffys Forest Bushcare volunteer group, Herbicide trial site	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Ku-ring-gai Fox TAP non treatment site	Red fox	<i>Isoodon obesulus</i> subsp. <i>obesulus</i> (EPBC-e TSC-e). Fox TAP.	Asset protection	Twice annual fox activity monitoring, twice annual southern brown bandicoot monitoring (cage trapping, camera monitoring)	C-TSC
Ku-ring-gai Chase	Garigal NP	Garigal Fox TAP treatment site	Red fox, feral cat	<i>Isoodon obesulus</i> subsp. <i>obesulus</i> (EPBC-e TSC-e). Fox TAP.	Asset protection	Ground baiting 1080 (continuous and ongoing), ejectors 1080, ground shooting, cage trapping, habitat modification: den detection and fumigation. Twice annual fox activity monitoring. Native species recovery monitoring: twice annual southern brown bandicoot monitoring (cage trapping, camera monitoring)	C-TSC
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Garigal Fox TAP treatment site (vicinity Bibbenluke, Sandy, Cooyong, Neverfail, Ryland and Showground trails)	Red fox, feral cat	<i>Isoodon obesulus</i> subsp. <i>obesulus</i> (EPBC-e TSC-e). Fox TAP	Asset protection	Ground baiting 1080 (continuous and ongoing), ejectors 1080, ground shooting, cage trapping, habitat modification: den detection and fumigation. Twice annual fox activity monitoring. Native species recovery monitoring: twice annual southern brown bandicoot monitoring (cage trapping, camera monitoring)	C-TSC
Ku-ring-gai Chase	Ku-ring-gai Chase NP	634 – Bobbin Head Track	Whisky grass, African lovegrass, Coolatai grass	<i>Acacia bynoeana</i> (EPBC-v TSC-e), <i>Darwinia biflora</i> (EPBC-v; TSC-v), <i>Tetradlea glandulosa</i> (TSC-v), <i>Genoplesium ruppilii</i> , <i>Isoodon obesulus</i> (BPWW-CC1)	Asset protection	Foliar spray. Monitor presence or absence threatened species	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Ku-ring-gai Chase NP	684 – Chase Trail orchid site	Whisky grass, African lovegrass, Coolatai grass	<i>Genoplesium baueri</i> (TSC-v), <i>Darwinia biflora</i> (EPBC-v TSC-v), <i>Tetradlea glandulosa</i> (TSC-v), <i>Persoonia mollis</i> subsp. <i>Maxima</i> (EPBC-e, TSC-e), <i>Genoplesium ruppii</i> . (BPWW-CC1)	Asset protection	Foliar spray. Monitor presence or absence threatened species	C-TSC
Ku-ring-gai Chase	Ku-ring-gai Chase NP	917 – Ku-ring-gai Chase Road near Powerlines trail (both sides of road)	Whisky grass, pampas grass, African lovegrass, Coolatai grass	<i>Genoplesium baueri</i> (TSC-v), <i>Darwinia biflora</i> (EPBC-v TSC-v), <i>Persoonia mollis</i> subsp. <i>Maxima</i> (EPBC-e, TSC-e), <i>Epacris crassifolia</i> ROTAP, <i>Genoplesium ruppii</i> . (BPWW-CC1)	Asset protection	Foliar spray. Monitor presence or absence threatened species	C-TSC
Valleys	Lane Cove NP	2749 – Devlins Creek (exclude creek) north to model aeroplane field (including Pennant Hills Track)	African lovegrass, tussock paspalum, pampas grass, blackberry, lantana, ground asparagus fern	Coastal Upland Swamp in the Sydney Basin Bioregion EEC (TSC-E), <i>Darwinia biflora</i> (TSC-v), <i>Tetradlea glandulosa</i> , (TSC-v), <i>Lomandra brevis</i> (ROTAP), <i>Angophora crassifolia</i> (ROTAP), Coastal Shale-Sandstone Forest, Hornsby Enriched Sandstone Exposed Woodland, Coastal Enriched Sandstone Sheltered Forest (BPWW-CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control.	C-TSC
Valleys	Lion Island NR	838 – Lion Island	Bitou bush lantana, ground asparagus fern, turkey rhubarb	Themeda grasslands on seacliffs and coastal headlands EEC (TSC-e), little penguin (<i>Eudyptula minor</i>) (colony at northern extent of range), open forest and woodland. (BPWW-CC1).	Asset protection	Aerial spray, foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, biological control	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	2132 – Byles Creek catchment Cheltenham	Bridal creeper, turkey rhubarb, morning glory, Japanese honeysuckle, blackberry, privet, ehrharta, mistflower, tradescantia, ginger lily, palm grass	Sydney Turpentine Ironbark Forest EEC (EPBC-e; TSC-e), Coastal Enriched Sandstone Sheltered Forest, (BPWW – CC3)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program Kethel Road).	C-TSC
Valleys	Marramarra NP	621 – Big Bay	Coral tree, crofton weed	Coastal Saltmarsh EEC (TSC-e), Estuarine complex. Cultural landscape – early river settlement with various relics remaining (BPWW-CC3)	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control	C-TSC
Valleys	Marramarra NP	2740 – Laughtondale Gully Rd	Crofton weed, sow thistle (<i>Sonchus oleraceus</i>)	<i>Asterolasia elegans</i> (TSC-e) only occurs in northern hills of Sydney, seven populations, <i>Zieria involucrata</i> (EPBC-v, TSC-e), Narrabeen Slopes Forest (regionally significant), Sydney Sandstone Gully Forest (BPWW-CC1)	Asset protection	Foliar spray, cut and paint, splatter gun, physical or mechanical removal Monitor weed (and goat) encroachment	C-TSC
Valleys	Marramarra NP	Laughtondale	Feral goat (<i>Capra hircus</i>)	<i>Acacia bynoeana</i> (TSC-e), <i>Asterolasia elegans</i> (TSC-e), <i>Grevillea parviflora</i> subsp. <i>supplicans</i> (TSC-e), <i>Tetratheca glandulosa</i> (EPBC-v TSC-v), <i>Zieria involucrata</i> (EPBC-v, TSC-e), <i>Darwinia fascicularis</i> subsp. <i>olgantha</i> endangered population (TSC-e). Aboriginal cultural heritage: engravings. Economic impact to park neighbours – orchards. Cooperative control program with Cumberland LHPA and UFAAG.	Asset protection	Mustering, trapping, ground shooting. Monitoring: goat activity sightings, signs, aerial survey, cameras. Monitoring: impact to threatened species and Aboriginal site. Liaison.	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Berowra Valley RP	2750 – Duneba Drive STIF	Widespread weeds	Sydney Turpentine Ironbark Forest (EPBC-ce; TSC-e) (BPWW-CC*)	Asset protection	Council Bushcare site Duneba Drive	C-TSC
Valleys	Dural NR	1060 – Dural Nature Reserve	Ground asparagus fern, bridal creeper, lantana, privet, <i>senna pendula var glabrata senna</i> , camphor laurel, morning glory	Sydney Turpentine Ironbark Forest EEC (EPBC-ce; TSC-e), <i>Epacris purpurascens var purpurascens</i> (TSC-e), <i>Tetraloche glandulosa</i> (EPBC-v; TSC-v), Open Forest. (BPWW-CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, biological control	C-TSC
Valleys	Long Island NR	841 – Long Island Nature Reserve	Lantana	Coastal Saltmarsh EEC (TSC-e), open forest. (BPWW-CC3).	Asset protection	Confirm weed impact. Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	C-TSC
Valleys	Marramarra NP	756 – Gentlemans Halt	Lantana	Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest EECs (TSC-e). Cultural landscape – early river settlement (minimal evidence persists). (BPWW-CC1)	Asset protection	Foliar spray, Cut and paint, splatter gun, physical or mechanical removal, naturally occurring biological controls, volunteer Bushcare program	C-TSC
Valleys	Wisemans Ferry Historic Site	1066 – Wisemans Ferry Historic Site	Lantana	<i>Olearia cordata</i> (EPBC-v, TSC-v), <i>Ancistrachne maidenii</i> , moist sclerophyll forest. Convict road camp associated with Old Great North Road (recommended for inclusion on State Heritage Register). (BPWW-CC1).	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Berowra Valley RP	2741 – Berowra Creek Estuarine zone Crosslands Reserve to Berowra Waters	Lantana, bridal creeper	Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest (TSC-e), River Flat Eucalypt Forest on Coastal Floodplain (TSC-e) Mangroves, Great North Walk (BPWW-CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	C-TSC
Valleys	Muogamarra NR	717 – Peats Bight	Lantana, crofton weed	Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest EECs (TSC-e), Diatreme Vegetation (regionally significant). (BPWW-CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, physical/mechanical removal, Bushcare program	C-TSC
Valleys	Lane Cove NP	2293 – Short Street Thornleigh	Lantana, ground asparagus fern, balloon vine, <i>Cotoneaster</i> spp., privet, ochna, palm grass (<i>Setaria palmifolia</i>), whisky grass, pampas grass, ehrharta, mistflower (<i>Ageratina riparia</i>), perennial ragweed, spider plant, ginger lily, prickly pear (<i>Opuntia</i> spp.), tradescantia	Sydney Turpentine Ironbark Forest EEC (EPBC-ce; TSC-e), <i>Tetratheca glandulosa</i> (EPBC-v; TSC-v), connectivity with Berowra Valley RP (BPWW – CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program (group 42).	C-TSC
Valleys	Lane Cove NP	2162 – Malton Road – Downes Street Duffy's Forest Ecological Community North Epping	Lantana, ground asparagus fern, balloon vine, Japanese honeysuckle, blackberry, ehrharta, spider plant, ginger lily (<i>Hedychium gardnerianum</i>), fishbone fern, tradescantia	Duffy's Forest Ecological Community EEC (TSC-e), <i>Pimelea curviflora</i> var. <i>curviflora</i> (TSC-v), <i>Epacris purpurascens</i> var. <i>purpurascens</i> (TSC-v), <i>Angophora crassifolia</i> (ROTAP), Sydney Turpentine Ironbark Forest (EPBC-e, TSC-e) remnant trees (BPWW – CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Erosion and stormwater control	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	2169 – Fairyland	Lantana, ground asparagus fern, blackberry, camphor laurel, large-leaved privet, small-leaved privet, ochna, senna, ehrharta, African lovegrass, tussock paspalum, golden wreath wattle, coral tree	Swamp Oak Floodplain Forest (TSC-e), Coastal Saltmarsh EECs (TSC-e), European cultural heritage site, Australasian bittern (TSC-v), Visitation: Great North Walk. (BPWW-CC3)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control Bushcare volunteer program (group 14)	C-TSC
Valleys	Lane Cove NP	2261 – Pages Creek Wetland	Lantana, ground asparagus fern, bridal creeper, <i>Cotoneaster</i> spp., small-leaved privet, senna, pampas grass, tussock paspalum, kikuyu	Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest EECs (TSC-e), <i>Callistemon linearifolius</i> (TSC-v), estuarine mangrove forest, cultural heritage (local) stone walls and terracing, visitation: Great North Walk (BPWW – CC3)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Biological control (bridal creeper)	C-TSC
Valleys	Dalrymple–Hay NR	2120 – Dalrymple–Hay NR	Lantana, ground asparagus fern, Cape ivy, Japanese honeysuckle, corky passionfruit, <i>Celtis</i> sp., Montpellier broom (<i>Genista monspessullana</i>), large-leaved privet, small-leaved privet, ochna, Chinese pistachio (<i>Pistacia chinensis</i>), senna, spider plant (<i>Chlorophytum comosum</i>), fishbone fern, tradescantia, ehrharta (<i>Ehrharta erecta</i>)	Blue Gum High Forest EEC (EPBC-ce; TSC-ce), eastern bentwing-bat (TSC-v), eastern freetail-bat (TSC-v), large-eared pied bat (EPBC-v; TSC-v) foraging, yellow-bellied sheath-tail-bat (TSC-v), eastern false pipistrelle (TSC-v), grey-headed flying-fox (EPBC-v; TSC-v), bat foraging important to Blue Gum High Forest health, powerful owl (TSC-v), (BPWW – CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, biological control (lantana rust release site), fire regime (20–60 year interval). Monitoring – flora and fauna transect monitoring, fixed photo point monitoring. Survey for BMAD. Bushcare volunteer program, cooperative programs with Ku-ring-gai Council and Sydney Water. Dalrymple–Hay NR is a demonstration site for Blue Gum High Forest best practice methods. Voluntary conservation agreement for Browns Forest.	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Wallumatta NR	2326 – Wallumatta Nature Reserve	Lantana, ground asparagus fern, Japanese honeysuckle, blackberry, camphor laurel, small-leaved privet, ochna, senna, mother-of-millions (<i>Bryophyllum delagoense</i>), spider plant, fishbone fern, tradescantia, ehrharta, exotic grasses	Sydney Turpentine Ironbark Forest EEC (EPBC-ce; TSC-e), <i>Epacris purpurascens var. purpurascens</i> (TSC-v), (BPWW-CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program (group 24).	C-TSC
Valleys	Lane Cove NP	2211 – Buffalo Creek, Sugarloaf to Kittys Creek	Lantana, ground asparagus fern, turkey rhubarb (<i>Acetosa sagittata</i>), morning glory, Japanese honeysuckle, senna, couch, kikuyu, pennywort (<i>Hydrocotyle bonariensis</i>), corky passionfruit	Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest EECs (TSC-e), eastern bentwing-bat (TSC-v) (fauna survey 2004), Migratory bird habitat, important nesting site for wading birds and fish habitat along Lane Cove River and an important wildlife corridor. Good example of <i>Melaleuca ericifolia</i> forest not well represented in the area, Visitation: Great North Walk (BPWW-CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Landscaping and planting. Bushcare volunteer program. Hand-weeding in intertidal zone. Wetland reclamation. Revegetation or landscaping of buffer zone. Planting to supplement habitat. Prevention of obstruction of roost cave entrances by weeds.	C-TSC
Valleys	Lane Cove NP	2212 – Kittys Creek to Magdala Park	Lantana, ground asparagus fern, turkey rhubarb, morning glory, Japanese honeysuckle, senna, kikuyu, pennywort	Coastal Saltmarsh EEC (TSC-e), Swamp Oak Floodplain Forest (TSC-e), migratory bird habitat, important nesting site for wading birds and fish habitat along Lane Cove River and an important wildlife corridor. Coastal Enriched Sandstone Sheltered Forest Coastal Shale Sandstone Forest, Estuarine mangrove. Visitation: Great North Walk (BPWW-CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, Bushcare.	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Muogamarra NR	877 – Milsons Passage south	Lantana, Madeira vine, pampas grass, South African pigface (<i>Carpobrotus</i> sp.), Agave	Coastal Saltmarsh EEC (TSC-e), Sydney Sandstone ridgetop Woodland, Sydney Sandstone Gully Forest. (BPWW – CC3)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical, landscaping or planting, Bushcare program	C-TSC
Valleys	Spectacle Island NR	1006 – Spectacle Island Nature Reserve	Lantana, pampas grass	Coastal Saltmarsh EEC (TSC-e), open forest. (BPWW –CC3)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Monitor weed distribution and density.	C-TSC
Valleys	Marramarra NP	2744 – Singleton Rd, Laughtondale	Lantana, pampas grass, blackberry	Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest EECs (TSC-e), Narrabeen Slopes Forest (regionally significant), dry sclerophyll forest. Sandstone cottage. Local European heritage significance (BPWW-CC3)	Asset protection	Foliar spray, cut and paint, splatter gun, physical or mechanical removal. Bushcare program.	C-TSC
Valleys	Berowra Valley RP	1009 – Stewart Ave Hornsby Heights	Lantana, privet, pampas grass, crofton weed	<i>Tetratheca glandulosa</i> (EPBC-v, TSC-v), <i>Eucalyptus camfieldii</i> (EPBC-v TSC-v), Open Forest/ Woodland. (BPWW-CC2)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control.	C-TSC
Valleys	Lane Cove NP	2172 – Fergusson Ave and Dawson Ave, Thornleigh	Lantana, turkey rhubarb, Madeira vine, balloon vine, morning glory, senna, ehrharta, tradescantia	Sydney Turpentine Ironbark Forest EEC (EPBC-ce; TSC-e), turpentine, ironbark (BPWW –CC3)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Weedy understorey. Improve understorey diversity in Sydney Turpentine Ironbark Forest EEC, promote recruitment of Sydney Turpentine Ironbark Forest EEC species, stormwater basin program Hornsby Council	C-TSC

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Marramarra NP	862 – Marramarra Creek recreational area	Lantana, turkey rhubarb, moth vine (<i>Araujia sericifera</i>), wild tobacco (<i>Solanum mauritianum</i>), tradescantia	Swamp Oak Floodplain Forest EEC (TSC-e). Cultural landscape – early river settlement, orchards' local significance (BPWW-CC1)	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control	C-TSC
Valleys	Lane Cove NP	2229 – Lorna Pass and Commenara Parkway	Madeira vine, morning glory, tradescantia, palm grass	<i>Wahlenbergia multicaulis</i> endangered population (TSC- e), Coachwood simple rainforest, riparian gallery forest, <i>Ninox strenua</i> (TSC-v), connectivity with Berowra Valley RP (BPWW – CC1)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	C-TSC
Valleys	Muogamarra NR	744 – Flat Rock	Whisky grass, African lovegrass	<i>Micromyrtus blakelyi</i> (EPBC-v TSC-v). (BPWW-CC2)	Asset protection	Foliar spray, physical or mechanical control	C-TSC
Harbour	Sydney Harbour NP	Sydney Harbour NP HNA boneseed eradication program	Boneseed (class 2)		Eradication	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, Monitoring presence/absence July-October	C-NE
Harbour	Sydney Harbour NP	Sydney Harbour NP HSA boneseed eradication program Nielsen Park, Green Point and South Head	Boneseed (class 2)		Eradication	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, monitoring presence/absence winter – spring	C-NE

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai	Ku-ring-gai Chase NP	Ku-ring-gai Chase NP Boneseed eradication program Freeway corridor and ridges Mt Colah to Berowra	Boneseed (class 2)		Eradication	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, Monitoring presence/absence July-October.	C-NE
Ku-ring-gai	Ku-ring-gai Chase NP	Heteranthera eradication program	<i>Heteranthera reniformis</i> (class 1)		Eradication	Monitor presence absence	C-NE
Ku-ring-gai Chase	Garigal NP	Garigal NP Boneseed eradication program	Boneseed (class 2)		Eradication	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, Monitoring presence/absence July-October confirm eradication	C-NE
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Ku-ring-gai Chase NP Boneseed eradication program Commodore Heights, West Head gate, McCarrs Creek	Boneseed (class 2)		Eradication	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, Monitoring presence/absence July-October. Confirm eradication	C-NE

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Marramarra NP	Hawkesbury River and tributaries alligator weed (<i>Alternanthera philoxeroides</i>) prevention program	Alligator weed		Containment	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, biological control	C-NE
Valleys	Berowra Valley RP	Berowra Valley Regional Park Boneseed eradication program. Ridgetops and urban interface Arthurs Crescent and Excelsior Road Mt Colah, Duneba Road Thornleigh, Cootamundra Fire Trail and Pacific Highway Hornsby Heights to Berowra	Boneseed (class 2)		Eradication	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, Annual monitoring boneseed July – October	C-NE

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	Lane Cove NP Boneseed eradication program	Boneseed (class 2)		Eradication	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, Bushcare volunteer program. Annual survey and monitoring July – October.	C-NE
Valleys	Muogamarra NR	Muogamarra Nature Reserve boneseed eradication program	Boneseed (class 2)		Eradication	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, Monitoring presence/absence July-October.	C-NE
Valleys	Marramarra NP	Canoelands	Fallow deer (<i>Dama dama</i>)		Containment	Monitoring deer activity: camera, signs, sightings. Ground shooting.	C-NE
Valleys	Muogamarra NR	Muogamarra Nature Reserve pig program	Feral pig		Containment	Trapping, ground shooting, baiting. Monitoring pig activity: camera, signs, sightings.	C-NE
Valleys	Marramarra NP	Marramarra NP pig program	Feral pig (<i>Sus scrofa</i>)		Containment	Trapping, ground shooting, baiting. Monitoring pig activity: camera, signs, sightings.	C-NE
Valleys	Lane Cove NP	Lane Cove NP Kukundi, LC River and tributaries: Heteranthera control program	<i>Heteranthera reniformis</i> (class 1)		Containment	Foliar spray, physical or mechanical control. Survey and monitoring	C-NE
Valleys	Muogamarra NR	Peats Bight track	Tropical soda apple		Containment	Foliar spray, cut and paint, physical/mechanical removal, monitor twice annually	C-NE

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	Lane Cove NP solanum control program	Tropical soda apple (<i>Solanum viarum</i>) (class 2), apple of Sodom (<i>Solanum linnaeanum</i>)		Containment	Foliar spray, cut and paint, stem injection, physical or mechanical control	C-NE
Harbour	Kamay Botany Bay NP	Cemetery and Repatriation site	Bitou bush, kikuyu, lantana	Cemetery and repatriation site European and Aboriginal cultural heritage of very high significance. Eastern Suburbs Banksia Scrub (EPBC-e TSC-e)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control.	H-CH
Harbour	Sydney Harbour NP	Dobroyd Head Reef Beach	Ground asparagus fern, lantana, ochna, senna, Agave	Aboriginal sites: repatriation site of high cultural significance, engravings, middens. Manly scenic walk. 20yr + investment by Bushcare group "Reef Beach volunteers"	Asset protection	Foliar spray, cut and paint, physical or mechanical control Bushcare volunteer program.	H-CH
Harbour	Kamay Botany Bay NP	Bare Island	Kikuyu, couch, mirror bush (<i>Coprosma repens</i>), bitou bush	Bare Island Fort State significance SHR 978. Themeda grassland on seacliffs and coastal headlands EEC (TSC-e)	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control, mowing.	H-CH
Harbour	Sydney Harbour NP	Dobroyd Head Crater Cove	Lantana, pampas grass, madeira vine, moth vine, ginger lily, exotic grasses, garden escapes	Cultural Heritage site (camps) of local significance, scenic values, 15yr+ investment Crater Cove caretaker volunteers	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program.	H-CH
Harbour	Kamay Botany Bay NP	Cemetery and Repatriation site	Rabbit	Cemetery and repatriation site European and Aboriginal cultural heritage of high significance	Asset protection	Ground baiting Pindone, ground shooting, ground baiting RHDV, habitat modification: warren/harbour detection and destruction. Monitoring: rabbit spotlight counts and daytime rabbit density index. Implement control when rabbit numbers exceed threshold and damage to heritage is likely.	H-CH

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Barrenjoey Headland	Rabbit	Lighthouse precinct SHR 979, Customs House precinct, Aboriginal middens, Littoral Rainforest (EPBC-ce TSC-e), Themeda grassland on sea cliffs and coastal headlands EECs (TSC-e). Cooperative program with neighbouring agencies (UFAAG)	Asset protection	Ground baiting Pindone, ground shooting, ground baiting RHDV, habitat modification: warren/harbour detection and destruction, monitoring: spotlight counts and daytime rabbit density index. Implement control when rabbit numbers exceed threshold and damage to heritage is likely.	H-CH
Valleys	Maroota Historic Site	859 – Maroota Historic Site	Lantana, mother of millions, crofton weed, <i>Watsonia</i> sp., Cootamundra wattle (<i>Acacia baileyana</i>), Queensland Silver Wattle (<i>Acacia podalyriifolia</i>)	Aboriginal cultural heritage site: National Heritage Register. European cultural heritage: farming landscape local significance. <i>Pimelea curviflora</i> var. <i>curviflora</i> (EPBC-v TSC-v), <i>Micromyrtus blakelyi</i> (EPBC-v TSC-v), <i>Acacia bynoeana</i> (EPBC-v TSC-e)	Asset protection	Monitor threatened species presence or absence and weed threat Foliar spray, splatter gun, cut and paint, physical or mechanical control	H-CH
Valleys	Mt Kuring-gai Aboriginal Area	Mt Kuring-gai Aboriginal Area	Lantana, pampas grass, exotic grasses	Aboriginal cultural heritage	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	H-CH
Valleys	Lane Cove NP	Bakers Cottage	Lantana, privet, exotic grasses	European cultural heritage local significance	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, Bushcare volunteer program (group 20).	H-CH
Valleys	Lane Cove NP	Terrace road Aboriginal engravings site	Lantana, privet, ground asparagus fern	Aboriginal rock engravings	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control,	H-CH
Valleys	Lane Cove NP	Fiddens Wharf cultural heritage site	Madeira vine, balloon vine, lantana, privet, mistflower, exotic grasses	European cultural heritage local significance, "Fiddens Wharf sanctuary", Wharf, historic picnic grounds, WW11 heritage	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, Bushcare volunteer program (Group 20)	H-CH

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Sydney Harbour NP	Green Point	Coral tree, lantana, African olive, senna	High visitation, picnic areas, iconic harbour views, Coastal Headland Banksia Heath, Military fortifications State significance HHIMs 1347	Asset protection	Foliar spray, cut and paint, physical or mechanical control	M-RA
Harbour	Sydney Harbour NP	Goat Island	Ground asparagus fern, lantana, morning glory, turkey rhubarb, African olive	High visitation including events, corporate volunteer program. Remnant native plants and bushland, Coastal Sandstone Foreshores Forest, European cultural heritage precinct, Aboriginal cultural heritage.	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control. Bushcare corporate volunteer program	M-RA
Harbour	Sydney Harbour NP	South Head	Lantana, mirror bush, ground asparagus fern, African olive, morning glory, Madeira vine, phoenix palm, fishbone fern	High visitation walking track, iconic harbour views, Historic precinct: Military fortifications 1871 and WW11 archaeological remnants pathways and structures. State significance HHIMs 1347, Coastal Headland Banksia Heath	Asset protection	Foliar spray, cut and paint, physical or mechanical control	M-RA
Harbour	Sydney Harbour NP	Chowder Head Iluka Road and The Manor	Lantana, ochna, large leaf and small leaf privet, Peruvian lily (<i>Alstroemeria aurea</i>), montbretia (<i>Crocasmia</i> sp.), fishbone fern, spider plant, garden escapes	Recreation and educational values, bush foods walk, Harbour Scenic Walkway, Coastal Enriched Sandstone Moist Forest, Coastal Sandstone Foreshores Forest previous program, Japanese war memorial plaque (mini submarine).	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control. Corporate volunteer program	M-RA
Harbour	Wolli Creek RP	Wolli Central (Hartill-Law to Nannygoat Hill)	Madiera vine, balloon vine, bridal creeper, ground asparagus fern, privet, lantana, African olive	Recreation or visitation values, picnic areas. Wildlife / green corridor. Sydney Sandstone Ridgetop Woodland, Sydney Sandstone Gully Forest. <i>Pteropus poliocephalus</i> grey headed flying-fox (EPBC-v, TSC-v) colony adjacent (mainly off park)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, biological control (bridal creeper rust), fire.	M-RA

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Terrey Hills entrance (old VES and road island)	Golden wreath wattle, kikuyu, coreopsis (<i>Coreopsis lanceolata</i>), pampas grass, whisky grass, African lovegrass	High profile iconic park entrance. Liberator General San Martin's monument (cultural heritage)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	M-RA
Ku-ring-gai Chase	Garigal NP	Works depot and office	Ground asparagus fern, coastal morning glory (<i>Ipomea cairica</i>), blue gum	Area office	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Autism program	M-RA
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Flint and Steel Beach and Creek / catchment	Lantana, crofton weed, senna, cottonbush (<i>Gomphocarpus fruticosus</i>), whisky grass, African lovegrass	Sydney coastal dry sclerophyll forest, Diatreme vegetation association, Casuarina Low Open Forest <i>Casuarina torulosa</i> food source for <i>Calyptorhynchus lathami</i> Glossy Black Cockatoo (TSC-v). Recreation – beach	Asset protection	Spot spraying, (vehicle, hand held), cut and paint, drill, hand-weeding	M-RA
Ku-ring-gai Chase	Ku-ring-gai Chase NP	The Basin campground and terraces	Lantana, pampas grass, crofton weed, senna, blackberry, fishbone fern	Bush surrounds of high visitation camping and day use area. The Basin historic heritage associations, state significance. The Basin terraces (sandstone walls).	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Corporate volunteer program	M-RA
Ku-ring-gai Chase	Garigal NP	Babbage Ravine – Davidson Park	Turkey rhubarb, Japanese honeysuckle, privet, camphor laurel, ochna, African olive, tussock paspalum, tradescantia	High visitation picnic area, Coastal Enriched Sandstone Moist Forest, Coastal Enriched Sandstone Sheltered Forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Babbage Ravine Bushcare group.	M-RA
Valleys	Ku-ring-gai Chase NP	905 – North Turramurra entrance	<i>Acacia binervia</i> , privet, black-eyed Susan (<i>Thunbergia alata</i>), crofton weed, fishbone fern, exotic grasses and annuals	Entrance to iconic park, high visitation. Sydney Sandstone Ridgetop Woodland, southern brown bandicoot <i>Isoodon obesulus</i> (EPBC-e, TSC-e), <i>Darwinia biflora</i> (EPBC-v TSC-v)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, post fire control of <i>Acacia sp.</i>	M-RA

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	Riparian zone, Fullers Bridge to Fern Valley Riverside Drive down slope to Lane Cove River	Balloon vine, turkey rhubarb, Madeira vine, Cape ivy, pineapple weed (<i>Eryngium pandanifolium</i>)	Swamp Sclerophyll Forest on Coastal Floodplains (TSC-e), <i>Ninox strenua</i> powerful owl (TSC-e), <i>Nettapus coromandelianus albipennis</i> cotton pygmy goose (TSC-v), <i>Botaurus poiciloptilus</i> Australasian bittern (TSC-v), High visitation Picnic Area 1, 3, 4, 6-9, 11-14, 16, 18-20, European heritage – Turnbridge estate and Depression era stonework, boat shed building, First stage ambulance room, picnic ground infrastructure has heritage value. Riverside Walk. Aboriginal cultural heritage – middens and shelters and engravings incl Commandment Rock Aboriginal engravings of regional significance	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program (Friends of LCNP Group 1), (Tuesday group 20), corporate volunteer program	M-RA
Valleys	Ku-ring-gai Chase NP	Bobbin Head picnic area surrounds	Cats claw creeper (<i>Macfadyena unguis-cati</i>), mother of millions, crofton weed	High visitation: picnics and visitors information centre. European cultural heritage: Bobbin Head picnic area shelters and plantings, Bobbin Inn, stone sea walls, cottage (ranger's residence).	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control Biological control – cats claw creeper	M-RA
Valleys	Ku-ring-gai Chase NP	814 – Kalkari Discovery Centre	Crofton weed	High visitation, educational or interpretation function. Sydney Sandstone Ridgetop Woodland, Sydney Sandstone Gully Forest, modified environment	Asset protection	Foliar spray, physical or mechanical control	M-RA

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	Picnic Areas De Burghs Bridge to the weir	Feral pigeon (<i>Columba livia domestica</i>), Indian myna (<i>Acridotheres tristis</i>), feral chicken (<i>Gallus gallus</i>), feral ducks and geese (family <i>Anatidae</i>)	Public open space: picnic ground amenity, public health. Prevent cross breeding/genetic dilution between exotic and native ducks, introduction of disease to native birds	Asset protection	Visitor education: discourage visitors from feeding birds, ground shooting, cage trapping. Reactive control program.	M-RA
Valleys	Ku-ring-gai Chase NP	1007 – Sphinx memorial	Lantana, <i>Acacia binervia</i> , privet, crofton weed, ginger lily, exotic grasses	Sydney sandstone ridgetop woodland	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	M-RA
Valleys	Lane Cove NP	Area 33 to Jenkins Hall	Lantana, privet, Japanese honeysuckle, blackberry, bridal creeper, ground asparagus fern, tussock paspalum, pampas grass, Madeira vine, balloon vine, Cape ivy, moth vine, ochna	High visitation picnic areas, function centre, Swamp Sclerophyll Forest on Coastal Floodplains (TSC-e)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	M-RA
Valleys	Lane Cove NP	Riparian zone Fern Valley to Deburghs Bridge downslope of Riverside Drive	Lantana, tussock paspalum, pampas grass, balloon vine, Madeira vine, tradescantia, box elder (<i>Acer negundo</i>), privet, weeping willow (<i>Salix babylonica</i>), pineapple weed, alligator weed	Coachwood Simple Rainforest, <i>Ninox strenua</i> powerful owl (TSC-e), Aboriginal cultural heritage: shelters, European cultural heritage: stone walls (depression era stonework), Riverside Walk	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program; individuals	M-RA

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	Tunks Hill to Cycleway and Lane Cove Road and upslope of Riverside Drive	Lantana, tussock paspalum, pampas grass, privet, bridal creeper, montpellier broom, blackberry, asparagus fern, turkey rhubarb, golden wreath wattle, St Johns wort (<i>Hypericum perforatum</i>)	<i>Darwinia biflora</i> (EPBC-v TSC-v), <i>Melaleuca deanii</i> (TSC-v), <i>Pseudophryne australis</i> red-crowned toadlet (TSC-v), <i>Angophora crassifolia</i> ROTAP Coastal Shale-sandstone Forest, Hornsby Enriched Sandstone Exposed Woodland, Coastal Enriched Sandstone Sheltered Forest, <i>Davesia ulicifolia</i> (only occurrence in LCNP).), <i>Ninox strenua</i> powerful owl (TSC-e), Aboriginal cultural heritage: grinding grooves, water well. European cultural heritage: tunks farm, stone walls Riverside drive, Picnic Areas: 21-23 park entry stations	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program: TAFE and corporate volunteer program	M-RA
Valleys	Lane Cove NP	Carters Creek to Fern Valley Creek upslope of Riverside Drive to and including LC Tourist Park/ Plassey Road	Privet, ochna, camphor laurel, tussock paspalum, blackberry, lantana, bridal creeper, ground asparagus fern, golden wreath wattle, turkey rhubarb, montpellier broom, pampas grass, periwinkle, Mexican poppy, Madeira vine, morning glory, phoenix palm	<i>Darwinia biflora</i> (EPBC-v TSC-v), <i>Epacris purpurascens</i> var. <i>purpurascens</i> (TSC-v), <i>Prostanthera howelliae</i> (regionally significant), <i>Callistemon linearifolius</i> (TSC-v), hanging swamp, Sydney sandstone ridgetop woodland, <i>Ninox strenua</i> powerful owl (TSC-e), Monash and Macquarie University research site: reptiles, European cultural heritage: depression era stonework, Tourist Park high visitation, cooperative weed control LCRA and Tourist Park, Picnic Areas: 10, 15, 17	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program (Friends of LCNP Group 1), (Scribbly Gums Group 13), corporate volunteer program	M-RA

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Ku-ring-gai Chase NP	Bobbin Head picnic area, Kalkari Discovery Centre and Mt Colah works depot	Rabbit	Bobbin Head picnic area cultural heritage precinct, high visitation and Kalkari Discovery Centre visitation and educational values. NPWS Works depot and helipad. KCNP is National Heritage listed reserve.	Asset protection	Ground baiting Pindone, ground shooting, ground baiting RHDV, habitat modification: warren/harbour detection and destruction, monitoring: rabbit spotlight counts and daytime rabbit density index.	M-RA
Valleys	Lane Cove NP	Picnic Areas and urban interface (and including The Lane Cove River Tourist Park)	Rabbit	High visitation picnic areas / open space / landscaped and revegetated areas. Cooperative program UFAAG and neighbouring businesses. Lane Cove River Tourist Park.	Asset protection	Ground baiting Pindone, ground shooting, ground baiting RHDV, habitat modification: warren/harbour detection and destruction. Monitoring: rabbit spotlight counts and daytime rabbit density index. Implement control in association with neighbouring businesses/agencies or when rabbit numbers exceed threshold and where risk assessment permits.	M-RA

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Sydney Harbour NP	2158 – Dobroyd Head	Ground asparagus fern, green cestrum, large leaf and small leaf privet, ochna, African olive, mother of millions, fishbone fern	20yr + investment by Bushcare group. Manly Scenic Walkway, High visitation (including events), iconic views. Littoral Rainforest EEC (EPBC-ce, TSC-e), Hornsby Sandstone Heath-Woodland, Coastal Sandstone Plateau Rock Plate Heath, Coastal Sandstone Foreshores Forest, Coastal Sandstone Riparian Forest, Coastal Headland Banksia Heath, Coastal Enriched Sandstone Moist Forest, <i>Rulingia hermanniifolia</i> (uncommon). Wildlife refuge <i>Pseudophyrne australis</i> red-crowned toadlet (TSC-v), <i>Ninox strenua</i> powerful owl habitat (TSC-v), <i>Pteropus poliocephalus</i> grey headed flying-fox (EPBC-v TSC-v) foraging, <i>Miniopterus schreibersii oceanensis</i> eastern bent-wing bat (TSC-v) foraging, <i>Hydromys chrysogaster</i> water rat (locally significant). (BPWW CC-4)	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control Bushcare volunteer program.	M-CP
Harbour	Sydney Harbour NP	Dobroyd Head Tania Park	Ground asparagus fern, Lantana, asthma weed (<i>Parietaria judaica</i>), exotic grasses, garden escapes	Park entrance, scenic values, Coastal Headland Banksia Heath. Established volunteer group “Reef Beach volunteers”	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program.	M-CP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Sydney Harbour NP	2119 – Bradleys Head including Taylors Bay Gully and Ashton Park	Lantana, ground asparagus fern, Cape ivy, coastal morning glory, Japanese honeysuckle, blackberry, green cestrum, coral tree, large leaf and small leaf privet, brush box, ochna, African olive, polygala, pampas grass, <i>Agave sp.</i> , mother of millions, spider plant, fishbone fern, garden escapes	Corporate volunteer program. High visitation including events, iconic views. Lookouts and amphitheatres. Coastal Sandstone Foreshores Forest, Coastal Enriched Sandstone Moist Forest, Coastal Tea-tree Banksia Scrub, Littoral Rainforest EEC (EPBC-ce, TSC-e), <i>Acacia terminalis</i> subsp. <i>terminalis</i> sunshine wattle (EPBC-e TSC-e). <i>Pseudophyrne australis</i> red-crowned toadlet (TSC-v), <i>Pteropus poliocephalus</i> grey headed flying-fox (EPBC-v TSC-v) foraging, <i>Miniopterus schreibersii oceanensis</i> eastern bent-wing bat (TSC-v) foraging. (BPWW-CC4)	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control. Monitoring: impact and response of <i>Acacia terminalis</i> subsp. <i>terminalis</i> sunshine wattle. Corporate volunteer program: Park entrance, Athol Beach, Bradleys Head Beach, volunteer program weed control via kayak. Weed control included in Athol Beach lease conditions.	M-CP
Harbour	Wolli Creek RP	Wolli Central aquatic weed control program	Primrose, willow (<i>Salix</i> spp.), alligator weed.		Containment	Foliar spray, physical or mechanical control	M-CP
Harbour	Wolli Creek RP	Wolli West (Bexley to Hartill-Law Ave)	Privet, Madeira vine, lantana, ochna, African olive, tradescantia.	Freshwater Wetlands on the Coastal Floodplains EEC (TSC-e), Sydney sandstone ridgetop woodland, Sydney sandstone gully forest. Wildlife / green corridor. European heritage (early 20 th C farm sites). Bushcare program and Friends of Wolli Creek.	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, fire, Bushcare volunteer program (3 groups).	M-CP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Kamay Botany Bay	Open space	Rabbit	Eastern Suburbs Banksia Scrub (EPBC-e TSC-e), Themedra Grassland on Sea Cliffs and Coastal Headlands (TSC-e), Bangalay Sand Forest EECs (TSC-e), neighbouring golf courses, recreational open space	Asset protection	Ground baiting Pindone, ground shooting, ground baiting RHDV, habitat modification: warren/harbour detection and destruction. Monitoring: rabbit spotlight counts and daytime rabbit density index. Monitoring impact to and native species recovery Eastern Suburbs Banksia Scrub EEC. Implement control in association with neighbours or when rabbit numbers exceed threshold or if impact to EEC is significant.	M-CP
Harbour	Malabar Headland NP*	Malabar Headland western section	Rabbit	Eastern Suburbs Banksia Scrub EEC (EPBC-e TSC-e)	Asset protection	Ground baiting Pindone, ground shooting, ground baiting RHDV, habitat modification: warren/harbour detection and destruction. Monitoring: rabbit spotlight counts and daytime rabbit density index. Monitoring impact to and native species recovery Eastern Suburbs Banksia Scrub EEC Implement control in association with neighbours or when rabbit numbers exceed threshold or if impact to EEC is significant.	M-CP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Sydney Harbour NP	Middle Head Bradleys Head	Rabbit	Cooperative program with adjacent agencies and UFAAG. Landscape and recreational values: public open space with high visitation including high profile events	Asset protection	Ground baiting, Pindone, ground shooting, ground baiting RHDV, habitat modification: warren/harbour detection and destruction. Monitoring: rabbit spotlight counts and daytime rabbit density index. Established ongoing program.	M-CP
Harbour	Sydney Harbour NP	Sydney Harbour NP (HNA) excluding North Head	Red fox, feral cat, black rat	<i>Rattus fuscipes</i> . Native bush rat reintroduction project cooperative program. Manly little penguin (<i>Eudyptula minor</i>) endangered population (TSC-e) potential habitat at Dobroyd Head, <i>Miniopterus schreibersii oceanensis</i> Eastern bentwing-bat roosting site Middle Head, <i>Perameles nasuta</i> long-nosed bandicoot	Asset protection	Ground baiting 1080 (continuous and ongoing) , cage trapping. Black rat culling Monitoring: native species recovery: native and exotic rat population monitoring, presence absence of long-nosed bandicoot, or little penguin (record in Wildlife Atlas). Monitoring of bat roost sites for signs of predation.	M-CP
Ku-ring-gai	Ku-ring-gai Chase NP	Urban interface	Rabbit	Park neighbours, APZs, urban interface amenity. Cooperative program with UFAAG/neighbouring agencies. Park interface adjacent Duffys Forest Ecological Community EEC (TSC-e), <i>Grevillea caleyi</i> (TSC-e).	Asset protection	Ground baiting Pindone, ground shooting, ground baiting RHDV, habitat modification: warren/harbour detection and destruction, monitoring: rabbit spotlight counts and daytime rabbit density index. Control if numbers exceed threshold and risk assessment permits and in association with neighbouring agencies/landholders.	M-CP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Garigal NP	Urban interface	Rabbit	Park neighbours, APZs, urban interface amenity. Common vegetation associations. Cooperative program with neighbouring agencies/UFAAG	Asset protection	Ground baiting Pindone, ground shooting, ground baiting RHDV, habitat modification: warren/harbour detection and destruction, monitoring: spotlight counts and daytime rabbit density index. Implement control if numbers exceed threshold and risk assessment permits and in association with neighbouring agencies/ landholders.	M-CP
Valleys	Lane Cove NP	Lane Cove River and tributaries: aquatic weed control program	Aquatic weeds: alligator weed, primrose (<i>Ludwigia longifolia</i> , <i>Ludwigia peruviana</i> , <i>Ludwigia repens</i>), marsh dewflower, sagittaria (<i>Sagittaria</i> sp.), arrowhead (<i>Sagittaria montevidensis</i>), pineapple lily, dense waterweed (<i>Egeria densa</i>), common starwort (<i>Callitriche stagnalis</i>), parrots feather (<i>Myriophyllum aquaticum</i>), watercress (<i>Nasturtium officinale</i>)	Aquatic biodiversity, Australian bass and native fish habitat, water quality, river bank stability. High visitation: recreation and landscape values. RWC (Ku-ring-gai, Hornsby, Ryde, Lane Cove Councils) control program.	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, biological control (Alligator weed flea beetle). Twice annual monitoring of changes in distribution. Submerged aquatics removal or harvesting at boat shed to maintain access	M-CP
Valleys	Lane Cove NP	Lane Cove NP grass control program	Coolatai grass, tussock paspalum, pampas grass	RWC program: priority grasses new incursions and pathways	Asset protection	Foliar spray, physical or mechanical control	M-CP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	Lane Cove NP	Fox	Long-nosed bandicoot <i>Perameles nasuta</i> , swamp wallaby <i>Wallabia bicolor</i> , ground dwelling birds, Australasian bittern <i>Botaurus poiciloptilus</i> (TSC-v) occasional visitor. Common native fauna species becoming uncommon in urban areas. Wildlife corridor, 10yrs + investment, Cooperative program UFAAG.	Asset protection	Ground baiting 1080, ground shooting, cage trapping, habitat modification: den detection and fumigation.	M-CP
Valleys	Lane Cove NP	Shrimptons Creek to Busaco Road (includes Mars creek)	Madeira vine, blackberry, lantana, bridal creeper, ground asparagus fern, privets, alligator weed, ludwigia spp., morning glory, Cape ivy, balloon vine, Japanese honeysuckle, cockspur coral tree (<i>Erythrina crista-galli</i>), box elder	<i>Darwinia biflora</i> (EPBC-v TSC-v), <i>Miniopterus schreibersii oceanensis</i> eastern bent wing bat (TSC-v) (foraging), <i>Ninox strenua</i> powerful owl (TSC-e), European cultural heritage: dry stone walls, steps, sandstone quarry (local)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Biological control Madeira vine beetle tinged. Bushcare volunteer program (Mars creek group 2 including Macquarie University Bushcare Club), (Group 47 Busaco Road South) corporate volunteer program, Macquarie University Sports Club and grounds staff cooperative programs Macquarie University ecological reserve voluntary conservation agreement.	M-CP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	Fullers Bridge to Carters Creek upslope of Riverside Drive to Delhi Road	Privet, ochna, camphor laurel, blackberry, lantana, bridal creeper, ground asparagus fern, golden wreath wattle, turkey rhubarb, montpellier broom, pampas grass, periwinkle (<i>Vinca major</i>), Madeira vine, phoenix palm, tussock paspalum, African lovegrass	<i>Darwinia biflora</i> (EPBC-v TSC-v), <i>Tetratheca glandulosa</i> (EPBC-v TSC-v), <i>Ninox strenua</i> powerful owl (TSC-e), Aboriginal cultural heritage: engravings European cultural heritage, depression era stonework, Picnic Areas: 2, 5, First Bushcare site in LCNP	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program (Friends of LCNP Group 1), corporate volunteer program	M-CP
Valleys	Berowra Valley RP	Urban interface	Rabbit	Park neighbours, APZs, urban interface amenity. Cooperative program with UFAAG or neighbouring landholders.	Asset protection	Ground baiting Pindone, ground shooting, ground baiting RHDV, habitat modification: warren/harbour detection and destruction, monitoring: rabbit spotlight counts and daytime rabbit density index. Implement control if numbers exceed threshold and risk assessment permits and in association with neighbouring agencies/landholders.	M-CP
Valleys	Dalrymple-Hay NR	Dalrymple-Hay Nature Reserve	Rabbit	Blue Gum High Forest EEC (EPBC-e, TSC-e)	Asset protection	Ground baiting Pindone, ground baiting RHDV, habitat modification: warren/harbour detection and destruction. Monitoring: rabbit spotlight counts and daytime rabbit density index. Implement control when rabbit numbers exceed threshold or if impact to EEC is significant	M-CP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Sydney Harbour NP	South Head target weeding bitou bush	Bitou bush		Containment	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, Monitoring presence/absence April – July	M-II
Harbour	Kamay Botany Bay NP	Botany Bay NP target weed control program	Coral tree, phoenix palms, pampas grass		Containment	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control Target weeding	M-II
Harbour	Wolli Creek RP	Wolli Central target weeding corky passion flower	Corky passion flower		Containment	physical or mechanical control	M-II
Harbour	Sydney Harbour NP	Sydney Harbour NP Pampas grass control program	Pampas grass		Containment	Foliar spray, cut and paint, stem injection, physical or mechanical control.	M-II
Harbour	Wolli Creek RP	Wolli West and Central target weeding willows	Willows		Containment	Cut and paint, stem injection, physical or mechanical control	M-II
Ku-ring-gai Chase	Ku-ring-gai Chase NP	1021 – Tip site, Ku-ring-gai Chase Road	Coral tree, pampas grass, crofton weed, senecio		Containment	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	M-II
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Valet stockpile	Golden wreath wattle, crofton weed, whisky grass, African lovegrass, tussock paspalum, coreopsis		Containment	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control Soil stockpiles to be kept clean of weeds. Monitor <i>Grevillea caleyi</i>	M-II

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Garigal NP	Garigal NP (East) trails and creeks	Lantana, golden wattle, whisky grass, pampas grass, African lovegrass, tussock paspalum, castor oil plant		Containment	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control If weeds are found to be impacting newly listed Coastal Upland Swamp EEC control may become a C-TSC priority	M-II
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Ludwigia /aquatic weed control program Mc Carrs Creek Catchment, Smiths Creek Catchment and Cowan /Kierans Creek Catchment	<i>Ludwigia peruviana</i> , <i>Ludwigia longifolia</i>		Containment	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	M-II
Ku-ring-gai Chase	Garigal NP	Middle Harbour Catchment Aquatic weed control program	<i>Ludwigia peruviana</i> , <i>Ludwigia longifolia</i> , <i>Ludwigia repens</i>		Containment	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	M-II
Ku-ring-gai Chase	Ku-ring-gai Chase NP	941 – Portuguese Beach Mosman River grass control (BPWW-CC4)	Mossman River grass, lantana, senna		Containment	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	M-II

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Ku-ring-gai Chase NP	McCarrs Creek catchment, Wirrianda creek and tributaries	Pampas grass, lantana		Containment	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	M-II
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Smiths Creek	Pampas grass, lantana, <i>ludwigia peruviana</i>		Containment	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	M-II
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Kalkari Discovery Centre dam	<i>Sagittaria platyphylla</i> , (Class 5)		Containment	Foliar spray, physical or mechanical control <i>Sagittaria</i> has a positive value as frog habitat	M-II
Valleys	Muogamarra NR	876 Milsons Passage Settlement	Lantana		Containment	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, fire prescribed burn.	M-II
Valleys	Muogamarra NR	718 – Peats Crater	Lantana, crofton weed, blackberry, wild tobacco, cottonbush, Noogoora burr		Containment	Foliar spray, Cut and paint, splatter gun, physical or mechanical removal, implement Bushcare program. Conserve cultural heritage plants but contain to site. Prune some as hedge.	M-II

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Sydney Harbour NP	2240 – Middle Head	Boneseed (class2), turkey rhubarb, Madeira vine, ground asparagus fern, mother of millions, balloon vine, green cestrum, spider plant, lantana, Japanese honeysuckle, large leaf and small leaf privet, fishbone fern, ochna, African olive, blackberry, coastal morning glory, senna, tradescantia	<i>Acacia terminalis</i> subsp. <i>terminalis</i> sunshine wattle (EPBC-e TSC-e), Littoral Rainforest EEC (EPBC-ce TSC-e), Coastal Sandstone Foreshores Forest, Coastal Tea-tree Banksia Scrub, Coastal Enriched Sandstone Moist Forest. <i>Pteropus poliocephalus</i> grey headed flying-fox (EPBC-v TSC-v) foraging, <i>Miniopterus schreibersii oceanensis</i> eastern bent-wing bat (TSC-v) over winter roost site. (BPWW-CC4)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Corporate volunteer program. Monitor presence or absence and weed impact to <i>Acacia terminalis</i> subsp. <i>terminalis</i> . Ensure clear flight path from eastern bent-wing bat over winter roost site.	L-LP
Harbour	Kamay Botany Bay NP	Congwong Beach and midden	Coral tree, alligator weed, ground asparagus fern, blackberry, Madeira vine, lantana, castor oil, African olive, green cestrum, pampas grass, phoenix palm, Cape ivy	Bangalay Sand Forest EEC (TSC-e), Eastern Suburbs Banksia Scrub (EPBC-e TSC-e), poor condition, foredune scrub. Aboriginal cultural heritage – midden of local significance	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Harbour	Kamay Botany Bay NP	Happy Valley	Coral tree, alligator weed, ground asparagus fern, blackberry, Madeira vine, lantana, castor oil, African olive, green cestrum, pampas, phoenix palm, Cape ivy	Bangalay Sand Forest EEC (TSC-e), Eastern Suburbs Banksia Scrub (EPBC-e TSC-e), poor condition.	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Harbour	Sydney Harbour NP	Milk beach middens and engravings	Ground asparagus fern, African olive, fishbone fern	Aboriginal and European cultural heritage – midden and engravings of local significance	Asset protection	Foliar spray, cut and paint, physical or mechanical control	L-LP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Sydney Harbour NP	Hermitage Foreshore Walking Track	Ground asparagus fern, African olive, lantana, morning glory, Madeira vine, Cape ivy, fishbone fern	walking track, iconic harbour views, Coastal Headland Banksia Heath, Coastal Sandstone Foreshores Forest	Asset protection	Foliar spray, cut and paint, physical or mechanical control Prevent vines from damaging native canopy.	L-LP
Harbour	Sydney Harbour NP	Middle Head Chowder Bay Road	Ground asparagus fern, lantana	Littoral Rainforest EEC (EPBC-ce TSC-e), Coastal Tea-tree Banksia Scrub, Coastal Sandstone Foreshores Forest	Asset protection	Foliar spray, splatter gun, cut and paint, physical or mechanical control. Stormwater drainage works, sewer monitoring. Bushcare volunteer program.	L-LP
Harbour	Sydney Harbour NP	Shark Island	Ground asparagus fern, Norfolk Island pine wildings (<i>Araucaria heterophylla</i>), prickly pear, African olive, buffalo grass, couch, giant reed	Picnic/recreation area, cultural heritage: recreation precinct	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program. Target prickly pear, pine wildings and African olive.	L-LP
Harbour	Kamay Botany Bay NP	La Perouse Headland	Kikuyu, couch, mirror bush, bitou bush, lantana	Visitation: picnic areas, views. Scattered native flora remnants. European cultural heritage precinct adjacent museum and monuments La Perouse Headland HHIMS 1375	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Harbour	Sydney Harbour NP	Clark Island	Madagascar vine, ground asparagus fern, <i>Bougainvillea</i> sp, English ivy (<i>Hedera helix</i>), Norfolk Island pine wildings, camphor laurel, travellers palm (<i>Ravenala madagascariensis</i>), buffalo grass, African lovegrass	Picnic/recreation area, remnant native plants, cultural heritage: recreation precinct	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program. Prevent vines from damaging canopy.	L-LP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Sydney Harbour NP	Rodd Island	Madeira vine, tree of heaven, fireweed (<i>Senecio madagascariensis</i>)	Picnic/recreation area, remnant native plants, cultural heritage: recreation precinct <i>Allocasuarina portuensis</i> Nielsen Park she oak (EPBC-e and TSC-e) transplanted	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	West Head gate	Blackberry, crofton weed, cottonbush, tussock paspalum, whisky grass, African lovegrass	Sydney coastal dry sclerophyll forest,	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	610 – Batching Plant site, Ku-ring-gai Chase Road	Boneseed (class 2), exotic grasses, pampas grass, senna	Sydney sandstone ridgetop woodland	Asset protection	Foliar spray, splatter gun, cut and paint, physical or mechanical control Target weed control – boneseed eradication program (HNCMA/Hornsby LGA). Annual monitoring boneseed July – October	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	752 – Freeway House sites 1,2 and3	Boneseed (class 2), lantana, senna, pine trees (<i>Pinus</i> sp.), pampas grass, exotic grasses and annuals, garden escapes	Sydney sandstone ridgetop woodland	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Target weed control – boneseed eradication program (HNCMA/Hornsby LGA). Annual monitoring boneseed July – October	L-LP
Ku-ring-gai Chase	Ku-ring-gai chase NP	Fishermans Beach North of the Basin	Coral tree, lantana	Sydney coastal dry sclerophyll forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Old YHA site (Morning Bay)	Coral tree, radiata pine (<i>Pinus radiata</i>), green cestrum, crofton weed, trad, garden escapes	House site – foundations, terraces (sandstone walls) and sandstone wharf. Local significance.	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Ku-ring-gai Chase NP	1000 – South end of Lovett Bay	Fishbone fern, garden escapes	Littoral Rainforest EEC (EPBC-ce TSC-e), (BPWW-CC4)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	604 – Ridgetop tracks west head peninsula including Bairne track	Golden wreath wattle, crofton weed, pampas grass whisky grass, African lovegrass	<i>Persoonia hirsuta</i> (TSC-e), coastal heath (Bairne Track), <i>Tetradlea glandulosa</i> (EPBC-v, TSC-v), <i>Boronia serrulata</i> ROTAP. (BPWW-CC4)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	617 – Berowra Track- head, Berowra Station	Green cestrum, coral tree, wild tobacco, ochna, weeping willow, senna, pampas grass, buffalo grass, thistles, crofton weed, asthma plant (<i>Chamaesyce hirta</i>)	Sydney sandstone ridgetop woodland. Track head.	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	883 – Mount Ku-ring-gai Boundary	Green cestrum, weeping willow, senna, wild tobacco, ochna, pampas grass, buffalo grass, crofton weed, fishbone fern, asthma weed, garden escapes, exotic grasses and annuals	Sydney Sandstone Ridgetop Woodland, <i>Eucalyptus luehmanniana</i> ROTAP, <i>Darwinia biflora</i> (EPBC-v TSC-v), <i>Grevillea shiressii</i> (EPBC-v TSC-v), <i>Epacris crassifolia</i>	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Cottage Point	Ground asparagus fern, fishbone fern, trad, mother of millions, blackberry, ehrharta	Sydney coastal dry sclerophyll forest, settlement	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control Cottage Point Bushcare volunteer group	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Coasters Retreat	Lantana, Cape ivy, Japanese honeysuckle, mother of millions	Sydney coastal dry sclerophyll forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control Coaster's Retreat Bushcare volunteer group	L-LP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Resolute Beach	Lantana, crofton weed	Themeda grasslands on sealiffs and coastal headlands EEC (TSC-e). Recreation – beach	Asset protection	Spot spraying, (hand held), cut and paint, hand-weeding	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	904 – North Turramurra Boundary / APZ (Gwydir Avenue)	Lantana, golden wreath wattle, coral tree, privet, weeping willow, pampas grass, exotic grasses	Sydney sandstone ridgetop woodland	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	903 – North Turramurra Boundary / Landings APZ and unnamed creek (Bobbin Head Road)	Lantana, golden wreath wattle, privet, pampas grass, exotic grasses	Sydney sandstone ridgetop woodland	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	906 – North Wahroonga Boundary (Curtin Avenue)	Lantana, golden wreath wattle, privet, pampas grass, thistles, exotic grasses	Sydney sandstone ridgetop woodland	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	House site White Horse Beach	Lantana, green cestrum, cape honeysuckle (<i>Tecoma capensis</i>), crofton weed, cottonbush	House site – foundations, sandstone terraces/walls, bullock track. Local significance.	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Ku-ring-gai Chase	Garigal NP	Bungaroo / Govenor Phillip crossing	Lantana, ground asparagus fern, giant reed, exotic grasses, widespread weeds	Governor Philip landing site local significance	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	751 – Freeway drainage lines	Lantana, morning glory, castor oil plant, pampas grass, crofton weed, exotic grasses, annuals	Syd sandstone gully forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Ku-ring-gai Chase NP	716 – Diatreme Veg at Commodore Heights	Lantana, Mossman River grass, climbing asparagus fern, senna, wild tobacco	Diatreme Vegetation association (regionally significant). (BPWW-CC3)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	698 – Cowan Creek St Ives Chase to Bobbin Head	Lantana, pampas grass, castor oil plant, coral tree, <i>Ludwigia peruviana</i> , <i>Agave</i> sp.	Swamp Oak floodplain Forest EEC (TSC-e), Sydney Sandstone Gully Forest, Estuarine complex	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, biological control	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	RSL caves	Lantana, pampas grass, crofton weed, cottonbush	RSL cave- historic occupation, graffiti and relics and Aboriginal shelters and middens	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP (co-managed by Dundundra Trust)	Aboriginal Hunting site Larool Road Terrey Hills	Lantana, senna, willows, crofton weed, coral tree, pampas grass, small leaf privet	Aboriginal cultural heritage site: engravings, Duffys Forest Ecological community EEC (TSC-e)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Apple Tree Creek Mt Colah to Apple Tree Bay	Purple elephant ears (<i>Colocasia esculenta</i>), whisky grass	Sydney sandstone gully forest	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control	L-LP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	2287 – Rudder Creek	Alligator weed, <i>Ludwigia peruviana</i> , lantana, bridal creeper, ground asparagus fern Madeira vine, turkey rhubarb, balloon vine, morning glory, privet, mistflower, fishbone fern, trad, St Johns Wort, pampas grass, African lovegrass, tussock paspalum	Sandstone Gully Forest, Coachwood Simple Forest, <i>Ninox strenua</i> powerful owl (TSC-v)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Valleys	Lane Cover River Area	College Creek Catchment	Balloon vine, privet, trad	Sydney Coastal Dry Sclerophyll Forest, Sydney Sandstone Gully Forest, Coastal Enriched Sandstone Moist Forest, <i>Darwinia biflora</i> , <i>Epacris purpurascens</i> var <i>purpurascens</i> (TSC-e), <i>Pseudophyrne australis</i> red-crowned toadlet (TSC-v)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program	L-LP
Valleys	Marramarra NP	1047 – Weavers Ridge Trail	Blackberry, pampas grass	Sydney sandstone ridgetop woodland	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Valleys	Lane Cove NP	Gloucester Ave	Blackberry, privet, trad, mistflower, crofton weed	Sydney coastal dry sclerophyll forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program (Wallalong weeders)	L-LP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	2118 – Boy Scout Creek	Boneseed (class 2), lantana, bridal creeper, ground asparagus fern, turkey rhubarb, Madeira vine, balloon vine, Cape ivy, morning glory, blackberry, cockspur coral tree, privet, ochna, senna, willow, mistflower, Peruvian lily, ginger lily, tree of heaven, fishbone fern, trad, box elder, giant reed	Sandstone Gully Forest, Coachwood Simple Forest, riparian vegetation, <i>Ninox strenua</i> powerful owl (TSC-v), <i>Miniopterus schreibersii oceanensis</i> eastern bentwing-bat (TSC-v), (BPWW-CC4)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Valleys	Lane Cove NP	2317 – Upper Blue Gum Creek Valley View Close to UTS	Boneseed (class 2), lantana, bridal creeper, morning glory, Japanese honeysuckle, blackberry, Montpellier broom, privet, erharta, ginger lily, trad, palm grass	Sandstone Gully Forest, Coachwood Simple Rainforest, riparian vegetation, <i>Ninox strenua</i> powerful owl (TSC-v), <i>Darwinia biflora</i> (EPBC-v TSC-v), <i>Schizomeria ovate</i> locally uncommon, crabapple, <i>Cryptocarya</i> sp. native laurel locally uncommon (BPWW-CC4)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Valleys	Berowra Valley RP	Tunks Creek catchment	Crofton weed, widespread weeds FIN	<i>Persoonia mollis</i> subsp. <i>maxima</i> (EPBC-e TSC-e)	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control	L-LP
Valleys	Berowra Valley RP	Galston Gorge	Feral chicken	Visitation area: amenity and public health. Unlawful release/dumping site. Prevention of introduction of disease to native birds.	Asset protection	Cage trapping, net capture. Public education campaigns. Monitor for presence or absence and impact.	L-LP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Parramatta River RP <i>*not yet fully managed by Metro North East Region</i>	Bedlam Bay	FIN, Madeira vine	FIN, European cultural heritage: Bedlam Bay road remains state significance. Aboriginal cultural heritage	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program. Biological control for Madeira vine.	L-LP
Valleys	Berowra Valley RP	Westleigh urban interface	Garden escapes FIN	Sydney Turpentine Ironbark Forest (EPBC-e, TSC-e)	Asset protection	Council Bushcare groups	L-LP
Valleys	Lane Cove NP	2280 – River Ave West Chatswood Quebec Road to Fullers Bridge	Ground asparagus fern bridal creeper, <i>Phyllostachys spp.</i> , turkey rhubarb, Madeira vine, balloon vine, Cape ivy, morning glory, cats claw creeper, privet	Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest (TSC-e) Swamp Sclerophyll Forest on Coastal Floodplains EECs (TSC-e), some turpentine and ironbark remnant trees, Coastal Enriched Sandstone Sheltered Forest, Estuarine Mangrove Forest, <i>Pseudophryne australis</i> red-crowned toadlet (TSC-v) at Koboda rocks. Aboriginal cultural heritage: midden	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program (group 43 River Ave), community planting days, corporate groups. Biological control (bridal creeper)	L-LP
Valleys	Lane Cove NP	2316 – Kurrajong Street to Pennant Hills Park	Ground asparagus fern, crofton weed, mistflower, senna, blackberry, lantana, privets, bridal creeper	<i>Ninox strenua</i> powerful owl (TSC-v), Sandstone Gully Forest, riparian vegetation, Coachwood Simple Rainforest forest (BPWW-CC4)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	2141 – Camp Creek including George Street and Cecil Ave	Ground asparagus fern, Madeira vine, balloon vine, Cape ivy, English ivy, morning glory, Japanese honeysuckle, cats claw creeper, palm grass, privet, ochna, senna, Peruvian lily, spider plant, trad	Sydney Turpentine Ironbark Forest EEC (EPBC-ce TSC-e), (degraded remnant on park edge and remnant trees) Shale sandstone forest, Coastal Enriched Sandstone Moist Forest, Blue Gums present as remnant trees	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Control vine weeds to prevent canopy damage especially to ironbarks, turpentines and bluegums, Bushcare volunteer program (group 20).	L-LP
Valleys	Berowra Valley RP	705 – Crosslands Reserve to Galston Gorge and Hornsby Heights urban interface Somerville Road	Ground asparagus fern, turkey rhubarb, lantana, Japanese honeysuckle, cats claw creeper, blackberry, senna, privet, wild tobacco, crofton weed, <i>Agave</i> sp., fishbone fern, trad, whisky grass, pampas grass, <i>Erharta</i> sp., African lovegrass, paspalum, kikuyu	<i>Tetratheca glandulosa</i> (EPBC-v TSC-v), <i>Darwinia biflora</i> (EPBC-v TSC-v), <i>Persoonia mollis</i> subsp. <i>maxima</i> (EPBC-e TSC-e), <i>Melaleuca deanei</i> (EPBC-v TSC-v), open woodland, Sydney sandstone gully forest and Sydney sandstone ridgetop forest. Crosslands Reserve high visitation, Galston Gorge lookout scenic values	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Valleys	Marramarra NP	Marramarra Creek settlement	Lantana	Sydney sandstone gully forest	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control	L-LP
Valleys	Lane Cove NP	Below George Christie Oval to Great North Walk.	Lantana, blackberry, African lovegrass, tussock paspalum, privet	<i>Darwinia biflora</i> (EPBC-v, TSC-v), Sandstone Gully Forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control.	L-LP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	Bradfield Road	Lantana, bridal creeper, ground asparagus fern, turkey rhubarb, Madeira vine, balloon vine, Cape ivy, morning glory, blackberry, tree of heaven, cockspur coral tree, privet, ochna, senna, mistflower, Peruvian lily, ginger lily, trad, fishbone fern, box elder, crofton weed	Sandstone Gully Forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Valleys	Berowra Valley RP	Barnetts Lookout to Berowra Waters	Lantana, ground asparagus fern, garden escapes, FIN	Native vegetation	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP
Valleys	Lane Cove NP	Thornleigh Oval surrounds to City View Lookout to Lane Cove River	Lantana, turkey rhubarb, Madeira vine, balloon vine, morning glory, senna, ehrharta, African lovegrass, tussock paspalum, trad	Sandstone Gully Forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control.	L-LP
Valleys	Berowra Valley RP	Galston Gorge Lookout and carpark	Privet, castor oil plant, widespread weeds, exotic grasses FIN	Visitation	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control	L-LP
Valleys	Berowra Valley RP	1011-Stringybark Ridge	Privet, willow, <i>Agave</i> sp., whisky grass, African lovegrass, paspalum	Stringybark Ridge Rest Area – recreation. <i>Melaleuca deanei</i> (EPBC-v TSC-v), <i>Galium australe</i> (TSC-e), <i>Darwinia biflora</i> (EPBC-v TSC-v), <i>Tetratheca glandulosa</i> (EPBC-v; TSC-v), Sydney sandstone ridgetop forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-LP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	2232 – Lower Blue Gum Creek Millwood Ave to UTS	Turkey rhubarb, Madeira vine, balloon vine, Cape ivy, privet, senna, trad, kikuyu	Coastal Saltmarsh (TSC-e), Swamp Oak Floodplain Forest EECs (TSC-e), fish nursery, (BPWW-CC5)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program (Fuller Park Rd, Fullers park)	L-LP
Valleys	Lane Cove NP	Fern Valley to Porters Creek upslope of Riverside Drive	Tussock paspalum, pampas grass, privet, lantana, bridal creeper, montpellier broom, blackberry, ground asparagus fern, turkey rhubarb	<i>Darwinia biflora</i> (EPBC-v TSC-v), <i>Ninox strenua</i> powerful owl (TSC-e), European cultural heritage: stone walls. Aboriginal cultural heritage: grinding grooves	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control.	L-LP
Valleys	Lane Cove NP	2274 – Quarry Creek	Yarrow (<i>Achillea millefolium</i>), egeria (<i>Egeria densa</i>), <i>Sagittaria sp.</i> , primrose, lantana, bridal creeper, ground asparagus fern, turkey rhubarb, Madeira vine, balloon vine, Cape ivy, morning glory, blackberry, tree of heaven, cockspur coral tree, privet, ochna, senna, willow, mistflower, Peruvian lily, ginger lily, fishbone fern, trad, box elder	<i>Darwinia biflora</i> (EPBC-v; TSC-v), Sandstone Gully Forest, Coachwood Simple Forest, <i>Ninox strenua</i> powerful owl (TSC-v), <i>Miniopterus schreibersii oceanensis</i> eastern bentwing-bat (TSC-v), <i>Pseudophyrne australis</i> red-crowned toadlet (TSC-v)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control Bushcare volunteer program (group 16 and Group 7)	L-LP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	2121 – Browns Waterhole to Devlins creek	Yarrow, egeria, <i>Sagittaria sp.</i> , primrose, lantana, bridal creeper, ground asparagus fern, turkey rhubarb, Madeira vine, balloon vine, Cape ivy, coastal morning glory, blackberry, tree of heaven, cockspur coral tree, privet, ochna, senna, willow, <i>Ageratina riparia</i> mistflower, <i>Alstroemeria pulchella</i> , tree of heaven, fishbone fern, trad, box elder, giant reed	Hornsby/Ku-ring-gai Gang Gang cockatoo <i>Callocephalon fimbriatum</i> endangered population (TSC-e), <i>Ninox strenua</i> powerful owl (TSC-v), <i>Macquaria novemaculeata</i> Australian bass habitat, Coastal Sandstone Gallery Rainforest, Coastal Shale-Sandstone forest, Coastal Enriched Sandstone Moist Forest (BPWW-CC5)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program (group 38). Monitoring: Gang Gang sightings and observations. Vine control to limit impact to canopy and habitat trees	L-LP
Harbour	Sydney Harbour NP	2144 – Chowder Head	Coral tree, ochna, African olive, large and small leaf privet, senna, Japanese honeysuckle, blackberry, coastal morning glory, trad, spider plant, fishbone fern	<i>Acacia terminalis</i> subsp. <i>terminalis</i> sunshine wattle (EPBC-e TSC-e), Coastal Sandstone Foreshores Forest, Coastal Tea-tree Banksia Scrub, (BPWW-CC4)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Monitor presence or absence and weed impacts <i>Acacia terminalis</i> subsp. <i>terminalis</i> . Bushcare volunteer program.	L-PP
Harbour	Sydney Harbour NP	Dobroyd Head Beatty Street APZ	Ground asparagus fern, coral tree, ginger lily, elephant ear (<i>Alocasia sp.</i>), garden escapes	Entrance to Manly Scenic walkway. Coastal Sandstone Foreshores Forest, Coastal Sandstone Riparian Forest. Established vol group "Reef Beach volunteers"	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program	L-PP
Harbour	Sydney Harbour NP	Dobroyd Head Cutler road	Ground asparagus fern, lantana, asthma weed, exotic grasses, garden escapes	Park entrance, scenic values, Coastal Headland Banksia Heath. Established vol group "Reef Beach volunteers"	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program.	L-PP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Harbour	Sydney Harbour NP	Morella Road	Large leaf and small leaf privet, ochna, senna, cherry blossom (<i>Prunus</i> sp.), bird of paradise (<i>Strelitzia reginae</i>), trad, garden escapes	Coastal Sandstone Foreshores Forest, Harbour scenic walk. Long standing Bushcare group 10 yrs+	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program	L-PP
Harbour	Sydney Harbour NP	Cross Street, Clifton Gardens	Madeira vine, moth vine, large leaf and small leaf privet, nasturtium (<i>Tropaeolum majus</i>), ginger lily, garden escapes	Bushcare site: Duke of Edinburgh Scouts. Small investment with good return for effort. Coastal Sandstone Foreshores Forest	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control. Duke of Edinburgh volunteer program	L-PP
Harbour	Wolli Creek RP	Wolli Bluff (east Highcliff Rd to the Bluff)	Privet, Madeira vine, lantana, ground asparagus fern, pampas grass, camphor laurel, African olive	Sydney Sandstone Ridgetop Woodland, Sydney Sandstone Gully Forest. Wildlife / green corridor. Bushcare	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, fire, Bushcare volunteer program (1 group).	L-PP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	714 – Mt Colah works depot and Deadmans Trail	<i>Acacia binervia</i> , castor oil plant, senna, tussock paspalum, Coolatai grass, pampas grass, exotic grasses	<i>E. camfieldii</i> (EPBC-v TSC-V), <i>Tetratheca glandulosa</i> , (EPBC-v TSC-V), Syd sandstone ridgetop woodland	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Target weed control – boneseed eradication program. Annual boneseed monitoring July-October	L-PP
Ku-ring-gai Chase	Garigal NP	Flat rock – Downpatrick Road – Killarney Heights	Blackberry, privet, senna, trad, bamboo, fishbone fern	Coastal Enriched Sandstone Moist Forest, Coastal Enriched Sandstone Sheltered Forest. Park entry/ track head	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare (Scouts) volunteer program.	L-PP
Ku-ring-gai Chase	Garigal NP	Calool Crescent – Belrose	Giant reed, pampas grass, garden escapes	Sydney sandstone ridgetop woodland, Coastal Sandstone Sheltered Peppermint – Apple Forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Calool Crescent Bushcare group	L-PP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Garigal NP	Ferguson Street West – Forestville	Ground asparagus fern, Madeira vine, morning glory, coral tree, blue psoralea (<i>Psoralea pinnata</i>), tussock paspalum	Coastal Sandstone Riparian Forest, Hornsby Sandstone Heath Woodland	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Fergusson Street West Bushcare volunteer group.	L-PP
Ku-ring-gai Chase	Garigal NP	Tryon Road– East Lindfield	Lantana, blackberry, privet, senna	Coastal Enriched Sandstone Sheltered Forest, Coastal Sandstone Sheltered Peppermint – Apple Forest. Park entrance/track head	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control Tryon Road Bushcare group	L-PP
Ku-ring-gai Chase	Garigal NP	Fireclay Gully Trail (off Heath Trail)	Lantana, cockspur coral tree, blue psoralea, crofton weed, pampas grass	Coastal Heath, <i>Boronia serrulata</i> ROTAP, <i>Isodon obesulus</i> subsp. <i>obesulus</i> southern brown bandicoot (EPBC-e, TSC-e) habitat	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control.	L-PP
Ku-ring-gai Chase	Garigal NP	Davidson Park Area 5	Lantana, ground asparagus fern, coastal morning glory, Japanese honeysuckle, montpellier broom, wild tobacco	Revegetation area, Recreation – fishing and bushwalking	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control, planting or landscaping. Bayer corporate group volunteer program	L-PP
Ku-ring-gai Chase	Garigal NP	Cook Street	Lantana, ground asparagus fern, senna, pampas grass, trad	<i>Melaleuca deanei</i> (EPBC-v; TSC-v), <i>Leptospermum deanei</i> (EPBC-v TSC-v), <i>Angophora crassifolia</i> (ROTAP), Hornsby Sandstone Heath – Woodland. (BPWW-CC3)	Asset protection	Foliar spray, splatter gun, cut and paint, physical or mechanical control	L-PP
Ku-ring-gai Chase	Garigal NP	Killarney Drive – Killarney Heights	Lantana, ground asparagus fern, senna, privet, camphor laurel, garden escapes	Coastal Enriched Sandstone Moist Forest, Coastal Enriched Sandstone Sheltered Forest. Park entrance/track head	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare group	L-PP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Ku-ring-gai Chase NP	736 – Elvina Bay	Lantana, ground asparagus fern, turkey rhubarb, senna, annuals, fishbone fern, <i>Phyllostachys aurea</i> , exotic grasses, garden escapes	Wagstaff Pittwater Spotted Gum Forest (TSC-e), (BPWW-CC4)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Elvina Bay Bushcare volunteer group, Pittwater LGA Asparagus Fern Out Day	L-PP
Ku-ring-gai Chase	Garigal NP	Andrew Street Borgnis Street, Stone Parade, Cascades track entrance	Lantana, <i>Ludwigia peruviana</i> , ground asparagus fern, Madeira vine, privet, senna, crofton weed, pampas grass, trad, blue gum	<i>Melaleuca deanei</i> (EPBC-v; TSC-v), <i>Leptospermum deanei</i> (EPBC-v TSC-v), Hornsby Sandstone Heath-Woodland. BPWW CC-3	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Implement Andrew Street and Stone Parade Bushcare program. Monitoring: presence or absence threatened species	L-PP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Cicada Glen Mona Vale	Lantana, morning glory, mistflower, crofton weed, trad	Littoral Rainforest EEC (TSC-e), Park entry sign	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-PP
Ku-ring-gai Chase	Garigal NP	East Killara Barrie Street Bushcare group	Lantana, pampas grass, camphor laurel, fishbone fern, garden escapes	<i>Haloragodendron lucassi</i> , (EPBC-e TSC-e) <i>Tetradlea glandulosa</i> (EPBC-v TSC-v), <i>Lomandra brevis</i> (ROTAP), <i>Angophora crassifolia</i> (ROTAP), Coastal Enriched Sandstone Sheltered Forest, Coastal Sandstone Sheltered Peppermint – Apple Forest, Hornsby Sandstone Heath –Woodland. Aboriginal middens	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Barry Street Bushcare program.	L-PP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Garigal NP	Starkey Street –Killarney Heights	Lantana, turkey rhubarb, balloon vine, blackberry, coral tree, ochna, castor oil plant, senna, mother of millions, bamboo	<i>Tetratheca glandulosa</i> (EPBC-v TSC-v), <i>Angophora crassifolia</i> ROTAP, <i>Pseudophryne australis</i> red-crowned toadlet (TSC-v), Coastal Sandstone Gully Moist Heath, Coastal Sandstone Riparian Forest, Hornsby Sandstone Heath Woodland	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Starkey Street Bushcare group. Monitoring: presence or absence threatened species	L-PP
Ku-ring-gai Chase	Garigal NP	Wentworth St East Killara	Lantana, turkey rhubarb, dolichos pea (<i>Dipogon lignosus</i>), chalice vine (<i>Solandra</i> sp.), privet, senna, wild tobacco	Coastal Enriched Sandstone Sheltered Forest, Coastal Sandstone Gallery Rainforest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control.	L-PP
Ku-ring-gai Chase	Garigal NP	Ferguson Street East – Forestville	Madeira vine, jasmine (<i>Jasminum</i> sp.), black-eyed Susan, coral tree, castor oil plant	Coastal Sandstone Riparian Forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Fergusson Street East Bushcare volunteer group	L-PP
Ku-ring-gai Chase	Ku-ring-gai Chase NP	Timaru Road and Perimeter Trail Terrey Hills	Pampas grass, lantana, crofton weed, <i>Ludwigia peruviana</i>	Sydney coastal dry sclerophyll forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-PP
Ku-ring-gai Chase	Garigal NP	2104 – Bare Creek Track	Privet, crofton weed, exotic grasses	<i>Melaleuca deanei</i> (EPBC-v; TSC-v), <i>Leptospermum deanei</i> (EPBC-v TSC-v), Hornsby Sandstone Heath-Woodland, <i>Isodon obesulus</i> subsp. <i>obesulus</i> (EPBC-e, TSC-e) southern brown bandicoot habitat	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Monitoring: presence or absence threatened species	L-PP
Ku-ring-gai Chase	Garigal NP	2250 – Near Burraneer Avenue	Privet, turkey rhubarb, pampas grass, exotic grasses	<i>Haloragodendron lucassi</i> (EPBC-e TSC-e), heath and sheltered and moist forest types	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Burraneer Bushcare group.	L-PP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Ku-ring-gai Chase	Garigal NP	2284 – Rocky Creek	Trad, buffalo grass, exotic grasses	Coastal saltmarsh EEC (TSC-e), Coastal Sandstone Gallery Rainforest, Coastal Sandstone Riparian Forest, Coastal Enriched Sandstone Sheltered Forest, Coastal Enriched Sandstone Moist Forest, Coastal Sandstone Sheltered Peppermint – Apple Forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Barry Street Bushcare program.	L-PP
Valleys	Lane Cove River Area	Little Blue Gum Creek	Balloon vine, privet, trad, mistflower, crofton weed, Madeira vine, turkey rhubarb	Swamp Oak Floodplain Forest EEC (TSC-e), Sydney coastal dry sclerophyll forest Sandstone Gully Forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program groups 11 and 12	L-PP
Valleys	Lane Cove NP	De Burghs Bridge to Shrimptons creek	Coastal morning glory, alligator weed primrose, lantana, bridal creeper, ground asparagus fern, turkey rhubarb, Madeira vine, balloon vine, cape ivy, morning glory, blackberry, cockspur coral tree, privet, ochna, senna, mistflower, Peruvian lily, ginger lily, trad, fishbone fern, box elder, flooded gum (<i>Eucalyptus grandis</i>), cottonbush	<i>Darwinia biflora</i> (EPBC-v TSC-v), <i>Miniopterus schreibersii oceanensis</i> eastern bent wing bat (TSC-v) (foraging), <i>Ninox strenua</i> powerful owl (TSC-e) roost, <i>Pseudophryne australis</i> red-crowned toadlet (TSC-e), Aboriginal Cultural heritage: artefacts site Shrimptons creek	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program (Group 4 Khartoum Creek and 3 Shrimptons creek group 5 Durham Close)	L-PP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Berowra Valley RP	952 – Quarry Trail including Tunks Ridge rest area	Ground asparagus fern, moth vine, blackberry, privet, wild tobacco, castor oil plant, crofton weed, whisky grass, paspalum	<i>Melaleuca deanei</i> (EPBC-v TSC-v), <i>Eucalyptus camfieldii</i> (EPBC-v TSC-v), <i>Galium australe</i> (TSC-e), <i>Darwinia biflora</i> (EPBC-v TSC-v), <i>Tetradlea glandulosa</i> (EPBC-v TSC-v), <i>Persoonia mollis</i> subsp. <i>maxima</i> (EPBC-e TSC-e), Sydney sandstone ridgetop forest, Sydney sandstone gully forest. Tunks Ridge rest area	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control	L-PP
Valleys	Berowra Valley RP	Clarinda Ave to Galston Road, Hornsby. Trail and urban interface	Ground asparagus fern, privet, garden escapes, exotic grasses	Native vegetation	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control Hornsby Council Bushcare	L-PP
Valleys	Berowra Valley RP	658 – Calna Creek and Lyrebird Gully Catchment (urban interface Calna creek and tributaries and surrounds Hornsby heights to Mt Kuring-gai)	Ground asparagus fern, turkey rhubarb, blackberry, lantana, trad, Japanese honeysuckle, senna, privet, mother of millions, pampas grass, <i>Ehrharta</i> sp., African lovegrass, paspalum, kikuyu	<i>Darwinia biflora</i> (EPBC-v; TSC-v), <i>Tetradlea glandulosa</i> (EPBC-v; TSC-v), <i>Lasiopetalum joyceae</i> (EPBC-v; TSC-v), <i>Persoonia mollis</i> subsp. <i>maxima</i> (EPBC-e; TSC-e), <i>Leucopogon fletcheri</i> (TSC-e), Sydney sandstone gully forest, Sydney sandstone ridgetop forest. Berowra Valley RP Lyrebird Gully Lookout Pacific Highway. (BPWW-CC4)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-PP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Berowra Valley RP	976 – Sams Creek Catchment, Berkley Trail and urban interface Berowra	Ground asparagus fern, turkey rhubarb, lantana, cats claw creeper, privet, wild tobacco, crofton weed, <i>Agave</i> sp, mother of millions, trad, kikuyu, exotic grasses	<i>Darwinia biflora</i> (EPBC-v TSC-v), <i>Darwinia peduncularis</i> (EPBC-v TSC-v), <i>Lasiopetalum joyceae</i> (EPBC-v TSC-v), <i>Persoonia mollis</i> subsp. <i>maxima</i> (EPBC-e; TSC-e), <i>Melaleuca deanei</i> (EPBC-v; TSC-v), <i>Tetradlea glandulosa</i> (EPBC-v; TSC-v), Sydney sandstone gully forest, Sydney sandstone ridgetop forest.	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-PP
Valleys	Lane Cove NP	2112 – Lane Cove Road to Fiddens Wharf including Blackbutt Creek	Lantana, bridal creeper, ground asparagus fern, turkey rhubarb, Madeira vine, balloon vine, Cape ivy, morning glory, blackberry, tree of heaven, cockspur coral tree, privet, ochona, senna, mistflower, Peruvian lily, ginger lily, trad, fishbone fern, box elder	Sandstone Gully Forest, Coachwood simple forest, riparian vegetation, powerful owl (TSC-v)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control Biological control (bridal creeper). Monitor for hederanthera (found upstream off park), Bushcare group 9 (Fiddens Wharf Road), Corporate volunteer program	L-PP
Valleys	Lane Cove NP	2244 – Fox Valley including Morona Ave fire trail and Beltana Ave	Lantana, Madeira vine, balloon vine, blackberry, privet, senna, ehrharta, crofton weed, mistflower, palm grass, trad	<i>Darwinia biflora</i> (EPBC-v; TSC-v), <i>Pseudophryne australis</i> red crowned toadlet (TSC-v), riparian vegetation community along upper reach of Lane Cove River. Sandstone Gully Forest, Sandstone Ridgetop Woodland. (BPWW – CC3)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program (Morona Ave / Beltana Ave group 23 and Group 45)	L-PP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	2301- Terrys Creek	Lantana, Madeira vine, Cape ivy, balloon vine, morning glory, small leaf privet, ehrharta, Peruvian lily, NZ Christmas bell (<i>Alstroemeria psittacina</i>), trad	Coachwood Simple Rainforest ,Sydney Sandstone Gully Forest, <i>Melaleuca deanei</i> (TSC-v), (BPWW-CC4)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control	L-PP
Valleys	Lane Cove NP	2157 – Devlins Creek Lane Cove River to Byles creek (riparian zone to park boundary)	<i>Ludwigia longifolia</i> , <i>Ludwigia peruviana</i> , lantana, bridal creeper, ground asparagus fern, turkey rhubarb, Madeira vine, balloon vine, Cape ivy, morning glory, blackberry, box elder, tree of heaven, camphor laurel, cockspur coral tree, privet, ochna, senna, trad, mistflower, Peruvian lily, ginger lily, fishbone fern, weeping willow	Sandstone Gully Forest, Coachwood Simple Rainforest, <i>Ninox strenua</i> powerful owl (TSC-v), (BPWW-CC4)	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Vine control to limit impact to canopy and habitat trees	L-PP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	Devilins creek upstream of Byles confluence	<i>Ludwigia longifolia</i> , <i>Ludwigia peruviana</i> , lantana, bridal creeper, ground asparagus fern, turkey rhubarb, Madeira vine, balloon vine, Cape ivy, morning glory, blackberry, box elder, tree of heaven, green cestrum, camphor laurel, cockspur coral tree, privet, ochna, senna, trad, mistflower, Peruvian lily, ginger lily, fishbone fern, weeping willow, St Johns Wort	Coachwood Simple Forest, Sandstone Gully Forest	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control.	L-PP
Valleys	Berowra Valley RP	Hornsby urban interface including Rosemead Road Great North Walk	Privet, lantana, widespread weeds, garden escapes, vines and scramblers FIN	Blue Gum Glen Forest EEC (EPBC-ce, TSC-ce), Recreation Great North Walk	Asset protection	Hornsby Council Bushcare sites	L-PP
Valleys	Berowra Valley RP	611 – Beaumont Rd, Gundah Ridge trail, Mount Kuringgai	Whisky grass, couch, kikuyu, Parramatta grass, crofton weed	<i>Darwinia biflora</i> (EPBC-v; TSC-v), <i>Tetraloche glandulosa</i> (EPBC-v; TSC-v), <i>Lasiopetalum joyceae</i> (EPBC-v; TSC-v), <i>Melaleuca deanei</i> (EPBC-v; TSC-v), <i>Persoonia mollis</i> subsp. <i>maxima</i> (EPBC-e; TSC-e), Sydney sandstone ridgetop forest	Asset protection	Foliar spray, physical or mechanical control	L-PP

Area	Reserve(s)	Site name	Target pests or weeds	Asset at risk	Aim of control	Action	Priority
Valleys	Lane Cove NP	Busaco road to Browns Waterhole and cycleway	Madeira vine, blackberry lantana, bridal creeper, ground asparagus fern, privets, alligator weed, <i>Ludwigia peruviana</i> , <i>L. longifolia</i> , <i>L. repens</i> , morning glory, Cape ivy, balloon vine, Japanese honeysuckle, cockspur coral tree, box elder	Gang-gang Cockatoo, <i>Callocephalon fimbriatum</i> (Grant), endangered population in the Hornsby and Ku-ring-gai LGAs (TSC-e), <i>Darwinia biflora</i> (EPBC-v TSC-v), Eastern bent wing bat (foraging), Powerful owl, Sydney sandstone gully forest, Sydney sandstone ridgetop woodland, Visitation: popular cycleway	Asset protection	Foliar spray, splatter gun, cut and paint, stem injection, physical or mechanical control. Bushcare volunteer program (group 26 Busaco road)	L-PP
Valleys	Muogamarra NR	761 – Glendale Road, precinct Cowan	Turkey rhubarb, senna, whisky grass, giant panic grass (<i>Panicum antidotale</i>), crofton weed	Sydney sandstone ridgetop woodland and Sydney sandstone gully forest	Asset protection	Foliar spray, cut and paint, stem injection, physical or mechanical control	L-PP
Valleys	Muogamarra NR	Bujwa Trail Cowan Oval to Bujwa Bay	Whisky grass, pampas grass, African lovegrass, Parramatta grass, buffalo grass	Sydney sandstone ridgetop woodland and Sydney sandstone gully forest	Asset protection	Foliar spray, physical or mechanical control	L-PP
Valleys	Muogamarra NR	720 – Bujwa Point Trail	Whisky grass, tussock paspalum	Sydney sandstone ridgetop woodland and Sydney sandstone gully forest	Asset protection	Foliar spray, physical or mechanical control	L-PP

* Not yet ranked as of June 2012

5 Consultation

The Metro North East regional pest management strategy was developed through consultation with external and internal stakeholders.

A pest management strategy stakeholder forum for external stakeholders was conducted at Jenkins Hall, Lane Cove, on Tuesday 23 August 2011. Invitees who could not attend on the day commented on two focus questions by email or mail. The Deputy Chief Executive of the Parks and Wildlife Group, Metro North East Region regional manager and the Metro North East Region pest management officer represented NPWS and a NPWS facilitator managed the event. A diverse range of government and community representatives participated, including representatives of Sydney Metropolitan and Hawkesbury–Nepean catchment management authorities, Cumberland Livestock Health and Pest Authority, local councils and other state government land management agencies, NSW Farmers Association, Australian Deer Association, representatives from the NPWS Regional Advisory Committee, Bushcare volunteers, community group representatives and park neighbours.

Two focus questions were posed:

- What do you see as the most important issues that need to be addressed in the regional pest management strategy?
- What do you see as some of the strategies to help address these important areas or issues in the regional pest management strategy?

The key issues and strategies identified are outlined below with links or comments as to how these have been addressed in the strategy or at another level by NPWS. The state strategy outlines pest management logic, provides seven principles of pest management and defines goals, objectives and actions for the effective management of pests by NPWS. Key performance indicators are included so outcomes are measurable and reportable.

Issues and strategies identified, with reference to objectives in the state strategy, are:

- the need for prioritisation of pest management programs to:
 - identify high value assets at risk (objective 2.1)
 - identify vulnerability and capacity especially to new incursions and species (objective 1.1)
 - set realistic management objectives (objective 2.1)
 - allocate resources for a long term commitment (objective 3.1)
 - prioritise at a state, regional and local scale (objective 2.1) to:
 - review existing plans, priorities and data
 - collect baseline data, including maps and surveys
 - understand pest biology and the interaction between pests and assets to be protected
 - develop a priority matrix
 - ensure longevity of investment and sustainability of programs.
- the need for collaboration between stakeholders to:
 - investigate opportunities where stakeholder partnerships can add value to pest management (objective 3.2)
 - identify community engagement programs (objective 3.2)
 - identify links with other plans and strategies (objective 2.1)

- develop communication and education programs (objective 3.2)
- liaise at a local, regional and state level (objective 2.2) to:
 - utilise existing committees, SWC and UFAAG
 - involve volunteers in control programs, surveys and other activities
 - liaise between regional and state stakeholders.
- the need for communication, education and awareness raising to:
 - outline objectives for communications, for example behavioural and attitudinal change (objective 3.2)
 - develop simple key messages (objective 3.2)
 - identify knowledge gaps and opportunities for research (objectives 1.1 and 2.2)
 - give ownership to stakeholders, community and neighbours (objective 3.2)
 - monitor, review and report on control programs and issues (objective 3.4)
 - engage specialists to develop messages
 - build on existing educational materials and programs (DPI, DET syllabus)
 - work with industry, business, tourism
 - utilise existing committees
 - utilise advertising, electronic media, word of mouth
 - provide government and educational institutions with a list of programs and issues to guide potential research projects
 - promote achievements.

A state level consultation forum was also facilitated by the Deputy Chief Executive and Pest and Ecological Management Unit representatives. Some issues raised at the regional forum were carried over to the state forum, for example collaboration on control programs involving state-wide agencies and interest groups.

A small forum for the Friends of Lane Cove and Lane Cove Bushcare volunteers was held at Jenkins Hall in February 2012. Comments were invited on the two focus questions with similar outcomes and ideas to those identified above. This informal forum also served to inform and involve more volunteers in the prioritisation process and specific examples in section 5. Regional prioritised pest programs relevant to the Lane Cove River Area were discussed.

Internal liaison was also undertaken in workshops conducted with each operational Area. Area managers, senior field supervisors, rangers and field officers were informed of the aims, objectives and prioritisation processes of the strategy and invited to provide input and comment in order to accurately identify and prioritise pest management programs. Support and input was also provided by the NPWS Pest and Ecological Management Unit, the OEH Biodiversity Conservation Section and NPWS Branch Planning and Coordination Section. Staff input will be an ongoing commitment over the life of the strategy as pest programs and issues are subject to change and the table of prioritised programs will be kept live on the Region's share drive to facilitate updates.

The draft version of this regional pest management strategy was placed on public exhibition and comments invited from the community, other government agencies and stakeholder groups. Comments were addressed in a submissions report and considered in the writing of the final regional pest management strategy as

appropriate. Key themes and issues emerging from the public consultation process were community and other agency engagement and liaison, biodiversity conservation, target specificity and the humaneness of poison baiting, shooting on NPWS estate, the prioritisation process and the need to identify funding and resourcing commitments. Comments were also received regarding impacts to aquatic flora and fauna, issues pertaining to stormwater management and on known programs such as weed control by Bushcare volunteers and fox and rabbit control.

Stakeholder liaison is ongoing. Public comment and enquiry on pest programs is welcomed at any time. Comment may be directed to any NPWS office or to the Region's two Information Centres or Discovery Centre. The Bobbin Head Information Centre has a dedicated pre-recorded phone service to provide information on pesticide application in the Region. Liaison with neighbouring agencies and land managers includes direct communications and NPWS participation in committees, forums and interest groups including the Urban Feral Animal Action Group and the Sydney Weeds Committees. The Metro North East Region Advisory Committee may also comment or request information regarding pest management. The pest management officer is responsible for maintaining strong functional links and networks relevant to pest management.

6 Pest species overviews

Information about high profile pests for the 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 and on the internet.²

Fox (*Vulpes vulpes*)

Distribution and abundance

Foxes are widespread in most environments in Australia; however, they are generally most abundant in agricultural areas with patches of uncleared vegetation, because these areas provide food, cover and denning sites. Foxes can also reach high numbers and be widespread throughout urban areas, but appear to be rare in closed forests away from cleared land.

Foxes occur throughout the Metro North East Region, in urban areas away from bushland and in parklands and bushland reserves.

Impacts

The introduction of foxes into Australia has had a devastating impact on native fauna, particularly among medium-sized (450–5000 g) ground-dwelling and semi-arboreal mammals, ground-nesting birds and freshwater turtles. Recent studies have shown that predation by foxes continues to suppress remnant populations of many such species. Foxes have also caused the failure of several attempts to reintroduce native fauna into areas of their former range. Predation by foxes was the first KTP to be listed under the TSC Act and a TAP has been prepared. Foxes are also significant predators of domestic stock, including lambs and poultry; predation by foxes has the potential to reduce lambing rates significantly. Although there is no statutory requirement under the *Rural Lands Protection Act 1998* (RLP Act) for the control of foxes, they are classed as vermin. NPWS is only responsible for the control of foxes on park estate and in accordance with set priorities, predominantly those determined by the Fox TAP.³

The common native species most likely to be impacted in the Metro North East Region include the brushtail possum (*Trichosurus vulpecular*), swamp wallaby (*Wallabia bicolor*), ground-nesting birds such as the superb lyrebird (*Menura novaehollandiae*), and the long-nosed bandicoot which is classed as common but is considered to be uncommon in urban areas throughout their range including Sydney Harbour (north) and Lane Cove National Park. Of greater concern is the impact of fox predation at a population level on a number of threatened species that reside or periodically occur in the Metro North East Region, including the endangered southern

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

³ www.environment.nsw.gov.au/pestsweeds/Foxes.htm

brown bandicoot (*Isoodon obesulus* subsp. *obesulus*) (EPBC-e; TSC-e), an endangered population of little penguins (*Sterna albifrons*) at Manly (TSC-e), an endangered population of long-nosed bandicoots (*Perameles nasuta*) at North Head (TSC-e) and the endangered inner western Sydney population of long-nosed bandicoots (TSC-e). Foxes may also pose a threat to bush-stone curlews (*Burhinus grallarius*) (TSC-e) that nest occasionally at Careel Bay and also little terns (*Sterna albifrons*) (TSC-e) and other endangered shorebirds that may nest occasionally on the northern shores of Kamay Botany Bay National Park. Fox predation will also reduce the likelihood of the successful reintroduction of native rats (*Rattus fuscipes*) and displacement of exotic rats in Sydney Harbour National Park, a joint project with The University of Sydney.

There are no major agricultural impacts of foxes in Metro North East Region; however, there are occasions when foxes cause significant impact to the core business of some park neighbours, for example harm to captive populations of study animals at the University of NSW's field studies centre in Marramarra Nature Reserve. Foxes occasionally cause nuisance in urban areas and are at times a cause for complaint or enquiry from urban residents across the Region.

Priorities for control

Kuring-gai Chase and Garigal national parks have been identified as priority sites in the NSW Fox TAP for the conservation of the endangered southern brown bandicoot (EPBC-e; TSC-e). Fox control is also a priority under the recovery plan and the Priorities Action Statement (PAS) for the species. Southern brown bandicoots are distributed patchily through Ku-ring-gai Chase and Garigal national parks and, despite their low numbers, these populations are important for the species' survival in NSW. Garigal National Park is a treatment site and Ku-ring-gai Chase National Park is a non-treatment site under the Fox TAP.

North Head, including Manly, is a priority site for the conservation of an endangered population of little penguins (*Eudypyula minor*) (TSC-e) and an endangered population of long-nosed bandicoots (TSC-e) under the Fox TAP and respective recovery plans and PAS.

Fox predation in conjunction with domestic dog and cat predation, habitat loss and road mortality has been identified as a key threat to the small, fragmented and disjunct inner west population of long-nosed bandicoots, declared an endangered population under the TSC Act. Should long-nosed bandicoots be confirmed in Wollie Creek National Park the addition of the site to the Fox TAP and introduction of fox control will be given due consideration.

While PAS actions for the eastern bentwing-bat include fox control, there is no quantifiable evidence that fox predation has a significant effect on roosting bats in the Region at this time; bat roosts in Sydney Harbour north, Kamay Botany Bay National Park and at Malabar Headland should be monitored and reactive fox control implemented where predation becomes evident.

Similarly, the foreshores and headlands of Kamay Botany Bay National Park should be monitored during breeding season for nesting little terns or pied oystercatchers (*Haematopus longirostris*) (TSC-e) and reactive fox control implemented if these threatened shorebirds are observed nesting. In these and any arising scenarios where foxes are preying upon threatened species fox control should only be implemented in consultation with the pest management officer and Fox TAP coordinator.

The University of Sydney, in conjunction with NPWS, reintroduced native rats (*Rattus fuscipes*) to Sydney Harbour National Park north in August 2011. Fox control will be

undertaken as a priority in Sydney Harbour National Park north to mitigate the effects of predation and promote best chance of success for native rats to re-establish; this project will be reassessed annually.

The Sydney North Regional Fox Control Program is a cross-tenure multiagency program that aims to reduce fox numbers across the landscape of northern Sydney to protect common species becoming uncommon in urban bushland and to create a buffer zone around Fox TAP sites. NPWS has invested over 10 years of fox control in Lane Cove National Park and Sydney Harbour National Park, with anecdotal evidence suggesting benefits to long-nosed bandicoots, swamp wallabies and ground dwelling birds. This program will continue as a medium priority.

Where foxes cause complaint from urban landholders and park neighbours consideration may be given to control of nuisance foxes by cage trapping or den fumigation, especially if this can be undertaken in association with neighbouring agencies. Advice on how to limit risk and discourage foxes will be provided. However, it must be acknowledged that foxes occur across the urban landscape and that NPWS has no statutory obligation to control them beyond the sites identified in the Fox TAP.

Control

Control at each Fox TAP site will be as per approved site management plans. Principle methods of control at the Garigal and North Head Fox TAP sites are intensive broad-area 1080 ground baiting, including the use of ejectors. Secondary methods, including ground shooting, den fumigation and cage trapping, will be employed as per site plans. The use of scent detection dogs to locate foxes and their dens may also be employed. The use of Para-aminopropiophenone (PAPP) will be given due consideration should it become available. 1080 and PAPP for the control of foxes in the Region have been assessed and are used in accordance with a NPWS conservation risk assessment and relevant pesticide control order.

Monitoring

The impact of fox predation on southern brown bandicoots and the effectiveness of the control program are being assessed through long-term monitoring of southern brown bandicoot and fox populations. Bandicoot populations are measured annually in spring via cage trapping and annual camera monitoring in autumn. Fox and other medium-sized mammal populations are measured biannually via track counts on sand-pads in May and November. Data will be entered into the PWIS and analysed by the Pest and Ecological Management Unit and published periodically as part of the review of the Fox TAP.

Long-nosed bandicoots and little penguins are subject to annual monitoring under their respective recovery plans. A mortality register is kept for both species and cause of death investigated. Fox activity at North Head is monitored quarterly via track counts on sand-pads. Data is analysed by Harbour North Area and threatened species officers of the biodiversity conservation section of the OEH.

Native bush rat survival rates and exotic rat displacement in Sydney Harbour National Park are being monitored and have been analysed by Sydney University students in 2012.

Monitoring data collected under these systematic monitoring programs will be submitted into the Biological Survey Subsystem of the Wildlife Atlas.

Rabbit (*Oryctolagus cuniculus*)

Distribution and abundance

Rabbits are found in most habitats throughout Australia below the tropic of Capricorn. The rabbit is considered one of the fastest colonising mammals in the world and can achieve high densities in some agricultural and urban areas.

Rabbits are common across the Region, generally as scattered populations in areas of high protein grass availability. Rabbits are able to breed year round in Sydney due to usually good rainfall and resultant high protein grass, and because of this they are most evident in and adjacent to cleared areas such as picnic areas in national parks and on bushland edges. Their numbers fluctuate in response to conditions (peaking in spring and summer) and also to outbreaks of naturally occurring myxomatosis (usually annually in February–March). Rabbits are also highly mobile and will disperse and colonise new areas when conditions are favourable.

Impacts

Rabbits are one of Australia's major agricultural pests and the feral European rabbit is a declared pest animal under the RLP Act; its control is the responsibility of the land manager. In the Region agricultural and economic impacts are minimal but rabbits do cause nuisance on lifestyle properties and to small businesses (rural and urban) and in some suburban neighbourhoods.

Competition and grazing by the feral European rabbit has been listed as a KTP under the TSC Act.

Control of the domestic rabbit is not covered under legislation. However, the impacts of feral domestic rabbits will be considered the same as those of the feral European rabbit and they will be subject to control on parks estate in the Region. Domestic rabbits interbreed with feral European rabbits, impact the environment, and there may be implications for their control, for example vaccination and immunity against RHDV.

Rabbits have significant impacts on native vegetation. Selective grazing and browsing of more palatable species leads to changes in species composition and habitat structure even at low rabbit densities. Rabbits can prevent the regeneration of impacted species through consumption of seed and seedlings; this is often worse in bushland regenerating after fire. Their digging scratches out seedlings and damages root systems, which can lead to a decline in native species and an increase in soil erosion and degradation.

Native fauna may be impacted by rabbits through competition for food and shelter. Where topography and geology are not favourable for rabbits to construct warrens, such as in Sydney sandstone, rabbits occupy above-ground harbour, such as tussock grasses and low-growing shrubs, fallen timber, hollows and rock overhangs. Ground-dwelling species, such as the long-nosed bandicoot and the endangered southern brown bandicoot, may be displaced. Rabbits can also provide a food source for cats and foxes, maintaining high numbers of these introduced predators, which in turn impact native prey species.

Damage caused by rabbits digging and the visual presence of rabbits in public open space reduces the amenity and recreational values of these areas. These impacts are often cause for complaint from park neighbours and include damage to residential gardens, footpaths and road verges, suburban parks, sports fields and golf courses, and to picnic areas in national parks. Rabbits can also cause damage to Aboriginal and European cultural heritages sites and precincts and undermine

buildings. They are prevalent in local cemeteries, and rabbit populations in Kamay Botany Bay and Sydney Harbour national parks and at Barrenjoey Headland in Ku-ring-gai Chase National Park have the potential to cause damage to cultural heritage sites of state significance.

Priorities for control

Rabbit density and distribution and, therefore, their level of impact and priorities for control can be expected to fluctuate over time across the Region; monitoring of the impact to assets followed by an assessment of the suitability of traditional control techniques and feasibility of success must be considered before implementing any control actions.

Where rabbits are found to be significantly impacting upon threatened flora, EECs or European or Aboriginal cultural heritage of high significance, their localised control will be given priority. Sites include North Head (EECs and European cultural heritage), Barrenjoey Headland lighthouse precinct (European cultural heritage), and the Kamay Botany Bay cemetery and repatriation site (Aboriginal and European cultural heritage). In Dalrymple–Hay Nature Reserve, rabbits are generally confined to the modified grass edges and APZs, but have the potential to impact upon Blue Gum High Forest EEC; if their numbers become high or if the EEC is regenerating after disturbance, control will be undertaken as a preventative measure to keep rabbit numbers low.

Under the RLP Act, when conditions lead to an overabundance of rabbits at a specific site that exceeds the threshold determined by Cumberland LHPA (a score of 50 or greater out of 100 when applying the rabbit density index), control will be given priority until numbers are reduced to a tolerable level.

Where rabbits are having a significant impact upon park amenity and recreational values, rabbit control will be undertaken subject to feasibility of success to maintain rabbit numbers and impacts to low levels. Specific sites include picnic areas and public open space in Lane Cove National Park, Bradleys and Middle Head in Sydney Harbour National Park, and the Bobbin Head picnic area and Kalkari Discovery Centre in Ku-ring-gai Chase National Park.

Rabbits on park boundaries or causing nuisance to neighbours will be prioritised according to impact and density (which can be expected to fluctuate over time) and also feasibility of success, including potential for collaborative cross-tenure control necessary for success. The Urban Feral Animal Action Group (Sydney North), of which Metro North East Region is a member, coordinates strategic rabbit control including Region-wide RHDV releases by land management agencies; south of the harbour rabbit control will be coordinated directly with neighbouring land management agencies and stakeholders. Control where rabbits occur across tenures without collaboration will become a low priority. Rabbits are the responsibility of individual landholders and control becomes a statutory requirement when numbers are high; control options are limited on park interfaces in urban areas and for suburban residential landholders and urban councils.

Control

Effective control of feral rabbits requires an integrated approach using several complementary control techniques. In the Region, the main control techniques are Pindone carrot baiting where rabbit density is high, shooting in open areas, harbour removal where harbour comprises weed species, and when specific conditions are met the release of RHDV. Techniques are often timed to take advantage of the naturally occurring biological control myxomatosis. Cage trapping and humane euthanasia may be employed if feasible in areas where a risk assessment excludes

other methods. The difficulty of rabbit control in suburban neighbourhoods (where the application of traditional control techniques is often difficult or impossible) must be acknowledged. Public education campaigns are carried out as a tool for prevention, particularly in relation to the dumping of domestic rabbits, and in response to requests for control by the community.

Monitoring

Rabbit abundance and impact must be measured to determine the need for, and response to, control in the short term and over time. Abundance can be measured using the Cumberland LHPA daytime rabbit density index (based upon daytime observations of scats and signs) or night spotlight counts. Records are kept at the Area level using AMS and PWIS and will be subject to periodic analysis by rangers or the pest management officer.

Where rabbits are impacting on threatened species or EECs, consideration will be given to monitoring vegetation recovery by photopoints, transects or quadrats.

Cat (*Felis catus*)

Distribution and abundance

Cats have been present in Australia at least since European settlement, and may have been introduced as early as the 17th century. They are widespread and occur in most habitats across Australia. There are estimated to be 400,000 feral cats in NSW and around 12 million in Australia. Local abundance is thought to be determined by the availability of food and shelter.

Cats are categorised in three ways: feral, stray and domestic, and individual cats can move between categories. Feral cats occur throughout the Region, in urban and industrial areas and bushland reserves, although their abundance is unknown. Stray and roaming domestic cats also cause impact in bushland in proximity to the urban and rural interface.

Impacts

Predation by feral cats is listed as a KTP under the TSC Act. While cats prey on exotic rats and rabbits, in bushland reserves they prey mainly on native species. Cats have caused the extinction of some species on islands and are thought to have contributed to the extinction of many ground-dwelling birds and mammals on the mainland. Common and declared threatened native fauna, in particular small mammals, reptiles, amphibians and ground-nesting birds in Metro North East Region are likely to be impacted upon by predation by cats. Predation by cats (also dogs and foxes) is identified as a threat in the Southern Brown Bandicoot Recovery Plan and PAS. Feral cats can compete with native predators such as quolls for food, but may be suppressed by predation and competition by foxes and wild dogs. Feral cats can transfer diseases and parasites, including toxoplasmosis and sarcosporidiosis, to native fauna, domestic animals and humans. Local wildlife carers report that many native animals, primarily juvenile ringtail possums that have been superficially injured in an attack by a cat may not recover because of transfer of infectious diseases. (This is also partially attributable to poor tolerance to antibiotics in juvenile ringtail possums.)

Priorities for control

At Fox TAP sites where there is the potential for meso-predator release (an increase in cats as a result of a decrease in foxes), cat control will be considered as a

secondary control program. Specifically, when cats, signs, scats or evidence of cat predation occurs in areas of known southern brown bandicoot habitat, or in proximity to the North Head long-nosed bandicoot endangered population or little penguin habitat, reactive trapping or shooting programs will be implemented. Where these and other threatened species and populations or critical habitat occur in close proximity to the urban interface public education on the impacts of domestic cats will be undertaken.

Where cats are causing a nuisance to people, or impacting upon the amenity of an area, for example a campground or picnic area, a reactive trapping program will be considered. A localised community education campaign should be undertaken in conjunction with control if relevant.

Control

Control of cats can be difficult due to a lack of effective broad-scale control techniques. Control will primarily be by cage trapping or, if applicable, by soft jaw trapping or by strategic ground shooting programs in suitable open space. Captured animals will be humanly euthanised, generally by lethal injection by a veterinarian. Captured domestic cats will be surrendered to a veterinarian or animal shelter to be scanned for microchip identification and may be returned to their owners, upon which a written warning or fine should ensue. Public education campaigns should be carried out as a tool for prevention, and in response to requests for control by the community.

Monitoring

Monitoring of feral cat abundance is extremely difficult. Sandplots used to determine fox presence do not effectively determine feral cat abundance. However, cat scats or prints noted during fox monitoring or other works can be used to determine cat presence in priority locations and thus trigger control at specific sites.

The number of cats controlled in relation to specific locations and impacts including threatened fauna population locations or habitat will be recorded in the PWIS.

No specific monitoring of fauna response to cat predation is planned.

Bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata*) and boneseed (*Chrysanthemoides monilifera* subsp. *monilifera*)

Distribution and abundance

Bitou bush has invaded over 80% of the NSW coastline and has the potential to spread further into coastal areas of Queensland and Victoria. Boneseed currently occurs in coastal and inland areas in NSW and in other states, and has the potential to spread across large areas of NSW and southern Australia.

In the Region bitou bush occurs in each of the coastal parks and boneseed occurs as scattered infestations in coastal parks and to the west in Ku-ring-gai Chase National Park, Berowra Valley National Park, Berowra Valley Regional Park and Lane Cove National Park. Boneseed has successfully been suppressed at some locations in recent years including the West Head peninsula in Ku-ring-gai Chase National Park.

Impacts

The species significantly impacts upon biodiversity in NSW and has been listed as a KTP under the TSC Act and a TAP and PAS are being implemented. Bitou bush and

boneseed are jointly considered a WoNS. Bitou bush is widespread and is listed as Control Class 3 in the Region; boneseed because it has not yet reached its full potential in NSW has been listed as Class 2 requiring a program for eradication. Both weeds are considered as high priority weeds by the SWC.

Bitou bush and boneseed are highly invasive and have potential to spread beyond their current distribution – this is particularly true of boneseed. They are fast growing and produce large amounts of seed. Bitou bush and boneseed invade native bushland and form dense thickets that smother native plants and prevent regeneration. They alter habitat and displace native food sources for native birds and provide a food source for pest animals such as foxes and Indian mynas.

Bitou bush degrades coastal environments valued for recreation and can restrict public access to beaches, dunes and trails.

Priorities for control

The Bitou Bush TAP identifies and prioritises sites for control and these priorities have been incorporated in the BPWW database. TAP Priority 1 sites include Lion Island, Barrenjoey Headland and Cape Banks for the conservation of Themeda Grasslands on Coastal Sea Cliffs and Headlands EEC (TSC-e) and Jennifer Street, Kamay Botany Bay National Park, for Eastern Suburbs Banksia Scrub EEC (EPBC-e, TSC-e). Bitou bush control in other zones rich in Eastern Suburbs Banksia Scrub or other EECs within Kamay Botany Bay National Park and the newly gazetted national park at Malabar Headland has also been assessed under BPWW and the regional pest management strategy as a critical priority (C-TSC). The full list of Metro North East Region priorities is given in section 4.

Boneseed will be subject to a local eradication or containment program. In recent years, boneseed is believed to have been eradicated from the West Head peninsula in Ku-ring-gai Chase National Park and a program is in place for its containment in the Mount Colah, Mount Kuring-gai vicinity of Ku-ring-gai Chase National Park and Berowra Valley National Park and Regional Park in association with Hornsby Council and Hawkesbury–Nepean CMA. Eradication is also feasible in Lane Cove National Park. Containment in Sydney Harbour National Park (north and south) is also a critical priority (C-NE) but in some locations control and consequently eradication will be less feasible because of difficult terrain (sea cliffs).

Control

Control at priority sites will be subject to a staged approach as outlined in Bitou Bush TAP site-specific plans. The staged approach follows a principle of working within the EEC (or other asset) as stage 1 and then creating a bitou bush-free buffer zone around the priority asset. Control programs also consider the treatment of associated and successive invasion of other weed species including lantana, asparagus fern, turkey rhubarb and exotic grasses. Works in Kamay Botany Bay National Park are also carried out in accordance with the Botany Bay National Park Bitou Bush Management Plan which defines precincts for control.

Control involves multiple integrated techniques, including hand removal, herbicide application by cut and paint and ground spraying, including by splatter gun and aerial spraying (spot and boom). Two biological control agents have established in the Region – tip moth (*Comostolopsis germana*) and seed fly (*Mesoclanis polana*) – and an area of monoculture bitou bush on disturbed lands within Kamay Botany Bay National Park is being managed by DPI in association with NPWS as a national nursery for bitou bush biological controls including the leaf-rolling moth (*Tortrix* spp.).

Monitoring

Monitoring requirements are defined in site plans and monitoring techniques will be employed in accordance with the monitoring manual for bitou bush control and native plant recovery, and may include transects, quadrats or photographic points. Bitou bush density and distribution at TAP priority sites has been mapped, and maps will be updated periodically. As a minimum, before and after photographs from set points should be collected to document the response of native vegetation to bitou bush removal.

Boneseed distribution will be collected and recorded as waypoints and held in PWIS and mapped. Known sites, including sites where boneseed is believed extinct, will be subject to presence/absence monitoring annually between July and October when the plant is generally in flower.

AMS will be used to record works undertaken at specific sites.

Lantana (*Lantana camara*)

Distribution and abundance

There are 29 morphologically defined variants of *Lantana camara* generally accepted to be naturalised in Australia and new forms may be evolving. Lantana is widespread along the east coast of Australia and has potential for further spread. It is widespread across the Region, but its habit, vigour and impact vary according to its location.

Impacts

Lantana is considered to be one of the 10 worst weeds worldwide. It is a WoNS, and has been listed as a KTP under the TSC Act. The National Lantana Management Group developed the Plan to Protect Environmental Assets from Lantana⁴ which established national conservation priorities for the control of lantana, including identifying species, populations and ecological communities most at risk from invasion by lantana. In addition to its impacts on biodiversity, lantana has significant and costly impacts on agriculture and commercial forestry. The councils of the SWC have listed lantana as a Control Class 4 weed under the NW Act, and it is a priority weed for control.

Lantana readily invades bushland, especially in disturbed areas. It has an impact on a large number of native species and communities, including species, populations and ecological communities listed as threatened under the EPBC Act and TSC Act. It is fast growing and readily spread by birds, and the fruit is also attractive to foxes. It forms dense thickets that smother native vegetation, dominate understoreys and prevent regeneration. It has an allelopathic effect (it is toxic to other plants), preventing their germination and growth. It may change soil microhabitat through shading and self-mulching, alter water and nutrient balances, and affect soil invertebrates and microorganisms. It can increase the intensity of wildfires and, conversely, be difficult to ignite during hazard reduction burns, or can suppress low intensity burns. It can impede access to tracks and trails or infrastructure. It also impacts upon the amenity of picnic and scenic areas and sites of Aboriginal and European cultural significance and can cause damage to these sites.

It should be noted that lantana has limited benefits: it provides habitat, particularly to small birds, ground-dwelling birds and small mammals, and insects (native butterflies and bees) and may also act as a buffer, preventing invasion by other weeds.

⁴ http://www.weeds.org.au/WoNS/lantana/docs/Lantana_Plan_Final_low_res.pdf

Priorities for control

The Plan to Protect Environmental Assets from Lantana 2010 lists priority species, populations and ecological communities for control. In NSW, site priorities from the plan have been incorporated into BPWW Biodiversity Priorities for Widespread Weeds⁵, and Metro North East Region priorities are listed in section 4. Priority species and endangered ecological communities identified in the Region are: *Acacia terminalis* subsp. *terminalis* (EPBC-e, TSC-e), *Allocasuarina portuensis*, (EPBC-e, TSC-e); *Olearia cordata* (EPBC-v, TSC-v), *Zieria involucrate* (EPBC-v, TSC-e) *Pimelea curviflora* var. *curviflora* (TSC-v) and *Grevillea caleyi* (TSC-e), Blue Gum High Forest EEC (EPBC-ce, TSC-e), Coastal Saltmarsh EEC (TSC-e), Duffys Forest Ecological Community EEC (TSC-e), Eastern Suburbs Banksia Scrub EEC (EPBC-e, TSC-e), Freshwater wetlands EEC (TSC-e), Littoral Rainforest EEC (EPBC-ce, TSC-e), Wagstaff and Pittwater Spotted Gum Forest EEC (TSC-e), Swamp Oak Floodplain Forest EEC (TSC-e), Sydney Turpentine Ironbark Forest EEC (EPBC-ce, TSC-e), Themeda Grasslands on Sea Cliffs and Coastal Headlands EEC(TSC-e).

Because of its climbing habit lantana (as well as other vines and scramblers) has the potential to negatively impact microbat foraging and roosting including over winter roosts of *Miniopterus schreibersii oceanensis* eastern bentwing-bat (TSC-v). Where roost sites are known, flight paths should be kept clear of all weeds.

Lantana is generally predominant among the weeds that impact European and Aboriginal cultural heritage sites. Because of its quick growing and aggressive habit, cultural heritage sites of significance should generally be kept clear of lantana. Where appropriate, site management plans for cultural heritage sites should be referred to for specific management actions. Because most cultural heritage sites require both weeds and native vegetation to be modified or cleared from structures, most cultural heritage sites are not considered in relation to strategic weed control programs, but are managed and accounted for in AMS as cultural heritage assets requiring maintenance, including vegetation removal. There are exceptions where weeds are the primary impact, and these strategic weed control actions are provided in brief in section 4. Lantana or other weed growth that limits public access to sensitive cultural heritage sites may be considered advantageous.

Control

Similarly to Bitou Bush TAP and Fox TAP sites, control at priority sites identified under the lantana plan and BPWW must be carried out in accordance with a site specific management plan that follows a staged approach to control.

Control is dependent on the situation and size of the infestation and integrated control techniques yield the best results. Control may consist of hand removal or herbicide application by the cut and paint method where small areas or scattered plants are to be treated, including gradual or mosaic clearing of large infestations. Herbicide application using a hand-held sprayer, splatter gun or vehicle-mounted spray equipment can be used for larger infestations, and aerial spraying (spot and boom) may be considered in some scenarios. Where access and negligible off-target effects permit removal by mechanical means, techniques like slashing or grubbing out have proved to be a cost-effective method. Fire can be a useful tool, although dense lantana will require pre-burn herbicide treatment; fire can also allow a window of opportunity for the control of lantana but this weed readily regenerates and colonises after fire. A number of naturally occurring biological control agents occur

⁵ <http://www.environment.nsw.gov.au/cmaweeds/index.htm>

across the Region; the most recently introduced lantana rust has had limited success establishing but is present in Dalrymple-Hay Nature Reserve.

As a minimum, annual follow-up for three to five years is essential for success, and control should not be implemented without resources for follow-up. Control must also consider successive weed invasion by other species.

Monitoring

Where lantana control is undertaken at sites identified as a critical priority, monitoring will be undertaken in accordance with guidelines outlined in the monitoring manual for bitou bush control and native plant recovery. This may include mapping the density and distribution of lantana over time to determine effectiveness of control, photographic records from fixed photopoints of lantana removal and native vegetation response, and transect or quadrat measurements of the response of native vegetation to control. Data will be recorded in PWIS.

Where lantana is controlled to protect cultural heritage, a written and photographic record of works undertaken and site condition over time should be kept.

AMS will be used to record works undertaken against specific sites.

Exotic perennial grasses

As defined in the KTPs, exotic perennial grasses including *Cenchrus ciliaris* (buffel grass), *Hyparrhenia hirta* (Coolatai grass), *Eragrostis curvula* (African lovegrass), *Nassella neesiana* (Chilean needlegrass) and *Nassella trichotoma* (serrated tussock) invade and may dominate native plant communities competing with, and displacing, many native species. Other perennial grasses that invade smaller areas of native plant communities include browntop bent (*Agrostis capillaris*), whisky grass (*Andropogon virginicus*), Rhodes grass (*Chloris gayana*), pampas grasses (*Cortaderia* spp.), panic veldgrass (*Ehrharta erecta*), molasses grass (*Melinis minutiflora*), torpedo grass (*Panicum repens*), vasey grass (*Paspalum urvillei*), kikuyu (*Pennisetum clandestinum*), phalaris (*Phalaris aquatica*), South African pigeon grass (*Setaria sphacelata*), giant Parramatta grass (*Sporobolus fertilis*), giant rats tail grass (*Sporobolus natalensis*) and *Urochloa mutica* (para grass). Other exotic perennial grasses not specified may, or have the potential to, adversely affect native plant communities and native species.

In the Region the latter include, but are not limited to, carpet grass (*Axonopus* spp.), giant reed (*Arundo donax*), Mossman River grass (*Cenchrus echinatus*), tussock paspalum (*Paspalum quadrifarium*), African feather grass (*Pennisetum macrourum*), fountain grass (*Pennisetum setaceum*), Columbus grass (*Sorghum x alpinum*), Johnson grass (*Sorghum halepense*) and buffalo grass (*Stenotaphrum secundatum*).

Distribution and abundance

Exotic perennial grasses, whether deliberately or accidentally introduced, have naturalised across much of Australia and many species can be found in all reserves in the Region. Most have the potential to increase their distribution and/or abundance.

In general, exotic grasses in the Region proliferate in disturbed areas and edges, such as road verges and track heads, or around infrastructure including utilities, but many of these species have invaded or are capable of invading otherwise undisturbed bush.

Impacts

Exotic perennial grasses have been listed as a KTP under the TSC Act, and many of the grasses listed here are declared noxious at the state or local level. Many species can limit the productivity of pasture as they readily invade but are unpalatable to stock; however, their impact upon primary production in the Region is limited.

Exotic grasses are primarily of concern in the Region because of their impact on biodiversity. They can invade and dominate native plant communities or outcompete and displace native plant species. Exotic grasses impact on a number of EECs in the Region. Perennial grasses are generally characterised by fast growth, prolific seed production and effective seed dispersal, and if uncontrolled are able to form dense monocultures. Exotic grasses can change the fuel load in plant communities, and some species can significantly increase flammability, for example tall tussock grasses like Coolatai grass that retain dead foliage. Such impacts may result in adverse effects on native fauna including invertebrates. In addition, many exotic tussock grasses provide harbour for rabbits and exotic mice (*Mus musculus*) on bushland verges, and some exotic grasses provide a high protein food source that promotes rabbit reproduction. Many grasses have positive impacts as soil stabilisers and, in some situations, measures must be implemented to prevent erosion when undertaking control.

Control priorities

Where grasses impact upon an EEC they should be given priority for control; this is particularly critical when a vegetation community is distinguished by its grass or ground layer. Generally, grass weeds at priority sites for the conservation of high value biodiversity occur as secondary weeds, and their control is part of a staged approach dictated by a site plan. The control of kikuyu in Themeda Grasslands on Coastal Sea Cliffs and Headlands at the Cape Banks Bitou Bush TAP site is an example. In Metro North East Region exotic grasses are also identified as a threat to the floristic diversity of these EECs: Blue Gum High Forest (EPBC-ce, TSC-e), Coastal Saltmarsh (TSC-e), Duffys Forest Ecological Community (TSC-e), Eastern Suburbs Banksia Scrub (EPBC-e, TSC-e), Freshwater Wetlands (TSC-e), Pittwater Spotted Gum Forest (TSC-e), Swamp Oak Floodplain Forest (TSC-e), Sydney Turpentine Ironbark Forest (EPBC-ce, TSC-e).

Widespread grasses like African lovegrass and whisky grass have been identified as impacting threatened species that grow in the immediate vicinity of tracks and trails, including *Acacia bynoeana* (EPBC-v, TSC-e), *Darwinia biflora* (EPBC-v, TSC-v), *Epacris crassifolia* ROTAP, *Genoplesium baueri* ROTAP, *Lasiopetalum joyceae* (EPBC-v, TSC-v), *Persoonia hirsuta* (TSC-e) and *Tetraglochin glandulosa* (EPBC-v, TSC-v).

Specific sites in the Region are listed in section 4 and identified as a critical priority (C-TSC).

The control of new incursions of listed or alert species, whether new to the state, region or reserve, will become a critical priority (C-NE) upon detection to prevent establishment and spread, subject to a risk assessment for feasibility of success.

Grasses in particular are most likely to be spread by the movement of vehicles, machinery and people as many have seeds that stick. The prevention of weed seed spread by vehicle and human hygiene and inspection and treatment or refusal of contaminated materials (including soil and crushed sandstone for track and trail maintenance, plant stock and mulch for landscaping on NPWS estate) is NPWS policy and routine procedure.

Where widespread grass species occur in isolation they will be subject to targeted control as a medium priority (M-II) to prevent spread and loss of biodiversity or other impact. Coolatai grass is currently limited in distribution to edges and road verges, and resources and effort are being invested to prevent its spread into new areas or penetration into good bush. Northern Beaches Area staff undertake control programs targeting Mossman River grass on headlands and beaches in Ku-ring-gai Chase National Park, including within or adjacent to Themeda Grassland on Seacliffs and Coastal Headlands EEC (TSC-e) to contain and reduce the impact of this weed, which is relatively new to the Sydney basin. Tussock paspalum has been subject to strategic targeted control across northern Sydney, particularly along arterial roads, tracks and trails in association with SWC; in recent years its distribution and the density of core infestations have been significantly reduced. The gains achieved in the control of these grasses should be capitalised upon and a continued targeted spray program or control at specific identified locations within reserves endorsed generally as a medium priority. The control of pampas grass (under a previous SWC group project) in Ku-ring-gai Chase National Park, Sydney Harbour National Park and Kamay Botany Bay National Park should also be continued to maintain past investment, especially where pampas grass grows in undisturbed bush in isolation from other weeds. Ku-ring-gai Chase is given priority for pampas grass control over other northern Sydney national parks because of its listing on the National Heritage Register for its wildflowers and waterways. This bias should also be applied to nature reserves and islands.

Control

Coordinated, consistent and timely control is needed in order to effectively control exotic perennial grasses. Control is most effective when the target grass is actively growing and ideally should be undertaken before seed is set. Control can be extremely difficult as some species set seed very rapidly (every six weeks), and in Sydney many species are able to grow and set seed year round. Timely control is the key to preventing the establishment of new infestations.

In general, physical removal is very effective at eradicating small and isolated clumps before they seed or when working in areas where native grasses or herbs dominate. Herbicide spot spraying is generally effective but care must be taken to avoid non-target native grasses which are generally highly susceptible to glyphosate, and follow-up control or other measures (such as mulching, planting) may be required as grasses will readily recolonise bare ground. Shading and outcompeting grasses by encouraging regeneration or by planting ground, shrub and canopy layer species can be used to good effect and is sometimes the only effective methodology on disturbed sites. Mowing, slashing or burning is often advantageous prior to spraying to remove dead foliage that may prevent herbicide from contacting new growth.

Soil, seed and vegetative matter should be removed from people, vehicles and plant when moving out of infested areas by washing, brushing or blowing (with compressed air) to prevent further spread; this is especially important when controlling new, small and isolated infestations. Control of grasses generally requires ongoing effort and control should not be implemented without an assessment of feasibility of success and adequate resources for follow-up.

Regular spraying of tracks and trails is undertaken as part of routine park maintenance programs and does serve to limit further spread, protect biodiversity and maintain park amenity.

Monitoring

New incursions should be recorded (GPS waypoints) and specific species that are subject to targeted control or controlled in association with other agencies as part of SWC Weed Action Program are periodically surveyed for and mapped, especially where they occur along major arterial roads or identified corridors; periodic updates are used to ascertain changes in distribution and measure response to control. Opportunistic and targeted surveying of internal tracks and trails and hot spots for new weed grass incursions is undertaken by staff while undertaking grass spraying or other routine duties. In this way new incursions or significant changes in distribution can be noted and control can be prioritised. Specific location data may be recorded in PWIS, and AMS will be used to record and report on grass control, including routine maintenance spraying.

Exotic vines and scramblers

As defined in the KTPs, exotic vines and scramblers include crabs-eye creeper (*Abrus precatorius*), turkey rhubarb or potato vine (*Acetosa sagittata*), Madeira vine (*Anredera cordifolia*), moth vine (*Araujia sericifera*), Dutchman's pipe (*Aristolochia elegans* and *Aristolochia littoralis*), ground asparagus (*Asparagus aethiopicus*), climbing asparagus fern (*Asparagus africanus*), bridal creeper (*Asparagus asparagoides*), climbing asparagus (*Asparagus plumosus*), climbing asparagus (*Asparagus scandens*), *Asystasia gangetica* var. *Micrantha*, mysore thorn (*Caesalpinia decapetala*), balloon vine (*Cardiospermum grandiflorum*), old man's beard (*Clematis vitalba*), Cape ivy (*Delairea odorata*), aerial yam (*Dioscorea bulbifera*), dipogon or dolichos pea (*Dipogon lignosus*), English ivy (*Hedera helix*), moon flower (*Ipomoea alba*), coastal morning glory (*Ipomoea cairica*), morning glory (*Ipomoea indica* and *Ipomoea purpurea*), *Lathyrus tingitanus*, Japanese honeysuckle (*Lonicera japonica*), cat's claw (*Macfadyena unguis-cati*), corky passion flower (*Passiflora suberosa*), passion flower (*Passiflora subpeltata*), *Passiflora toriminiana*, kudzu (*Puearia lobata*), *Senecio angulatus*, *Senecio macroglossus*, potato vine (*Solanum jasminoides*), climbing nightshade (*Solanum seaforthianum*), *Sollya heterophylla*, black-eyed Susan (*Thunbergia alata*), blue trumpet vine (*Thunbergia grandiflora*), tradescantia (*Tradescantia fluminensis*), periwinkle (*Vinca major*).

The majority of these species were originally introduced for horticultural purposes and have escaped from cultivation. Other horticultural vines may currently be environmental weeds at particular locations and other species currently in cultivation may become weeds in the future.

In Metro North East Region these include, but are not limited to, blackberry (*Rubus fruticosus* agg.), pampas lily of the valley (*Salpichroa organifolia*) and Cape honeysuckle (*Techoma capensis*).

Distribution and abundance

Exotic vines and scramblers are widespread and locally abundant in the eastern part of NSW.

They occur across the Region, particularly on disturbed edges and in riparian zones, but some such as the asparagus species have invaded otherwise undisturbed bushland. Many have the potential to increase their distribution and abundance and some species not yet naturalised in the Region have the potential to become established.

Impacts

Invasion and establishment of exotic vines and scramblers has been listed as a KTP under the TSC Act and many of the species listed here have been declared noxious under the NW Act at the state or local level. Bridal creeper and blackberry are WoNSs (stage 2) and the asparagus group are now listed as new WoNSs (stage 1). Vines and scramblers impact upon a number of EECs and threatened species in the Region.

Exotic vines and scramblers can smother native vegetation on the ground or in the shrub layer and canopy, and if uncontrolled can dominate and significantly alter the health and composition of native plant communities. Where they form a dense cover, exotic vines and scramblers suppress native plant vigour, growth and seed germination. The weight of exotic vines in a canopy can cause branches to break and in severe situations total canopy collapse. They can alter light levels and promote a more humid microclimate, affecting soil biota and plant-dwelling invertebrates, altering soil moisture and nutrient levels, and favouring pathogens. As many vines and scramblers have a mesic effect they can alter fire behaviour and fire regimes, especially in sclerophyll communities. Exotic vines and scramblers can affect fauna, including threatened species, by restricting the movement of some species, damaging or restricting access to habitat trees and providing favourable habitat for others. They can also overrun, damage or restrict access to cultural heritage sites or infrastructure or impede recreational and amenity values.

Priorities for control

Where vines and scramblers individually or as suites of weeds impact upon an EEC or threatened species they should be given priority for control. Specific sites in Metro North East Region are listed in section 4 and identified as priority C-TSC.

Vine control is particularly critical when a vegetation community is distinguished by its canopy. Riparian EECs especially prone to invasion and establishment of climbers and scramblers include Blue Gum High Forest (EPBC-ce, TSC-e), Coastal Saltmarsh (TSC-e), Duffys Forest Ecological Community (TSC-e), Littoral Rainforest (TSC-e), Wagstaff and Pittwater Spotted Gum Forest (TSC-e), Swamp Oak Floodplain Forest (TSC-e), Swamp Sclerophyll Forest on Coastal Floodplains (TSC-e) and Sydney Turpentine Ironbark Forest EECs (EPBC-ce, TSC-e).

Asparagus fern is widespread, particularly in the east of the Region, and has significant negative impact in Coastal Saltmarsh (TSC-e), Wagstaff and Pittwater Spotted Gum Forest (TSC-e), and Littoral Rainforest EECs (EPBC-ce, TSC-e), and control is a priority in these EECs where there is feasibility of success. Turkey rhubarb is an example of a secondary weed requiring control following bitou bush removal in Themeda Grasslands EEC (TSC-e) on Lion Island as identified in the Lion Island Bitou Bush TAP site plan.

Vines and scramblers have also been identified as impacting on specific threatened species including *Darwinia biflora* (TSC-v), *Tetratheca glandulosa* (TSC-v) and *Epacris purpurascens* var. *purpurascens* (TSC-v). The majority of a formerly extensive infestation of ground asparagus has been removed at Nielsen Park as part of the program for the protection of *Allocasuarina portuensis* (EPBC-e, TSC-e).

Threatened species reliant on habitat trees that are susceptible to vine invasion on parks estate include the Hornsby endangered population of gang-gang cockatoos (TSC-e) and powerful owls (*Ninox strenua*) (TSC-v); canopy vines also negatively impact the foraging and roosting behaviour of a number of microbats including threatened species and grey-headed flying-foxes (TSC-v), and these bats in turn are important for the health of many forest trees.

The protection of flight paths, perches and tree hollows as habitat are particularly important in reserves that form wildlife corridors, such as Wollie Creek Regional Park, Lane Cove National Park, Berowra Valley National Park and Sydney Harbour National Park. At sites ranked low priority because suites of widespread weeds impact common vegetation or create weedy edges, vine weed control should be given priority over other weed control to prevent canopy damage and conserve habitat.

Any new incursions of species not currently recorded in the Region will be a critical priority (C-NE), subject to a risk/feasibility assessment, for control to prevent new weeds establishing. Staff are to be vigilant in promptly identifying and responding to new incursions. Kudzu is an example of an extremely aggressive invasive vine not yet present in the Region that has potential to establish.

Similarly, vines that may be widespread in some reserves but present only as small and isolated infestations in other reserves should be given a medium priority for control, for example corky passionfruit is reasonably established in Dalrymple-Hay Nature Reserve but control and containment is more feasible in Lane Cove National Park and Wollie Creek Regional Park.

NPWS supports the strategic targeting and general reduction in ground asparagus fern and its propagules on public and private property in the Pittwater LGA through Asparagus Fern Out community weeding days (a joint initiative of NPWS, Pittwater Council, Pittwater Natural Heritage Association, Hawkesbury–Nepean CMA and the local community). Asparagus Fern Out days are held at sites across the LGA including at NPWS C-TSC sites at Barrenjoey and Towlers Bay.

Control

Coordinated, consistent and timely control is needed in order to effectively control exotic vines and scramblers. Methodology is dependent on species and situation. Hand removal of seedlings or crowning (for example asparagus fern) is acceptable for control of small, scattered infestations, or in sensitive areas. The removal (bag and dispose) of propagules (berries, pods, aerial tubers) can be undertaken in association with other methods or as a means to slow spread if full treatment of the plant is not achievable at that time. Where vines occur in canopy they are best treated by cutting or scraping and painting with herbicide. Care should be taken not to pull vines from trees as this can cause canopy damage or disturb fauna; rather, vines should be left to die in situ. Foliar application of herbicides is useful to control mass seedlings, regrowth or as primary control, especially on ground layer species. Several herbicides are registered for use on climbers and scramblers, although timing is important (application during active growth is best practice). Bridal creeper rust fungus (*Puccinia myrsiphylli*) is available, generally effective and has been released with good effect in Wollie Creek Regional Park, Lane Cove National Park and at Davidson Picnic Area in Garigal National Park. Newly developed biological controls, including those for Madeira vine and cat's claw creeper, will be released (over the lifespan of this strategy) under trial in association with DPI.

Community education and awareness about the impacts of vines and scramblers will be achieved by participation in Weed Buster and other SWC events and targeted events like Asparagus Fern Out community weeding days in the Pittwater LGA.

Monitoring

Where the control of vines and scramblers is undertaken at sites identified as a critical priority (C-TSC), monitoring will be undertaken in accordance with guidelines outlined in the monitoring manual for bitou bush control and native plant recovery. This may include mapping the density and distribution of species or weeds over time,

photographic records from fixed photopoints or data collected from transects or quadrats. New incursions will be recorded (GPS waypoints). Site-specific data will be recorded in PWIS, and AMS will be used to record works undertaken on specific sites.

Escaped garden plants, including aquatic plants

For a list of species relevant to the Region see Appendix 3 and state and local noxious weeds lists.

Distribution and abundance

Escaped garden plants, including aquatic plants, are defined as plants that are currently or were historically used in gardens or aquaria for ornamental or utility purposes, which have formed self-sustaining populations in natural or other areas. Escaped garden plants make up 66% of the 2779 introduced plants that have become naturalised in Australia. The largest source of environmental weeds are escaped garden plants that have become invasive. Many newly naturalised or currently commercially available horticultural plants have not yet reached their invasive potential and many are likely to be advantaged by climate change.

Garden escapes constitute a high proportion of the widespread and environmental weeds across NPWS estate in the Region. Garden escapes are generally associated with urban development and infrastructure and are therefore more abundant in disturbed areas and edges, including road and trail verges, in bushland adjoining residential or rural properties or in areas of high nutrient levels such as riparian zones. While many are associated with disturbance, other species have invaded otherwise undisturbed bushland in the Region.

Aquatic weeds occur in standing, contained (dams and ponds) and open flowing waterways across the Region and may occur in isolation, but many are widespread throughout water bodies or catchments, including Wolli Creek, the Lane Cove River catchment, Middle Harbour catchment Garigal National Park, Cowan Creek catchment, Kierans Creek catchment and McCarrs Creek catchment in Ku-ring-gai Chase National Park, and Berowra Creek in Berowra Valley National Park.

Garden escape weeds may include plants native to Australia but not endemic to Sydney, inappropriately planted native species and commercially grown hybrids of native species. They may also include escaped cultural heritage plantings and wildlings.

Impacts

Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants has been declared a KTP under the TSC Act. In addition, a number of species declared as KTPs (Appendix 2), such as lantana, African olive, climbers and scramblers are also escaped garden plants. Many of the initial and newly announced WoNSs are garden escapes and many garden escapes, including aquatic weeds, have been declared noxious under the NW Act.

The primary impact of garden escape weeds in the Region is on biodiversity. Garden escapes outcompete native plant species, they displace species and cause threatened species or communities to become extinct. In NSW, introduced invasive plants have been recognised as having an adverse impact on 341 species, 14 populations and 64 ecological communities listed as threatened under the TSC Act.

Many have the potential to form monocultures if left uncontrolled. In addition to negatively impacting native plant species and vegetation associations these weeds

cause changes to ecosystem function, including habitat degradation, by altering shelter and food availability (positively and negatively) for fauna, including invertebrates.

Invasive aquatic plants can choke waterways and modify water chemistry, including nutrient concentration, pH, salinity and available oxygen, all of which may adversely affect native aquatic species.

Garden escapes and aquatic weeds can reduce the aesthetic appeal and scenic value of natural bushland and can impede passive and active recreational opportunities in bushland and public open space, including in the aquatic environment. Garden escapes readily invade disturbed, modified or built areas and can impede access and cause damage to park infrastructure and cultural heritage precincts, buildings and relics. This in turn raises the costs associated with infrastructure maintenance, including trail and cultural heritage site maintenance.

Many garden escapes alter fuel loads and affect fire behaviour and long term fire regimes. Garden escapes in APZs may impede hazard reduction but still effectively carry a wildfire. Some garden escapes (for example, tall tussock grasses commonly used in landscaping) can promote the rapid spread of fire. In general, weeds readily colonise bare areas and outcompete native species in regeneration after a fire.

It is noted that some garden escapes, including aquatic weeds, can have positive effects on individual species or ecosystems, for example as shelter or as a food source, by performing a useful ecosystem function (the aquatic weed *Egeria densa* is effective at aerating water), or a specific weed monoculture may prevent invasion by other weeds by creating a barrier effect.

Priorities for control

Where garden escapes, including aquatic weeds, individually or as suites of weeds impact upon an EEC or threatened species they are given priority for control. Specific sites in the Region are listed in section 4 and identified as priority C-TSC. When developing the BPWW, specific high priority weeds were listed for each catchment, many of which were garden escapes and included some aquatic weeds. However, submerged aquatic weeds and aquatic ecosystems were not fully represented by the BPWW process but have been captured in this regional pest management strategy. The escaped garden plants including aquatics KTP specifically mentions the following species and EECs listed under the TSC and or the EPBC Act that are also of critical concern in the Region: *Acacia terminalis* subsp. *terminalis* (TSC-e), Blue Gum High Forest (EPBC-ce, TSC-e), Eastern Suburbs Banksia Scrub (EPBC-e, TSC-e), Littoral Rainforest (TSC-e) and Swamp Sclerophyll Forest EECs (TSC-e).

Many other threatened species and EECs are identified as at risk from garden escapes in this strategy, including those identified under other KTPs.

The prevention of new and emerging weeds is a critical priority under this strategy. As the largest source of new plant species introduced into Australia is the horticultural industry (25,360 new species or 94%, 25,448 or 97% of introduced species), liaison, education and cooperation with the horticultural industry at state level by OEH and at a regional and local level via the SWC or local control authorities are of utmost importance. This may include NPWS participation in public education campaigns and liaison with park neighbours about appropriate garden plants, for example the Grow Me Instead and What Does My Garden Grow initiatives or stalls at local environmental education days, the Royal Easter Show or gardening expos. The education of staff and volunteers to be able to survey for and recognise exotic plant species is promoted in the Region, and information and recording systems are in place, including internal and external training opportunities, the circulation of weed

alerts by the pest management officer, internal communications and the introduction of the PWIS for record keeping.

The prevention of weed spread by vehicles (including boats) and human hygiene and inspection and treatment or refusal of contaminated materials including soil, and crushed sandstone for track and trail maintenance, plant stock and mulch for landscaping on NPWS estate is NPWS policy and routine procedure.

Where new infestations of highly invasive species that are not yet established in the Region or reserves are found, prompt and effective control is a critical priority (Appendix 1). This may also involve substantial effort surveying for new incursions or spread. *Heteranthera* (*Heteranthera reniformis*) is known in only one location on NPWS estate in the bat cage at Kukundi in Lane Cove National Park and its eradication from this contained location is a critical priority. *Heteranthera* has also been reported in two locations off park estate in Blackbutt Creek, a tributary of the Lane Cove River, Lane Cove National Park and in a pond that overflows into the Cockle Creek catchment in Ku-ring-gai Chase National Park. Liaison with the local control authority, Ku-ring-gai Council, and joint proactive surveying of these catchments to prevent establishment are a critical priority.

Many other aquatic weeds, such as *Ludwigia peruviana*, *L. longifolia*, *L. repens* and alligator weed, are subject to containment or asset protection control programs as a medium priority (M-II) in order to capitalise on past successes to limit spread and prevent significant negative impact to waterways by species capable of choking creeks and rivers.

Terrestrial garden escapes currently subject to similar medium priority (M-II) targeted control programs include coral trees, phoenix palms and brush box.

Garden escapes including aquatics often first occur as sleeper weeds (plants that naturalise but appear to be innocuous and then when conditions are right thrive and spread). Staff are encouraged to recognise and report this process internally and to neighbouring agencies and control authorities and target these species for timely control; a current example in the Region is evergreen ash (*Fraxinus griffithii*), a popular street tree that is now becoming a noticeable problem in open forest and woodlands. Sleeper weeds, because their eradication is unlikely, most often fall into the medium priority M-II category, meaning that target control of isolated infestations or these weeds should be targeted first in areas that are otherwise ranked low priority. In all instances control should be implemented subject to an assessment of feasibility of success.

Other examples of control programs prioritised as medium M-II isolated infestations are programs targeting suites of garden escapes occurring in isolation from other weeds and generally from other current compounding negative impact such as stormwater. These programs include relatively remote sites subject to previous disturbance, such as old house sites. These programs include relatively remote sites subject to previous disturbance, such as old house sites. Small and isolated weed infestations in reserves afforded higher conservation status and generally lower levels of disturbance, such as Muogamarra Nature Reserve or Ku-ring-gai Chase National Park (because it is listed on the National Heritage Register) are also included here.

Some garden plants, for example rhus tree (*Toxicodendron succedanea*), are toxic and harmful to human health and should be targeted for control, especially around infrastructure and in areas frequented by park visitors or staff including dwellings, works depots, amenity blocks, picnic areas, campgrounds, lookouts, tracks and trails. Privet and some other flowering garden escapes can trigger asthma attacks in susceptible people, and some effort should be directed to strategically reducing their

spread. Where mildly allergenic garden escapes occur in management areas identified as low priority, consideration can be given to reducing their number or flowering, although it must be recognised that, for example, privet is one of the most widespread garden escapes in the Region, including off-park estate, and eradication is not feasible.

Control of single or suites of garden escapes, where they threaten cultural heritage values by causing damage to structure, obscuring or overgrowing structures and reducing the amenity of a site for visitors or interpretation is a priority. However, as noted above, where both native and exotic species are subject to the same level of control these sites will be considered as cultural heritage management sites and not strategic weed control sites, and works will be recorded and reported separately as part of the regional pest management strategy process. Where exotic or historic garden plants are an integral part of a cultural landscape, for example gardens associated with the Harbour Masters and other cottages on Goat Island, or cottages at Barrenjoey headland, consideration must be given to retaining or planting appropriate and non-invasive garden plants or preventing seed set or spread by pruning and proactive management.

Where garden escapes impact Aboriginal cultural heritage sites, control should be undertaken in association and consultation with the relevant Aboriginal Land Council and local Aboriginal communities or site plan. An example is the control of mother-of-millions growing on Aboriginal rock engravings at Maroota Historic Site.

The control of garden escapes, including aquatic weeds where they impact on the aesthetic, recreational and landscape values of areas that have high visitation, is also of importance, and is a medium priority. Some of the affected sites are educational showcases which illustrate that gardens and surrounds can comprise native species and still be visually attractive. It is recognised that park visitors value a bush surrounding when bushwalking, sightseeing or picnicking and that some other recreational pursuits, such as bird-watching, benefit from a healthy native ecosystem over a weed monoculture or exotic plant dominance. Examples of such sites include Kalkari Discovery Centre and lookouts and picnic areas in Lane Cove, Berowra Valley, Ku-ring-gai Chase and Garigal national parks and in Wollri Creek Regional Park. Staff and Bushcare programs are directed to many of these sites.

In many scenarios garden escapes have invaded, established and are negatively impacting on common vegetation associations and species; these are generally ranked as low priority because they have localised impact and control is not urgent or essential for the survival of a species, population or community. However, NPWS will continue to support where possible works by staff and Bushcare volunteers at these sites. Benefits include improvement in the condition of reserves, improved local amenity and outlook, and significant and valued community involvement and education.

Control

Control techniques for garden escapes and aquatic weeds vary depending on species and situation, and in general, best practice involves the integration of several techniques. A timeline for primary, secondary and maintenance weeding of the target and successive weeds should be developed and projects adequately resourced prior to implementing control to ensure efficacy of control efforts. Environmental weeds are often a symptom of a problem rather than just the cause, and thus control methods must take into consideration measures to mitigate underlying causes. Correct species identification, an understanding of ecology, interrelationships and plant succession are also essential for long-term effectiveness. Control should be undertaken subject to a site plan, risk assessment and feasibility of success.

Weed control, including bush regeneration techniques and misidentification, have been identified as a threat to 31 threatened species in NSW, highlighting the need for caution when undertaking weed control.

Any beneficial roles played by weeds at specific sites should also be identified; in this instance weeds may need to be tolerated or measures put in place to counteract any negative impacts of control.

The prevention of weed and seed spread by the implementation of good hygiene (by staff, contractors, volunteers and visitors), when moving people, equipment, plant or vehicles between areas is essential. Cleaning by washing, brushing or blowing with an air blower of all mowers, brushcutters, plant and vehicles must be implemented as a matter of routine by staff and should be a condition of any weed control contract. This is equally essential when moving boats.

Control techniques include hand removal, physical removal using plant and equipment, chemical treatments with a range of herbicides as per label or permit and including cut, scrape and paint, hand-held, vehicle mounted or aerial spray application. A number of biological control agents have naturalised in the Region or can be introduced to specific species in association with DPI. Additional treatments such as landscaping, including sandstone capping, weed matting, mulching and planting (with locally endemic species collected from local seed stock where possible) may be used to ameliorate weed impacts.

Fire may be used as a technique for controlling some weeds, particularly mesic species, but may also stimulate or enable the spread of other weed species. Where hazard reduction burning is scheduled in or adjacent to an EEC or in the vicinity of threatened species, pre- and post-fire weeding should be considered during the planning process and resources should be committed for weed control. This is especially true where weed spread may be promoted by fire, where the EEC or threatened species may become more susceptible to negative impact from weeds as a result of fire, or if the efficacy of the fire is likely to be impeded by weeds. Similarly, where wildfire impacts an EEC or threatened species, weed control should be prioritised after the fire to prevent weed invasion from limiting threatened species recovery.

For some species and scenarios viable control options do not exist, or control is unfeasible or prohibitively expensive. An example of this is the submerged aquatic weed *Egeria densa* that is widespread in the Lane Cove River. Although its control is not currently viable and its spread into other waterways can be prevented, it does have some positive effects as an aerator.

Monitoring

Where control of garden escapes, including aquatic weeds, is undertaken at sites identified as a critical priority (C-TSC), site plans must be developed to identify specific aims, outcomes and a staged approach. Monitoring will be undertaken in accordance with guidelines outlined in the Monitoring Manual for Bitou Bush Control and Native Plant Recovery⁶. This may include maps of the density and distribution of weeds, photographic records from fixed photopoints, or data collected from transects or quadrats. The aim of monitoring is to measure native species' response to control and reduction in density and distribution of weeds.

Survey effort and any new incursions of garden escapes or aquatic weeds will be recorded. Site-specific data will be recorded in PWIS, and AMS will be used to record works undertaken in specific sites.

⁶ <http://www.environment.nsw.gov.au/resources/pestsweeds/09352MManualPreface.pdf>

Where Bushcare volunteers control weeds, volunteers and their supervisors are required to give strategic direction, develop brief site plans and undertake periodic mapping or photo-point recording to document tasks undertaken and site condition over time (including any negative impacts from control). Volunteer effort should be entered into AMS.

Myrtle rust (*Uredo rangelii*)

Distribution and abundance

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

Uredo rangelii belongs to a group of closely-related fungi known as the guava or eucalyptus rust complex. The complex includes the fungus *Puccinia psidii* which has had severe impacts on eucalypt plantations in Brazil and has been found in other parts of the Americas, Hawaii and Japan.

Impacts

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

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

Introduction and establishment of exotic rust fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae is listed as a KTP under the TSC Act.

Priorities for control

The management plan for myrtle rust on national parks outlines how myrtle rust will be managed on national park estate in NSW, including the potential impacts of myrtle rust on threatened species. The plan also provides guidance to managers of other bushland and threatened species sites.

The objectives of the plan are to:

- 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.

The plan includes eight action areas to manage myrtle rust:

- 1 identify high value assets at risk
- 2 limit the spread of myrtle rust
- 3 monitor the spread of myrtle rust
- 4 manage infections
- 5 research the impacts of myrtle rust
- 6 training, extension and external communication
- 7 record the incidence of myrtle rust
- 8 liaise and report on the spread and impacts of myrtle rust.

Myrtaceae are a component of most endangered ecological communities in the Region and a number of threatened Myrtaceae species occur across the Region. Myrtle rust has been identified in the vicinity of Littoral Rainforest EEC (EPBC-ce, TSC-e) in Ku-ring-gai Chase National Park on the commonly affected *Rhodamnia rubescens* and also on *R. rubescens* in Blue Gum High Forest EEC (EPBC-ce, TSC-e) in Dalrymple-Hay Nature Reserve. A control program using systemic fungicides is being implemented under trial. In Dalrymple-Hay Nature Reserve the health of affected plants and response to treatment is being monitored and other Myrtaceae species in the reserve are also being monitored for presence/absence of the rust. Presence/absence data will be submitted to the Biological Survey Subsystem of the Wildlife Atlas, and may also be entered in PWIS.

The identification of other EECs and threatened species that may be affected by myrtle rust is ongoing. Control will be implemented based on asset at risk and feasibility of success.

Phytophthora (*Phytophthora cinnamomi*)

Distribution and abundance

Phytophthora cinnamomi is believed to have evolved in south-east Asia and was first described by a Dutch expert of plant disease in 1922. While dieback was not discovered in Australia until 1922, it is believed that it was probably introduced in to Western Australia prior to the 1900's, before quarantine procedures were in place. There are 32 phytophthora species in Australia.⁷

Phytophthora is present in reserves across the Region but its impacts are generally location-dependent and influenced by other factors, such as nutrients and soil moisture.

There is no way to visually identify whether the pathogen is present in the soil at a particular site; however, laboratory analysis can detect the organism.

Impacts

Phytophthora cinnamomi is a microscopic soil-borne organism, invisible to the naked eye, which causes root rot of a wide variety of plant species including many native and introduced plants. Infection often results in the death of the plant, with early symptoms including wilting, yellowing and retention of dried foliage, and darkening of young feeder roots and occasionally the larger roots. Phytophthora requires moist

⁷ NSW Statement of Intent 1: Infection of native plants by *Phytophthora cinnamomi*: www.environment.nsw.gov.au/resources/threatenedspecies/08119soipc.pdf

soil conditions and warm temperatures to be active, but damage is most evident in summer when plants are also prone to drought stress.

The spores can be dispersed over relatively large distances by surface and subsurface water flows and can also be readily transported in contaminated soils. People can spread *Phytophthora* further and faster than any other vector through the movement of infected soil, water or plant material. *Phytophthora* is able to survive in dead plant tissue and soil for extended periods.

Phytophthora cinnamomi is the most widespread and destructive of the 32 *Phytophthora* species that occur in Australia and is listed as KTP under the TSC Act and EPBC Act. Infection of native plants by *Phytophthora cinnamomi* has been identified as a KTP for a number of threatened species resulting in a national TAP for *Phytophthora*⁸ prepared in 2001 and a Statement of Intent⁹ prepared in 2008.

Priorities for control

The key priorities for the control of *Phytophthora* in the Region are to:

- identify presence/absence by conducting surveys and sampling areas of poor tree health or dieback
- prevent the spread of *Phytophthora* from current known locations to uninfected areas
- identify and implement appropriate prevention, containment and hygiene protocols.

Control

Currently there is no single method for controlling *Phytophthora*. A combination of hygiene protocols, good horticultural management, the selective use of fungicides and the addition of organic matter to soils can be used to retard the activity of *Phytophthora*. Hygiene protocols should be implemented in every reserve to prevent the spread of *Phytophthora*, even where the organism has not been detected.

Monitoring

Presence/absence data collected under these programs will be entered in PWIS and periodically submitted to the Wildlife Atlas.

⁸ <http://www.environment.gov.au/biodiversity/threatened/publications/tap/phytophthora.html>

⁹ <http://www.environment.nsw.gov.au/resources/threatenedspecies/08119soipc.pdf>

Appendix 1 New and emerging pest species

New pest species

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

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

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

** Noxious Weeds in Control Classes 1, 2 and 5 are notifiable weeds under the NW Act. This means that you must notify the local control authority within three days of becoming aware that the notifiable weed is on the land.

Emerging pest species

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

the areas on-park mentioned below, should also be reported to the pest management officer who will decide on the appropriate course of action.

Cane toad (*Bufo marinus*)

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

Vagrants are regularly reported in Sydney, Wollongong, Coffs Harbour and the Central Coast. A small and isolated population is known and is subject to control in Kurnell in NPWS Metro South West Region, indicating that cane toads have the potential to establish in Sydney. To date only vagrant cane toads have been recorded in NPWS Metro North East Region at a rate of a few per year. Vagrant reports are typically a single animal, often found near transport hubs, along railway or highway corridors, landscape/nursery supplies, fruit and vegetable supplies or tourist parks.

The invasion and establishment of cane toads has been listed as a KTP under both the TSC Act and EPBC Act, and NPWS has a cane toad management policy. Cane toads are poisonous at all stages of their life cycle (eggs, tadpoles, toadlets and adult toads) and can impact on native fauna during all of these stages. Their ability to survive in a range of habitats and wide temperature ranges (5–40°C) increases their threat to native species. Insects, smaller toads, native frogs and tadpoles, small snakes and the occasional small mammal are part of the cane toads' diet. Not only do they prey on native fauna, but they also compete for food, shelter and breeding sites. Females lay 8000–35,000 eggs at a time and may lay two clutches each year, and cane toad tadpoles will outcompete native frog tadpoles in a shared water body.

It is a critical priority to control cane toads in the Metro North East Region to prevent cane toad populations from establishing. Staff will respond in a timely manner to any cane toads reported on or immediately adjacent to NPWS estate. Control will be by manual collection and humane euthanasia. If cane toad hot spots are identified NPWS will undertake proactive monitoring of at risk locations using visual and auditory survey techniques in the breeding season from spring to autumn.

Metro North East Region staff have a role in raising community awareness of the impacts of cane toads and encouraging members of the public to correctly identify cane toads to ensure prompt and appropriate humane control and also to protect native frogs from misidentification and harm. NPWS will also provide support and advice, and share information with the agencies of UFAAG in relation to cane toad management.

Cane toad sightings and control will be recorded in PWIS including the location, numbers collected, sex, breeding status and size (if possible), and recorded in AMS.

Feral deer

Six deer species are known to have established feral populations in Australia. Deer live in herds with complex social organisation, often involving considerable competition between males in the breeding season. Deer are generally cryptic and, although there is no state-wide census of numbers, deer populations in NSW are believed to have increased dramatically in recent years. This is mainly attributed to escapes and deliberate releases from deer farms, expansions of acclimatisation

herds and possibly in some areas deliberate translocation by hunters. They are nocturnal or semi-nocturnal, sheltering by day in forests or woodlands and emerging to graze from late afternoon to early morning in native grassland, improved pasture, crops or other agricultural land.

A small herd of fallow deer (*Dama dama*) have been observed in Marramarra National Park in the vicinity of Canoelands, and larger numbers may occur in the park. Because of their cryptic nature their numbers and distribution are difficult to quantify. Lone deer have been recorded and sometimes controlled in locations across the Region in recent years. There is an opportunity for wild, escaped or translocated deer to migrate onto parks estate, especially in the north-western section of the Region.

Herbivory and environmental degradation caused by feral deer is listed as a KTP under the TSC Act. The KTP identifies that grazing and trampling by deer could alter the composition and structure of the following EECs that are found at risk in reserves in the Region: Littoral Rainforest (EPBC-ce, TSc-e), Sydney Freshwater Wetlands (TSC-e), Montane Peatlands and Swamps, River-Flat Eucalypt Forest on Coastal Floodplains (TSC-e) and Swamp Sclerophyll Forest on Coastal Floodplains (TSC-e). Deer could potentially alter the composition and structure of the habitats of threatened fauna such as *Isoodon obesulus* (southern brown bandicoot), impact a number of threatened species found in the Region, including *Acacia bynoeana* (TSC-e), *Persoonia hirsuta* (TSC-e), *Eucalypus camfieldii* (TSC-v), and *Melaleuca deanei* (TSC-v), or cause some uncommon species to become threatened.

Feral deer impacts include selective browsing, spreading weeds, wallowing, rubbing trees and other vegetation and causing erosion through scrapes and pads. Their browsing can impact on native vegetation by preventing the establishment of seedlings and reducing seed reproduction of established plants. While some threatened species may be impacted by this selective browsing, it can also lead to changes in vegetation communities with more palatable species being reduced and less palatable species becoming dominant. Furthermore, native animals that rely on native plant species for food or shelter may be impacted through competition with feral deer. Feral deer on roads and rail corridors have caused car and train accidents in NSW in recent years including fatalities. A fallow deer stag was observed crossing Pennant Hills Road, a major arterial road in a suburban area in north-western Metro North East Region in 2005; it was subsequently controlled.

Because a breeding population of fallow deer has only recently (December 2011) been confirmed in Marramarra National Park, a plan for their control is currently in development. The primary aim of a control program at Canoelands will be to prevent or minimise damage to adjacent private landholdings including economic enterprises and the containment of the population to prevent fallow deer establishing in new locations or reserves.

The most effective current option for control is ground shooting both on and off NPWS estate in association with neighbouring landholders and agencies. At state level, NPWS is investing effort into the development of target-specific and effective control options for a range of deer species.

Surveying be undertaken as part of the Marramarra deer management program. Surveys will record impacts, sightings, scats and signs, and use cameras to record deer presence/absence and breeding status, and to identify commonly used deer tracks. The pest management officer and Marramarra ranger will maintain records of deer sightings and control in PWIS and effort will be recorded in AMS. Proactive liaison with park neighbours, UFAAG and Cumberland LHPA will be undertaken to ensure sightings and off-park impacts are also reported and recorded.

Changes in the relative abundance of deer will be assessed by comparing numbers culled or sighted over time and in relation to control effort. A decrease in reports may reflect successful control (but could also indicate a failure to report).

Feral goat (*Capra hircus*)

Goats were introduced into Australia with the First Fleet and currently occur across a wide range of habitats in all states of Australia, with the majority of their distribution in arid and semi-arid pastoral areas. Feral goats have high reproductive potential where conditions are favourable, and in the absence of control feral goat populations can increase by up to 75% per year.

Feral goats were first reported in Marramarra National Park after the 2002 Chilvers wildfire; the goats were easily seen in the burnt landscape. A herd of 20 feral goats was removed from private property adjacent to Marramarra National Park in a cooperative control program involving NPWS, Cumberland LHPA, a contractor and private landholders in November 2008 after the herd were seen on successive days in the one location on private property. The herd predominantly comprised males. Goats have not been reported in Marramarra National Park since that time, nor have goats been confirmed elsewhere in the Region; however, small herds living in isolation may persist and there is opportunity for feral, escaped or dumped domestic goats to migrate onto parks estate especially in the north-western section of the Region.

Competition and habitat degradation by feral goats has been listed as a KTP under the TSC Act. In Marramarra National Park there are five plant species and one flora population listed under the TSC Act that are vulnerable to impacts by feral goats.

Grazing and browsing by feral goats has significant impacts on native vegetation. They can lead to changes in species composition as more palatable species are eaten and removed, as well as changes in vegetation structure. Areas with a high density of goats have a conspicuous browse line, as all foliage within their reach is consumed. Feral goats can survive on highly fibrous, low nutrient herbage, provided sufficient water is available, and will consume litter, fruit fall, bark and sticks. This can lead to a decrease in overall cover and an increase in bare ground, which, combined with trampling and soil surface damage caused by their hooves, may result in significant increases in soil erosion, especially along pathways. These habitat changes in turn affect native fauna, which may also be impacted by feral goats through competition for food and shelter. Feral goats also cause damage to Aboriginal heritage sites, compete with neighbouring livestock or agricultural pursuits such as fruit orchards at Laughtondale, and are potential vectors of livestock diseases.

Control options include mustering and trapping, ground and aerial shooting (although opportunities for aerial shooting are limited in the Region because of the highly urbanised environment). In Marramarra National Park the previous system of control by mustering and trapping when goats are reported in the same location in open space with access (as afforded by private property orchards) on successive days will be encouraged.

Because they are not widely established in the wild in the Region, there is potential that some feral goats may be stray pets or stock and potential for ownership needs to be taken into consideration when planning control programs. In these instances landholders will be encouraged to prevent further feral goat invasion by containing stock with adequate fencing and disposing of unwanted stock responsibly.

Changes in the relative abundance of the feral goats will be assessed by comparing numbers culled or sighted over time and in relation to control effort. The pest

management officer and Marramarra ranger will record all goat sightings, survey and control results in PWIS, and effort will be recorded in AMS. Proactive liaison with park neighbours, UFAAG and Cumberland LHPA will be undertaken to ensure sightings and off-park impacts are reported and recorded. A decrease in reports may reflect successful control (or a failure to report). Monitoring of *Asterolasia elegans* and *Zieria involucrate* in accordance with the recovery plans for these species will include monitoring species condition and the impacts of feral goats.

Feral pig (*Sus scrofa*)

Within Australia feral pigs are widely distributed in NSW, Queensland, the Northern Territory and the Australian Capital Territory, whilst only isolated populations occur in other states. The most critical factors affecting their distribution are the need for daily water and dense shelter. Provided these requirements are met, the density of populations is largely dependent upon the availability of preferred foods.

In Metro North East Region feral pigs occur in very low numbers, and individuals are sighted very occasionally. It is often not possible to confirm sightings by the public, suggesting that sightings may be unreliable, or that pigs are in such low abundance that they are undetectable, or that pigs are highly mobile and do not linger in a location long enough for signs or impact to be observed. October 2011 to February 2012 saw a spike in pig sightings and subsequent control including off-park and in bushland managed by council. The reserves most prone to the establishment of pigs in the Region are the relatively larger or more remote parks in the northern and western part, including Marramarra National Park (where three pigs were trapped and dispatched in association with a park neighbour and Cumberland LHPA in late 2012), Muogamarra Nature Reserve, Berowra Valley National Park and Ku-ring-gai Chase National Park. However, the recent removal of a pregnant sow from the Ku-ring-gai Council reserve, Sheldon Forest, a relatively small isolated reserve in Sydney's suburban Upper North Shore, exemplifies the need for vigilance and cross-agency liaison throughout the Region.

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

Feral pigs can act as vectors for diseases such as tuberculosis and foot and mouth disease. These diseases can cause economic losses or personal distress for neighbouring farmers or lifestyle property owners, and may result in disease outbreak in humans. The latter is a particular concern where pigs have the potential to occur adjacent to suburbia in the Region. Public safety can also be at risk from cars or trains striking feral pigs crossing major arterial roads and rail that surround or transect many of the parks in the Region. Feral pigs also act as a vector for the spread of weeds through faecal deposition after the consumption of weed fruits.

It is a critical priority to prevent pigs from establishing at a population level in any of the reserves of the Region. Inspection and surveys for pigs, sign or impact should be initiated promptly (within 48 hours when possible) after any report.

A number of EECs, including Coastal Saltmarsh (TSC-e) and Swamp Oak Floodplain Forest (TSC-e), or regionally significant vegetation, for example the diatreme vegetation at Peats Bight and Peats Cater, occur in the reserves listed above that are most susceptible to pigs establishing. These vegetation associations are both attractive ecosystems providing habitat resources for pigs and also have a fragile understory very susceptible to damage by pigs. In addition, Ku-ring-gai Chase is

listed on the Natural Heritage Register for its wildflowers, and as a nature reserve Muogamarra has significant interpretational, educational and scientific value, and as such, significant effort should be directed to surveying and the prevention of pigs establishing in these reserves.

Survey effort will comprise camera monitoring and on-ground searching for scats or signs like footprints or wallows. Control will be by trapping, ground shooting or poison baiting as appropriate. Where appropriate, control will be in association with park neighbours, Cumberland LHPA or neighbouring land management agencies via the UFAAG.

All sightings should be reported to the park ranger or pest management officer, sightings, survey and control results recorded in PWIS and effort recorded in AMS.

Red-eared slider turtle (*Trachemys scripta elegans*)

The current extent of the distribution and abundance of red-eared slider turtles in NSW is unknown. Individuals have been recorded in the Lane Cove River and in Wollie Creek but a breeding population has not been confirmed anywhere within the Region. Vagrants are occasionally found in suburban areas and these are assumed to be escaped or unlawfully released pets.

The red-eared slider turtle is an aggressive animal which can kill native turtles, birds and aquatic wildlife. They are included in the top 100 of the world's worst invasive species by the International Union for the Conservation of Nature (IUCN), due to their invasive nature and their potential impacts on biodiversity. In NSW, the true extent of their impact on aquatic ecosystems is unclear and they have not been declared under the TSC Act; however, in recognition of their invasiveness and potential for impact it is illegal to keep red-eared slider turtles as pets in NSW under the EPBC Act and Live Import List.

There are no identified control program priorities for red-eared slider turtles in Metro North East Region; however, it is a critical priority that they are prevented from establishing populations where possible. Thus all reports of suspected red-eared slider or other exotic turtles in or immediately adjacent to NPWS estate, including waterways that flow to NPWS estate, will be promptly recorded, investigated and control initiated as feasible.

Control will be by manual collection or cage trapping as feasible and humane euthanasia. All exotic turtles captured from the wild should be examined for breeding status. If breeding turtles or populations are identified proactive surveying and additional control techniques will be investigated for feasibility of success at known and at risk locations.

NPWS staff may be called upon to take possession of seized or surrendered pet red-eared slider turtles; in this instance staff will take the pet to a veterinarian for humane euthanasia, a death certificate must be issued by the veterinarian and the matter should also be reported to OEH Wildlife Licensing and Management Unit. Metro North East Region staff also have a role to play in raising community awareness of the impacts of red-eared slider turtles and encouraging members of the public to report all sightings.

Off-park reports will be referred to DPI and other land management agencies as relevant. Collaborative surveys, control or community education will be supported via the UFAAG especially where impacts to park values or wildlife are likely.

Red-eared slider turtle sightings and control will be recorded in PWIS including the location, numbers collected, sex, breeding status and size, and effort will be recorded in AMS.

Aquatic weeds

Heteranthera (*Heteranthera reniformis*) is known in only one location on NPWS estate in the bat cage at Kukundi in Lane Cove National Park and its eradication from this contained location is a critical priority. Heteranthera has also been reported in two locations off park estate in Blackbutt Creek, a tributary of Lane Cove River in Lane Cove National Park, and in a pond that overflows into the Cockle Creek catchment in Ku-ring-gai Chase National Park. Liaison with the local control authority, Ku-ring-gai Council, and joint proactive surveying of these catchments to prevent establishment are also considered a critical priority. Heteranthera is a Control Class 1 weed in NSW.

Red Ludwigia (*Ludwigia repens*) is widespread in the Lane Cove River catchment but is not currently known in any other reserves in the Region. A small and isolated infestation was detected in Garigal National Park near the Cascades but has been removed, and the location is subject to ongoing monitoring. It may, however, occur undetected in isolated locations in creeks and waterways in Garigal or other reserves. Periodic scheduled or opportunistic surveying should be undertaken and control implemented if it is found outside the Lane Cove River catchment based on feasibility of success.

The following aquatic weeds have been recognised as highly invasive with potential for significant impact, including to biodiversity and the health and function of waterways. They do not currently occur on NPWS estate but are known off park estate in the Region or have potential to occur: cabomba (*Cabomba caroliniana*), salvinia (*Salvinia molesta*) water hyacinth (*Eichhornia crassipes*), lagarosiphon (*Lagarosiphon major*) and Senegal tea plant (*Gymnocoronis spilanthoides*). These species must be reported to the pest management officer, and information on infestations forwarded to DPI or relevant LGA and Sydney SWC.

Tropical soda apple (*Solanum viarum*)

Tropical soda apple (*Solanum viarum*) is a prickly perennial shrub up to two metres high. It has cream coloured spines, large leaves, white flowers and fruit that look similar to small water melons when immature, reaching golf-ball size and turning yellow as it matures. It was first recorded in Australia in August 2010 in the Kempsey area and several other small infestations have since been identified around Wingham, Coffs Harbour and Grafton. An isolated infestation of two plants was identified on the Peats Bight Trail in Muogamarra Nature Reserve and subsequently controlled, and the site is subject to ongoing monitoring. If any further infestations are identified, control programs will be conducted by NPWS and the relevant LCA and the SWC will be informed. Similar *Solanum* species uncommon in the Region are also subject to control. Tropical soda apple is listed as a Class 2 weed across the Region.

Appendix 2 Pest-related key threatening process in NSW relevant to Metro North East Region

As determined by the NSW Scientific Committee.¹⁰ All determinations listed are final.

Name	Gazettal date
Anthropogenic climate change	17/11/2000
Clearing of native vegetation	
Competition and grazing by the feral European rabbit	10/05/2002
Competition and habitat degradation by feral goats	12/11/2004
Competition from feral honeybees (<i>Apis mellifera</i>)	29/11/2002
Forest eucalypt dieback associated with over-abundant psyllids and bell miners	28/10/2008
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	24/03/2000
Herbivory and environmental degradation caused by feral deer	17/12/2004
Importation of red imported fire ants into NSW	23/08/2002
Infection by beak and feather disease (<i>Psittacine circoviral</i>) affecting endangered <i>psittacine</i> species and populations	06/12/2002
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	22/08/2003
Infection of native plants by <i>Phytophthora cinnamomi</i>	13/12/2002
Introduction and establishment of exotic rust fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	15/04/2011
Introduction of large earth bumblebee (<i>Bombus terrestris</i> L.)	13/02/2004
Invasion and establishment of exotic vines and scramblers	21/04/2006
Invasion and establishment of Scotch broom (<i>Cytisus scoparius</i>)	09/11/2007
Invasion and establishment of the cane toad (<i>Bufo marinus</i>)	21/04/2006
Invasion of native plant communities by African olive (<i>Olea europaea</i> L. subsp. <i>cuspidate</i>)	01/10/2010
Invasion, establishment and spread of lantana (<i>Lantana camara</i>)	08/09/2006
Invasion of native plant communities by <i>Chrysanthemoides monilifera</i>	12/03/1999
Invasion of native plant communities by exotic perennial grasses	12/09/2003
Invasion of the yellow crazy ant (<i>Anoplolepis gracilipes</i>) into NSW	19/08/2005
Loss of hollow-bearing trees	
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	26/08/11
Predation and hybridisation of feral dogs (<i>Canis lupus familiaris</i>)	31/07/2009
Predation by the European red fox	20/03/1998
Predation by the feral cat	24/03/2000
Predation by the plague minnow (<i>Gambusia holbrooki</i>)	29/01/1999
Predation, habitat degradation, competition and disease transmission by feral pigs (<i>Sus scrofa</i>)	27/08/2004
Removal of dead wood and dead trees	12/12/2003

¹⁰ For further details and a full list of determinations see www.environment.nsw.gov.au/committee/ListOfScientificCommitteeDeterminations.htm

Appendix 3 Weeds of National Significance

The WoNSs were listed based on four criteria: invasiveness, impacts, potential for spread and impacts on social and environmental values. WoNS classification was developed as a means of prioritising weed control at a national level and over a range of land uses.¹¹

Individual landowners and managers are responsible for managing WoNSs. State and territory governments are responsible for overall legislation and administration.

Each WoNS has a strategic plan that outlines strategies and actions required to control the weed, and that identifies responsibilities for each action.

Each WoNS has a management coordinator and a National Management Group/Steering Committee to oversee implementation of the goals and actions of the WoNS strategic plans and to develop and coordinate priority actions.

The strategic control of WoNSs where they significantly impact park values is a priority for NPWS.

Inaugural list of Weeds of National Significance in Metro North East Region

Scientific name	Common name	Known to occur on NPWS estate
<i>Acacia nilotica</i>	Prickly acacia	Outside potential range
<i>Alternanthera philoxeroides</i>	Alligator weed	Known
<i>Annona glabra</i>	Pond apple	Outside potential range
<i>Asparagus asparagoides</i>	Bridal creeper	Known
<i>Cabomba caroliniana</i>	Cabomba	Potential to occur
<i>Chrysanthemoides monilefera</i> subsp. <i>monilifera</i> and subsp. <i>rotundata</i>	Boneseed and bitou bush	Known
<i>Cryptostegia grandiflora</i>	Rubber vine	Outside potential range
<i>Hymenachne amplexicaullis</i>	Hymenachne	Outside potential range
<i>Lantana camara</i>	Lantana	Known
<i>Mimosa pigra</i>	Mimosa	Outside potential range
<i>Nassella neesiana</i>	Chilean needle grass	Potential to occur
<i>Nassella trichotoma</i>	Serrated tussock	Potential to occur
<i>Parkinsonia aculeata</i>	Parkinsonia	Outside potential range
<i>Parthenium hysterophorus</i>	Parthenium weed	Outside potential range
<i>Prosopis</i> spp.	Mesquite	Outside potential range
<i>Rubus fruticosus</i> agg.	Blackberry	Known
<i>Salix</i> spp. except <i>S. babylonica</i> , <i>S. x reichardtiji</i> , <i>S. x calodendron</i>	Willows except weeping willow, pussy willow and sterile pussy willow	Known
<i>Salvinia molesta</i>	Salvinia	Potential to occur
<i>Tamarix aphylla</i>	Athel pine	Outside potential range
<i>Ulex europaeus</i>	Gorse	Potential to occur

¹¹ www.weeds.gov.au/weeds/lists/index.html

Additional List of Weeds of National Significance in Metro North East Region, April 2012

Scientific name	Common name	Known to occur on NPWS estate
<i>Andropogon gayanus</i>	Gamba grass	Outside potential range
<i>Anredera cordifolia</i>	Madeira vine	Known
<i>Asparagus aethiopicus</i> , <i>A africanus</i> , <i>A declinatus</i> , <i>A plumosus</i> , <i>A. scandens</i> , and includes original WoNS <i>Asparagus asparagoides</i>	Asparagus weeds	Known
<i>Cytisus scoparius</i> , <i>Genista monspessulana</i> , <i>Genista linifolia</i>	Brooms: Scotch, Montpellier, flax leaf	Known
<i>Jatropha gossypifolia</i>	Bellyache bush	Outside potential range
<i>Eichhornia crassipes</i>	Water hyacinth	Potential to occur
<i>Lycium ferocissimum</i>	African boxthorn	Known
<i>Macfadyena unguis-cati</i>	Cat's claw creeper	Known
<i>Opuntia</i> spp. (excludes <i>O. ficus-indica</i>), <i>Cylindropuntia</i> spp., <i>Austrocylindropuntia</i> spp.	Optuntoid cactus	Known
<i>Sagittaria platyphylla</i>	Sagittaria	Known
<i>Senecio madagascariensis</i>	Fireweed	Known
<i>Solanum elaeagnifolium</i>	Silver-leaf nightshade	Outside potential range

Appendix 4 National Environmental Alert List

The National Environmental Alert List was developed to identify plant species that are in the early stages of establishment and have the potential to become a significant threat to biodiversity if they are not managed. Species were identified based on three criteria: posing a high or serious potential threat to the environment, having limited distribution within Australia at present, being amenable to successful eradication or containment programs.

New incursions of National Environmental Alert List Weeds in the Metro North East Region should be recorded and reported to the pest management officer and a control program developed.

Scientific name	Common name	Known to occur
<i>Barleria prionitis</i>	Porcupine flower	
<i>Cynoglossum creticum</i>	Blue hound's tongue	
<i>Nassella hyalina</i>	Cane needle grass	
<i>Koelreuteria elegans</i> ssp. <i>formosana</i>	Chinese rain tree	
<i>Asystasia gangetica</i> subspecies <i>micrantha</i>	Chinese violet	
<i>Acacia catechu</i>	Cutch tree	
<i>Cyperus teneristolon</i>	Cyperus	
<i>Dittrichia viscosa</i>	False yellowhead	
<i>Pelargonium alchemilloides</i>	Garden geranium	
<i>Calluna vulgaris</i>	Heather	
<i>Senecio glastifolius</i>	Holly leaved senecio	Potential to occur
<i>Equisetum</i> spp.	Horsetail species	Potential to occur. Known in the Region off park in Warringah LGA.
<i>Acacia karroo</i>	Karoo thorn	
<i>Kochia scoparia</i>	Kochia	
<i>Lagarosiphon major</i>	Lagarosiphon	Potential to occur
<i>Thunbergia laurifolia</i>	Laurel clock vine	
<i>Pereskia aculeata</i>	Leaf cactus	
<i>Nassella charruana</i>	Lobed needle grass	
<i>Hieracium</i> spp.	Orange hawkweed	
<i>Praxelis clematidea</i>	Praxelis	
<i>Tipuana tipu</i>	Rosewood	
<i>Gymnocoronis spilanthoides</i>	Senegal tea plant	Potential to occur
<i>Chromolaena odorata</i>	Siam weed	
<i>Trianoptiles solitaria</i>	Subterranean cape sedge	
<i>Piptochaetium montevidense</i>	Uruguayan rice grass	
<i>Cytisus multiflorus</i>	White Spanish broom	
<i>Retama raetam</i>	White weeping broom	
<i>Lachenalia reflexa</i>	Yellow soldier	

