



NSW Department of Primary Industries
Office of Environment & Heritage

NSW Catchment Management Authorities
NSW National Parks & Wildlife Service

Australian Government

BIODIVERSITY PRIORITIES FOR WIDESPREAD WEEDS

Namoi CMA region

Part I

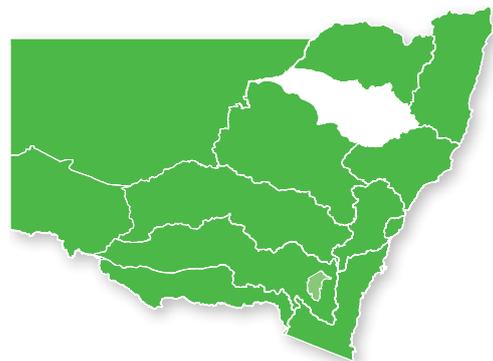


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Published by NSW Department of Primary Industries (NSW DPI). This project was developed by NSW DPI and the Office of Environment & Heritage (OEH) and in collaboration with the 13 Catchment Management Authorities (CMAs) in New South Wales.

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This publication should be cited as:

NSW DPI and OEH (2011). *Biodiversity priorities for widespread weeds*. Report prepared for the 13 Catchment Management Authorities (CMAs) by NSW Department of Primary Industries and Office of Environment & Heritage, Orange.

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ISBN: 978 1 74256 095 3

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11. INTRODUCTION

This is one of the 13 regional documents that sit under the *Biodiversity priorities for widespread weeds – statewide framework*. It provides information for the Namoi Catchment Management Authority (CMA) region. The *statewide framework* should be read in conjunction with this document as it provides (i) background information, (ii) objectives of the project, (iii) the standardised methodology used to establish regional priorities and (iv) guidance on implementing the priorities.

The overarching document to this report, the *statewide framework*, details the process used for identifying biodiversity (biological assets) at risk from widespread weeds in New South Wales, as well as prioritising sites for weed control in each CMA region. This sub-report (Part I) establishes regional priorities, in the form of priority widespread weeds and priority sites for control, in the Namoi CMA region.

The Namoi CMA region covers approximately 42,000 square kilometres (Namoi CMA 2009). The vegetation varies from primarily open woodland and grasslands in the western part, grasslands and open woodlands on the plains and lower slopes of the central and eastern parts, and woodland and forest communities on the hill slopes and ranges that form the margins of the region. Riparian zones along major rivers and creeks are dominated by river red gum (EAS 2008). Approximately 100,000 people live in the region, concentrated mostly along the Namoi River and its tributaries between Tamworth and Narrabri. Grazing is the principal land use on the slopes and plains, with major areas of cropping on the Namoi River floodplains (Namoi CMA 2009). With the exception of the large wooded areas of Pilliga State Forest and National Park and Mount Kaputar National Park, much of the region has been cleared of native vegetation to support agriculture (EAS 2008). For this reason any areas of native vegetation still remaining on the fertile soils are considered to be of high environmental significance (Mawhinney 2004). Despite extensive clearing, the Namoi region is still home to many threatened plant and animal species with biodiversity areas recognised as nationally significant (Mawhinney 2004).

Invasive plants and animals are recognised as a key threat to the sustainability of the region's natural resources. Weeds pose a significant threat to biodiversity by directly impacting the growth and survival of native flora and fauna and via indirect effects on other aspects of landscape health, e.g. water quality. A review of the impact of weeds on threatened biodiversity in New South Wales (i.e. species, populations and ecological communities listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act)) indicated that 72 weed species in the Namoi CMA region were threatening biodiversity, including 22 threatened plant and animal species (Coutts-Smith and Downey 2006).

This project builds on the existing regional weed strategies by considering the impact of all widespread weeds present in the Namoi CMA region on biodiversity, regardless of their legislative listing. Given many widespread weeds are unlikely to be extensively controlled or eradicated, this project provides strategic management options for protection of biological assets by identifying the priority widespread weeds, the biodiversity impacted and priority sites for control.

To reduce the impact of widespread weeds on biological assets, control programs need to be prioritised to areas where control is both achievable and likely to have the greatest benefit to native biodiversity, independent of land tenure. Such a site-led approach will ensure maximum benefit from limited resources available for management of widespread weeds. Therefore, specific information on management sites was compiled to assist in strategic decisions relating to investment aimed at protecting biological assets from widespread weeds. This project will enable all stakeholders in the Namoi CMA region to target on-ground works to those locations where weed control will have the greatest benefits for biodiversity. In addition, implementation of monitoring using the *Monitoring manual for bitou bush control and native plant recovery* (Hughes *et al.* 2009) will allow Namoi CMA to measure progress towards relevant targets, including the Natural Resource Commission (NRC) target for invasive species (NRC 2005) and Catchment Action Plan (CAP) targets (Namoi CMA 2006).

12. REGIONAL CONTEXT

This section summarises the strategies, policies and programs relevant to weed management in the Namoi CMA region and outlines how they relate to the development and outputs of this project. Relevant statewide strategies, targets and legislation are addressed in the *statewide framework*.

12.1 Catchment Action Plan

Under the *Catchment Management Authorities Act 2003*, each CMA is required to prepare a Catchment Action Plan (CAP) that outlines future priorities for the specific CMA and provides a co-ordinated plan for natural resource work in the region over a 10-year period. Although a revised CAP is being prepared by Namoi CMA at the time of this publication the current Namoi CMA CAP (Namoi CMA 2006) outlines catchment targets under four broad themes: (i) people and their communities, (ii) the landscape, (iii) surface and groundwater and (iv) ecosystems, native plants and animals.

This project will primarily contribute to the *Catchment target for native plants and animals* (B):

- » From 2006 there will be an improvement in the extent and condition of native plants and animals and the environments in which they live.

Within this catchment target, two specific management targets (MT) will be addressed:

- » MTB2 – From 2006, support the recovery of priority fauna populations and threatened species, populations and communities

More specifically, the identification of priority sites will help achieve management action A (*identify priority species, populations and/or communities found naturally in the Namoi Catchment*); and

- » MTB3 – From 2006, reduce the economic and environmental impact of invasive plants and animals

Implementing a state-wide process to prioritise areas for the management of current weed threats will help achieve management action C (*applying strategic control measures to existing invasive plants and animals which include current pest and weed strategies*).

12.2 Priority environmental weeds in the Namoi region

Priority environmental weeds in the Namoi Catchment (Mawhinney 2004) was funded by the Namoi CMA to develop a process to rank and prioritise environmental weeds in the Namoi CMA region. Three criteria were used to rank the weeds: (i) invasiveness, (ii) impacts and (iii) existing and potential range. Priority was given to weed species that were highly invasive and have serious impacts on the environment but are not yet widespread across the region. The resulting list is considered to be the top 20 environmental weeds for the Namoi CMA region. This list has been used as a starting point for this project, but the priority environmental weeds in the Namoi CMA region ranking procedure specifically excludes well established or widespread weeds. This project also considers the need to manage existing weed threats for biodiversity conservation.

12.3 Regional weed advisory committees and management plans

Regional weed advisory committees support the communication of best practice amongst neighbouring councils, or local control authorities, who are responsible for implementing the NSW *Noxious Weed Act 1993* (NW Act). Membership includes NSW Department of Primary Industries (NSW DPI), regional councils and public land managers (e.g. National Parks and Wildlife Service (NPWS)).

Regional weed management plans are developed by regional weeds advisory committees and target specific noxious weed species for control within a defined area. They outline the biology of the weed and its impacts as well as overall objectives and actions required to coordinate an effective control program. The Northern Inland Weeds Advisory Committee (NIWAC) is responsible for co-ordinating a number of regional management plans in the Namoi CMA. Current plans include: African boxthorn (*Lycium ferocissimum*), blue heliotrope (*Heliotropium amplexicaule*), Chilean needle grass (*Nassella neesiana*), giant Parramatta grass (*Sporobolus fertilis*), green cestrum (*Cestrum parqui*), mimosa bush (*Vachellia farnesiana*), mother of millions (*Bryophyllum delagoense*), serrated tussock (*Nassella trichotoma*), silver-leaf nightshade (*Solanum elaeagnifolium*) and St Johns wort (*Hypericum perforatum*).

12.4 Office of Environment & Heritage (OEH) Regional Pest Management Strategies

Within the Namoi CMA region, the NPWS (part of OEH) administers significant land for conservation purposes. Weed management priorities on NPWS estate are established within 18 regional pest management strategies (RPMS); based on NPWS regions. In 2010, the number of regions was reduced to 14. However, revision of the strategies is not due until 2011.

As the NPWS regional boundaries do not align with those of the CMA regions, there are three strategies relevant to the Namoi Catchment: (i) Northern Plains, (ii) Northern Tablelands, and (iii) Hunter RPMS (see www.environment.nsw.gov.au/pestsweeds/RegionPestManagement.htm). During 2009-10, NPWS undertook a comprehensive survey of NPWS estate to establish biodiversity priorities for widespread weeds. Relevant priorities from these surveys, including those priority widespread weeds and biological assets at risk, are incorporated into this project (see Section 1.6.1 of the *statewide framework*).

12.5 Priorities Action Statement

In accordance with the TSC Act, the Priorities Action Statement (PAS) was developed to ensure that conservation actions were established for all biodiversity listed under the Act. The PAS outlines the broad strategies and detailed priority actions to be undertaken in New South Wales to promote the recovery of threatened species, populations and ecological communities and manage key threatening processes (KTPs).

There are 24 actions in the PAS relevant to weed management in the Namoi CMA region (Appendix 11). Of these, one action is not applicable being associated with implementation of the Bitou Bush threat abatement plan (TAP) (DEC 2006), 13 are generic recommending targeted bush regeneration or general weed management, with the remaining 10 directing weed control to specific weeds and/or sites.

This project incorporates information from the PAS to identify priority weeds posing a threat to threatened species and ecological communities as well as priority sites for weed control.

I2.6 Namoi Catchment Conservation Strategy

The *Namoi catchment conservation strategy* (EAS 2008) was prepared for the Namoi CMA as a long term plan for conservation in the region. It used the best available spatial data to identify key areas of the landscape for targeting delivery of on-ground conservation, specifically producing four prioritised spatial layers: (i) conservation priority layer; (ii) restoration priority layer; (iii) corridor priority layer; and (iv) landscape degradation risk layer. These layers highlight areas that would contribute most to biodiversity outcomes for the Namoi CMA region based on variables such as percentage of woody vegetation, presence of native species and proximity to other sites of significance (reserved land, regionally significant vegetation, watercourses and cultural heritage sites).

The *Namoi catchment conservation strategy* used threat information contained in threatened species profiles to determine threats from weeds and incorporated proximity to exotic species, using data from the NSW Atlas of Wildlife and herbarium records, along with threats to create the landscape degradation risk layer. This project will allow this information to be updated and expanded to represent the current impact of weeds in the region (the previous records may not represent an assessment of the weed threat). It will also allow Namoi CMA to identify defined sites on the ground within priority areas identified by the conservation strategy at which control is both feasible and likely to result in a positive biodiversity response.

13. REGIONAL OUTPUTS

13.1 Methodology used to develop the priorities

The *statewide framework* outlines the broad methods applied across the 13 CMA regions in New South Wales to establish widespread weed priorities for biodiversity conservation. The primary output is a ranked list of weed management sites for each CMA region in New South Wales. Rankings are based on where investment in weed control will result in greatest reduction of the impact of widespread weed species on biodiversity; primarily, but not exclusively, on threatened biological assets (plant and animal species, populations and ecological communities listed under the TSC Act and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)).

This approach uses four stages to establish regional weed management priorities for biodiversity conservation:

1. Identify and prioritise the widespread weed species posing a threat to biodiversity in each region.
2. Identify the biodiversity at risk from high priority weed species identified in Stage 1.
3. Identify sites where control will maximise biodiversity outcomes by reducing widespread weed impacts.
4. Develop and implement a monitoring system to determine whether investment in weed control programs at high priority sites has resulted in a biodiversity response and thus progress towards the relevant statewide targets.

The specific details of implementing the process in the Namoi CMA region (stages 1 to 3) are outlined below with modifications to account for existing data and strategies. Stage 4 is discussed in the overarching *statewide framework*.

13.1.1 Workshops in the Namoi CMA region

Two workshops were held in the Namoi CMA region at Tamworth and Narrabri on the 17 and 18 February 2009 respectively. Sixty individuals from seven councils, four government agencies, one weed authority and five community groups were invited to attend. Representatives from Namoi CMA, Department of Environment, Climate Change & Water (DECCW) now known as Office of Environment & Heritage, NSW Industry & Investment (I&I NSW) now known as NSW Department of Primary Industries, Livestock Health and Pest Authority, Northern Inland Weeds Advisory Committee Authority, three councils, one community organisation (Friends of the Klori) and one private contractor attended the workshops. See Appendix I2 for a full list of workshop attendees.

13.1.2 Namoi CMA specific webpages

On the main project website (www.environment.nsw.gov.au/cmaweeds), specific CMA webpages were established to provide stakeholders with information on the process followed in the Namoi CMA region including: workshop details, outcomes from workshops, the site nomination form and instructions and a project contact (www.environment.nsw.gov.au/cmaweeds/Namoi.htm).

13.2 The process

13.2.1 Stage 1. Identifying weeds that pose a threat in the Namoi CMA region

A weeds dataset for the Namoi CMA region

A list of weeds to consider at the workshops was collated using the resources outlined in Section 3.1.3 of the *statewide framework* and the sources listed in section I2.

Distribution of weeds within the Namoi CMA region

The weeds dataset for the Namoi CMA region was presented to workshop participants who were asked to identify the current distribution of each of the weeds in four landscapes (Tablelands, Slopes, Plains and Riparian) according to the categories outlined in Table 11. The distribution for each weed considered, plus weeds added by participants, is provided in Appendix 13.

Current impact of widespread weeds on biodiversity

Workshop participants were asked to prioritise the current impact of each widespread weed as Low, Medium or High (Table 12). A total of 22 weeds were identified as having a high impact on biodiversity in at least one landscape type and constituted a draft list of priority weeds which was distributed to workshop participants and other stakeholders for comment. Stakeholder comments were incorporated in the list, which is presented in Table 13. Nine weeds were identified as having a high impact on tablelands, 19 on slopes, 13 on plains and 11 on riparian landscapes. For landscape specific weeds see Appendix 14.

Table 11. Definitions of spatial weed distribution categories, as used in stakeholder workshops.

Category	Definition
Widespread*	Species that have established well in the landscape and are close to reaching their maximum potential distribution in the region.
Localised	Species confined to small, local infestations only.
Emerging	Species perceived as threatening that have been recorded in the region but only in isolated instances or in small areas. Populations of the weed are expanding rapidly but they have not yet become widely established.
Alert	Species that do not currently occur in the region but have the potential to be introduced and would have significant impacts on natural systems if they were to invade.

* Given the large variation in environmental conditions at the CMA regional scale it is likely that very few weeds will be widespread across the entire area under consideration. For this reason participants were asked to consider the current distribution of the weed in relation to its future potential distribution within the region. To do this, a consideration of the preferred habitat conditions of each weed is necessary. For example, riparian weeds will only grow in riparian environments. If a particular riparian weed is widespread within these environments then it is considered widespread across the region. In addition, species that are widespread in tablelands areas, for instance, are unlikely to be widespread in the plains areas of the same region.

Table 12. Definitions of the level of impact of weed species on biodiversity as used in stakeholder evaluations.

Impact	Definition
High	High impact weeds are capable of causing major change to the composition or structure of a community (transformers). They can suppress the regeneration of many species in a community and have a major effect on dominant species in a community. They are long-lived or can form self-sustaining monocultures.
Medium	Medium impact weed species can have a modest effect on the composition or structure of a community. They can suppress the regeneration of some species and have some effect on dominant species in a community. They are relatively long-lived or can persist over long periods of time.
Low	Low impact weeds do not affect structurally dominant species. They do not suppress the regeneration of native species. They do not persist or they have relatively short life spans.

Table 13. Priority widespread weeds impacting on biodiversity in the Namoi CMA region (listed in alphabetical order).

Scientific name (Common name)	KTP ¹	WoNS ²	Noxious	
			NSW ³	LGA ⁴
<i>Ailanthus altissima</i> (tree of heaven)	Y*			Y
<i>Bryophyllum delagonese</i> (mother of millions)	Y			Y
<i>Cenchrus ciliaris</i> (buffel grass)	Y			
<i>Centaurea solstitialis</i> (St Barnaby's thistle)				
<i>Cestrum parqui</i> (green cestrum)	Y*			Y
<i>Chloris gayana</i> (Rhodes grass)	Y			
<i>Echium plantagineum</i> (Paterson's curse)	Y*			Y
<i>Eragrostis curvula</i> (African lovegrass)	Y			Y
<i>Gomphocarpus fruticosus</i> (cotton bush)				
<i>Hyparrhenia hirta</i> (Coolatai grass)	Y			
<i>Hypericum perforatum</i> (St John's wort)	Y*			Y
<i>Ligustrum lucidum</i> (large-leaf privet)	Y*			Y
<i>Ligustrum sinense</i> (small-leaf privet)	Y*			Y
<i>Lycium ferocissimum</i> (African boxthorn)	Y*			Y
<i>Phyla canescens</i> (lippia)	Y*		4	
<i>Rapistrum rugosum</i> (turnip weed)				Y
<i>Rosa rubiginosa</i> (sweet briar)	Y*			Y
<i>Rubus fruticosus</i> agg. (blackberry)	Y*	Y	4	Y
<i>Salix</i> spp. (willows)	Y*	Y	5	Y
<i>Sorghum halepense</i> (Johnson's grass)				Y
<i>Vachellia farnesiana</i> (mimosa bush)				
<i>Xanthium occidentale</i> (Noogoora burr)				Y

KTP¹= Weed listed under a Key Threatening Process in the TSC Act; WoNS² = Weeds of National Significance (Thorpe and Lynch 2000); NSW³ = New South Wales; LGA⁴ = Local Government Areas.

Y = yes, where the species is listed under a KTP, as a WoNS or is listed as noxious in at least one LGA within the region, * = Proposed only (Preliminary Determination under the TSC Act). All listings as at 31 August 2010.

Numbers in the table refer to the control class under the NSW *Noxious Weeds Act 1993*.

13.2.2 Stage 2. Identifying biodiversity at risk from high priority weeds

At each workshop, participants were provided with lists of endangered ecological communities (EECs) and threatened species (as listed under the TSC Act and EPBC Act), as well as general vegetation types present in the Namoi CMA region. They were asked to consider if any species on these lists were currently at risk from each of the high priority widespread weeds (identified during Stage 1) and a draft list of biodiversity at risk was created. Following the workshops, this list was sent to workshop participants and other stakeholders for comment and verification.

The revised list identified EECs and vegetation communities that are considered under threat from the high priority weeds (Table 14). This information was used to help guide site nominations (see Stage 3, section 3.2.3).

The list of EECs and vegetation communities is by no means exhaustive, but is likely to represent communities where the priority weeds are having the greatest immediate impact. The lists can also be used to identify knowledge gaps or areas that require further information and can also be updated as new information becomes available through site nominations or further community consultation.

Impact of widespread weeds on EECs

The EEC threatened by the greatest number of high priority weeds was Box Gum Woodland (18 high priority weeds), followed by Native Vegetation on Cracking Clay Soils of the Liverpool Plains (14 high priority weeds impacting) and Natural Grasslands on Basalt and Fine-Textured Alluvial Plains (11 high priority weeds). The weed species posing the greatest threat in terms of number of EECs threatened were lippia (*Phyla canescens*) (nine EECs), followed by mimosa bush (*Vachellia farnesiana*) (seven EECs), Coolatai grass (*Hyparrhenia hirta*) and African boxthorn (*Lycium ferocissimum*) (both six EECs).

13.2.3 Stage 3. Selecting and prioritising sites for control

Site nomination process

Stakeholders were asked to nominate sites where high priority weeds were impacting biodiversity using a site nomination process. Site nomination forms and instructions (see Appendix 3 of the *statewide framework*) were emailed to key stakeholders (including workshop participants), and placed on the Namoi CMA project website to enable access for others. In order to capture high priority biodiversity sites on private lands, site nomination forms were also sent to all landholders with voluntary conservation agreements (VCA) and wildlife refuges with the NPWS in the Namoi CMA region, along with a letter outlining the aims of the project (Appendix 15) and a list of priority weeds in the region as identified in Stage 1. In addition, during 2009–10, NPWS undertook a comprehensive survey of sites on NPWS estate.

Categories for control

The 226 sites nominated to date (as at 31 August 2010) for the Namoi CMA region were separated into six categories using the ranking process outlined in Appendix 4 of the *statewide framework*. The ranking of sites provides strategic direction for on-ground works by identifying areas where weed control programs will have positive benefits for biodiversity.

This process resulted in 16 sites in control category 1 (Table 15). Category 1 represents the highest priority for action. Within category 1, sites were ordered based on the number of biological entities (e.g. threatened species, populations or ecological communities) present at the site to allow prioritisation within this category. Nominated sites were deemed invalid for ranking if three or more of the required fields contained insufficient information.

13.2.4 Review and additional site nominations

A draft of this report was provided to Namoi CMA for comment and review on 10 July 2009. The draft report contained information on Stages 1 and 2, as well as the list of site nominations received before April 2009. Summary information from site nominations was provided in the draft report to highlight any important assets or tenures that may have been missed in the initial site nomination process. In addition, site nominations received for NPWS estate were provided to the NPWS regions for comment and review.

Further site nominations were then sought and all nominations received from 2009 to August 2010 were included and then ranked. Additional sites were added that incorporated survey information of Travelling Stock Routes collected during 2006. However, the site nomination process is ongoing and should be used by Namoi CMA to identify additional regional priorities for weed control that are not already captured in this report. The complete list of priority sites for control will therefore be only held electronically and updated by the CMA.

Table 14. Communities under threat from priority widespread weeds in the Namoi CMA region, as determined in stages 1 and 2.

Priority widespread weed	Endangered Ecological Community														General vegetation types								
Scientific name (Common name)	Aquatic Ecological Community	Artesian Springs Ecological Community	Brigalow	Ooline Community	Carbeen Open Forest Community	Coolibah-Black Box Woodland	Fuzzy Box on Alluvials	Myall Woodland	Native Vegetation on Cracking Clay	Semi-evergreen Vine Thicket	Box Gum Woodland	Howell Shrublands	Mckies Stringybark/Blackbutt Open Forest	Ribbon Gum/Mountain Gum/Snow Gum	Natural Grasslands on Basalt and Fine-textured Alluvial Plains	Grasslands	Open Woodland	Riparian Vegetation	Open Forest	Applebox-Kurrajong Woodland	Floodplain Vegetation	Red Gum Woodland	
<i>Ailanthus altissima</i> (tree of heaven)																							
<i>Bryophyllum delagonesse</i> (mother of millions)																							
<i>Cenchrus ciliaris</i> (buffel grass)																							
<i>Centaurea solstitialis</i> (St Barnaby's thistle)																							
<i>Cestrum parqui</i> (green cestrum)																							
<i>Chloris gayana</i> (Rhodes grass)																							
<i>Echium plantagineum</i> (Paterson's curse)																							
<i>Eragrostis curvula</i> (African lovegrass)																							
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<i>Sorghum halepense</i> (Johnson's grass)																							
<i>Vachellia farnesiana</i> (mimosa bush)																							
<i>Xanthium</i> spp. (Noogoora burr)																							

Table 15. The number of sites in each of the six categories.

	Categories						Not valid [^]	Total
	1*	2	3	4	5	6		
Number of sites	16	42	6	75	59	20	8	226

*Category 1 represents the highest priority for action - see Appendix 4 of the statewide framework for further information.

[^] insufficient information was provided to reliably allocate these sites to a category.

14. SUMMARY FOR NAMOI CMA

The approach followed here to identify priorities for widespread weed management for biodiversity conservation has been endorsed by the NSW Natural Resources and Environment CEO Cluster Group. This site-led approach is across all land tenures. Thus, where possible, government agencies and public land managers should use the priorities established here to help guide investment in widespread weed management.

Priority is directed to areas where the outcomes of weed control will have the greatest biodiversity benefit (in terms of the biological assets at risk) and thus enable the delivery of a number of key objectives in New South Wales. Greatest benefit will be achieved when the outputs of this project are embraced by multiple natural resource managers at a landscape scale. Whilst the regional priorities were developed specifically to guide future investment by CMAs, ideally the site ranking will be adopted by all environmental managers to strategically direct resources to manage widespread weeds across all land tenures. Control programs should be undertaken in a coordinated manner by CMAs as well as by state and local authorities with jurisdiction in the region.

Control programs at priority sites will need to be complementary to existing control programs that have primary objectives other than reduction of current weed impacts, e.g. noxious weed control, erosion management or strategic prevention programs to avoid future impacts.

14.1 Meeting the NRC target for invasive species

Undertaking weed control programs at the high priority sites identified here will help to deliver on the third indicator of the NRC target for invasive species, '*success of control programs for widespread weeds*'.

The list of priority sites, weed species and biodiversity outlined here for the Namoi CMA region can also be used to meet a range of CMA priorities. This project directly addresses the Namoi CMA CAP targets as outlined in Section 12.1, as it supports management of widespread weeds for biodiversity conservation. Following an implementation option outlined in Section 4 of the *statewide framework* will result in a number of specific outcomes for Namoi CMA. However, how the list of sites is used to guide investment will depend on the number of sites in each control category, the funding available, previous commitment to high priority sites and the specifics of individual CMA CAP actions (both for weeds and biodiversity conservation).

14.2 Biodiversity conservation and widespread weed management

The list of priority sites provides strategic direction for on-ground works by identifying areas where weed control programs will have positive benefits for biodiversity. Identifying the specific native species and ecological communities at risk from weeds at the site will ensure that control and monitoring programs are tailored towards their recovery, helping to ensure conservation outcomes.

Identification of the native species and ecological communities negatively impacted by high priority weeds, and site specific information on their location and condition in the Namoi CMA region, will improve tools like regional pest strategies, the PAS database and recovery plans for threatened species under the TSC Act. Currently many of the weed control actions for threatened species and ecological communities are quite general. Information obtained via this project will improve the usefulness of general weed control actions in the PAS by providing detail on the weed species having an impact and sites where control is required. It also highlights weed impacts and site locations for EECs, threatened plant species and threatened fauna species not currently captured in the PAS.

Detailed monitoring that specifically assesses the potential reduction in impact of widespread weeds in the Namoi CMA region is also required. Monitoring programs need to measure (i) reductions in weed presence and (ii) response of native species and communities, following control (see Section 3.1.6 of the *statewide framework*).

14.3 Capability for interrogation and review

The priorities identified in this report are not static. They do not represent a comprehensive ground-based assessment of the entire Namoi CMA region. As conditions or management requirements change at existing sites, and as information on new sites becomes available, they can be included in the Namoi site spreadsheet for subsequent re-ranking at a future point (either formally or informally). Also, by combining the sites with other spatial data for biodiversity conservation, greater integration between weed management and biodiversity conservation can be achieved.

The draft report for Namoi CMA contained site nominations received before April 2009. Any site nominations received between May 2009 and August 2010 were included and ranked in this final report. Any additional site nominations or changes to existing nominations should be provided to the relevant contact within Namoi CMA for inclusion in the site spreadsheet and sites should subsequently be re-ranked by Namoi CMA.

The list of priority sites will be kept by the CMA in electronic form to ensure that the lists are updated or revised when necessary. This is important given the continuing nature of the site nomination process, data collection and monitoring.

15. REFERENCES

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16. APPENDICES

Appendix 11: Current actions in the Priorities Action Statement relating to weed management in the Namoi CMA region

Appendix 12: Attendees at Namoi CMA weed impacts to biodiversity workshops

Appendix 13: All weeds considered at workshops in the Namoi CMA region, their distribution and their relative impact on biodiversity

Appendix 14: Priority widespread weeds impacting on biodiversity in the Namoi CMA region sorted by landscape

Appendix 15: Template of letter sent to private landholders with voluntary conservation agreements or wildlife refuges on their properties

**APPENDIX 11.
CURRENT ACTIONS IN THE PRIORITIES ACTION STATEMENT RELATING
TO WEED MANAGEMENT IN THE NAMOI CMA REGION**

Threatened species, populations and communities	Type of species	Level of threat	Priority actions in PAS relating to weed management
High priority			
<i>Anseranas semipalmata</i>	Birds	V	1. Promote and support weed control programs within wetlands.
<i>Eucalyptus oresbia</i>	Trees	V	1. Control weeds in populations shown to be affected by weed burden.
<i>Hakea pulvinifera</i>	Shrubs	E	1. Pine encroachment control.
<i>Lepidium aschersonii</i>	Herbs and Forbs	V	1. Conduct weed control and regeneration of the vegetative community.
<i>Miniopterus schreibersii oceanensis</i>	Bats	V	1. Undertake non-chemical removal of weeds (e.g. lantana; blackberry) to prevent obstruction of cave entrances.
White Box Yellow Box Blakely's Red Gum Woodland	Ecological Communities	E	1. Target priority weeds for control.
Medium priority			
Artesian Springs Ecological Community	Ecological Communities	E	1. Prohibit the establishment of exotic pasture species in GAB discharge spring wetlands. 2. Provide advice and support for the removal of exotic plants around any newly located spring wetlands; where required.
Brigalow within the Brigalow Belt South; Nandewar and Darling Riverine Plains Bioregions	Ecological Communities	E	1. Encourage land managers to employ best management practice standards in controlling noxious weed or pest species in EECs.
Coolibah-Black Box woodland of the northern riverine plains in the Darling Riverine Plains and Brigalow Belt South bioregions	Ecological Communities	E	1. Encourage land managers to employ best management practice standards in controlling noxious weed or pest species in EECs.
<i>Dichanthium setosum</i>	Herbs and Forbs	V	1. Conduct weed control; especially of invasive exotic grasses.
<i>Digitaria porrecta</i>	Herbs and Forbs	E	1. Conduct weed control; especially of invasive exotic grasses.
<i>Eucalyptus mckieana</i>	Trees	V	1. Undertake weed control where required.
<i>Fontainea australis</i>	Shrubs	V	1. Control weeds in populations shown to be affected by weed burden.
Fuzzy Box on alluvials of South West Slopes; Darling Riverine Plains and the Brigalow Belt South	Ecological Communities	E	1. Encourage land managers to employ best management practice standards in controlling noxious weed or pest species in EECs.
<i>Goodenia macbarronii</i>	Herbs and Forbs	V	1. Control weed infestations in and around habitat; where required; taking care to avoid damage from herbicide application.
Howell Shrublands in the Northern Tablelands and Nandewar Bioregions	Ecological Communities	E	1. Undertake weed control where required.
Native Vegetation on Cracking Clay Soils of the Liverpool Plains	Ecological Communities	E	1. Undertake weed control in areas where required.

Threatened species, populations and communities	Type of species	Level of threat	Priority actions in PAS relating to weed management
New England Peppermint (<i>Eucalyptus nova-anglica</i>) Woodland on Basalts and Sediments in the New England Tableland Bioregion	Ecological Communities	E	1. Undertake weed control where required.
<i>Pomaderris queenslandica</i>	Shrubs	E	1. Manage weeds at known populations.
<i>Syconycteris australis</i>	Bats	V	1. Control coastal weed species e.g. Bitou Bush; but avoid aerial spraying during the flowering season of important heath species as herbicides can directly collect in flowers that are fed upon at night.
<i>Thesium australe</i>	Herbs and Forbs	V	1. Implement Bitou bush control as described in the approved TAP.

Low priority

<i>Cadellia pentastylis</i>	Trees	V	1. Provide advice and assistance for the removal of weed species within Ooline habitat such as Tiger Pear.
<i>Cadellia pentastylis</i> (Ooline) community in the Nandewar and Brigalow Belt South Bioregions	Ecological Communities	E	1. Provide advice and assistance for the removal of weed species within Ooline habitat such as Tiger Pear.

Note: Although the species in this table are found in Namoi CMA some actions listed above are not specific to Namoi CMA.

V = listed as vulnerable under the TSC Act.

E = listed as endangered under the TSC Act.

**APPENDIX 12.
ATTENDEES AT NAMOI CMA WEED IMPACTS TO BIODIVERSITY
WORKSHOPS**

Name	Organisation	Position
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Tuesday 17 February 2009 at Tamworth

Andrew Schweitzer	Namoi CMA	Invasive Species Coordinator
Michael Hooper	Tamworth Regional Council	Noxious Weed Inspector
Kate McLaren	Friend of the Kloori	Landowner (Voluntary Conservation Agreement private land)
Lee Amidy	Gunnedah Shire Council	Weeds Officer
Mike Whitney	Liverpool Plains Shire Council	Weeds Officer
Peter Scott	Liverpool Plains Shire Council	Weeds Officer
Patrick Lupica	DECCW	Ranger
Chris Nadolny	DECCW	Regional Ecologist
Tony Lawler	Inland Weed Control Services	Contractor
Dennis Boschma	Namoi CMA	Vegetation Officer

Wednesday 18 February 2009 at Narrabri

Graham Charles	I&I NSW	Research Agronomist (Weeds)
Jamie Maddocks	NW LHPA	Ranger
Duane Shawcross	DECCW	Senior Ranger (Pests)
Tony Meppem	I&I NSW	Institute Manager
Andrew Schweitzer	Namoi CMA	Invasive Species Coordinator

DECCW is now known as Office of Environment & Heritage (OEH), I&I NSW is now known as NSW Department of Primary Industries (NSW DPI)

APPENDIX 13. ALL WEEDS CONSIDERED AT WORKSHOPS IN THE NAMOI CMA REGION, THEIR DISTRIBUTION AND THEIR RELATIVE IMPACT ON BIODIVERSITY

Table 16. Top 20 Environmental Weeds in the Namoi CMA region (Mawhinney 2004).

Scientific name (Common name)	Tamworth					Narrabri				
	Distribution				I ¹	Distribution				I ¹
	T	S	P	R		T	S	P	R	
<i>Anredera cordifolia</i> (Madeira vine)	L	L	L	L			L	L		
<i>Asparagus asparagoides</i> (bridal creeper)	E	L	L	L						
<i>Cardiospermum grandiflorum</i> (balloon vine)				L						
<i>Cestrum parqui</i> (green cestrum)	W	W	W	W	H				W	H
<i>Eragrostis curvula</i> (African lovegrass)	W	W	W		H		W	W		H
<i>Genista monspessulana</i> (Montpellier broom)	L	L								
<i>Gleditsia triacanthos</i> (honey locust)		E	E	L						
<i>Gomphocarpus fruticosus</i> (cotton bush)	L	W	W	W	H		W	W		M
<i>Heliotropium amplexicaule</i> (blue heliotrope)	W	E	E	L	M		W			M
<i>Hyparrhenia hirta</i> (Coolatai grass)	W	W	W	W	H					
<i>Hypericum perforatum</i> (St John's wort)	W	W	W	E	H		L			
<i>Macfadyena unguis-cati</i> (cat's claw creeper)	L	L	L							
<i>Nassella neesiana</i> (Chilean needle grass)	E	L	L	L						
<i>Phyla canescens</i> (lippia)	E	W	W	W	H		L	W	W	H
<i>Salix</i> spp. (willows)				W	M				W	H
<i>Vinca major</i> (blue periwinkle)	E	L								
<i>Parthenium hysterophorus</i> (parthenium weed)	L	L	L	L						
<i>Zantedeschia aethiopica</i> (arum lily)	L	L	L	L						

Distribution abbreviations: W = widespread; L = localised; E = emerging.

¹Impact (I) abbreviations: H = high; M = medium; L = low.

Landscape abbreviations: P = plains; T = tablelands; S = slopes; R = riparian.

Table 17. Additional weeds considered at workshops in the Namoi CMA region.

Scientific name (Common name)	Tamworth					Narrabri				
	Distribution				I ¹	Distribution				I ¹
	T	S	P	R		T	S	P	R	
<i>Ailanthus altissima</i> (tree of heaven)	W	W	W	W	H		L	L	L	
<i>Ammi majus</i> (bishop weed)	W	W	W	W	M			W		L
<i>Anthoxanthum odoratum</i> (sweet vernal grass)	W				M					
<i>Araujia sericifera</i> (moth vine)										
<i>Arctotheca calendula</i> (Cape weed)	W	W	W	W	L		W	W		L
<i>Asphodelus fistulosus</i> (onion weed)		W	W		L			L		
<i>Bidens pilosa</i> (cobble's pegs)	W	W	W	W	L		W	W	W	L

Scientific name (Common name)	Tamworth					Narrabri				
	Distribution				I'	Distribution				I'
	T	S	P	R		T	S	P	R	
<i>Briza maxima</i> (quaking grass)							L	L		
<i>Bromus diandrus</i> (great brome)							L	L		
<i>Cenchrus ciliaris</i> (buffel grass)			L				W			H
<i>Cenchrus incertus</i> (spiny burr grass)	W	W	W	W	L		W	W		L
<i>Chloris gayana</i> (Rhodes grass)	E	E					W			H
<i>Cirsium vulgare</i> (spear thistle)	W	W	W	W	L		W	L		L
<i>Conyza</i> spp. (fleabanes)	W	W	W	W	L		W	W		L
<i>Coreopsis lanceolata</i> (coreopsis)										
<i>Cotoneaster</i> spp. (cotoneaster)	W	L	L		M					
<i>Crataegus monogyna</i> (hawthorn)	W	L			M					
<i>Cyperus eragrostis</i> (umbrella sedge)	W	W	W	W	L				L	
<i>Dactylis glomerata</i> (cocksfoot)	W	W		W	M					
<i>Echinochloa crus-galli</i> (barnyard grass)		W	W		M		W	W		L
<i>Ehrharta erecta</i> (panic veldgrass)										
<i>Hedera helix</i> (English ivy)	L	L	L	L						
<i>Hypochaeris radicata</i> (cat's ears)	W	W			L		W			L
<i>Ipomoea cairica</i> (morning glory)	L	L	L							
<i>Juncus articulatus</i> (jointed rush)	W	L			M					
<i>Ligustrum lucidum</i> (large-leaf privet)	W	L	L	W	H					
<i>Ligustrum sinense</i> (small-leaf privet)	W	L	L	W	H					
<i>Lolium perenne</i> (perennial ryegrass)	W	W	W	W	M					
<i>Lonicera japonica</i> (Japanese honeysuckle)	L	L	L	L						
<i>Lotus uliginosus</i> (lotus)										
<i>Lycium ferocissimum</i> (African boxthorn)	L	W	W	W	M		W	W		H
<i>Nassella trichotoma</i> (serrated tussock)	L									
<i>Ochna serrulata</i> (Mickey Mouse plant)										
<i>Olea europaea</i> subsp. <i>cuspidata</i> (African olive)		E	E							
<i>Opuntia stricta</i> (prickly pear)	W	W	W		L		W	W		L
<i>Paspalum dilatatum</i> (paspalum)	W	W	W	W	M		W		W	M
<i>Pennisetum clandestinum</i> (kikuyu)				L			L		L	
<i>Pennisetum villosum</i> (feather grass)	L	L	L							
<i>Phalaris aquatica</i> (bulbous canary grass)							L			
<i>Plantago lanceolata</i> (narrow-leaf plantain)	W	W			L			W		L
<i>Pyracantha angustifolia</i> (orange firethorn)	L	L								
<i>Rosa rubiginosa</i> (sweet briar)	W	W			L		W		L	H
<i>Rubus fruticosus</i> agg. (blackberry)	W	W		W	H					
<i>Senecio madagascariensis</i> (fireweed)	E	E	E							
<i>Senna pendula</i> (senna)							W	W		M
<i>Sida rhombifolia</i> (Paddy's lucerne)	W	W	W	W	M		W	W		L
<i>Solanum nigrum</i> (blackberry nightshade)	W	W	W	W	L		W	W		L

	Tamworth					Narrabri				
	Distribution				I'	Distribution				I'
Scientific name (Common name)	T	S	P	R		T	S	P	R	
<i>Solanum pseudocapsicum</i> (Madeira winter cherry)	L	L								
<i>Sonchus oleraceus</i> (common sowthistle)	W	W	W	W	L		W	W		L
<i>Taraxacum officinale</i> (dandelion)	W	W	W	W	L		L	L		
<i>Tradescantia fluminensis</i> (tradescantia)									W	L
<i>Verbena bonariensis</i> (purpletop)	W	W	W	W	L		W	?		L
<i>Vicia sativa</i> (spring vetch)	W	W			L		L			
<i>Vulpia myuros</i> (rat-tailed fescue)	W	W			L		W			L
<i>Xanthium occidentale</i> (Noogoora burr)	L	W	W	W	L		W	W	W	H

Distribution abbreviations: W = widespread; L = localised; E = emerging; ? = unsure.

Impact (I) abbreviations: H = high; M = medium; L = low.

Landscape abbreviations: P = plains; T = tablelands; S = slopes; R = riparian.

Table 18. Weeds added by workshop participants in the Namoi CMA region.

	Tamworth					Narrabri				
	Distribution				I'	Distribution				I'
Scientific name (Common name)	T	S	P	R		T	S	P	R	
<i>Achnatherum</i> sp. (espartillo)			E		H					
<i>Agave americana</i> (century plant)							L	L	L	
<i>Bryophyllum delagoense</i> (mother of millions)		W			H		W			H
<i>Carthamus lanatus</i> (saffron thistle)	W	W	W	W	M					
<i>Centaurea solstitialis</i> (St Barnaby's thistle)	W	W	W	W	H					
<i>Cuscuta campestris</i> (golden dodder)									W	L
<i>Echium plantagineum</i> (Paterson's curse)	W	W	W	W	H					
<i>Leucanthemum vulgare</i> (ox-eye daisy)	A				M					
<i>Olea europaea</i> subsp. <i>europaea</i> (European olive)		E	E							
<i>Opuntia aurantiaca</i> (tiger pear)							W	W		M
<i>Pennisetum</i> (fountain grass)	E	E	E							
<i>Rapistrum rugosum</i> (turnip weed)	W	W	W	W	H					
<i>Sorghum halepense</i> (Johnson's grass)		W	W	W	H					
<i>Vachellia farnesiana</i> (mimosa bush)		W	W		H		W	W		H
<i>Verbena rigida</i> (veined verbena)	W	W	W	W	M					
<i>Xanthium spinosum</i> (Bathurst burr)		W	W	W	M		W	W		M

Distribution abbreviations: W = widespread; L = localised; E = emerging.

Impact (I) abbreviations: H = high; M = medium; L = low.

Landscape abbreviations: P = plains; T = tablelands; S = slopes; R = riparian.

**APPENDIX 14.
PRIORITY WIDESPREAD WEEDS IMPACTING ON BIODIVERSITY IN THE
NAMOI CMA REGION SORTED BY LANDSCAPE**

Scientific name (Common name)	Scientific name (Common name)
Tablelands	Plains
<i>Ailanthus altissima</i> (tree of heaven)	<i>Ailanthus altissima</i> (tree of heaven)
<i>Cestrum parqui</i> (green cestrum)	<i>Centaurea solstitialis</i> (St Barnaby's thistle)
<i>Eragrostis curvula</i> (African lovegrass)	<i>Cestrum parqui</i> (green cestrum)
<i>Hyparrhenia hirta</i> (Coolatai grass)	<i>Echium plantagineum</i> (Paterson's curse)
<i>Hypericum perforatum</i> (St John's wort)	<i>Eragrostis curvula</i> (African lovegrass)
<i>Ligustrum lucidum</i> (large-leaf privet)	<i>Gomphocarpus fruticosus</i> (cotton bush)
<i>Ligustrum sinense</i> (small-leaf privet)	<i>Hyparrhenia hirta</i> (Coolatai grass)
<i>Rubus fruticosus</i> agg. (blackberry)	<i>Hypericum perforatum</i> (St John's wort)
<i>Xanthium</i> spp. (Noogoora burr)	<i>Lycium ferocissimum</i> (African boxthorn)
Slopes	<i>Phyla canescens</i> (lippia)
<i>Ailanthus altissima</i> (tree of heaven)	<i>Rapistrum rugosum</i> (turnip weed)
<i>Bryophyllum delagonesse</i> (mother of millions)	<i>Sorghum halepense</i> (Johnson's grass)
<i>Cenchrus ciliaris</i> (buffel grass)	<i>Vachellia farnesiana</i> (mimosa)
<i>Centaurea solstitialis</i> (St Barnaby's thistle)	Riparian
<i>Cestrum parqui</i> (green cestrum)	<i>Ailanthus altissima</i> (tree of heaven)
<i>Chloris gayana</i> (Rhodes grass)	<i>Cestrum parqui</i> (green cestrum)
<i>Echium plantagineum</i> (Patterson's curse)	<i>Gomphocarpus fruticosus</i> (cotton bush)
<i>Eragrostis curvula</i> (African lovegrass)	<i>Hyparrhenia hirta</i> (Coolatai grass)
<i>Gomphocarpus fruticosus</i> (cotton bush)	<i>Hypericum perforatum</i> (St John's wort)
<i>Hyparrhenia hirta</i> (Coolatai grass)	<i>Ligustrum lucidum</i> (large-leaf privet)
<i>Hypericum perforatum</i> (St John's wort)	<i>Ligustrum sinense</i> (small-leaf privet)
<i>Lycium ferocissimum</i> (African boxthorn)	<i>Phyla canescens</i> (lippia)
<i>Phyla canescens</i> (lippia)	<i>Rubus fruticosus</i> agg. (blackberry)
<i>Rapistrum rugosum</i> (turnip weed)	<i>Salix</i> spp. (willows)
<i>Rosa rubiginosa</i> (sweet briar)	<i>Xanthium</i> spp. (Noogoora burr)
<i>Rubus fruticosus</i> agg. (blackberry)	
<i>Sorghum halepense</i> (Johnson's grass)	
<i>Vachellia farnesiana</i> (mimosa bush)	
<i>Xanthium</i> spp. (Noogoora burr)	

**APPENDIX 15.
TEMPLATE OF LETTER SENT TO PRIVATE LANDHOLDERS WITH
VOLUNTARY CONSERVATION AGREEMENTS OR WILDLIFE REFUGES
ON THEIR PROPERTIES**

Date

Address

Dear

Did you know that weeds are one of the biggest threats to our native plants and animals in Australia?

Our colleagues in the Pest Management Unit are currently running a project to identify priority sites where priority widespread weeds are threatening biodiversity across all land tenures. At a series of workshops recently, a list of high priority widespread weeds impacting on biodiversity within the Namoi Catchment was established (see overleaf).

The project is now identifying the location of these priority weeds within the Catchment. This information will be collated into a database and will help direct investment in weed control for biodiversity conservation. Funding for weed control at priority sites may become available through the project.

Being landholders with biodiversity of high conservation value, you are invited to take part in the project. If one or more of the weeds listed below are threatening biodiversity on your land you are eligible to nominate a site, or a number of sites on your property and potentially receive funding for weed control.

All you need to do is complete the attached site nomination form and return it by Friday 3rd April. Information from site nominations, as well as existing biodiversity knowledge within the region, will be used to rank sites for weed control funding. If you wish to be considered for the weed control aspect of the project and the funding assistance, please indicate if, as a landholder in the Conservation Partners Program, you have previously received funding for weed control on your property and details of the scope of the work undertaken.

Please follow the instructions attached to the form and complete and return the data use agreement. If you have any questions about how to nominate a site or fill in the form, wish to receive an electronic copy of the forms to complete or require more information, contact the project officer on 9585 6837 or **weeds.cma@environment.nsw.gov.au**.

Please complete the form to the best of your knowledge. If you are unsure of how to address any of the fields then indicate 'Further Information Required'.

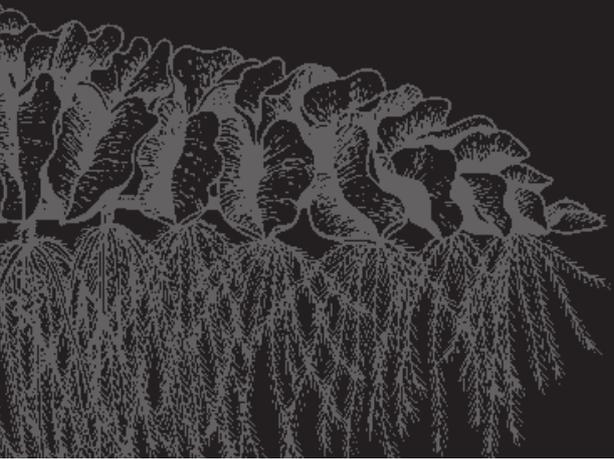
You can also find out more about the project by visiting:
www.environment.nsw.gov.au/cmaweeds

Yours sincerely

Sally Ash

Conservation Partners Program Coordinator

Parks and Wildlife Group



BIODIVERSITY PRIORITIES FOR WIDESPREAD WEEDS

Catchment Management Authority Regions

- Part A | Border Rivers–Gwydir
- Part B | Central West
- Part C | Hawkesbury–Nepean
- Part D | Hunter–Central Rivers
- Part E | Lachlan
- Part F | Lower Murray Darling
- Part G | Murray
- Part H | Murrumbidgee
- Part I | Namoi
- Part J | Northern Rivers
- Part K | Southern Rivers
- Part L | Sydney Metropolitan
- Part M | Western



Primary
Industries



Office of
Environment
& Heritage



Catchment
Management
Authorities



Australian Government