



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

Murray CMA region

Part G

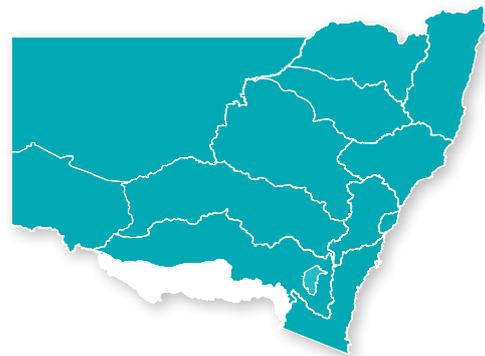


NSW Department of Primary Industries
Office of Environment & Heritage

BIODIVERSITY PRIORITIES FOR WIDESPREAD WEEDS

Murray CMA region

Part G



NSW Catchment Management Authorities
NSW National Parks & Wildlife Service
Australian Government

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.

© State of New South Wales 2011.

Disclaimer: While all care has been taken in the preparation of this publication, neither NSW DPI, OEH, or the key stakeholders accept any responsibility for loss or damage that may result from any inaccuracy or omission, or from use of the information contained herein.

For further information contact:

Pest Management Unit
NSW National Parks and Wildlife Service
Office of Environment & Heritage
43 Bridge Street
PO BOX 1967 Hurstville NSW 1481
Email: weeds.cma@environment.nsw.gov.au
Project weblink: www.environment.nsw.gov.au/cmaweeds

This document was prepared by:

**Leonie K. Whiffen, Moira C. Williams, Natalie Izquierdo,
Paul O. Downey, Peter J. Turner**
Pest Management Unit
NSW National Parks and Wildlife Service
Office of Environment & Heritage
PO Box 1967 Hurstville NSW 1481

Bruce A. Auld and Stephen B. Johnson
NSW Department of Primary Industries
Locked Bag 21, Orange NSW 2800

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.

This material may be reproduced in whole or in part, provided the meaning is unchanged and the source is acknowledged.

ISBN: 978 1 74256 093 9

G1. Introduction	5
G2. Regional context	6
G2.1 Catchment Action Plan	6
G2.2 Regional Weed Strategy for the Murray Catchment	6
G2.3 Regional weed advisory committees and management plans	7
G2.4 OEH Regional Pest Management Strategies	7
G2.5 Priorities Action Statement (PAS)	7
G3. Regional outputs	8
G3.1 Methodology used to develop the priorities	8
G3.1.1 Workshops in Murray CMA	8
G3.1.2 Murray CMA specific webpages	8
G3.2 The process	8
G3.2.1 Stage 1. Identifying weeds that pose a threat in the Murray CMA region	8
G3.2.2 Stage 2. Identifying biodiversity at risk from high priority weeds	11
G3.2.3 Stage 3. Selecting and prioritising sites for control	11
G3.2.4 Review and additional site nominations	11

G4. Summary for Murray CMA	15
G4.1 Meeting the NRC target for invasive species	15
G4.2 Biodiversity conservation and widespread weed management	15
G4.3 Capability for interrogation and review	16
G5. References	17
G6. Appendices	18
Appendix G1. Current actions in the Priorities Action Statement relating to weed management in the Murray CMA region	19
Appendix G2. Attendees at the Murray CMA region weed impacts to biodiversity workshops	20
Appendix G3. Weeds considered at the workshops in the Murray CMA region, their distribution and their relative impact on biodiversity	21

G1. 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 Murray 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 G) provides the framework for establishing regional priorities, in the form of priority widespread weeds and priority sites for control, in the Murray CMA region.

The Murray CMA region covers approximately 35,170 square kilometres. It is located in southern New South Wales and surrounded by the Murray River to the south, the Murrumbidgee River catchment to the north and the Australian Alps to the east. The region has supported the Indigenous Nations of the Wiradjuri, Yorta Yorta, Birapa Birapa, Wamba Wamba, Wadi Wadi and Muthi Muthi (Murray CMA 2009). The Murray CMA region sustains a diverse agricultural sector that includes grazing, cropping, irrigation, forestry and horticulture (Murray CMA 2009). As a result of the extent of clearing and land use changes in some areas, there are four endangered ecological communities (EECs) and a total of 102 threatened species (64 animals and 34 plants) listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) in the region (DECC 2009).

Invasive plants and animals are recognised as a key threat to sustainability of the region's natural resources. Weeds pose a significant threat to biodiversity by directly impacting 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 55 weeds in the Murray CMA region were threatening biodiversity, including 24 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 Murray 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. When considering such investments, it must be noted that the timescale and intensity of weed management in arid and semi-arid regions of the state may differ significantly from that in coastal areas due to greater variation in rainfall and productivity.

This project will enable all stakeholders in the Murray 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 Murray 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.

G2. REGIONAL CONTEXT

This section summarises the strategies, policies and programs relevant to weed management in Murray 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*.

G2.1 Catchment Action Plan

Under the NSW *Catchment Management Authorities Act 2003* each CMA is required to prepare a CAP, which outlines future priorities for each CMA and provides a co-ordinated plan for natural resource work in the region over a 10-year period. The Murray CMA CAP outlines a broad biodiversity theme with three catchment targets and four management targets that relate to weed management for biodiversity conservation (Murray CMA 2007). By identifying and prioritising biodiversity at risk from weeds in the region as well as identifying priority sites for control, this project will help Murray CMA address these targets:

B1 Aim: By 2016 there is an improvement in the status of native vegetation.

- » B1.1 Aim: By 2016, at least an additional 30,500 ha of remnant native vegetation will be actively managed.

B2 Aim: By 2016 there is a reduction in the status of ecologically significant invasive plants and animals.

- » B2.1 Aim: From 2008, eradication of State and Regionally Prohibited Weeds from priority High Conservation areas will occur within five years of detection.

B3 Aim: By 2016 there is an improvement in the status of priority biodiversity assets.

- » B3.1 Aim: By 2016, at least 200 threatened species recovery actions listed in Priorities Action Statement will be implemented.
- » B3.2 Aim: By 2016, at least 13 key threatening processes will be abated by undertaking the priority actions outlined in the Priority Action Statement.

G2.2 Regional Weed Strategy for the Murray Catchment

The Regional Weed Strategy for the Murray CMA region was commissioned by Murray CMA. The prioritisations and recommendations (Bosse and Verbeek 2008) were developed through a series of workshops. A prioritisation process based on Randall's system (Randall 2000) was used to rank weeds within seven subcatchments. Weeds were placed in four categories with an emphasis on (i) potential weed threats and (ii) new and (iii) emerging weed problems. The fourth category was for (iv) widespread weeds throughout the region, yet some widespread weeds were not included because they were 'already widespread, not declared noxious and well established throughout Australia' (Bosse and Verbeek 2008). The Regional Weed Strategy Murray Catchment states that 'The Murray CMA may invest in low priority or un-prioritised weeds where they are deemed to be threatening the biodiversity or ecological values of a particular site' (Bosse and Verbeek 2008). This project focuses on widespread weeds that are impacting on biodiversity and is therefore complementary to the Regional Weed Strategy for the Murray CMA region.

G2.3 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 Eastern and Western Riverina Noxious Weeds Advisory Groups (ERNWAG and WRNWAG) are responsible for co-ordinating a number of regional management plans relevant to the Murray CMA region. Current plans include: Alligator weed (*Alternanthera philoxeroides*), black willow (*Salix nigra*), Chilean needle grass (*Nassella neesiana*), Coolatai grass (*Hyparrhenia hirta*), hardhead thistle (*Acroptilon repens*), Johnson grass (*Sorghum halepense*), perennial and prairie ground cherry (*Physalis* spp.), blackberry (*Rubus fruticosus* agg.), sagittaria (*Sagittaria* spp.), serrated tussock (*Nassella trichotoma*), silver-leaf nightshade (*Solanum elaeagnifolium*), spiny burr grass (*Cenchrus incertus*) and St John's wort (*Hypericum perforatum*).

G2.4 Office of Environment & Heritage (OEH) Regional Pest Management Strategies

Within the Murray CMA region, the NPWS (part of OEH) administers significant land for conservation purposes. Weed management priorities on NPWS estate are currently 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 two strategies relevant to the Murray region: (i) Western Rivers, and (ii) Snowy Mountain and Resorts (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 are incorporated into this project (see Section 1.6.1 of the *statewide framework*).

G2.5 Priorities Action Statement (PAS)

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 12 actions relevant to weed management in the Murray CMA region (Appendix G1). These actions apply to eight plant and three animal species, but only three actions mention specific weeds relevant to Murray CMA, these include lamb's tongues (*Plantago lanceolata*), cyperus (*Cyperus tenellus*), soft brome (*Bromus hordeaceus*), quaking grass (*Briza* spp.), blackberry (*Rubus fruticosus* agg.) and lilaea (*Lilaea scilloides*). Bitou bush (*Chrysanthemoides monilifera*) is also mentioned, but is not relevant as it does not occur in the Murray CMA region.

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.

G3. REGIONAL OUTPUTS

G3.1 Methodology used to develop the priorities

The *statewide framework* outlines the broad methods used across all 13 CMAs in NSW to establish regional weed priorities for biodiversity conservation. The specific details of implementing the process in the Murray CMA are outlined below with modifications to account for existing relevant data and strategies.

G3.1.1 Workshops in Murray CMA

Two workshops were held in the Murray CMA region at Albury and Deniliquin on the 17 and 19 March 2008 respectively. People from all local councils, relevant government departments, tertiary education establishments, consultants, landholders and community organisations were invited to attend. Representatives from Murray CMA, Land and Property Management Authority (LPMA), Forestry NSW, Councils, Livestock Health and Pests Authorities (LHPA), TAFE, primary producers and consultants attended the workshops. See Appendix G2 for a full list of attendees.

G3.1.2 Murray CMA specific webpages

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

G3.2 The process

G3.2.1 Stage 1. Identifying weeds that pose a threat in the Murray CMA region

A weeds dataset for the Murray CMA region

A list of weeds to consider at the workshops was collated using the resources outlined in Section 3.2 of the *statewide framework*, sources listed in section G2, and the following documents:

- » Plants of NSW (Jacobs and Pickard 1981)
- » Weeds (Auld and Medd 1992)
- » Plants of Western NSW (Cunningham *et al.* 1981)

Distribution of weeds within the Murray CMA region

The list of weeds for the Murray CMA region was presented to workshop participants who were asked to identify which weeds they considered to be widespread. The weeds list considered at each workshop within the region is provided in Appendix G3.

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 G1). Sixty two widespread weeds were identified as having a high impact on biodiversity, which are the species that make up the final list of priority widespread weeds in the region (Table G2).

The impact of each widespread weed as determined at each workshop within the Murray CMA region is provided in Appendix G3.

Table G1. Relative impact of widespread weeds on biodiversity.

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 have relatively short life spans.

Table G2. Priority widespread weeds impacting on biodiversity in the Murray CMA region (listed in alphabetical order).

Scientific name (Common name)	KTP ¹	WoNS ²	Noxious	
			NSW ³	LGA ⁴
<i>Acacia baileyana</i> (Cootamundra wattle)				
<i>Acacia longifolia</i> (Sydney golden wattle)				
<i>Acer negundo</i> (box elder)				
<i>Acroptilon repens</i> (creeping knapweed)				Y
<i>Aira cupaniana</i> (silvery hairgrass)				
<i>Alisma lanceolata</i> (alisma)				
<i>Alisma plantago-aquatica</i> (water plantain)				
<i>Amsinckia</i> spp. (yellow burr weed)				
<i>Asparagus asparagoides</i> (bridal creeper)	Y	Y	5	Y
<i>Asphodelus fistulosus</i> (onion weed)				Y
<i>Avena fatua</i> (wild oats)				
<i>Briza maxima</i> (blowfly grass)				
<i>Briza minor</i> (shivery grass)				
<i>Bromus diandrus</i> (ripgut brome)				
<i>Carrichtera annua</i> (Wards weed)				
<i>Cenchrus incertus</i> and <i>C. longispinus</i> (spiny burr grass)				Y
<i>Chamaecytisus palmensis</i> (tree lucerne)				
<i>Echium plantagineum</i> (Paterson's curse)	Y*			Y
<i>Egeria densa</i> (dense waterweed)			5	
<i>Ehrharta calycina</i> (perennial veldtgrass)	Y			
<i>Eragrostis curvula</i> (African lovegrass)	Y			
<i>Fraxinus angustifolia</i> (desert ash)				
<i>Galenia pubescens</i> (galenia)				
<i>Gazania rigens</i> (gazania)	Y*			
<i>Holcus lanatus</i> (Yorkshire fog)				
<i>Hyparrhenia hirta</i> (Coolatai grass)	Y			Y
<i>Hypericum perforatum</i> (St John's wort)	Y*			Y
<i>Hypochoeris radicata</i> (flatweed, catsear)				
<i>Juncus articulatus</i> (jointed rush)				
<i>Leucanthemum vulgare</i> (ox eye daisy)				
<i>Ligustrum lucidum</i> (broad-leaf privet)	Y*			Y
<i>Ligustrum sinense</i> (small-leaf privet)	Y*			Y

Scientific name (Common name)	KTP ¹	WoNS ²	Noxious	
			NSW ³	LGA ⁴
<i>Limonium</i> spp. (sea lavender)				
<i>Lolium rigidum</i> (annual ryegrass)				
<i>Lycium ferocissimum</i> (African boxthorn)	Y*			Y
<i>Marrubium vulgare</i> (horehound)	Y*			Y
<i>Nassella trichotoma</i> (serrated tussock)	Y	Y		Y
<i>Nymphaea mexicana</i> (yellow water lily)				
<i>Olea europaea</i> (olives)	Y			
<i>Phalaris aquatica</i> (phalaris)				
<i>Phoenix</i> spp. (date palm)	Y*			
<i>Phyla canescens</i> (lippia)	Y*		4	
<i>Physalis virginiana</i> (perennial ground cherry)	Y*			Y
<i>Pinus</i> spp. (pines)	Y*			
<i>Populus</i> spp. (poplars)				
<i>Romulea minutiflora</i> (small flowered onion grass)			5	
<i>Romulea rosea</i> (onion grass)			5	
<i>Rosa rubiginosa</i> (sweet briar)	Y*			Y
<i>Rubus fruticosus</i> agg. (blackberry)	Y*	Y	4	
<i>Sagittaria platyphylla</i> (sagittaria)			5	Y
<i>Sagittaria montevidensis</i> (arrowhead)			5	
<i>Salix</i> spp. (willows)	Y*	Y	5	
<i>Schinus</i> spp. (pepper tree)	Y*			
<i>Scleroleana birchii</i> (galvanised burr)				Y
<i>Senecio cunninghamii</i> (bushy groundsel)				
<i>Solanum elaeagnifolium</i> (silver-leaf nightshade)				Y
<i>Tamarix aphylla</i> (athel tree)	Y*	Y	5	
<i>Tribulus terrestris</i> (caltrop)				
<i>Vulpia</i> spp. (rats tail fescue)				
<i>Watsonia meriana</i> (watsonia)				
<i>Xanthium occidentale</i> (Noogoora burr)				Y
Various families, genera and species (feral fruit trees)				

KTP¹ = Weed listed under a Key Threatening Process in the TSC Act, as at 31 August 2010; WoNS² = Weeds of National Significance (Thorp and Lynch 2000); NSW³ = All of 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*.

G3.2.2 Stage 2. Identifying biodiversity at risk from high priority weeds

At each workshop, participants were provided with lists of general ecological communities (Keith 2004) and threatened species (as listed under the NSW TSC Act and national *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)) present in Murray CMA region. Some of the general ecological communities within the list were made up of EECs listed under the TSC and EPBC Act (Table G3). Participants were asked to consider if any were currently at risk from each of the high priority widespread weeds (identified during Stage 1). The impacts of weeds on individual species were not considered due to a lack of knowledge about species' exact locations and interactions with specific weed species. The list of ecological communities identified as under threat from the high priority weeds (Table G4) was used to help guide site nominations (G3.2.3, Stage 3).

The list of ecological communities is by no means exhaustive, but is likely to represent communities where the priority weeds are having the greatest immediate impact.

Table G3. Endangered ecological communities (EECs) included within general ecological communities considered at workshops in the Murray CMA region.

General ecological community	Endangered Ecological Community
Woodlands (east)	1) White Box Yellow Box Blakely's Red Gum Woodland 2) White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland Grassy White Box Woodlands
Grasslands (east)	Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital
Montane Areas and Peatland	Montane Peatlands and Swamps
Floodplain Transition Woodlands (east and west)	Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions
Inland Floodplain Woodland	Inland Grey Box Woodland

Impact of widespread weeds on ecological communities

Woodlands were generally the most susceptible vegetation formation to weeds and a wide range of weeds invaded riparian areas across the region. Riparian areas are subject to on-going natural disturbance and are conduits for plant spread. Restoration and maintenance of riparian areas will aid in reducing the overall impact of weeds in a region.

Tree weeds such as athel tree (*Tamarix aphylla*), box elder (*Acer negundo*), pepper tree (*Schinus* spp.) and poplars (*Populus* spp.) impacted many ecological communities in the east of the region although there is some uncertainty whether these species can be considered widespread given limited herbarium records. Shrubs impacted many ecological communities across the whole region, having a slightly larger impact in the west. Grass species impacted a greater number of ecological communities in the east, but herbaceous weeds impacted more ecological communities in the west.

G3.2.3 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 made available to key stakeholders (including workshop participants), and placed on the Murray CMA project website to enable access for others. In addition, during 2009-10 NPWS undertook a comprehensive survey of sites on NPWS estate.

Categories for control

The nine sites nominated to date (as at 31 August 2010) for the Murray CMA region were separated into six categories using the site ranking process outlined in Appendix 4 of the *statewide framework*. 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.

This process resulted in five sites in Category 1 (Table G5). 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.

G3.2.4 Review and additional site nominations

A draft of this report was provided to Murray CMA for comment and review on 10 July 2009. The draft report contained information on Stages 1 and 2 only. At the time of the workshops Murray CMA had an existing project that potentially identified priority assets and sites for weed control. Unfortunately no site nominations were received from stakeholders for this project as a result. All sites identified and ranked to date were provided through the survey of sites on NPWS estate carried out in 2009-10. Therefore site nominations should be sought from stakeholders in Murray CMA in the future, including private land owners with wildlife refuges or voluntary conservation agreements on their properties to try and access important biodiversity sites on private land.

The site nomination process is ongoing and should be used by Murray 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 G4. Ecological communities under threat from priority widespread weeds in the Murray CMA region.

Priority widespread weed	Ecological community																					
Scientific name (Common name)	East (of Berrigan)								West (of Berrigan)													
	Southern Tablelands Grasslands	Woodlands*	Forests	Grasslands*	Floodplain Transition Woodlands*	Montane Areas and Peatland*	Riparian Areas	Wetlands	Aquatic	Woodlands	Mallee Woodlands	Inland Riverine Forests	Floodplain Transition Woodlands*	Inland Floodplain Woodland*	Boree (Myall) Woodlands*	Grasslands	Chenopod Shrublands	Riverine Sandhill Woodlands	Riparian Areas	Wetlands	Aquatic*	
<i>Acacia baileyana</i> (Cootamundra wattle)																						
<i>Acacia longifolia</i> (Sydney golden wattle)																						
<i>Acer negundo</i> (box elder)																						
<i>Acroptilon repens</i> (creeping knapweed)																						
<i>Aira cupaniana</i> (silvery hairgrass)																						
<i>Alisma lanceolata</i> (alisma)																						
<i>Alisma plantago-aquatica</i> (water plantain)																						
<i>Amsinckia</i> spp. (yellow burr weed)																						
<i>Asparagus asparagoides</i> (bridal creeper)																						
<i>Asphodelus fistulosus</i> (onion weed)																						
<i>Avena fatua</i> (wild oats)																						
<i>Briza maxima</i> (blowfly grass)																						
<i>Briza minor</i> (shivery grass)																						

Priority widespread weed	Ecological community																					
Scientific name (Common name)	East (of Berrigan)								West (of Berrigan)													
	Southern Tablelands Woodlands	Grassy Woodlands*	Forests	Grasslands*	Floodplain Transition Woodlands*	Montane Areas and Peatland*	Riparian Areas	Wetlands	Aquatic	Woodlands	Mallee Woodlands	Inland Riverine Forests	Floodplain Transition Woodlands*	Inland Floodplain Woodland*	Boree (Myall) Woodlands*	Grasslands	Chenopod Shrublands	Riverine Sandhill Woodlands	Riparian Areas	Wetlands	Aquatic*	
<i>Bromus diandrus</i> (ripgut brome)																						
<i>Carrichtera annua</i> (Wards weed)																						
<i>Cenchrus incertus</i> <i>C. longispinus</i> (spiny burr grass)																						
<i>Chamaecytisus palmensis</i> (tree lucerne)																						
<i>Echium plantagineum</i> (Paterson's curse)																						
<i>Egeria densa</i> (dense waterweed)																						
<i>Ehrharta calycina</i> (perennial veldtgrass)																						
<i>Eragrostis curvula</i> (African love grass)																						
<i>Fraxinus angustifolia</i> (desert ash)																						
<i>Galenia pubescens</i> (galenia)																						
<i>Gazania rigens</i> (gazania)																						
<i>Holcus lanatus</i> (Yorkshire fog)																						
<i>Hyparrhenia hirta</i> (Coolatai grass)																						
<i>Hypericum perforatum</i> (St John's wort)																						
<i>Hypochaeris radicata</i> (flatweed, catsear)																						
<i>Juncus articulatus</i> (jointed rush)																						
<i>Leucanthemum vulgare</i> (ox eye daisy)																						
<i>Ligustrum lucidum</i> (broad-leaf privet)																						
<i>Ligustrum sinense</i> (small-leaf privet)																						
<i>Limonium</i> spp. (sea lavender)																						
<i>Lolium rigidum</i> (annual ryegrass)																						
<i>Lycium ferocissimum</i> (African boxthorn)																						
<i>Marrubium vulgare</i> (horehound)																						
<i>Nassella trichotoma</i> (serrated tussock)																						
<i>Nymphaea mexicana</i> (yellow water lily)																						
<i>Olea europaea</i> (olives)																						
<i>Phalaris aquatica</i> (phalaris)																						
<i>Phoenix</i> spp. (date palm)																						

Priority widespread weed	Ecological community																						
Scientific name (Common name)	East (of Berrigan)								West (of Berrigan)														
	Southern Tablelands Grassy Woodlands	Woodlands*	Forests	Grasslands*	Floodplain Transition Woodlands*	Montane Areas and Peatland*	Riparian Areas	Wetlands	Aquatic	Woodlands	Mallee Woodlands	Inland Riverine Forests	Floodplain Transition Woodlands*	Inland Floodplain Woodland*	Boree (Myall) Woodlands*	Grasslands	Chenopod Shrublands	Riverine Sandhill Woodlands	Riparian Areas	Wetlands	Aquatic*		
<i>Phyla canescens</i> (lippia)																							
<i>Physalis virginiana</i> (perennial ground cherry)																							
<i>Pinus</i> spp. (pines)																							
<i>Populus</i> spp. (poplars)																							
<i>Romulea minutiflora</i> (small flowered onion grass)																							
<i>Romulea rosea</i> (onion grass)																							
<i>Rosa rubiginosa</i> (sweet briar)																							
<i>Rubus fruticosus</i> agg. (blackberry)																							
<i>Sagittaria graminea</i> (sagittaria)																							
<i>Sagittaria montevidensis</i> (arrowhead)																							
<i>Salix</i> spp. (willows)																							
<i>Schinus</i> spp. (pepper tree)																							
<i>Scleroleana birchii</i> (galvanised burr)																							
<i>Senecio cunninghamii</i> (bushy groundsel)																							
<i>Solanum elaeagnifolium</i> (silver-leaf nightshade)																							
<i>Tamarix aphylla</i> (athel tree)																							
<i>Tribulus terrestris</i> (caltrop)																							
<i>Vulpia</i> spp. (rats tail fescue)																							
<i>Watsonia meriana</i> (watsonia)																							
<i>Xanthium occidentale</i> (Noogoora burr)																							
Various families, genera and species (feral fruit trees)																							

*These vegetation types include endangered ecological communities listed under the TSC or EPBC Act (see Table G3)

Table G5. The number of sites in each of the six categories.

	Categories						Not valid^	Total
	1*	2	3	4	5	6		
Number of sites	5	0	1	2	0	0	1	9

*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.

G4. SUMMARY FOR MURRAY 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 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.

The timescale and intensity of weed management in arid and semi-arid parts of the state will differ from coastal areas due to greater rainfall variability and the consequential “boom and bust” cycle of productivity. For example, sites where biodiversity is at risk from weeds may only require action following periods of high rainfall. It is also important to note that other threats may be of greater significance and management of weeds should not be undertaken in isolation. 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.

G4.1 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 Murray CMA region, can also be used to meet a range of CMA priorities. This project directly addresses the Murray CMA CAP targets as outlined in Section G2.1, 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 Murray 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).

G4.2 Biodiversity conservation and widespread weed management

The list of priority sites provides strategic direction for on-ground works by identifying areas where weed control 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 Murray 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 Murray 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*).

G4.3 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 Murray CMA region. As conditions or management requirements change at existing sites, and as information on sites becomes available, they can be included into the the Murray CMA site spreadsheet for subsequent re-ranking in the future (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.

This final report includes all site nominations received up until 31 August 2010. The low number of sites compiled to date indicates that further consultation of stakeholders is required, especially with regards to private landholders, to improve the robustness of this as a prioritisation tool in the Murray CMA region. Any additional site nominations or changes to existing nominations should be provided to the relevant contact within the Murray CMA for inclusion in the site spreadsheet and sites should subsequently be re-ranked by Murray 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.

G5. REFERENCES

- Auld, BA and Medd, RW 1992. *Weeds: An Illustrated Botanical Guide to the Weeds of Australia* (Revised Edition). Inkata Press, Melbourne.
- Bosse, P and Verbeek, B 2008. *Regional Weed Strategy Murray Catchment*. Murray Catchment Management Authority, Albury.
- Coutts-Smith, AJ and Downey, PO 2006. *Impact of weeds on threatened biodiversity in NSW*. Technical Series 11. CRC for Australian Weed Management, Adelaide.
- Cunningham, GM, Mulhan, WE, Milthorpe, PL and Leigh, JH 1981. *Plants of Western New South Wales*. New South Wales Government Printer and Soil Conservation Service of New South Wales, Sydney.
- DECC 2009. *Threatened Species – Species, Populations and Ecological Communities of NSW*, www.threatenedspecies.environment.nsw.gov.au/tsprofile/index.aspx. June 2009.
- Hughes, NK, Burley, AL, King, SA and Downey, PO 2009. *Monitoring manual for bitou bush control and native plant recovery*. Department of Environment, Climate Change and Water, Sydney, NSW, www.environment.nsw.gov.au/bitouTAP/monitoring.htm.
- Jacobs, SWL and Pickard, J 1981. *Plants of New South Wales. A Census of the Cycads, Conifers and Angiosperms*. Royal Botanic Gardens, Sydney.
- Keith, DA 2004. *Ocean Shores to Desert Dunes – The Native Vegetation of NSW and the ACT*. Department of Environment and Conservation, Hurstville.
- Murray CMA 2007. *Murray Catchment Management Authority Catchment Action Plan*. Murray Catchment Management Authority, Deniliquin.
- Murray CMA 2009. *Murray Catchment Management Authority Homepage*, www.murray.cma.nsw.gov.au/?p=main&p_id=5. Accessed June 2009.
- NRC 2005. *State-wide targets for natural resource management*. Natural Resources Commission, Sydney, www.nrc.nsw.gov.au/content/documents/Standard%20and%20targets%20-%20The%20Standard%20and%20targets.pdf.
- Randall, R 2000. 'Which are my worst weeds?' A simple ranking system for prioritising weeds. *Plant Protection Quarterly* 15:109-115.
- Thorp, JR and Lynch, R 2000. *The Determination of Weeds of National Significance*. National Weeds Strategy Executive Committee, Launceston.

G6. APPENDICES

Appendix G1: Current actions in the Priorities Action Statement relating to weed management in the Murray CMA region

Appendix G2: Attendees at Murray CMA region weed impacts to biodiversity workshops

Appendix G3: Weeds considered at the workshops in the Murray CMA region, their distribution and their relative impact on biodiversity

**APPENDIX G1.
CURRENT ACTIONS IN THE PRIORITIES ACTION STATEMENT RELATING
TO WEED MANAGEMENT IN THE MURRAY 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>Caladenia arenaria</i>	Orchids	E	1. Conduct experimental weed control.
<i>Caladenia concolor</i>	Orchids	E	1. Hand removal of <i>Briza</i> spp. and other weeds around individual orchids at Albury.
<i>Diuris</i> sp. (Oaklands, D.L. Jones 5380)	Orchids	E	1. Develop and implement a weed eradication program at the Oaklands site and other sites if necessary.
<i>Pilularia novae-hollandiae</i>	Ferns and Cycads	E	1. Remove exotic species such as <i>Plantago lanceolata</i> , <i>Cyperus tenellus</i> , <i>Bromus hordeaceus</i> and <i>Lilaea scilloides</i> in areas of known or likely habitat.
White Box Yellow Box Blakely's Red Gum Woodland	Ecological communities	CE	1. Target priority weeds for control

Medium Priority

<i>Austrostipa metatoris</i>	Herbs and Forbs	V	1. Conduct weed control at 5 selected sites and monitor benefit.
<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.
<i>Litoria spenceri</i>	Amphibians	E	1. Monitor extent of weeds along Bogong Ck 2. Monitor extent of weeds at Bourke's Gorge Bridge and control where necessary.
<i>Mastacomys fuscus</i>	Rodents	V	1. Control exotic weeds, including blackberry, in areas of broad-toothed rat habitat.
<i>Sclerolaena napiformis</i>	Shrubs	E	1. Conduct weed control at three selected sites and monitor benefit.
<i>Senecio garlandii</i>	Herbs and Forbs	V	1. Undertake weed control for populations on reserves in Murrumbidgee and Riverina-Highlands Areas.
<i>Thesium australe</i>	Herbs and Forbs	V	1. Implement bitou bush control as described in the approved TAP.

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

V = listed as vulnerable under the TSC Act.

E = listed as endangered under the TSC Act.

CE = listed as critically endangered under the TSC Act.

**APPENDIX G2.
ATTENDEES AT THE MURRAY CMA REGION WEED IMPACTS TO
BIODIVERSITY WORKSHOPS**

Name	Organisation	Position
Monday 17 March 2008 at Albury		
Shona Cowley	LPMA	Acting Team Leader
Warwick Hull	LPMA	Environmental Officer
Alan Scammel	LHPA	
Neal Whitsed	LHPA	Ranger
Kylie Durant	Murray CMA	Natural Resource Officer
Cassie West	Murray CMA	
Damian Wall	Red-Gum Pty Ltd	Consultant
Sarah Stuart	Albury City Council	Vegetation Management Officer
Jan Mitchell	Albury City Council	Noxious Weeds Officer
Tom White	Greater Hume Council	
Paula Bosse	Greater Hume Council	Noxious Weeds Project Officer
Sue Brunskill	TAFE	Lecturer
Judy Frankenberg	Private Landholder	
Alexandra Knight	Murray CMA	Senior Project Officer
Dale Stringer	Murray CMA	Senior Implementation Officer
Wednesday 19 March 2008 at Deniliquin		
Mick Lalor	Forests NSW	Operations Forester
Mick Mullins	LHPA	Managing Ranger
Martin Driver	Murray CMA	Catchment Officer - Vegetation
Nick Cullen	Murray CMA	
Sue Logie	Murray CMA	Implementation Officer
Rick Webster	Ecosurveys Pty Ltd	Consultant
Mick Jacob	Central Murray County Council	Weeds Officer
Brian Bourke	Central Murray County Council	Weeds Officer
Louise Armstrong	Murray CMA	Catchment Officer
Josh Ellis	Murray CMA	Implementation Officer
Stephen Battenally	Wakool Shire Council	Weeds Officer

**APPENDIX G3.
WEEDS CONSIDERED AT THE WORKSHOPS IN THE MURRAY CMA
REGION, THEIR DISTRIBUTION AND THEIR RELATIVE IMPACT ON
BIODIVERSITY**

Scientific name (Common name)	Albury		Deniliquin	
	D ¹	I ²	D ¹	I ²
<i>Acacia</i> spp.* (wattles)	W	H	W	H
<i>Acer negundo</i> * (box elder)	W	H		
<i>Acetosella vulgaris</i> (sheep sorrel)				
<i>Achillea millefolium</i> (milfoil)				
<i>Acroptilon repens</i> (creeping knapweed)			W	H
<i>Agrostis capillaris</i> (browntop bent grass)				
<i>Ailanthus altissima</i> (tree of heaven)	W	M		
<i>Aira cupaniana</i> (silvery hairgrass)				
<i>Alhagi maurorum</i> (camel thorn)				
<i>Alisma lanceolata</i> * (alisma)			W	H
<i>Alternanthera pungens</i> (khaki weed)	W	L	W	L
<i>Amaranthus albus</i> (tumbleweed)				
<i>Amaranthus retroflexus</i> (redroot amaranth)				
<i>Ammi majus</i> (bishop's weed)				
<i>Amsinckia calycina</i> (hairy fiddleneck)			W	H
<i>Amsinckia intermedia</i> (yellow burr weed)			W	H
<i>Anagallis arvensis</i> (scarlet pimpernel)				
<i>Anthemis cotula</i> (stinking mayweed)				
<i>Arctotheca calendula</i> (Capeweed)				
<i>Argemone ochroleuca</i> (Mexican poppy)				
<i>Artemisia verlotiorum</i> (mugwort)				
<i>Asparagus asparagoides</i> (bridal creeper)	W	H	W	H
<i>Asphodelus fistulosus</i> (onion weed)	W	H	W	H
<i>Aster subulatus</i> (bushy starwort)				
<i>Avena fatua</i> (wild oats)	W	H	W	M
<i>Briza maxima</i> (blowfly grass)	W	H		
<i>Briza minor</i> (shivery grass)				
<i>Bromus catharticus</i> (prairie grass)	W	L		
<i>Bromus diandrus</i> (ripgut brome)	W	H	W	M
<i>Bromus molliformis</i> (soft brome)	W	H		
<i>Bromus rubens</i> (red brome)				
<i>Capsella bursa-pastoris</i> (shepherd's purse)				
<i>Cardaria draba</i> (hoary cress)				
<i>Carduus tenuiflorus</i> (winged slender thistle)				
<i>Carrichtera annua</i> * (Wards weed)			W	H
<i>Carthamus lanatus</i> (saffron thistle)			W	L
<i>Cenchrus incertus</i> (spiny burr grass)	W	H	W	H
<i>Cenchrus longispinus</i> (spiny burr grass)	W	H	W	H
<i>Centaurea calcitrapa</i> (star thistle)				
<i>Centaurea melitensis</i> (Maltese cockspur)				

Scientific name (Common name)	Albury		Deniliquin	
	D ¹	I ²	D ¹	I ²
<i>Centaurea solstitialis</i> (St Barnaby's thistle)				
<i>Centaureum erythraea</i> (common centaury)				
<i>Cerastium glomeratum</i> (mouse-eared chickweed)				
<i>Chenopodium album</i> (fat hen)				
<i>Chenopodium multifidum</i> (scented goosefoot)				
<i>Chenopodium murale</i> (nettle-leaved goosefoot)				
<i>Chloris gayana</i> (Rhodes grass)				
<i>Chondrilla juncea</i> (skeleton weed)	W	L	W	M
<i>Cichorium intybus</i> (chicory)				
<i>Cirsium vulgare</i> (spear thistle)	W	L	W	L
<i>Conium maculatum</i> (hemlock)	W	L		
<i>Convolvulus arvensis</i> (field bindweed)				
<i>Conyza bonariensis</i> (flax leaf fleabane)				
<i>Cortaderia</i> spp. (pampas grass)			W	L
<i>Cucscuta campestris</i> (golden dodder)	W	L	W	M
<i>Cucumis myriocarpus</i> (prickly paddy melon)			W	L
<i>Cylindropuntia imbricata</i> (devil's rope pear)				
<i>Cynara cardunculus</i> (artichoke thistle)				
<i>Cyperus eragrostis</i> (umbrella sedge)	W	H		
<i>Cyperus rotundus</i> (nutgrass)				
<i>Datura ferox</i> (fierce thornapple)				
<i>Datura stramonium</i> (thornapple)				
<i>Digitaria sanguinalis</i> (summer grass)				
<i>Dittrichia graveolens</i> (stinkwort)				
<i>Echinochloa crus-galli</i> (barnyard grass)				
<i>Echinochloa microstachya</i> (prickly barnyard grass)				
<i>Echinochloa oryzoides</i> (hairy barnyard grass)				
<i>Echium plantagineum</i> (Paterson's curse)	W	H	W	H
<i>Echium vulgare</i> (viper's bugloss)	W	M		
<i>Egeria densa</i> * (dense waterweed)			W	H
<i>Eleusine indica</i> (crowsfoot grass)				
<i>Eleusine tristachya</i> (goose grass)				
<i>Elodea canadensis</i> (elodea)	W	L	W	M
<i>Elytrigia repens</i> (quack grass)				
<i>Emex australis</i> (spiny emex, cats head)	W	L		
<i>Eragrostis cilianensis</i> (stinkgrass)				
<i>Eragrostis curvula</i> (African lovegrass)			W	H
<i>Erodium cicutarium</i> (blue storksbill)				
<i>Erodium moschatum</i> (crowsfoot, storksbill)				
<i>Eschscholzia californica</i> (Californian poppy)				
<i>Fallopia convolvulus</i> (black bindweed)				

Scientific name (Common name)	Albury		Deniliquin	
	D ¹	I ²	D ¹	I ²
<i>Fraxinus angustifolia</i> * (desert ash)	W	H		
<i>Fumaria bastardii</i> (bastard's fumitory)				
<i>Fumaria capreolata</i> (white flowered fumitory)				
<i>Fumaria densiflora</i> (dense flowered fumitory)				
<i>Fumaria muralis</i> (wall fumitory)				
<i>Galenia pubescens</i> * (galenia)			W	H
<i>Galium aparine</i> (cleavers)	W	L	W	M
<i>Galium divaricatum</i> (slender bedstraw)				
<i>Gazania rigens</i> * (gazania)			W	H
<i>Geranium molle</i> (dove's foot cranesbill)				
<i>Heliotropium europaeum</i> (common heliotrope)			W	L
<i>Hirschfeldia incana</i> (Buchan weed)				
<i>Holcus lanatus</i> (Yorkshire fog)	W	L		
<i>Hordeum glaucum</i> (barley grass)	W	H	W	M
<i>Hyparrhenia hirta</i> (Coolatai grass)			W	H
<i>Hypericum perforatum</i> (St John's wort)	W	H	W	H
<i>Hypochoeris glabra</i> (smooth catsear)	W	H		
<i>Hypochoeris radicata</i> (flatweed, catsear)				
<i>Ibicella lutea</i> (devils claw)				
<i>Juncus articulatus</i> (jointed rush)	W	H		
<i>Lactuca serriola</i> (prickly lettuce)				
<i>Lamarckia aurea</i> (goldentop)				
<i>Lepidium africanum</i> (peppergrass)				
<i>Lepidium bonariense</i> (cutleaf peppergrass)				
<i>Leucanthemum vulgare</i> * (ox eye daisy)	W	H		
<i>Ligustrum lucidum</i> (broad-leaf privet)	W	H		
<i>Ligustrum sinense</i> (small-leaf privet)				
<i>Limonium</i> spp.* (sea lavender)			W	H
<i>Linum usitatissimum</i> (flax, linseed)				
<i>Lolium rigidum</i> (annual ryegrass)	W	H	W	M
<i>Lycium ferocissimum</i> (African boxthorn)	W	H	W	H
<i>Malva parviflora</i> (small-flowered mallow)				
<i>Marrubium vulgare</i> (horehound)	W	H	W	H
<i>Medicago sativa</i> (lucerne)			W	L
<i>Melilotus albus</i> (Bokhara clover)				
<i>Melilotus indicus</i> (Hexham scent)				
<i>Mentha pulegium</i> (pennyroyal)	W	L		
<i>Modiola caroliniana</i> (red flower mallow)	W	L		
<i>Nassella trichotoma</i> (serrated tussock)	W	H		
<i>Nicotiana glauca</i> (tree tobacco)				
<i>Nothoscordum borbonicum</i> (onion weed)	W	H	W	H
<i>Nymphaea mexicana</i> * (yellow water lily)			W	H

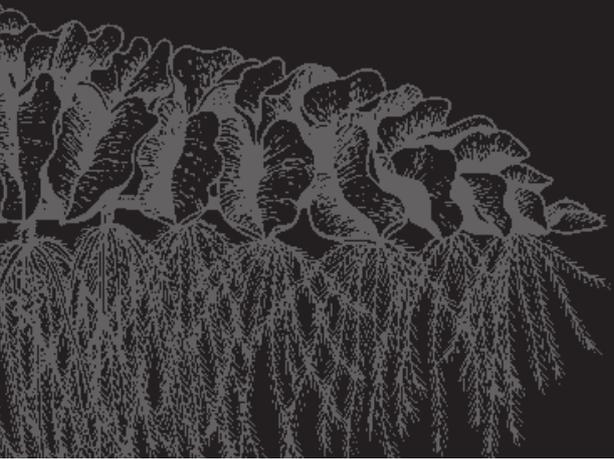
Scientific name (Common name)	Albury		Deniliquin	
	D ¹	I ²	D ¹	I ²
<i>Oenothera stricta</i> (evening primrose)			W	M
<i>Olea europaea</i> * (olives)	W	H	W	H
<i>Onopordum acaulon</i> (stemless thistle)				
<i>Onopordum illyricum</i> (Illyrian thistle)				
<i>Onopordum acanthium</i> (Scotch thistle)				
<i>Opuntia stricta</i> (prickly pear)				
<i>Oxalis pes-caprae</i> (soursob)	W	M	W	M
<i>Panicum coloratum</i> (bambatsi panic)				
<i>Papaver hybridum</i> (rough poppy)				
<i>Papaver somniferum</i> (opium poppy)				
<i>Paspalum dilatatum</i> (paspalum)	W	H	W	M
<i>Paspalum urvillei</i> (Vasey grass)				
<i>Pennisetum villosum</i> (feather grass)				
<i>Phalaris aquatica</i> (phalaris)	W	H	W	M
<i>Phoenix</i> spp.* (date palm)	W	H		
<i>Physalis virginiana</i> (perennial ground cherry)			W	H
<i>Physalis viscosa</i> (sticky cape gooseberry)				
<i>Pinus</i> spp.* (pines)	W	H		
<i>Plantago lanceolata</i> (lamb's tongue)	W	M		
<i>Poa annua</i> (winter grass)				
<i>Poa labillardieri</i> (poa tussock)				
<i>Polygonum arenastrum</i> (sand wireweed)				
<i>Polygonum aviculare</i> (wireweed)			W	L
<i>Populus</i> spp.* (poplars)	W	H	W	H
<i>Proboscidea louisianica</i> (purple flowered devil's claw)				
<i>Ranunculus muricatus</i> (sharp buttercup)				
<i>Ranunculus sceleratus</i> (celery leaf buttercup)	W	M		
<i>Raphanus raphanistrum</i> (wild radish)				
<i>Rapistrum rugosum</i> (turnip weed)				
<i>Reseda luteola</i> (wild mignonette)				
<i>Romulea minutiflora</i> (small-flowered onion grass)	W	M		
<i>Romulea rosea</i> (onion grass)	W	H	W	H
<i>Rorippa nasturtium-aquatica</i> (watercress)	W	L		
<i>Rosa rubiginosa</i> (sweet briar)	W	M	W	L
<i>Rubus fruticosus</i> agg. (blackberry)	W	H	W	H
<i>Rumex conglomeratus</i> (clustered dock)				
<i>Rumex crispus</i> (docks)				
<i>Rumex pulcher</i> (curled dock)				
<i>Sagittaria montevidensis</i> (arrowhead)				
<i>Sagittaria platyphylla</i> (sagittaria)	W	H	W	H
<i>Salix</i> spp. (willows)	W	H	W	H
<i>Scleroleana birchii</i> * (galvanised burr)			W	H

Scientific name (Common name)	Albury		Deniliquin	
	D ¹	I ²	D ¹	I ²
<i>Senecio cunninghamii</i> * (bushy groundsel)			W	H
<i>Setaria verticillata</i> (whorled pigeon grass)				
<i>Sisymbrium irio</i> (London rocket)				
<i>Solanum elaeagnifolium</i> (silver-leaf nightshade)			W	H
<i>Solanum nigrum</i> (blackberry nightshade)	W	L		
<i>Solanum rostratum</i> (buffalo burr)				
<i>Soliva sessilis</i> (bindii)				
<i>Sonchus asper</i> (rough sowthistle)				
<i>Sonchus oleraceus</i> (sowthistle)				
<i>Sorghum halepense</i> (Johnson grass)	W	L		
<i>Stellaria media</i> (chickweed)				
<i>Taraxacum officinale</i> (dandelion)				
<i>Tragopogon porrifolius</i> (salsify)				
<i>Tribulus terrestris</i> (caltrop)	W	L	W	H
<i>Trifolium</i> spp. (clovers)	W	L		
<i>Urtica urens</i> (stinging nettle)	W	L		
<i>Vallisneria</i> sp. (ribbon weed)				
<i>Verbascum thapsus</i> (great mullein)	W	L		
<i>Verbena bonariensis</i> (purpletop)	W	L	W	M
<i>Vicia sativa</i> (common vetch)	W	M		
<i>Vinca major</i> (blue periwinkle)	W	L		
<i>Vulpia bromoides</i> (squirrel-tail fescue)	W	H		
<i>Vulpia myuros</i> (vulpia, rat's tail fescue)	W	H		
<i>Watsonia meriana</i> * (watsonia)	W	H	W	H
<i>Xanthium occidentale</i> (Noogoora burr)	W	H	W	H
<i>Xanthium spinosum</i> (Bathurst burr)	W	L	W	M

¹Distribution (D) abbreviations: W = widespread; blank cells = species not considered to be widespread in the catchment or distribution unknown.

²Impact (I) abbreviations: H = high; M = medium; L = low.

* Weeds added by workshop participants not in the original dataset



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