NSW GOVERNMENT | Natural Resources Commission

Weeds – Time to get serious

Review of weed management in NSW
Final report and recommendations

May 2014

Enquiries

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List of acronyms

APVMA	Australian Pesticides and Veterinary Medicines Authority
CAP	Catchment Action Plan
CMA	Catchment Management Authority
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cwlth	Commonwealth
DPI	Department of Primary Industries (NSW)
FTE	Full Time Equivalent
IGAB	Intergovernmental Agreement on Biosecurity
IPART	Independent Pricing and Regulatory Tribunal
LCA	Local Control Authority
LHPA	Livestock Health and Pest Authorities
LLS	Local Land Services
NEBRA	National Environmental Biosecurity Response Agreement
NPWS	National Parks and Wildlife Service
NWAC	Noxious Weeds Advisory Committee
NRC	Natural Resources Commission
NSW	New South Wales
OEH	Office of Environment and Heritage (NSW)
PIC	Property Identification Code
RDC	Research and Development Corporation
RWAC	Regional Weeds Advisory Committee
SWC	State Weed Committee
WAP	Weeds Action Program
WoNS	Weeds of National Significance

Document No. D14/0968

ISBN: 978 1 921050 95 4

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1 Executive summary

Weeds have a significant impact on environmental, economic and social well-being in NSW. The community is bearing substantial ongoing costs for past failures to prevent or eradicate what were once new weeds. A recent study estimated the annual economic cost of weeds to NSW to be $1.8 billion, not including the significant impacts to environmental and social amenity which have not been monetarily quantified. NSW agricultural businesses incur the majority of these costs - more than $1.3 billion per annum - due to lost productivity, labour, machinery and chemical costs.[1] Weeds also threaten around 40 per cent of vulnerable and endangered species in NSW and 89 per cent of the state's endangered ecological communities.[2]

The Minister for Primary Industries asked the Natural Resources Commission (NRC) to undertake an independent evaluation of the effectiveness and efficiency of weed management arrangements in NSW, given the significant impacts on the NSW economy and environment. This report sets out the NRC's final recommendations.

Overall, the NRC found that the effectiveness of weed management arrangements is variable across NSW. Many of the reasons for this relate to ineffective regulation, planning and funding, or ineffective implementation, enforcement and accountability. Distribution mapping of weeds in NSW is inconsistent, making it difficult to get a complete picture of how weed density, extent and impacts are changing across the state.

In particular, the different requirements imposed on private land managers compared with public land managers are a source of considerable angst in the community.

From submissions to this review, it is clear that the threats posed by weeds are of major concern to both farmers and environmental groups. Community members across the spectrum have advocated the need for urgent change, and the many positive responses to the draft report indicate strong support for implementing the recommendations.

This report outlines a comprehensive package of recommendations that should be aligned with new legislation and must be implemented together to be effective. The recommendations focus on avoiding future costs by improving prevention, early detection and rapid response, while ensuring consistent compliance across tenures and rebuilding seriously eroded research and development capacity.

The NRC is recommending a staged transition to new arrangements, allowing time for collaborative implementation with the community and weed professionals. The framework also provides opportunities to evaluate and improve arrangements over time.

This detailed review follows many others. Several of the NRC's recommendations have been made before with support from stakeholders, but have not been acted upon. Strong leadership within government is now needed to implement the required changes and improve accountability at all levels to avoid adding to the more than $1.8 billion in annual costs already being borne by the community. The good news is that there is a wealth of committed, passionate people at all scales in the public, private and community sectors eager to improve weed management outcomes.

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1 Kalisch-Gordon, C., 2014, *The Economic Cost of Weeds in NSW,* A GrainGrowers Research Report commissioned by the NRC.

2 Coutts–Smith, AJ and Downey, PO 2006, *Impact of weeds on threatened biodiversity in New South Wales*, Technical Series no. 11, CRC for Australian Weed Management, Adelaide.

1.1 Recommendations

NSW 2021 includes actions to reduce the impact of weeds on prime agricultural land, parks and reserves. The NRC's proposed arrangements build on what is already working well to support Local Government[3] to do what it does best, while simultaneously creating more effective regional and state governance structures to improve prevention, early detection, rapid response and consistent compliance across tenures.

Recommendation 1: Promote shared responsibility for weed management across the whole community

1. The NSW Government should:
   a. create clear accountabilities for:
      - **prevention and eradication** of weed incursions at the state scale
      - **effective management of widespread weeds** at the local and regional scales to reduce impacts
   b. adopt a tenure-neutral approach to integrated weed management requiring both public and private landholders to meet common legislative requirements and regionally agreed obligations
   c. build community-wide shared responsibility for weed management through improved education, capacity-building and cooperative community-based responses
   d. create a general biosecurity obligation that requires all stakeholders to take all reasonable and practical measures to minimise biosecurity risks.

Recommendation 2: Provide consistent and transparent state level leadership and accountability

2. The NSW Government should:
   a. establish an independent Chair to lead a State Weed Committee as a statutory position appointed by the Governor
   b. enable the Chair of the Committee to enforce public authorities' compliance with management obligations, including undertaking works and recovering costs, or taking legal action
   c. develop a skills and stakeholder representation based State Weed Committee to provide state-level oversight and governance functions including:
      - transparently evaluating weed declarations, based on assessment of potential long-term risks and impacts to the economy, environment and community
      - establishing and managing a high-risk incursion fund
      - commissioning independent audits of Local Control Authorities (LCAs), Local Land Services (LLS) and the Department of Primary Industries (DPI) against standards and implementation of agreements and plans, and taking action where necessary
      - promoting a coordinated and strategic state-wide approach to weed management
   d. replace the current weed classes with three outcomes focused weed categories: weeds excluded from entering the state, weeds to be eradicated, and weeds to be effectively managed to reduce impacts on a regional basis
   e. include provisions in new legislation for permits to be issued by the NSW Government for authorised use of "conflict species", which may be declared but have economic value to some parties
   f. establish a service agreement to ensure taxonomy services are readily available and consistent protocols are used for identifying and recording potential new species.

[3] Local Control Authorities (LCAs) have a responsibility under the *Noxious Weeds Act 1993* (NSW) for inspections and enforcement on private lands as well as control of noxious weeds on their own lands. LCAs are in most cases local councils, but a local council may designate another authority to carry out its duties. LCAs currently include single councils, county councils, weed authorities, the Western Lands Commission and the Lord Howe Island Board.

Recommendation 3: Ensure consistent and coordinated regional planning and local delivery

3. The NSW Government should:
   a. confirm and support local level service delivery by LCAs and define LCA statutory functions
   b. replace the existing 14 regional weed advisory committees with 11 statutory regional weed committees comprising LCAs, public and private landholders, and community members (similar to the Bush Fire Management Committee model) as subcommittees to LLS, and aligned with LLS borders
   c. provide a legislative basis for tasking the regional weed committees with developing regional plans and priorities for widespread weeds and surveillance
   d. ensure all regional plans are based on best available local knowledge, research and technology, and promote behavioural change and adoption of integrated land management practices
   e. encourage state bodies and the Australian Government to align funding with regional priorities identified in these strategic plans
   f. ensure legislation allows for integration of pest plant and animal services and that LLS and LCAs work together to realise opportunities for efficiencies.

Recommendation 4: Improve prevention measures and response to incursions

4. The NSW Government should:
   a. establish a reserve fund for responding to new high-risk incursions (similar to the pest insect destruction fund)
   b. prepare enforceable weed eradication plans consistent with response plans for other biosecurity responses, with funding arrangements to be negotiated between DPI, LLSs, LCAs, industry and other relevant stakeholders
   c. implement a 'permitted list' for sale of plants in NSW, starting with aquatic plants and transitioning to all species within four years
   d. advocate to the Australian Government for a review of the requirements for obtaining a minor use permit to improve access to herbicides for incursions.

Recommendation 5: Improve management of high-risk pathways

5. The NSW Government should:
   a. standardise inspection requirements to ensure all properties greater than one hectare are inspected at least once every five years
   b. establish weed status certificates for each property inspected which would be:
      - disclosed on planning information certificates for the sale of land
      - included in any application for the subdivision of land greater than one hectare
      - provided to parties who lease public land
      - required for registration as a producer of fodder for sale
   c. require the registration of commercial entities whose activities generate weed risks, for example, nurseries and producers of fodder for sale, and making it an offence for unregistered entities to carry out these activities
   d. encourage greater self-management of weed risks by competent parties by providing for the establishment of industry contribution schemes and auditable compliance agreements
   e. appoint LLS to coordinate management of declared aquatic weeds within each region.

Recommendation 6: Improve accountability and enforcement at all scales

6. The NSW Government should:
   a. strengthen the enforcement provisions in the new legislation by:
      - providing for more substantial penalties, based on the severity and type of offence
      - allowing for weed notices to specify clear actions and outcomes that the landholder must demonstrate compliance with by a specified time
      - escalating enforcement action to LLS after failure to comply with a weed control notice, and simplifying the requirements for taking control or enforcement actions
      - enabling easier enforcement of obligations for public land managers through the independent Chair of the State Weeds Committee
   b. require the State Weeds Committee to develop state-wide service delivery standards for LCAs. The Committee should commission independent audits of LCAs against these standards, with LLS given the resources and mandate to assume the LCA's surveillance responsibilities if the LCA is not meeting their obligations. LCAs would not be relieved of responsibilities to manage their own land or roadsides.
   c. require the State Weeds Committee to commission audits of LLS and DPI's performance in weed management, and the extent to which funding has been allocated in line with strategic priorities
   d. provide for consistent, state-wide weed mapping including:
      - adopting standard data protocols and record keeping requirements, which are mandatory for any body receiving government funding for weed management
      - developing and maintaining a state-wide data sharing system for tracking weed distribution and density that has current data from all LCAs
      - ensuring that data is readily available to stakeholders and regional managers for use in adapting management plans and actions.

Recommendation 7: Support research and development

7. The NSW Government should:
   a. commit long-term funding for the strategic rebuilding and maintenance of NSW weeds research capacity
   b. prioritise and coordinate strategic research investment
   c. work with other states to establish a permanent, national weeds research, development and extension organisation funded jointly by industry and state and Commonwealth governments
   d. actively participate in this organisation through secure long-term investment, expertise and in-kind contributions
   e. develop a centralised, accessible, web-based portal for collating research outcomes and sharing weed identification, distribution and management information and supporting researchers to effectively communicate research findings to land managers
   f. ensure best available research and chemical choices are available to manage the risk of herbicide resistance on roadsides and in other areas where herbicides are regularly applied.

Recommendation 8: Ensure effective implementation of reforms

8. The NSW Government should:
   a. establish a working group of relevant agencies to detail the regulatory and administrative arrangements for implementation of the recommendations, oversee the transition and ensure that Government's timeframes are met
   b. allow for each LLS to establish a position for a regional project officer to oversee implementation of weed management programs within its region
   c. commission an evaluation of the implementation of the new arrangements in five years.

Proposed roles and responsibilities reflecting these recommendations are illustrated in Figure 1.

Part I of this report outlines the recommendations in more detail:

- **Chapter 2** outlines the background to this review, including the terms of reference
- **Chapter 3** provides the rationale and more detail about each of the recommendations
- **Chapter 4** describes proposed transitional arrangements for implementing the recommendations.

Part II outlines the NRC's findings and the evidence underpinning this review:

- **Chapter 5** discusses the distribution and impacts of weeds in NSW, including risk pathways
- **Chapter 6** explains the NRC's findings in relation to the current regulatory arrangements
- **Chapter 7** outlines the NRC's evaluation of current organisational arrangements
- **Chapter 8** explains findings about Australian and NSW funding programs.

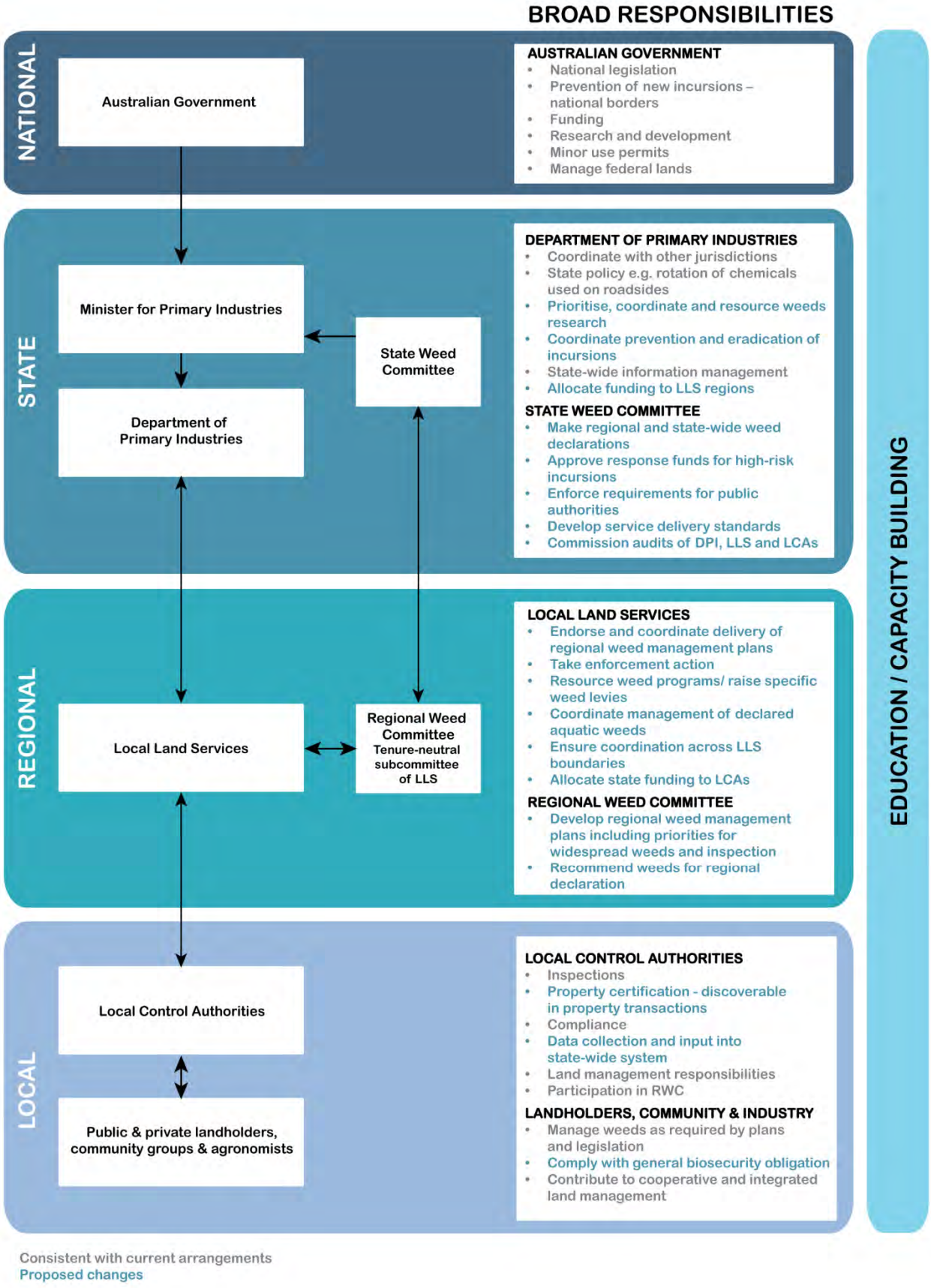

Figure 1: Proposed roles and responsibilities for weed management

Part I - Recommendations

2 Background

The Minister for Primary Industries requested the Natural Resources Commission (NRC) to undertake an independent evaluation of the effectiveness and efficiency of weed management arrangements in NSW, with the view of informing the further development of the proposed NSW Biosecurity Act, and other relevant strategies under the NSW Biosecurity Strategy 2013-2021. The NRC review has focused on existing good practice, opportunities and barriers that exist within current weed management arrangements, and ways to overcome the barriers.

2.1 About this review

The Minister's **terms of reference** (see Attachment A), request the NRC to:

- assess (based on existing data) the distribution and abundance of weeds across NSW, their impacts, likely trajectories and risk creators and bearers
- evaluate current regulatory and institutional arrangements across both public and private tenures
- evaluate weed management programs funded by the Australian and NSW Governments
- identify and assess viable alternative weed management arrangements
- provide advice on potential transitional arrangements for the future implementation of the proposed NSW Biosecurity Act and NSW Biosecurity Strategy 2013-2021.

For the purposes of the review:

- The assessment of the current and projected distribution and abundance of weeds and their impacts relies on existing data.
- Weeds include both introduced and native species, but are limited to terrestrial and freshwater aquatic species. Marine species and environments are excluded. The review considered weeds defined under various Acts including noxious weeds (*Noxious Weeds Act 1993*), invasive native species and feral native species (*Native Vegetation Act 2003*), environmental weeds identified in the biodiversity priorities for widespread weeds, and Weeds of National Significance (WoNS) and National Environmental Alert List Weeds noted in the Australian Weeds Strategy.

The Commissioner for Natural Resources, Dr John Keniry AM, was asked to Chair a Steering Committee to ensure the terms of reference were met and stakeholder input was appropriately considered. The Steering Committee consisted of Cr Reg Kidd, Chair of the Noxious Weeds Advisory Committee; Dr Bruce Christie, Executive Director of Biosecurity NSW, Department of Primary Industries; and Mr Mick O'Flynn, Senior Manager, Nature Conservation, Office of Environment and Heritage.

Context for this review

The review of biosecurity legislation provides an opportunity to examine current weed management arrangements and identify opportunities to improve their effectiveness.
There have been several previous reviews into weed management in NSW, most recently the 2009 Weeds Summit, the 2011 Statutory Review of the *Noxious Weeds Act 1993*, and a Weed Management Task Force convened in 2011. While some recommendations have been implemented, there is still considerable community concern about weeds, as reflected at the Local

Land Services (LLS) community consultation meetings, and in the many stakeholder submissions received during this review.

Previous reviews identified issues with different aspects of weed management including: lack of equity in the treatment of public and private landholders; limited enforcement mechanisms; complex and often duplicative governance arrangements; uncoordinated funding; lack of standardised reporting; the need for improved accountability; overlap and conflict between various pieces of weed legislation; separation of environmental and production-related weeds; and separation of native and non-native weeds.[4] [5] [6] [7] [8] A detailed discussion of these is provided in the NRC weed management review Issues Paper.[9] The NRC has considered the findings of these reviews along with other evidence in forming the recommendations in this report.

Several other reviews are relevant to these recommendations and involve similar stakeholders. These include: the Independent Local Government Review; review of NSW Crown Land Management; and review of the NSW Invasive Species Plan and the Australian Weeds Strategy.

Marine species and environments were excluded from this review. However, marine weed infestations can impact on marine industries, such as aquaculture, commercial and recreational fishing and boating, tourism and even international and domestic shipping.[10] The NRC believes a separate review of marine pest management (including pest animals and weeds) is warranted.

Review approach

The NRC review uses best available evidence. The NRC has consulted relevant Australian, state, regional and local government organisations, as well as industry, environmental and community groups. The NRC also examined approaches and results from other jurisdictions to inform recommendations. The process followed for completing the review is as follows:

Stage 1 - Issues Paper: The NRC released an Issues Paper in October 2013. The Issues Paper was based on an initial literature review and consultation, including a workshop with weed management professionals and experts from local government, regional weed management groups, Catchment Management Authorities (CMAs), other government agencies, non-governmental organisations, community and research organisations.

Stage 2 - Consultation: The Issues Paper was available for public comment for six weeks ending 6 December 2013. The NRC received 206 submissions and a summary of the submissions is provided in Attachment C.

4 Gledhill, R 2004, *Report on coordination and management of weeds in NSW*, prepared for the NSW Minister for Primary Industries, Sydney, NSW.
5 Noxious Weeds Advisory Committee 2009, *Final report: 2009 NSW Weed Summit*, NWAC, Sydney, NSW.
6 NSW Department of Industry & Investment 2011, *Report on the Statutory Review of the Noxious Weeds Act 1993*, DI&I, Sydney, NSW.
7 Montoya, D 2012, *Noxious Weeds Briefing Paper,* no. 02/2012, NSW Parliamentary Library Research Service, Sydney NSW.
8 Rural Industries Research and Development Corporation 2013, *Who's involved in weeds: a social network analysis of funding and information networks for weed management*, RIRDC publication no. 13/065, Canberra, ACT.
9 Natural Resources Commission 2013, *Issues Paper: Review of weed management in NSW*, viewed on 2 December 2013, www.nrc.nsw.gov.au/content/documents/Weed management-issues paper.pdf
10 NSW DPI, Marine Pests, viewed on 20 May 2014, www.dpi.nsw.gov.au/fisheries/pests-diseases/marine-pests .

The majority of submissions were provided by individuals and Local Government organisations (councils, county councils, and weed authorities). Other stakeholders who provided comments included community organisations, environmental groups, industry, academics and the NSW Aboriginal Land Council.

Targeted consultation was also carried out from October to December 2013, including regional tours attended by Steering Committee members and local stakeholders, focus group meetings and key stakeholder interviews. A record of consultation can be found in Attachment E.

Stage 3 - Draft report: The Draft Report represented the findings from Steps 1 and 2. It was based on consultation, feedback on the Issues Paper and NRC analysis, and was available for public comment from 24 February until 6 April 2014.

Stage 4 - Consultation: During the public comment period, the NRC undertook additional consultation with the general community and relevant stakeholders. Public meetings were held in seven locations: Parramatta, Cowra, Wagga Wagga, Dubbo, Armidale, Grafton and Nowra.

Stage 5 - Final report: The NRC has prepared this Final Report based on feedback on the Draft Report during the final consultation phase. The NRC received 108 submissions in response to the Draft Report. The greatest number of responses were received from Local Government organisations (councils, county councils, weed authorities, etc). Submissions were also received from individuals, community organisations including Landcare and Bushcare groups, environmental groups, other government organisations and industry groups.

The submissions were broadly supportive of the draft recommendations. Some raised concerns about adequate, long-term funding models and some suggested practical steps to implement the recommendations. The NRC appreciates the time and effort stakeholders put into preparing thorough and thoughtful submissions. The submissions highlighted the impact that weeds have on a range of stakeholder groups, and provided useful insights that directly informed the recommendations.

2.2 Guiding principles

Principles for an effective and efficient weed management system were developed in consultation with stakeholders during a workshop at the start of the review (Table 1). The NRC review focuses on assessing the current arrangements against these principles and identifying barriers and opportunities for improved management systems, as well as ways of ensuring good practice.

Table 1: Principles for quality weed management systems

Principle	
Outcomes-focused	▪ arrangements should aim for best outcomes on the ground ▪ weed management is one part of overall sustainable landscape management for achievement of triple bottom line outcomes
Shared responsibility	▪ effective cooperation across tenures and jurisdictions ▪ coordinated collective action e.g. on widespread weeds ▪ clear understanding of roles and responsibilities
Evidence-based	▪ prioritised, risk-based programs based on best available science and research ▪ effective evaluation and reporting of outcomes
Consistent	▪ equity in approach across tenures (tenure-neutral) ▪ consistency in management of native and introduced invasive species ▪ consistency in planning and reporting processes
Responsive	▪ effective emergency response to new threats ▪ responsive/agile to prevent and control new incursions ▪ responsive and adaptable to emerging issues and new knowledge
Administratively effective and efficient	▪ aligned institutional arrangements, policies, legislation and funding ▪ action at scale appropriate to the problem ▪ research aligned with needs
Accountable	▪ appropriate and implementable compliance arrangements ▪ organisations at all scales held accountable for achieving results ▪ appropriate accountability of risk creators

2.3 Overview of current regulatory and institutional arrangements

The regulatory and institutional arrangements for managing weeds in NSW involve numerous pieces of legislation, departments, agencies and committees, and strategies, plans and lists (Figure 2).

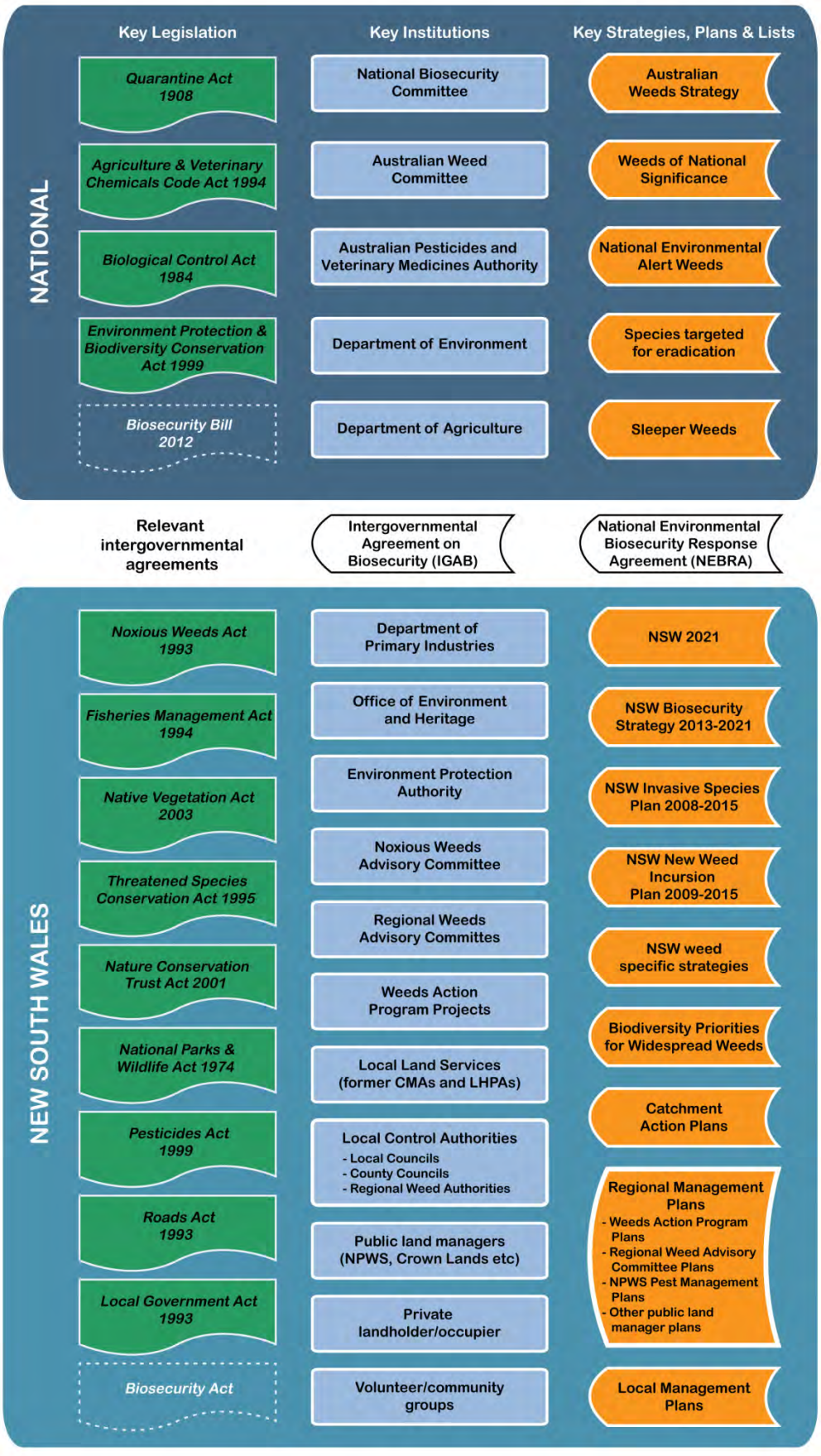

Figure 2: Regulatory and institutional arrangements for weed management in NSW

2.3.1 Regulatory arrangements

While all the legislation shown in Figure 2 influences weed management, the key pieces of legislation are:

- *Noxious Weeds Act 1993* (NSW) (and the *Noxious Weeds Regulation 2008*)
- *Native Vegetation Act 2003* (NSW) (and the *Native Vegetation Regulation 2013*)
- *Threatened Species Conservation Act 1995* (NSW)
- *Environment, Protection and Biodiversity Conservation Act 1999* (Cwlth)
- *Quarantine Act 1988* (Cwlth).

In general, this legislation seeks to prevent new weed incursions and minimise negative impacts of both native and non-native species on economic, environmental and social values. This is to be done through surveillance and inspections to detect incursions, eradication of incursions, management of widespread weeds, and capacity-building and education.

For the remainder of this report, an '**incursion**' is a weed invasion that is either newly identified or for which a determination has been made that it can and should be eradicated; and an '**infestation**' is a weed for which a determination has been made that regional eradication is either unfeasible or undesirable.

Noxious Weeds Act 1993

The *Noxious Weeds Act 1993* is jointly administered by the Minister for Primary Industries, the Minister for Natural Resources, Land and Water, and the Minister for Regional Infrastructure and Services. The Act aims to prevent the establishment of significant new weeds; prevent, eliminate or restrict the spread of particular significant weeds; and effectively manage impacts of widespread significant weeds. These goals align with the goals of the NSW Invasive Species Plan developed in 2008 to align actions for all invasive pests (plants, animals and diseases).

The Act provides for the making of Weed Control Orders, which declare weeds as noxious and specify the area to which the order applies, as well as the objectives of control and the specific control measures required.

A new Weed Control Order (order 30) comprising 241 taxa was recently released.[11] Weeds are listed by Local Control Authority (LCA) boundary or state-wide. Some native taxa are included in this order; native plants can be declared as noxious with the consent of the Minister responsible for administering the *National Parks and Wildlife Act 1974*.[12]

Five classes of noxious weeds are defined under the *Noxious Weed Act 1993*. The Department of Primary Industries (DPI) website indicates that noxious weeds are "*plants that have potential to cause harm to the community and individuals, can be controlled by reasonable means and have the potential to spread within an area and to other areas. A weed is declared noxious because its control will provide a benefit to the community over and above the cost of implementing control programs*."[13] This definition is consistent with DPI policy that the benefits of action should outweigh the costs, but is not specified in the legislation or regulations.

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11 NSW Department of Primary Industries 2014, *Noxious Weeds (Weed Control) Order 2014,* viewed on 22 April 2014, dpi.nsw.gov.au/aboutus/about/legislation-acts/noxious-weeds.

12 *Noxious Weeds Act 1993* (NSW) s 7(5).

13 NSW Department of Primary Industries, *Weeds Definitions and FAQ*, viewed on December 2013, dpi.nsw.gov.au/agriculture/pests-weeds/weeds/definition.

Native Vegetation Regulation 2013

Native plants that are considered weedy can be declared under the *Native Vegetation Regulation 2013* as either feral native species or invasive native species. Feral native species generate impacts outside of their natural range and for ground cover, within their natural range. Invasive native species are those that generate impacts within their natural range through dense regeneration or are invading plant communities in which they do not generally occur.

The clearing of feral native species or invasive native species is deemed a *routine agricultural management activity*, if carried out in accordance with a relevant order. Clearing of these species is also permitted on land identified as protected riparian land by a natural resource management plan.[14]

Threatened species regulations

The NSW *Threatened Species Conservation Act 1995* and the *Environment, Protection and Biodiversity Conservation Act 1999* (Cwlth) provide for the listing of invasive species, including weeds, as key threatening processes. Key threatening processes listed under the NSW legislation are intended to be consistent with those listed under the Commonwealth Act.[15] The listing reflects the threats posed by weeds to biodiversity, specifically threatened native species or ecological communities. The NSW Office of Environment and Heritage (OEH) and the Australian Government Department of Environment develop threat abatement plans to address these key threatening processes.

2.3.2 Institutional arrangements

A complex set of institutional arrangements has developed to manage weeds at national, state, regional and local scales.

National arrangements

The Australian Government is responsible for preventing new weedy species from entering the country. This is done through implementation of the Australian Weed Risk Assessment System to assess the risks associated with imported plants, border control measures and quarantine operations.

Australian and state governments work together through several national committees related to biosecurity and weed management (Figure 2). The Australian Government has recently announced that they will be merging the Australian Weeds Committee, the Biosafety and Biosecurity Working Group and the Established Pests and Diseases Working Group with the National Biosecurity Committee. The committees guide and coordinate the various institutions responsible for delivering plant biosecurity outcomes. There are also intergovernmental agreements and a national strategy for management of weeds. These committees, strategies and agreements are described further in Attachment B.

14 *Native Vegetation Regulation 2013* (NSW) cl 58.

15 Cattanach, G, Harris, A and Horris, J 2013, *Mapping Australia's Weed Management System*, RIRDC publication no. 13/019, Canberra, ACT.

NSW institutional arrangements

A range of bodies at different scales have weed management responsibilities within NSW.

LCAs have a responsibility under the *Noxious Weeds Act 1993* for inspections and enforcement on private lands as well as control of noxious weeds on their own lands. LCAs are generally local councils or county councils. However, the LCA for land in the Western Division that is not within a local government area is the Western Lands Commissioner and the LCA for Lord Howe Island is the Lord Howe Island Board. Historically, DPI has provided funds to assist LCAs to carry out their duties. This is currently done through the Weeds Action Program (WAP).

There are several participants in weed management at the regional level:

- **Weeds Action Program (WAP) groups -** DPI administers funds to 'lead agencies' established for regional groups of LCAs. There are 13 WAP regions. Each region is responsible for developing a variety of plans for management of weeds.
- **Regional Weed Advisory Committees** (RWACs) - regional organisations developed to help strategically organise weed management at a regional level. Their objectives and activities vary, but they generally focus on providing a forum for weed-related information-sharing and supporting capacity-building and education.
- **Local Land Services -** incorporates functions of:
    - **CMAs –** strategic planning and funding for overall natural resource management, taking a landscape-based approach.
    - **Livestock Health and Pest Authorities (LHPAs) –** pest animal control, livestock health and maintenance of travelling stock reserves.
    - **Agricultural extension services –** providing advice regarding production issues and communicating agricultural research findings.

DPI supports administration of the *Noxious Weeds Act 1993*; as such it develops policies and legislation and provides state-level oversight of, and support for, weed management programs. Biosecurity NSW, part of DPI, develops state-wide policies and programs for management of all biosecurity risks, including the NSW Biosecurity Strategy 2013-2021. In addition to funding LCA activities, DPI funds state-wide projects.

The NSW Biosecurity Strategy 2013-2021 outlines how government, industry and the community need to work together to identify, minimise, respond to and manage biosecurity risks. It highlights the importance of biosecurity for NSW. The objectives of the strategy are to manage pest, disease and weed risks by:

- preventing their entry into NSW
- quickly finding, containing and eradicating any new entries
- effectively minimising the impacts of those pests, diseases and weeds that cannot be eradicated.

OEH administers the *Threatened Species Conservation Act 1995* and the *Native Vegetation Act 2003*, and is responsible as a public land manager for management of weeds in national parks. Public land managers including OEH, Crown Lands, Forestry Corporation NSW, Sydney Catchment Authority, Country Rail Network, State Water, and Roads and Maritime Services are responsible for ensuring declared weeds do not spread from land under their management. Public land makes up a large portion of the NSW land area. Private landholders are responsible for controlling all declared weeds in accordance with the Weed Control Orders.

3 Recommendations

The NRC has developed a suite of recommendations to better protect the NSW environment and agricultural sector from the serious threat of weeds. These recommendations will improve progress towards Goals 3 and 22 of *NSW 2021* – driving economic growth in regional NSW, and protecting our natural environment and the goals of the NSW Biosecurity Strategy:

- biosecurity is a shared responsibility
- biosecurity contributes to sustainable economic growth
- biosecurity protects the environment and community
- biosecurity is underpinned by a responsive and consistent legislative framework.

Details of the recommendations are provided in the following sections. The recommendations have been organised generally around the key outcomes that they seek to achieve; however, they are intended to operate as an integrated package. Implementation of these recommendations is expected to:

- promote community-wide shared responsibility for weed management
- provide consistent and transparent state level guidance for weed management
- ensure consistent and coordinated regional planning and local delivery
- improve prevention measures and response to new incursions
- improve management of high-risk pathways
- provide accountability for weed management in NSW at all scales
- support weed management research and development.

Figure 3 below summarises the recommendations. Building shared responsibility underpins all of the outcomes. Recommendations to encourage shared responsibility include:

- implementing a tenure neutral approach
- creating a general biosecurity obligation
- increasing education and capacity building
- clarifying roles and responsibilities for prevention and eradication and effective management of widespread weeds.

Greater accountability will also underpin success of all the recommendations. Specific recommendations for improving accountability include:

- strengthening enforcement provisions
- creating state-wide service delivery standards and audits for LCAs
- requiring independent audits of DPI and LLS
- implementing a state-wide weed data management system.

Further, supporting and disseminating research and development will contribute to improved outcomes for all the recommendations shown in Figure 3.

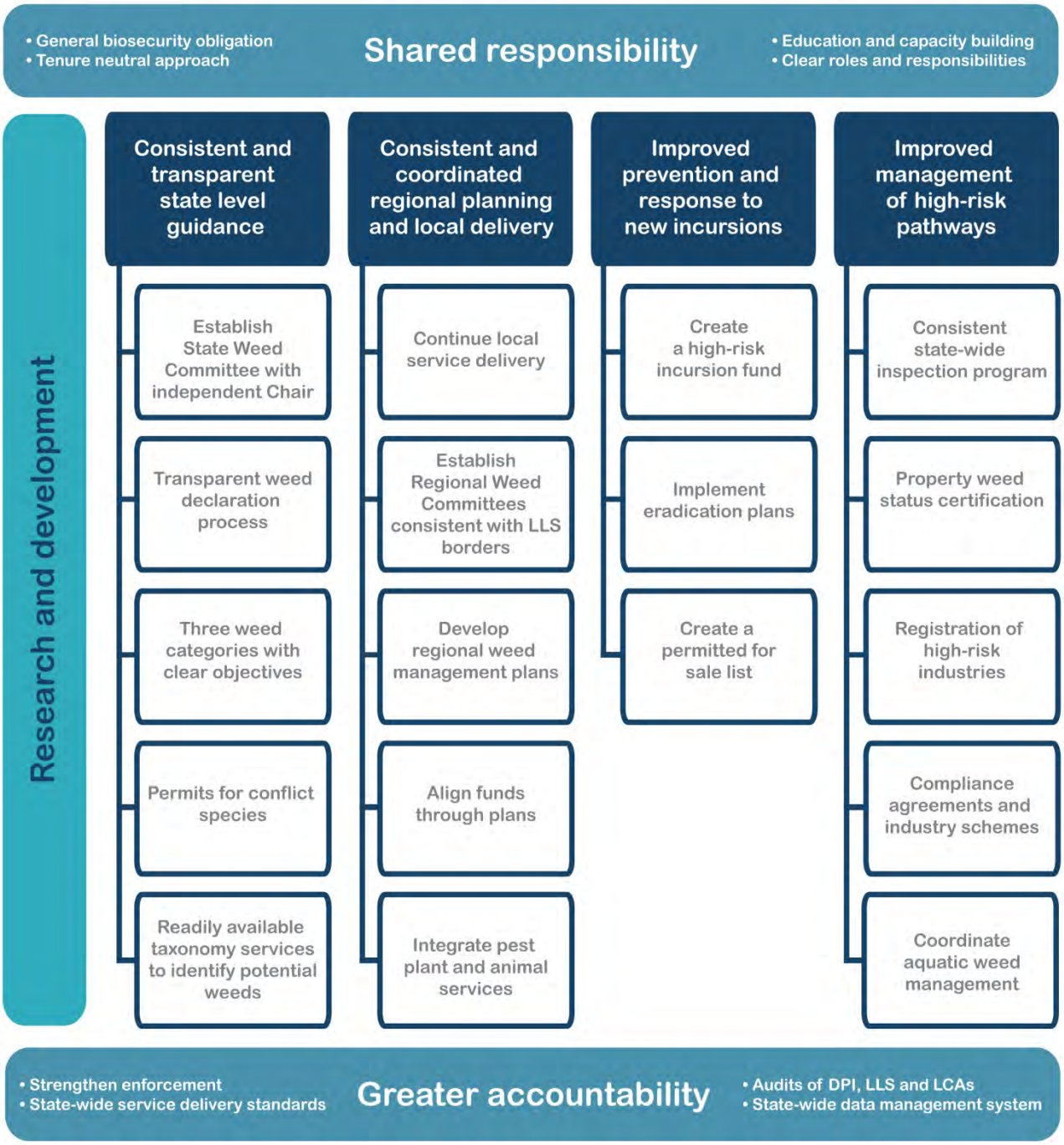

Figure 3 : Overview of key recommendations

To support these outcomes some changes to institutional arrangements and roles and responsibilities are suggested. These are discussed in relation to each recommendation in the following sections. However, Figure 1 presented at the end of the Chapter 1 provides a summary of the overall proposed institutional arrangements and responsibilities that will support delivery of the recommendations.

3.1 Shared responsibility

Recommendation 1: Promote shared responsibility for weed management across the whole community

The NSW Government should:

a. create clear accountabilities for:
   - **prevention and eradication** of weed incursions at the state scale
   - **effective management of widespread weeds** at the local and regional scales to reduce impacts

b. adopt a tenure-neutral approach to integrated weed management requiring both public and private landholders to meet common legislative requirements and regionally agreed obligations

c. build community-wide shared responsibility for weed management through improved education, capacity-building and cooperative community-based responses

d. create a general biosecurity obligation that requires all stakeholders to take all reasonable and practical measures to minimise biosecurity risks.

Weed management systems are designed to prevent or quickly eradicate weed incursions, and to manage and reduce the impact of already widespread invasive species. Both eradication and widespread weed management are potentially long-term programs, but they differ in that eradication programs cease when the target weed is successfully eradicated.[16] On the other hand, widespread weeds require ongoing management obligations with no definitive time period. This is in part why early eradication is far more cost effective than trying to manage a widespread weed using containment or asset protection strategies.

It is beneficial to consider weed management as made up of two core strategies: prevention and eradication of incursions, and reducing impacts of widespread weed infestations, with a clear decision point for transitioning from one scenario to the other when eradication is deemed unfeasible.[17] Both strategies are needed for effective weed management, but they require some different regulatory and management approaches to be successful.

Good practice for effective weed management incorporates specific, enforceable requirements as well as allowing for flexibility, adaptive management and community ownership. Flexible approaches and a range of tools are particularly important for addressing widespread weeds. Widespread weeds present a 'collective action problem'[18] as seeds are easily dispersed across

[16] Panetta, FD, Cacho, O, Hester, S, Sims-Chilton, N, and Brooks, S 2011, 'Estimating and influencing the duration of weed eradication programmes', *Journal of Applied Ecology,* vol. 48, no. 4, pp. 980-8.

[17] Sydes, T 2012, *Using a local management zoning framework to foster a management continuum. Is the 'big four' a defeatist mindset and are there alternatives at a local and regional level*. Proceedings of the Eighteenth Australasian Weed Conference, Melbourne, viewed 22 April 2014, caws.org.au/awc_contents.php?yr=2012.

[18] Graham, S 2013, 'Three cooperative pathways to solving a collective weed management problem', *Australasian Journal of Environmental Management*,20(2): pp. 116-129.

the landscape and individual land managers have little incentive to undertake weed control action if their neighbours are not also acting.[19]

Collective action problems present institutional challenges, requiring a greater focus on the social aspects of landscape management. Institutional arrangements for widespread weed management should meet the design principles for effective collective action programs, which include[20]:

- clear boundary rules defining who is in and out of the cooperative relationship
- local rules clearly defining expectations and obligations
- the capacity of the participants to collectively change the rules and tailor to local conditions
- effective monitoring of all participants
- graduated sanctions that depend on the context and seriousness of the offence.

NSW should provide for different arrangements to tackle eradicable incursions and widespread infestations. Government should be held accountable for preventing, identifying and responding to incursions and managing eradication. Governments are generally better placed for managing incursions since management relies on consistent surveillance, response planning, coordination, diagnostics, control, funding and legislative authority.[21] Regional and local stakeholders should be responsible for long-term management of widespread weeds. Priorities and required actions should be developed with input from a range of stakeholders to ensure their varying objectives and resources are considered.

In order to provide greater flexibility and support the two functions described above, the new legislation should provide for two types of enforceable management plans:

- species specific eradication plans
- regional weed management plans to effectively manage widespread weeds to reduce impacts

Details of these plans are explained in the following sections. The plans would specify obligations for landholders and be enforced.

Tenure-neutral approach

A key finding of this review is that the different legislated responsibilities for public and private land managers has led to fragmented weed management and created tension between landholders (see Section 6.1). In response to the Legislative Council inquiry into public land management, the NSW Government supported in principle a "tenure blind" approach to the management of key landscape threats, such as bushfire, animal pests and weeds that do not recognise property boundaries.[22]

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19 Sindel, B, Berney, P, Coleman, M, Marshall, G and Reeve, I 2013, '*Improving regional adoption of weed control: A case study in the NSW Northern and Southern Tablelands*', RIRDC Publication No. 13/016Project No. PRJ-007151.

20 Ostrom, E 2000, Collective Action and the Evolution of Social Norms, *The Journal of Economic Perspectives*, vol. 14, no. 3, pp. 137-158.

21 Identification of risks and management of invasive alien species using the IPPC framework Proceedings of a workshop in Braunschweig, Germany 22-26 September 2003, viewed 22 April 2014, fao.org/docrep/008/y5968e/y5968e00.htm.

22 NSW Parliament Legislative Council General Purpose Standing Committee No. 5 (2013), *Management of public land in New South Wales*, NSW Parliament Legislative Council, Sydney, NSW.

The current requirements for public landholders were reported to create problems in preventing and managing incursions and for building cooperative responses to widespread weeds.[23] New legislation should take a tenure-neutral approach, to be facilitated through formalised regional weed committees discussed further in Section 3.3. All landholders will have the same responsibilities for prevention and eradication of high-risk incursions. Risk-based requirements should be established for widespread weeds recognising varied management objectives of different landholders. All landholders should then be held accountable for agreed obligations. Submissions to the draft report were strongly in favour of this recommendation.[24]

General biosecurity obligation

The NRC supports the adoption of a general biosecurity obligation under new biosecurity legislation consistent with the NSW Biosecurity Strategy[25] principle that biosecurity is everyone's responsibility. This approach was also adopted in *Queensland Biosecurity Act 2014*. The general biosecurity obligation applies to any person who deals with biosecurity matter including weeds. The obligation requires any person who knows, or ought reasonably to know, that the biosecurity matter poses a risk to take all reasonable and practical measures to minimise or eliminate the risk.

The general biosecurity obligation is based upon the requirement of Australian Work Health and Safety Law that requires that those responsible do everything reasonably practical to minimise risks in the workplace[26]. Under the Queensland biosecurity legislation it is an offence not to discharge your general biosecurity obligation with penalties that may include imprisonment.

The effectiveness of the general biosecurity obligation as a regulatory instrument requires the general public to be aware of biosecurity risks and acceptable approaches to eliminating or minimising them. Therefore, the introduction of a general biosecurity obligation must be supported by effective awareness raising programs. Awareness programs should include the dissemination of codes of practice and guidelines that will define "reasonable" actions required under the general biosecurity obligation. For example, codes of practice and guidelines may detail how and when vehicle hygiene practices should be implemented in order to minimise the risk of weed spread, or appropriate steps for management of a particular weed.

The proposed regional weed management plans will outline the weed management requirements necessary to meet the general biosecurity obligation. However, it is neither possible nor desirable that codes of practice and guidelines prescribe all that a person must do to discharge their general biosecurity obligation. All persons will be responsible for reasonably mitigating risks.

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23 In this report an 'incursion' is defined as a weed invasion that is either newly identified or for which a determination has been made that it can and should be eradicated; and an 'infestation' is defined as a weed for which a determination has been made that regional eradication is either unfeasible or undesirable

24 Over half of the submissions specifically noted their support for this recommendation.

25 NSW Department of Primary Industries 2014 NSW Biosecurity Strategy, viewed 24 April 2014, http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/467699/NSW-biosecurity-strategy-2013-2021.pdf.

26 Safework Australia 2014 Interpretive guideline—model work health and safety act - The meaning of 'reasonably practicable', viewed 24 April 2014, http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/607/Interpretive%20guideline%20-%20reasonably%20practicable.doc.

Education and community ownership

Community programs play an essential role in weed management in NSW and are envisioned to play an even greater role under new arrangements. LLS and LCAs should leverage available community and volunteer programs to assist with implementing broad-based education and awareness programs, as well as providing greater opportunities for co-design of programs and community led initiatives to support regional outcomes. Landcare, for instance can assist with group facilitation, community engagement and coordination.[27]

Education, capacity building and community programs will be critical for successfully implementing the proposed changes. A considerable outreach program will be required to ensure that landholders are aware of their obligations, which will be specified through regional plans. LCAs should work together with the LLSs and local community groups to develop targeted public education programs to support the regional plans. This will help to ensure that land managers understand their obligations and raise community awareness about the seriousness of weed incursions.

Education is particularly important in urban and peri-urban areas, which have unique weed management challenges. High turn-over of land, subdivision, landscaping and escapes from gardens are particular issues for these regions, which require strong educational programs in cooperation with regulation and enforcement. Bush regeneration in and around conservation areas is also very important and should be guided by good practice and sound bush regeneration principles.

Weed management responses should go beyond "spray and walk away". Many organisations including community groups, bush regeneration organisations, Local Land Services, and several LCAs focus on integrated land management solutions to achieve long-term results from management activities. Expansion of this type of activity is needed to improve outcomes across the state. The legislative and institutional changes described in the following section are intended to increase flexibility in local and regional management actions and encourage more adaptable solutions such as working with landholders to develop long-term property management plans.

DPI has recently provided training for several project officers and weed officers regarding social marketing techniques for changing landholder behaviour. This program should be continued and leveraged by all regions to facilitate behaviour change where needed.[28]

One of the many benefits of strong education and community outreach programs is that they allow all community members to become part of the surveillance network. Having a large group of citizens able to identify weed incursions can significantly improve rapid response to new incursions by providing for faster identification.

Good practice examples of educational programs are described in the findings (see Section 7.4). These practices should be built upon to expand and improve education and capacity building programs. Education programs should be designed considering the following:

- using a range of communication tools to target different community members, such as media releases, emails, field days, etc.

[27] Landcare submission in response to the NRC Draft Report – Weed management review.

[28] The importance of social marketing for behaviour change was noted in several submissions including, Southern Tablelands and South Coast Noxious Plants Committee.

- ensuring education programs are coordinated, long-term and focus on a range of issues including clarifying the goals, objectives and responsibilities for weed management. It is essential that programs relay what the expectations are for people and not just 'raise awareness'.[29] Increased awareness does not necessarily lead to improved weed management.
- tailoring programs to the concerns of the audience, and highlighting the range of serious impacts from weeds. For instance, emphasising the health and economic impacts may be more effective in peri-urban areas than focusing on impacts to farmland.
- focusing on integrated land management and long-term solutions
- continuing one on one engagement and support by weed officers at the local level.

3.2 State level governance

Recommendation 2: Provide consistent and transparent state level leadership and accountability

The NSW Government should:

a. establish an independent Chair to lead a State Weed Committee as a statutory position appointed by the Governor

b. enable the Chair of the Committee to enforce public authorities' compliance with management obligations, including undertaking works and recovering costs, or taking legal action

c. develop a skills and stakeholder representation based State Weed Committee to provide state-level oversight and governance functions including:
   - transparently evaluating weed declarations, based on assessment of potential long-term risks and impacts to the economy, environment and community
   - establishing and managing a high-risk incursion fund
   - commissioning independent audits of Local Control Authorities (LCAs), Local Land Services (LLS) and the Department of Primary Industries (DPI) against standards and implementation of agreements and plans, and taking action where necessary
   - promoting a coordinated and strategic state-wide approach to weed management

d. replace the current weed classes with three outcomes focused weed categories: weeds excluded from entering the state, weeds to be eradicated, and weeds to be effectively managed to reduce impacts on a regional basis

e. include provisions in new legislation for permits to be issued by the NSW Government for authorised use of "conflict species", which may be declared but have economic value to some parties

f. establish a service agreement to ensure taxonomy services are readily available and consistent protocols are used for identifying and recording potential new species.

[29] Sainty, G., McCorkelle, G., and Julien, M. (1998), 'Control and spread of Alligator Weed *Alternanthera philoxeroides* (Mart.) Griseb., in Australia: lessons for other regions', *Wetlands Ecology and Management,* 5: pp. 195–201.

State level governance

Effective weed management at the regional scale should be supported by a new state-wide governance framework. A state level body is needed to provide state level assurance that weed management programs are properly and consistently implemented and that organisations are held accountable for their responsibilities. This body should fulfil several functions:

- ensuring tenure neutrality by enforcing public authorities' compliance with weed management obligations
- commissioning audits of DPI, LLS and LCAs and taking any necessary actions as identified through the audits
- determining whether a new incursion warrants release of high-risk incursion response funding (described in Section 3.4)
- making weed declarations considering weed risk assessments and declaration proposals
- evaluating and approving species for the permitted for sale list
- promoting a coordinated strategic approach to weed issues in NSW by supporting regional weed committees
- reviewing regional weed management plans and providing feedback as to whether they are consistent with State policy
- providing general policy advice on weed management issues when requested by the Minister.

Although this report recommends a state level governance structure specifically for weed management these responsibilities could be integrated with a body established for broader biosecurity management.

The Minister has established the Noxious Weed Advisory Committee (NWAC) consistent with the provisions of the *Noxious Weeds Act 1993*. This committee provides advice to the Minister regarding various issues including weed declarations and the WAP. The NWAC has served an important role in current weed management in NSW, in particular assisting in driving the changes achieved under the WAP.

However, to meet the needs of the proposed arrangements, the NRC recommends that this committee be dissolved and that the proposed Biosecurity Act establish a State Weed Committee to provide state level oversight for weed management. The Chair of the State Weed Committee should be a statutory, independent position. The Committee should be adequately resourced, with the ability to source resources and support from other bodies such as DPI, OEH and the NRC as needed to fulfil their duties. The Act should specify the membership of the committee and its functions.[30]

The State Weed Committee should provide state level guidance to the regional weed committees and be empowered to make independent decisions regarding weed declarations and the high-risk incursion fund. Decisions and advice from the State Weed Committee will be transparent, with appropriate opportunities for public input and appeal as outlined in the next sections.

[30] The committee may be specified as a broader biosecurity coordinating committee that encompasses weed management.

The group requires both a technical capacity to consider risk assessments and the stakeholder representation required to ensure that decisions are informed by community and industry views. The skills-based representatives should have a range of skills and knowledge covering agriculture, social science, economics, environmental science, risk assessment and enforcement expertise. Three representatives should be chosen to represent industry, environmental and community stakeholders. Representatives from DPI, OEH, LLS, Local Government, and a weed officer representative[31] should also be appointed. Selection of these appointees should ensure coverage of a range of skills. If it is considered necessary, the Committee may from time to time request support from additional outside experts to ensure robust, evidence-based decision making. Membership on the committee should be subject to reasonable term limits to ensure continuity of leadership but also refresh membership periodically.

The State Weed Committee should be a statutory body representing the Crown and generally under Ministerial control. However, consistent with other environmental legislation,[32] the Chair of the committee should be exempted from Ministerial control and direction in decisions regarding enforcement actions against public authorities. Therefore, the Chair should be appointed by the Governor to ensure independence, as is the case with the Chair of the Environment Protection Agency Board. Other committee members should be appointed by the Minister. Further detail on compliance for public authorities can be found in Section 3.6.

As the State Weed Committee will on occasion consider taking enforcement action against public authorities represented on the Committee, rules should be established to address potential conflicts of interest. In the event that the Committee is deliberating enforcement against a particular member's organisation, that member should be excluded for that portion of the meeting. It will at all times be the decision of the independent Chair, not the Committee, to take enforcement action.

General state level support

In addition to forming the State Weed Committee, the NSW Government should:

- provide strategic guidance on weed species with impacts at the state scale
- coordinate program delivery across agencies and jurisdictions (e.g. advocating for consistent weed declarations across state borders)
- coordinate eradication plans to ensure cooperation and consistency across boundaries where necessary
- produce codes of practice on key operational matters including the rotation of herbicide type to avoid the development of herbicide resistance
- prepare and disseminate educational and capacity building material including best practice information for weed management
- establish state-wide data protocols and a data management system for tracking weed management information
- prioritise research needs
- create a web-based portal for the community and weed practitioners on weed identification and best practice for management of weeds.

[31] Several submissions noted that operational knowledge should be included in this committee.
[32] e.g. *Protection of the Environment Administration Act 1991.*

DPI should be the lead agency for the majority of these functions. However, they should work closely with OEH to ensure that weeds that impact on the environment are appropriately prioritised and managed.

DPI should be responsible for ensuring there is appropriate capacity to quickly identify new species, as part of their overall responsibility for prevention and eradication. In most Australian jurisdictions the state agency responsible for weed management has a relationship with their botanical gardens / herbarium to provide a rapid identification of plant specimens suspected of being a new weed species. There is currently no dedicated resource fulfilling this function in NSW.

The availability of services to rapidly identify potential new weeds is critical to prevention efforts. Therefore, the NRC recommends that DPI:

- enter into a service arrangement with the NSW Herbarium or other appropriate plant diagnostics institution to identify and record suspected new plant species on an as-needed basis
- develop protocols and procedures for LCAs and LLS regions submitting new plant specimens records for identification and recordkeeping.

Weed categories

Stakeholders find the five control classes of weeds under the *Noxious Weed Act 1993* confusing and the control requirements ambiguous as they do not clearly specify the management objective sought. This is particularly true for Class 4 weeds, for which the control requirements are vague, and some argue, unenforceable. Respondents to this review indicated that this has led to inconsistent interpretation of requirements for different classes across the state.

Australian jurisdictions that have recently updated their biosecurity legislation have used the opportunity to revise and rationalise the listing of organisms. A notable example is Western Australia[33], which provides a simple and robust categorisation that is easy to interpret. The NRC proposes to adopt a similar system where all weeds are placed in one of three categories:

- exclude (Category 1) - Weeds will be assigned this category if they are not established in the state and control measures are to be taken in order to prevent them entering and establishing in the state.
- eradicate (Category 2) – Weeds will be assigned to this category if they are present in the state in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
- impact reduction (Category 3) – Weeds will be assigned to this category if they are established but it is feasible and desirable to manage them in order to limit their impact. Control measures can prevent these weeds from increasing in population size or density or moving into an area currently free of these weeds.

The declaration of a native species would require approval from the Minister responsible for the *National Parks and Wildlife Act 1974,* as is currently the case. All declared weeds will be banned from sale or distribution unless authorised by a permit. Category 1 (exclude) and 2 (eradicate) weeds would remain notifiable and all community members would be responsible for reporting their presence to the local weed officer or LLS.

[33] *Biosecurity and Agriculture Management Act 2007* (WA).

Containment is an important weed management strategy that must be tailored to the specifics of both the weed and the outcome sought.[34] A containment strategy can be employed to support eradication, to reduce the area impacted or protect key assets. Eradication plans should clearly identify the location and function of the containment areas for eradication, which may span several LLS regions. Similarly, regional weed management plans should clearly identify the location and function of the containment areas for Category 2 (eradicate) and Category 3 (impact reduction) weeds.

This categorisation aligns well with the proposed model, allowing DPI to have primary responsibility for excluded species and eradication (Categories 1 and 2) and weeds to be managed for impact reduction (Category 3) to be managed regionally. Further it is consistent with the first three goals of the Invasive Species Plan, which is already being implemented[35] [36]. Adoption of these categories would clarify objectives and requirements for all weeds, and create a clear decision-point for shifting management objectives from eradication to impact management.

Weeds should be declared at a scale that provides for strategic approaches to weed management. It is recommended under the proposed arrangements that weed categorisation apply at the LLS scale, thereby covering all LCAs in a region. In Victoria pest species are declared according to each catchment management authority region, demonstrating that declaration at this scale is feasible. While there will always be weeds that cross administrative boundaries, declaration at larger scales provides for more consistent declaration, and increased likelihood of covering an entire containment area.

This recommendation does not mean that LCAs will lose the ability to have localised eradication programs for Category 3 weeds. Objectives and management requirements for Category 3 weeds (impact management), including specific landholder obligations, would be negotiated at the regional and local level and included in the regional plan. Regional plans may specify management zones for Category 3 weeds, where landholders may variably be asked to contain, eradicate or inspect for the weed depending on their location in the region and the current distribution of the weed.

Therefore, if an LCA or group of LCAs have a logical plan for locally eradicating a specific weed, this can easily be incorporated into the regional plan. For example, in the Towamba Valley they have already implemented a program to limit impacts of serrated tussock and eradicate it where possible. They may adopt the currently agreed upon cooperative management practices for this subregion in the regional plan. In the same LLS there may be areas in which there is no serrated tussock and therefore surveillance and immediate control would be required, or areas where serrated tussock is so widespread that they choose only to require buffer zones to ensure landholders aren't affecting their neighbours.

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[34] Grice, AC, Clarkson, JR, Friedel, MH, Murphy, HT, Fletcher, CS and Westcott, DA 2012, C*ontainment: the state of play*, Proceedings of the Eighteenth Australasian Weeds Conference, pp.320-324.

[35] NSW Department of Primary Industries 2010, *2010-2015 Invasive Species Plan,* Department of Primary Industries, Sydney, viewed 15 November, dpi.nsw.gov.au .

[36] Submissions to the draft report indicate broad support for this recommendation with several noting the clear alignment with the Invasive Species Plan goals.

Conflict species

Weeds listed under any of the categories in the new system should be prohibited from sale or distribution to minimise risks. However, this should be subject to permitting provisions. These provisions would provide for handling of 'conflict species,' which may be potentially invasive but have some economic benefits to certain parties. (See Section 6.3 for further discussion and examples of conflict species). This approach is in keeping with the NSW policy that biosecurity risks should be minimised without unduly impacting on trade.

The proposed Queensland *Biosecurity Act 2014*[37] provides for the authorised use of declared species through a permit system. Permits may be issued for biological control, commercial use, scientific research or another type of use as prescribed under a regulation.

Similarly, the proposed NSW biosecurity legislation should include capacity for the NSW Government to issue permits for the use of declared species, including for commercial production. Conditions on the permit should include requirements for record keeping and reporting and allowing access for an authorised officer to enter and inspect the property.

Declaration process

Declaration of a species has major cost implications for landholders and LCAs. It is imperative that the decision making process for determining the management regime for a weed is timely, transparent, evidence-based and objective. The decision to move from a plan to eradicate an incursion to treating a weed as widespread should also be a clear and distinct, evidence-based decision. Further, where eradication is not feasible because there are no known or only very expensive control options, additional research should be considered as an action, with a periodic re-assessment to determine if research results affect the assessment.

Currently NWAC assesses proposed weed declarations as described in Section 6.3. Under the proposed arrangements the State Weed Committee would be responsible for assessing proposed declarations. This body will incorporate appropriate skills to perform an evidence-based assessment of economic, environmental and social impacts of species proposed for declaration. The process for declaring a species should be transparent and contestable. Further, guidelines should be established regarding the time allowed to make a declaration determination to improve timeliness of assessments.

In the current declaration process a key consideration is the feasibility of coordinated control based on available resources. There are likely to be situations where although eradication costs would exceed readily available funds, it would be far more cost effective to eradicate the weed than to allow it to become widespread and incur ongoing impacts. The State Weed Committee may, where necessary, commission cost-benefit analyses for declaration requests and evaluate options for raising additional resources where it is warranted. Given the risk of potentially serious and irreversible damage that may be caused by new incursions, the precautionary principle should be used in assessing appropriate responses to weed incursions.

Some submissions have noted that currently different LCAs interpret the requirements for the current weed classes differently. The State Weed Committee should provide guidance notes for how to apply the three categories identified to ensure that all regional committees and LCAs are using the same definitions and requirements for each category.

[37] *Biosecurity Act 2014* (Qld) ch 8.

Temporary declarations

Under the Queensland legislation the general biosecurity obligation applies to all biosecurity matter (which includes all living things other than humans).[38] Therefore, although the Queensland legislation provides for the designation of biosecurity matter as either prohibited or restricted it does not have to be declared for the general biosecurity obligation to apply.

There may be situations under the proposed system where effective weed management will require landholders to manage weeds that are not yet declared. These should be managed as follows:

- **new localised incursions of known weeds:** If a weed known to be problematic and declared in other regions of the state is identified in a region where it was not previously present, and therefore not declared, an authorised weed officer should be able to advise the landholder of the risks and instruct them on reasonable and practical measures that should be undertaken to control the weed under the general biosecurity obligation requirements.
- **new incursions into the state:** In the case where a new potentially weedy species is identified, which is not declared into NSW, the new legislation should allow for an LLS to request that the Chair of the State Weed Committee make a temporary emergency declaration. Once landholders are informed of the temporary declaration and required controls, they would be required to implement controls consistent with their general biosecurity obligation. The weed should then be assessed for declaration through the normal processes. It would remain covered by the temporary declaration until such time as the State Weed Committee makes a declaration decision or the weed is eradicated in the region.

[38] *Biosecurity Act 2014* (Qld) s 15.

3.3 Regional planning and local delivery

Recommendation 3: Ensure consistent and coordinated regional planning and local delivery

The NSW Government should:

a. confirm and support local level service delivery by LCAs and define LCA statutory functions

b. replace the existing 14 regional weed advisory committees with 11 statutory regional weed committees comprising LCAs, public and private landholders, and community members (similar to the Bush Fire Management Committee model) as subcommittees to LLS, and aligned with LLS borders

c. provide a legislative basis for tasking the regional weed committees with developing regional plans and priorities for widespread weeds and surveillance

d. ensure all regional plans are based on best available local knowledge, research and technology, and promote behavioural change and adoption of integrated land management practices

e. encourage state bodies and the Australian Government to align funding with regional priorities identified in these strategic plans

f. ensure legislation allows for integration of pest plant and animal services and that LLS and LCAs work together to realise opportunities for efficiencies.

Local service delivery

Local service delivery by LCAs is a significant strength of the NSW system, and should be maintained, consistent with the NSW commitment to localism. Under the proposed model LCAs would continue to have statutory responsibility for delivery of weed management services including inspection, initial enforcement, engagement, capacity building, and weed control on their own land. Implementation of these services at the local scale is important for building relationships with local stakeholders and fostering community ownership for weed management.[39] However, clear standards for performance and improved accountability are necessary to ensure consistent service delivery across the state. Submissions in response to the draft report indicate strong support for this recommendation.[40] See Section 7.3 for a full discussion of findings regarding local service delivery.

The NRC recognises the potential economies of scale arising from formal groupings of LCAs through shared service delivery arrangements. For example, pooling resources could facilitate the adoption of technology such as remote sensing and GIS systems that is currently too costly for some individual LCAs. It is also recognised that the independent Local Government Review has recommended that regional 'joint organisations' be established based on a Council

[39] Office of the Auditor General Western Australian 2013, *Managing the Impact of Plant and Animal Pests: A State-wide Challenge*, Western Australian Auditor General's Report. Office of the Auditor General Western Australia, Perth. December 2013.

[40] Many of the submissions regarding the draft report specifically noted support for this recommendation. Many also indicated that current funding should be maintained to ensure ongoing local delivery is feasible.

Controlled Organisation model similar to that provided for in the *New Zealand Local Government Act 2002*.[41]

LCAs should consider the establishment of shared service delivery arrangements with neighbouring LCAs where it may be required to meet service delivery standards. Shared service delivery arrangements for weed management should form at a scale that best supports quality service delivery and conform to LLS boundaries.[42]

Over time, LLSs and LCAs should identify and realise efficiencies by integrating management of pest plants and animals where feasible and cost effective. The legislation should allow for authorised "biosecurity officers" so that staff can be trained and authorised to carry out multiple duties.

Regional coordination

Strategic planning for weed management needs to take place on a landscape scale and work across tenures and organisational boundaries. LLS organisations are best placed to take on responsibilities for regional coordination of weed management under new institutional arrangements. LLS was created to provide integrated land management services by building strong partnerships with landholders, industry, community groups and governments. The LLS incorporates:

- CMAs who have a demonstrated capacity for integrated landscape planning and building whole-of-government and community consensus
- LHPAs with experience in biosecurity and land management
- extension services with knowledge of production systems and capacity building.

Therefore, LLS is ideally placed to provide coordination of weed management that is integrated with broader land management and biosecurity efforts. LLS also have the capacity to raise levies, which they may choose to do for control of specific weeds in consultation with the community. This may be necessary to secure long-term funding resources for the management of priority widespread weeds.

LLS should ensure that weed management is integrated into broader land management programs where feasible, and that innovative solutions are trialled. For example, the Southern Rivers Catchment Action Plan aims to manage causes of weed establishment and prevention of further incursions and recommends investment in drought preparedness, drought management, and grazing management training to reduce the threat of the natural shock of drought.[43] Further, LLS should support public education and extension programs in partnership with LCAs and community groups. These responsibilities are consistent with the historical role of organisations now part of LLS and the mandate for the LLS.

LLS is not intended to be the delivery body for services under this arrangement, except in the case where they are responsible for managing land as a public land manager. Their role will be predominantly to facilitate and coordinate regional strategic planning, assist with educational

41 NSW Independent Local Government Review Panel 2013, *Revitalising Local Government: Final Report of the NSW Independent Local Government Review Panel*. Division of Local Government, Sydney.

42 One county council indicated in their submission that the Local Government Review recommends that county councils become "subsidiaries" to the proposed joint organisations, and expressed a preference for remaining independent. This is an issue which should be further considered based on the final outcomes of the Local Government and weed management reviews.

43 Southern Rivers Catchment Management Authority 2013, *Southern Rivers Catchment Action Plan 2013 – 2023*.

and community outreach programs, and to have overall responsibility for delivery of the regional weed management plans. It is recognised that coordination of weed management for the region is a significant task and it is recommended that each LLS incorporate a full time position dedicated to weed management, who would be the Secretariat of the regional weed committee. This role, which is currently undertaken by project officers under the WAP, has been indicated by stakeholders to be critical to success of regional weed programs. Consistent with the current approach, some WAP funds could be used to fund the project officer. However, all other WAP funds would remain separate from LLS funding and only be available for the priorities identified in the regional plan such as on-ground works and educational programs.

Regional weed committees

Effective regional coordination will require a properly comprised regional body representing a broad range of public and private interests, with opportunities for public participation. The Bushfire Management Committee model is widely supported as good practice for cross-tenure planning.

The new legislation should adopt a similar model for regional weed management planning with:

- statutory Regional Weed Management Committees
- statutory Regional Weed Management Plans
- clear specification of the composition and function of the committee
- the capacity for making public authorities accountable for meeting obligations made in the plan.

Representatives for public land managers noted the benefits of the Bushfire Management Committee model include: they are statutory, they provide confidence in longevity; the composition is specified and includes a broad range of stakeholders; roles and responsibilities are clearly defined; and participants are made accountable for meeting obligations.

The legislation or regulations should identify regional weed management committees[44] as a sub-committee of the LLS board and specify that they be formed on the LLS boundaries. These committees should build on the relationships and progress already made through the various existing regional groups. The legislation or regulations should also define the committee's functions.

Composition of committees

The legislation or regulations should clearly specify the composition of the regional weed management committee. The Chair of the relevant LLS should appoint the Chair of the regional weed management committee. Committee members should include representatives nominated by each of the following organisations that are important for weed management in the LLS region:

[44] There may be opportunities to integrate pest plan and animal planning through these committees in the future and legislation should allow for this.

- major public land managers in the LLS region, e.g.:
  - OEH
  - Crown Lands
  - Forestry Corporation of NSW
- managers of major linear reserves, e.g.:
  - Roads and Maritime Services
  - Australian Rail and Track Corporation
  - Transport for NSW
- representatives of the Local Control Authorities within the LLS region
- a person nominated by from a regionally relevant environmental organisation (such as the Nature Conservation Council of NSW) and approved by the LLS Board
- a person nominated by a regionally relevant farm industry group, such as NSW Farmers Association, and approved by the LLS Board
- the LLS weed management project officer as secretariat to the committee
- any other persons as nominated by the LLS Chair and approved by the Chair of the State Weeds Committee (for example representatives of Local Aboriginal Land Councils, Landcare, or regionally relevant producer groups).

The Australian Government is an important landholder in some regions. In these regions regional weed committees should seek to engage with the Australian Government and encourage participation in the regional planning process and commitment to take agreed upon actions.

To ensure the committee functions effectively, the number of representatives will need to be limited. Effectively this means that it may not be possible for all the LCAs that make up a LLS region to be represented on the committee.

Groupings of LCAs should nominate a person to represent their interests on the committee.[45] For example the Sydney region currently operates as one region with four subregions. Under the proposed model each of the subregions could select representatives for the regional weed committee. These representatives would ensure that subregional issues are duly considered in the broader regional plan. The regional weed management plan will inform the preparation of operational plans at the subregional and LCA level, which would need to be consistent with the regional plan.

LCAs should be free to determine how they would like the nomination process to work. For instance, representation may rotate from council to council on a reasonable time frame. It is recommended that LCA representatives include a mix of elected councillors and weed officers to ensure a breadth of local level viewpoints.

Several regions currently have weed committees that operate on a subregional basis. These committees often serve as a networking forum for on-ground practitioners and facilitate coordination of operational planning. Where these groups are currently effective, they should be encouraged to continue to operate in this capacity, and facilitate implementation of the

[45] Respondents to the draft report noted that six LCAs straddle LLS borders creating problems with enforcement if regional priorities differ. The NRC recommends that these LCAs choose one of the two regional committees and comply with that plan.

regional plans. However, their roles and responsibilities relative to the regional weed committee should be clear.

Regional weed management plans

A key role of the regional weed committees should be to negotiate and prepare the regional weed management plans. The committees would also make recommendations regarding the declaration of Category 2 (eradicate) and Category 3 (impact reduction) weeds for their region. Regional weed management plans will have both strategic and regulatory functions and will be prepared in consultation with the broader community with opportunities for public participation. The regional weed management plans are central to the proposed reforms as they provide for rule setting, program design and resourcing at the appropriate scale, involving all parties with an interest in weed management.[46]

The regional plans will provide a strong basis for coordinated, shared delivery of actions as:

- they will include a broad range of stakeholders
- they will provide clear articulation of the regional outcomes sought by the plan, and specify objectives, targets and strategies for meeting the desired outcomes
- they will establish enforceable control requirements for managing regional weeds
- different land managers will be able to tailor their weed management responses to their specific objectives and constraints provided outcomes are met
- they will be adaptable through implementation of new guidelines and codes of practice as new information becomes available or new risks arise.

Strategically the regional weed management plans would replace a range of current plans, reducing confusion and facilitating improved coordination and collaboration. For example the plans would incorporate the plans prepared for the WAP, and priorities in the Catchment Action Plans and Biodiversity Priorities for Widespread Weeds would be considered. (See Section 7.2 for a discussion of current regional planning arrangements).

The plans would be endorsed by the LLS Board and should be enforceable. Prior to endorsing the plan each LLS Board will consult with the State Weed Committee and Biosecurity NSW and consider any feedback provided. Each representative of a public land manager / authority should have delegated authority to agree to the plan on behalf of their organisation. Each organisation should put procedures in place to ensure that there is appropriate internal consultation prior to the delegate agreeing the plan.

The plans will be central to ensuring weed management consistency across tenures. Management obligations for weed control programs will be specified for all land regardless of tenure. Public land managers will be expected to meet their obligations, including inspection and control, and enforcement action will be initiated for non-compliance (see Section 3.6).

Content of regional plans

Regional plans will be prepared in a consistent format following guidelines endorsed by DPI and LLS in order to ensure consistency. The plans will comprise:

- the current plans prepared regionally for the WAP, including – new incursions, high-risk pathways, rapid response, inspections and communications

[46] Many of the submissions expressed specific support for the regional weed management plans.

- spatial information at the appropriate scale for landholders to understand their obligations
- the detail of any relevant and endorsed eradication plan that has effect in the LLS region, including spatial management zones and clear articulation of the management objectives within the zones (See Section 3.4 for further explanation of eradication plans).
- the detail of LLS programs for the management of widespread weeds, including identification of declared weeds for the region, clear management objectives and performance metrics
- the agreed management obligations for all types of land managers
- resources required to implement the plan and funding sources
- monitoring, evaluation and reporting requirements
- relevant state and regional guidelines, best practice information and codes of practice - for example vehicle hygiene.

While the LLS scale is effective for strategic weed management planning, planning at finer resolutions may be required to appropriately address the variety of landscapes with different weed management priorities within an LLS region, and ensure spatial information is sufficiently detailed. The regional weed management plans, similar to the Catchment Action Plans, can include subregions to reflect landscape differences. For example, the South East LLS transitional Catchment Action Plan divided the region into five subregions as illustrated in Figure 4. These, or similar, could be used as subregions for the preparation of the regional weed management plan.

Figure 4: South East Local Land Services Region

The plans should have a five year duration consistent with the LLS local strategic plans. However, amendments may be made as necessary to adapt to changing conditions and information. The preparation of plans, as with other transitional arrangements, may require additional resources as discussed in Chapter 4. The LLS board should review progress against the plan annually and report to the State Weed Committee on progress and any proposed changes to the plan.

Management requirements

While many weed management requirements may be consistent across the LLS region, some management programs may need to identify areas within a region where different weed management obligations apply. In these instances the regional weed management plans may establish management zones that specify conditions including:

- management obligations – requirement to take specified actions in different zones
- contribution obligation – requirement to contribute financially to collective management programs for a zone.

Weed management programs and zones could occur at a range of scales from a single property to a number of LLS regions. The capacity to develop zones with differing obligations for landholders provides the regional weed management committees with the flexibility to design a range of weed management programs to address weed issues at the appropriate scale. It also ensures that risk creators and beneficiaries can be held financially responsible where appropriate.

For example, the management zone provisions may be used to establish containment programs as illustrated in Figure 5. In order to halt the spread of a weed that infests Zone A the landholders in Zone B may be required to monitor for and control all occurrences of the species. The landholders in Zones B and C are beneficiaries of the containment program. This approach could also be used to eventually eradicate the weed in Zone A if feasible, by implementing eradication programs around the border of Zone A and gradually reducing the size of the containment area. If there is community support, the LLS may choose to apply a weed specific levy to landholders in the different zones to resource the containment program. Management zones could be used in a similar fashion for programs designed to protect particular assets from weeds.

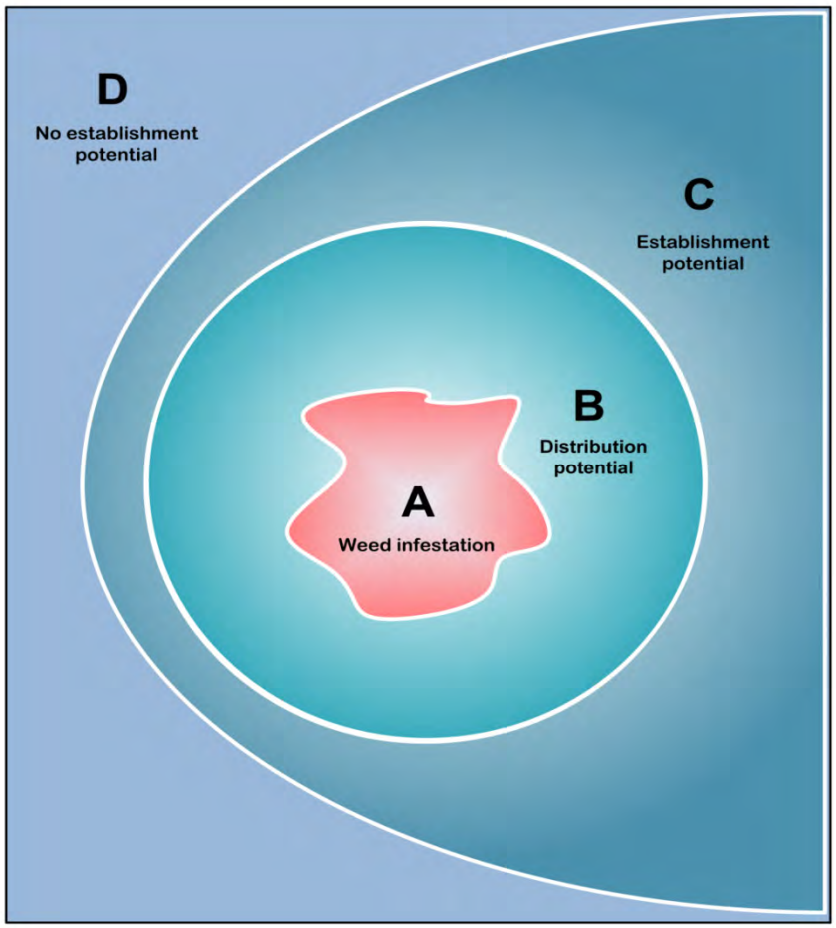

Figure 5: Example weed management zones

Coordination across LLS regions in the preparation of the regional weed management plans will be critical. This is true for management zones that cross boundaries, as well as for situations where one LLS region declares a species where another determines that it is not feasible to manage it. In these cases a buffer zone may need to be developed so that the LLS where the weed is not declared does not create undue risk for the LLS where the weed is declared. Such zones would be specified as management zones in the regional management plans. LLS Boards should work together to resolve any border issues. The Board of Chairs should be responsible for resolving any disputes if LLSs cannot resolve a border issue on their own.

Resourcing

Strategic planning at the regional scale will provide for the accurate determination of the resources required to implement the plan and provide a credible basis for aligning diverse sources of local, regional, state and Australian government funding sources. The plans will include a resourcing strategy that identifies the financial resources required to deliver the plans' objectives and where the resources will come from including grants, LLS levies, Local Government contributions, Catchment Action NSW funding, public land manager budgets, and Australian Government funding.

The regional management plans should be used as a basis to allocate regional WAP funding from DPI. Under the recommended model, DPI in consultation with the State Weed Committee should allocate the WAP funding using a risk-based and strategic funding allocation process,

such as the NRC funding allocation model previously used to allocate funds to CMAs.[47] DPI should allocate some portion of the WAP funds to regional LLS projects and some portion to state-wide projects as is currently done. The LLSs would then allocate the regional project funds to LCAs in accordance with the regional plans. LCAs should be required to commit to specific co-contributions for fulfilling their duties not related to management of their own land and roadsides. See Section 3.5 for further discussion of funding for inspections.

The specifics of joint funding arrangements should be determined at the LLS scale to allow consideration of regional variations in incursion risk. For example, there may be an argument for a greater state contribution to the surveillance of sites or pathways that pose incursion risks to the entire state such as ports and markets.

DPI should commit funds for the length of the plan (five years) rather than allocating it annually part way through the fiscal year as is currently the case. This will provide certainty for regional planners. However, DPI should be able to vary a certain percent of the funds on an annual basis based upon whether the agreed upon outcomes are being met as demonstrated through annual reports (see Section 3.6).

Long-term funding is essential to ensure that investments, particularly investments in reducing the impacts of widespread weeds, are not wasted. Funding for major projects should require a commitment by recipients to contribute to long-term maintenance of the benefits received from the project. One option for achieving this is to provide allowances for some portion of funds to be put aside into a trust, which can be used for ongoing maintenance when a project is completed.

Aligning funding

Establishment of the regional management plans should provide stakeholders with a more consolidated set of regional priorities, and provide a means to better leverage additional investment. Various land managers have different priorities and may still choose to fund alternative priorities. However, the regional strategic plan would allow stakeholders to identify where their priorities align with broader goals so that they can leverage their investments. In particular, the Australian Government should be encouraged to align their funding with agreed regional priorities. The tenure-neutral approach would also allow for improved coordination of funds across landscapes and boundaries.

Catchment Action NSW funding continues to be available to LLSs for integrated land management projects. Weeds were identified as a key issue in all of the Catchment Action Plans. During the regional planning, the regional weed committees should identify where projects funded through the CAP programs could assist with meeting their regional weed management goals.

Similarly Landcare, Bushcare and other community groups provide valuable services which can be coordinated to assist in meeting weed management objectives. Inclusion of community group members on the regional weed committees should help ensure that these resources are duly considered in strategic planning.

[47] Natural Resources Commission 2013, *Review of Catchment Action NSW 2013-14 funding allocations to Catchment Management Authorities*, Natural Resources Commission, Sydney.

3.4 Prevention and response to new incursions

Recommendation 4: Improve prevention measures and response to incursions

The NSW Government should:

a. establish a reserve fund for responding to new high-risk incursions (similar to the pest insect destruction fund)

b. prepare enforceable weed eradication plans consistent with response plans for other biosecurity responses, with funding arrangements to be negotiated between DPI, LLSs, LCAs, industry and other relevant stakeholders

c. implement a 'permitted list' for sale of plants in NSW, starting with aquatic plants and transitioning to all species within four years

d. advocate to the Australian Government for a review of the requirements for obtaining a minor use permit to improve access to herbicides for incursions.

Response to high-risk incursions

The early detection and effective response to incursions can be the difference between successful eradication and ongoing management requiring a potentially large and ongoing financial commitment by landholders.[48] Effective responses require preparedness, including clear roles and responsibilities and timely access to adequate resources. Response to weed incursions should be consistent with the rigour of responses to other biosecurity concerns.

Identification of a weed incursion should trigger immediate responses including implementation of rapid response plans. During the response period, funds should be allocated for immediate eradication efforts and the general landholder obligations to cooperate with eradication efforts should take effect.

The biosecurity legislation should provide for the establishment of a NSW response fund for high-risk new incursions, similar to the pest insect destruction fund established in 1934 to deal primarily with locust outbreaks. This would be a reserve fund separate, and in addition to, current funding arrangements.

The fund should have a broad base as the location of weed incursions cannot be predicted and all community members may be risk creators and/or beneficiaries of eradication. It should be set initially at one million dollars. The fund should be established by contributions from the NSW Government and a flat rate contribution by all LLS rate payers, reflecting that all community members are risk creators and that landholders will often be the primary beneficiaries. As with the pest insect destruction fund, the NSW Government should provide additional funds in an emergency if the fund is depleted. In the future the NSW Government could work towards developing agreements with industry groups for contributing to the fund where risk creators can be clearly identified.

[48] Rejmanek, M, and Pitcairn, MJ 2004, 'When is eradication of exotic pest plants a realistic goal?', in CR Veich. and MN Cout (eds), *Turning the tide: the eradication of invasive species*, IUCN SSC Invasive Species Specialist Group. IUCN, Gland, Switzerland and Cambridge UK. Viii + 414 no. 27, pp.249-253.

The response fund should be rebuilt after use through NSW Government and LLS rate payer funds, consistent with how it is originally established. High-risk incursions should be addressed regardless of the land tenure on which they occur. Public land managers should have access to the fund when determined appropriate by the State Weed Committee as the NSW Government will be contributing to the fund. These funds should also be used to leverage further funds from the Australian Government under existing intergovernmental agreements. This levy should only be collected once governments have also agreed to contribute to the fund.

This fund should be used only for on-ground works for immediate respond to high-risk new incursions. The State Weed Committee should determine when an incursion is high-risk and eligible for response funding, and how long funding should be provided. Specific rules and requirements for the release of funds should be established.

Timely response is the key to eradicating new incursions. The high-risk incursion fund is only intended for immediate response to significant high-risk incursions. Small, local incursions that can be quickly and reasonably handled by LCAs should continue to be handled that way. Eradication of an incursion may well take a significant period of time and considerable investment, depending on how quickly it is identified. The incursion fund is intended only to provide immediate response measures to ensure that the incursion is tackled as quickly as possible. If ongoing management will be required, this should be planned and resourced via eradication plans as described below.

The initial response period must be sufficient to allow the State Weed Committee to monitor progress, and review risks and timeframes. If the incursion is not fully eradicated during the initial response period, but it is still deemed eradicable over the longer term, an eradication plan should be implemented. The weed would also be declared as a Category 2 (eradicate) weed in relevant LLS regions upon release of the plan. The State Weed Committee should establish a maximum time limit for developing an eradication plan, to ensure that a long-term eradication program does not unduly tax the response fund.

Eradication plans

Eradication plans should be developed by DPI in consultation with relevant LLS and LCAs as they will have responsibilities for carrying out the eradication in cooperation with landholders. Plans should identify management zones that may be of any scale, for instance, the entire state, a local government area or a number of properties. Eradication plans should be endorsed by the State Weed Committee, and should clearly specify:

- the purpose of the plan
- the areas that it applies to
- an estimated activity period
- the powers that it authorises
- roles and responsibilities
- management goals
- performance metrics, and monitoring programs.

Eradication plans should also specify the resources that will be required to implement the plan. Resource estimates should be conservative and secured for sufficient time to allow for the resolution of unanticipated issues and support post eradication activities. Funding for delivery

of eradication plans beyond the initial response period should be negotiated between DPI, relevant LLSs and LCAs, other relevant public authorities and stakeholders including industry, based upon an assessment of the scale of the incursion, the values that are likely to be impacted and identification of any risk creators. Funds should be requested and provided consistent with the principles outlined in the LLS funding framework, as described further in Section 4.1.

Permitted list

Preventing the naturalisation of new species is accepted as the most cost effective weed management strategy.[49] The naturalisation of new weed species in NSW is occurring at an estimated average rate of almost eight new species per year[50], and there are thousands of potentially invasive species already in Australia.[51] The NRC recommends taking a precautionary approach to managing this new incursion risk by creating a permitted list indicating the species that are permitted to be sold in NSW and prohibiting the sale of other species until their weed risk can be assessed. This approach will ensure that only low risk plants will be available for purchase in NSW.

The significant advantage of a permitted list, rather than a prohibited list approach, is that it is a precautionary and proactive way to manage risk. This approach is justified by the considerable potential costs and impacts of new incursions. In contrast, a prohibited list is reactive, relying on a plant to be identified as a problem and declared before it is managed. The objective of this recommendation is that any new species proposed for introduction or sale in NSW is subject to a risk assessment. This is consistent with the Australian Government quarantine program, which is based on a permitted list approach; only plants that are on the permitted list are allowed into the country.

There is strong support for a permitted list; for example, many submissions in response to the draft report noted support including those from the Invasive Species Council, NSW Farmers, many environment NGOs, bush regeneration groups, regional weed advisory committees and local governments.

Commonly permitted lists cover both sale and movement of plants. For this reason, a permitted listed approach is more suited to national borders. However, this approach can also be effective in federated countries where the states have weed declaration and management responsibilities.[52] For instance, in Western Australia the permitted list system has been found to work effectively,[53] but it is supported by comprehensive interstate quarantine measures that may not be supported in NSW.

The porous borders of the eastern Australian states make the implementation of a permitted list approach in NSW more difficult and there are obvious benefits to coordination with adjacent states. Efficiencies could be gained and risks further reduced if all of the states on the eastern

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49 Wittenberg, R, and Cock, MJW (eds.) (2001), "Invasive Alien Species: A Toolkit of Best Prevention and Management Practices", CAB International, Wallingford, Oxon, UK.

50 Johnson, SB 2013, 'Some weeds have no boundaries. What are the next steps we need to take with species that jump the fence?', *Proceedings of the 17th Biennial NSW weeds conference*, Corowa, NSW DPI, Orange, NSW.

51 Csurhes, S, Randall, R, Goninon, C, Beilby, A, Johnson, S and Weiss, J 2006, 'Turn the tap off before you mop up the spill: Exploring a permitted-list approach to regulations over the sale and interstate movement of potentially invasive plants in the States and Territories Australia', Proceedings of the 15th Australian Weeds Conference, Adelaide, SA, pp. 95-98.

52 Wittenberg, R, and Cock, MJW (eds.) (2001), "Invasive Alien Species: A Toolkit of Best Prevention and Management Practices", CAB International, Wallingford, Oxon, UK.

53 Auditor General Western Australia 2013 Managing the Impact of Plant and Animal Pests: A State-wide Challenge.

seaboard were to adopt a consistent permitted list and contribute to risk assessments.[54] However, this should not be used as an argument for delaying action in NSW.

Given that there is not currently agreement across Eastern Australian states, the NRC proposes that the permitted list only apply to the sale of plants. The movement of plants not on the permitted list into NSW (but not sold) will not be regulated as it would be impractical given the significant border issues and available resources. However, NSW should continue to advocate for improved alignment of weed declarations with adjacent jurisdictions, which may allow for regulation of movement at a later date. DPI should investigate options for policing internet sales and notifying internet sellers of the NSW permitted list.

The preliminary work for a nationally coordinated permitted aquatic plant list is already in place. As early as 1982, the National Committee on Management of Aquatic Weeds developed a list of undesirable species and recommended a national ban from sale.[55] In 2008, Land and Water Australia funded a project to identify and assess the weed risks of all known species in the aquatic plant trade. The project adapted and applied the New Zealand Aquatic Weed Risk Assessment Model so as to better reflect factors relevant to mainland Eastern Australia.[56] In 2008, the group evaluated the 401 aquatic plant species reported as being present in Australia. They recommended to the Australian Weeds Committee that 25 species be banned nationally from sale and distribution, with a further 21 species recommended for further evaluation, leaving 355 species recommended to be permitted for sale. However, this list has not been fully adopted by each of the states and the adoption of a nationally consistent approach is still under consideration.

Implementation of the permitted list

The effective implementation of the permitted list requires the registration of nurseries and their adoption of industry biosecurity standards such as plant labelling protocols. This will allow weed officers to more easily inspect nurseries for violations of the permitted list. Nursery registration is discussed further in Section 3.5.

The Nursery and Garden Industry Association should develop a proposed permitted list within 12 months of a commitment by government to adopt a permitted list approach. For efficiency the initial permitted list should be developed based on plants currently sold rather than all of the plants currently known to be within NSW.

The State Weed Committee should review the proposed list and either confirm or remove species where the risk is deemed too high. While the nursery industry is developing the proposed list, the State Weeds Committee should design a process for ensuring the prompt assessment of the weed risk posed by plant species proposed for the list. Such assessments should adopt existing protocols. Where risk assessments have already been performed on particular species these assessments should be considered to determine if they are sufficient or if additional assessment is required. It is anticipated that many of the proposed plants may have been assessed for weed risk in the past. However, the resource demands of the preliminary list will require temporary increased assessment capacity. The State Weed Committee should

54 The potential for efficiencies was highlighted in several submissions including those from the Invasive Species Council, and Dr. Mehreen Faruqi MLC.

55 Petroeschevsky, A, and Champion, P, 2008, *Preventing further introduction and spread of aquatic weeds through the ornamental plant trade* Proceedings of the 16th Australian Weeds Conference, Cairns.

56 Champion, PD, Clayton, JS, Petroeschevsky, A, and Newfield, M 2010, 'Using the New Zealand Aquatic weed Risk assessment Model to manage potential weeds in the aquarium/ pond plant trade, *Plant protection quarterly,* vol. 25, no. 2.

procure suitable additional assessment services as required potentially from Universities with a specialisation in the field. A public consultation period should be provided prior to finalising the list.

Proposals to add plant species to the permitted list after the initial list is implemented will need to be accompanied by a weed risk assessment consistent with accepted weed risk assessment protocols. The State Weed Committee should review the assessment and make a decision on whether the species can be added to the permitted list. Persons applying for the inclusion of a plant species on the permitted list should ensure that any associated intellectual property is appropriately protected through, for example, plant breeder's rights.[57]

The development and maintenance of the permitted list should be transparent with a presumption of disclosure and opportunities for public input into decisions, as with all the deliberations of the State Weed Committee.

Given the work that has already been completed into evaluating the risks of various aquatic plants, an aquatic plant "permitted list" should be implemented in the first instance. It is recommended that the State Weed Committee establish the aquatic plant permitted for sale list within two years. The aquatic plant permitted list should be implemented in the third year following passage of the legislation. This will provide an opportunity to identify any potential implementation issues prior to roll-out of a more comprehensive permitted list.

The permitted list would be administered by DPI. LCAs would be responsible for enforcing the permitted list through their usual inspection of nurseries. As described in Section 3.5 all nurseries will be required to be registered allowing for easier identification by weed officers for inclusion in inspection programs.

Minor use permits

NSW should advocate through APVMA for improvements to the minor use permitting process. Providing herbicides for treating incursions in a timely and cost effective manner will improve efforts to eradicate incursions.

[57] http://www.ipaustralia.gov.au/get-the-right-ip/plant-breeders-rights/, viewed 3 February 2014.

3.5 Effective risk management

Recommendation 5: Improve management of high-risk pathways

The NSW Government should:

a. standardise inspection requirements to ensure all properties greater than one hectare are inspected at least once every five years

b. establish weed status certificates for each property inspected which would be:
   - disclosed on planning information certificates for the sale of land
   - included in any application for the subdivision of land greater than one hectare
   - provided to parties who lease public land
   - required for registration as a producer of fodder for sale

c. require the registration of commercial entities whose activities generate weed risks, for example, nurseries and producers of fodder for sale, and making it an offence for unregistered entities to carry out these activities

d. encourage greater self-management of weed risks by competent parties by providing for the establishment of industry contribution schemes and auditable compliance agreements

e. appoint LLS to coordinate management of declared aquatic weeds within each region.

Standard inspection requirements

Inspection programs in NSW are intended to ensure that the weed status of properties is periodically assessed, with the frequency of assessment varying according to the weed risk that the property or land use poses. The quality and frequency of inspections and reporting varies considerably across the state. The number and type of properties visited, as well as the inspection protocols vary from LCA to LCA, resulting in patchy inspection coverage across the state. However, there is good state-wide coverage of qualified weed inspectors, which could support the establishment of a coordinated and consistent inspection scheme.

The inspection of all properties greater than one hectare according to agreed upon standard protocols should be a key service delivery responsibility for LCAs. The objectives of the comprehensive inspection program include:

- early identification of new incursions to improve the likelihood they can be eradicated
- proper understanding of weed distribution, abundance and risks across the state
- information to better manage weed risks (e.g. through property transactions, subdivisions and sale of fodder)

Evidence indicates that a five year inspection time frame is generally appropriate to mitigate risks of new incursions.[58] It is therefore proposed that the reference inspection frequency for all regions be five years, with the provision that if a region can provide sufficient evidence that they can meet the required outcomes through an alternative inspection regime, then the region may be provided an exemption from the five year requirement. Alternatively, an LLS region

[58] Brown J, Harris S and Timmins S M (2004), "Estimating the maximum interval between repeat surveys," *Austral Ecology* 29, 631-636.

may request a variance from the one hectare property size requirement to two hectares. Any exemptions or variances would need to be approved by the State Weed Committee who will ensure that the inspection frequencies are suitably evidence-based and that the region can demonstrate their program will appropriately mitigate risk. Inspection programs will be detailed in the regional management plans. High-risk pathways in all regions would still need to be inspected more regularly.

Funding for inspections

The NRC has investigated the potential resource implications of implementing this recommendation. Currently most LCAs have goals for frequency of inspection of rural and rural residential properties but not all properties over one hectare. Several LCAs raised concerns about the feasibility of this recommendation in their submissions and indicated that it would require significantly increased resources. However, some LCAs are currently meeting this requirement and many submissions supported this recommendation. Unfortunately there is insufficient data available from LCAs to make any strong conclusions about typical LCA funding for inspections or what percentage of inspections are paid for by LCAs versus the NSW Government. As such, it is not possible to accurately determine the degree of additional resources required to meet this recommendation at this time.

Under the *Noxious Weed Act 1993*, LCAs have responsibility for inspection of private property. Local councils should be prioritising weed management and contributing sufficient funds to inspection programs to ensure that their obligations under the Act are met. However, it is clear from responses to this review that some LCAs view funding for inspections as a State responsibility. This is in part due to historical practices in which DPI provided grants for weed officers and more recently on DPI's position that WAP funding is meant for Goals 1, 2 and 4 of the Invasive Species Plan (prevention, eradication and capacity building). Over time a joint-funding arrangement has developed whereby LCAs and the NSW Government effectively share the cost of surveillance, inspection and capacity building. The relative proportions within the cost sharing arrangements vary considerably across the state.

It is appropriate that all ratepayers should contribute through their local government rates towards weed inspections as all community members create risk and benefit from prevention efforts. LCAs should be required to report the amount local governments' are contributing towards inspection programs, and that amount should at least match the amount of WAP funding provided to the LCA for inspections. This will create transparency and demonstrate whether LCAs are appropriately prioritising weed management obligations. LCAs and LLSs should continue education and awareness efforts to raise the profile of weed issues so that community members understand the significant risks, support ongoing funding, and increase funding where necessary. Under the proposed model DPI has overall accountability for ensuring inspection and surveillance for prevention and eradication of incursions. As such, it is appropriate that they contribute through WAP to supporting the inspection network and capacity building.

Inspection of public land

LCAs currently differ in whether they inspect public lands or not. Additionally, some LCAs raised in their submissions that if they were required to inspect public land they would require additional resources. Public land managers do not contribute through rates to the LCAs and therefore should be responsible for inspection on their own lands. Where it is more efficient, public land managers should contract local LCAs or other organisations to perform the inspections and undertake immediate minor control works. Where a public land manager

requires an inspection for weed status certification (described below) this should be obtained from the appropriate LCA on a cost recovery basis. With these provisions, the requirements for public land to be inspected should not lead to any unrecoverable costs for the LCAs.

Potential efficiencies

Potential efficiencies for inspection programs include:

- LLS rangers, if properly trained, may be able to perform weed inspections. Some LCAs or regions may choose to cross-train rangers and weed officers to support each other's functions so that one site visit could accomplish multiple outcomes. Rangers would need to be properly trained and authorised in order to perform certified weed inspections. Alternatively they may provide high-risk pathway surveillance to alert weed officers of potential incursions.
- All LCAs will be required to implement the state-wide data management system (see Section 3.6) which will significantly reduce the administrative burden for those currently using paper based systems.
- LCAs may choose to work together in County Council or similar arrangements to share resources such as GIS capabilities and equipment.
- Increased use of technology such as drones and aerial inspections may provide an opportunity to reduce inspection time. It is noted that increased use of these techniques for inspections would require some regulatory changes, and that they are not as accurate as inspections carried out on foot at this time.[59] Research and development in this area should improve the feasibility of increased application of these technologies in the future.[60]
- The inspection standards will be based on risk management principles and detail the extent of property to be inspected to meet requirements. For some LCAs this may be a less extensive inspection protocol than is currently implemented.

Weed status certificate

The effective operation of markets requires sufficient information for consumers to make informed decisions. There are a number of instances where a lack of knowledge regarding the weed status of a property contributes to poor weed management outcomes or imposes unexpected obligations on new owners, particularly in the sale and subdivision of property[61] and the sale and distribution of fodder.

[59] Official inspections currently require that the landholder be notified and that the inspector enter the property. Aerial inspections do not provide as detailed information as land based inspections. Currently to use a drone you must keep it within your line of sight at all times, limiting its application. Weed inspectors have also indicated that it is very time consuming to evaluate the results from drone inspections.

[60] The NSW Department of Trade & Investment has been awarded an innovation grant from the Australian Government Department of Agriculture to study "the practical application of state-of-the-art un-manned aerial vehicles and imaging technology to on-farm property management of invasive species", the results of which should be leveraged in the future.

[61] Submissions from many LCAs strongly supported certification for the sale or subdivision of land.

Implementation of the inspection program, in conjunction with the state-wide data management system, will allow property weed status certificates to be issued. Landholders for all properties inspected should receive a weed status certificate following an inspection. The certificates would explain the status of the property in regards to weed species declared for that particular LLS region.

In developing inspection plans weed officers should assess which weeds are most likely to be present in the local area of the site and focus on those species. Although any weed species declared for the region or new incursions of undeclared known or possible weed species should be noted. Some respondents have indicated that some sites would require more than one visit in a year to ensure that all weeds have been inspected for due to seasonality. This should be up to the discretion of the weed officer.

Future legislation should retain the provision for the accreditation by the NSW Government of suitably qualified LCA officers. These officers could be authorised to issue weed status certificates for both private and public land. The new biosecurity legislation should include provisions exempting weed officers from liability provided that they perform the inspections substantially in accordance with established standards. This standard could also be applied to private third party inspectors who could obtain their own liability insurance.

The certificates would state the date of the inspection and include a disclaimer to specify that the certificate reflects weed status at a point in time and the professional judgement of the authorised officer. It would be a breach of the general biosecurity obligation for a landholder to use a weed certificate in a transaction if they knew that it was no longer accurate.

Properties would be assessed every five years as a minimum (unless a variance is granted for the region) with shorter frequencies for riskier properties or land uses possible. For example, LCAs should continue to inspect high-risk pathways with a higher frequency in accordance with the high-risk pathway plans for their region, which will be incorporated into the regional plans. Land managers may request the LCA to update a property's weed status certificate more frequently on a cost recovery basis. However, this will be subject to weed officer's discretion in regards to whether it is an appropriate season to certify the property or not. It is not intended that all public lands will be "certified". Only public land that will be leased or sold would require a weed status certificate.

The certificates would follow a state-wide standard format and would be required:

- to obtain or retain registration to produce fodder (hay) for sale
- in planning information certificates[62]
- in applications for the subdivision of land greater than one hectare
- in leases for public land.

Requiring disclosure of the weed status on the sale of land will require an amendment to the provisions in the planning regulations.

The certification system would be phased in over a five year period, allowing time for landholders to address current weed issues. The development of one certificate to meet a number of requirements will reduce compliance and administration costs. The effectiveness and consistency of the weed status certificate process across the state would be monitored by the LLSs and subject to periodic evaluation by the State Weed Committee.

62 Planning Bill 2013 (NSW) Division 11.3.

Sale and subdivision of land and lease of public land

Lack of knowledge regarding the weed status of a property can contribute to poor weed management outcomes. Although 'buyer beware' is an accepted principle in contract law, the weed status of a property is difficult to assess by those unfamiliar with the landscape and land management requirements. This is particularly a concern in peri-urban and coastal regions where the transfer and sub-division of land and land transfer is more common. The NSW Government is currently considering the *Planning Bill 2013*. The Bill, like current legislation provides for the provision of planning information certificates in relation to a particular parcel of land.[63]

The NRC recommends that the regulations supporting the Planning Bill 2013 include the requirement for all planning information certificates to include:

- reference to any plan by the LLS or other public authority that details the weed management obligations for property in the region
- the most current property weed status certificate.

The regulation should also require that a current property weed status certificate accompanies all applications for the subdivision of land greater than one hectare. A subdivision certificate should not be issued unless specified weed management requirements are complied with.

Similarly, a current property weed status certificate should accompany all leases of state land, and the lease should clearly identify the lessee's responsibilities for weed management.

Managing high-risk industries

High-risk pathways for weeds in NSW are discussed in detail in Chapter 5. Several high-risk industries have been identified for NSW including commercial plant trade, fodder trade, livestock trade and aquariums. Consistent state-wide inspections in combination with the weed property certification program, and state registration systems currently in place will allow for weed risk posed by these industries to be more readily addressed.

The recommendations in this report specify commercial plant and fodder industries as high-risk industries for greater focus initially. However, the management systems and inspection protocols outlined for these industries will enable the effective regulation of other pathways in the future including livestock movement, sale of lawn turf, pet shops, and landscapers. While the NRC is calling for initial programs to focus on nurseries and fodder traders, the legislation should provide more broadly for regulations to be put in place to address other pathways as determined necessary.

Commercial plant trade

Businesses in the commercial plant trade[64] should be required to be registered with DPI. The proposed Biosecurity Act should make trading of plants by unregistered organisations an offence. This recommendation was supported by the submission from the Primary Industries Ministerial Advisory Committee as well as several LCAs.

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63 *Planning Bill 2013* (NSW) Division 11.3.

64 This is not intended to apply to cut flower shops (e.g. local florists). Reasonable rules for which entities must be registered as plant traders should be established in the regulations in consultation with industry.

In order to be registered, nurseries should be required to demonstrate compliance with appropriate industry biosecurity standards. The Nursery and Garden Industry Australia would be responsible for the development of the industry standards, drawing from existing accreditation schemes where appropriate. The industry biosecurity standards should include record keeping, plant labelling and plant pest and disease management protocols. The NSW Government should contribute resources to facilitate development of the standards. The Nursery and Garden Industry Australia or a suitably qualified private certifier should be allowed to certify businesses against the industry standards.

Informal plant trading operations including school fetes will not require registration; however LCAs should provide closer surveillance and education about weed risks for such events. Nurseries will continue to be inspected by LCAs consistent with their management of high-risk pathways. An LCA will notify DPI of any contravention of weed risk management standards, for example, identification of species for sale that are not on the permitted list.

Registration should be through the Government Licensing System, an e-Government platform provided by the Department of Finance and Services. Several NSW Departments use the Government Licensing System processes to manage business, occupational, recreational and community licensing. Examples include online licensing of bee-keepers for DPI, and licensing of operators and pilots of Pesticide Applicator Aircrafts for OEH. Hard copies of registration forms should be available at all LCA offices, and for download from the Government Licensing System and the relevant industry websites. Registration would require the identification of a responsible person, place of business and type of business activity. Registration should be required every five years and businesses would incur a registration fee (based on an annualised rate) to cover the costs of maintaining the register and the cost of LCA inspections. The first registration fee should be waived to remove any financial barrier to participation.

Fodder industry

Producers of fodder for sale should also be required to register through the Government Licensing System and the sale of fodder by unregistered producers should be an offence. Alternatively it may be possible to register using the Biosecurity Information System. Registration would require maintaining property weed status certification, and only properties free from weeds declared in the region would be eligible for registration. The State Weed Committee would ensure that any weed that may cause significant risk through fodder transfer would be declared for all regions (e.g. serrated tussock, Chilean needle grass, African lovegrass). This does not mean that all LLS regions would have to actively manage those weeds, but they would be required to inspect for them at a minimum.

Registration would last until the expiry date of the latest property weed status certificate, making registration required at least once every five years. A fee for maintaining the registration system would be charged at the time of registration or renewal based on an annualised rate.

Registered fodder producers should provide their Property Identification Code (PIC) to record weed inspections results against and allow inspectors to review the weed risk from adjoining properties. LLS offers PIC registration services on-line for a fee, and maintain the PIC database. LCAs should be provided access to this information through the state-wide weed management database (described in Section 3.6). Weed officers would be responsible for enforcement against unregistered landholders selling fodder. Audits of weed status certificates against PICs for fodder purchased by fodder distributors should drive compliance in a similar process to saleyard audits for National Livestock Identification System compliance. In Victoria, PICs for

plant industries are used in relation to pest or disease outbreaks to allow the Department of Environment and Primary Industries to inform the property owner or occupier about any requirements associated with a pest or disease outbreak.[65]

All fodder sales should be accompanied with a vendor declaration certificate that adheres to the industry standard[66], and the declarations should include a copy of the relevant property weed status certificate. A fodder producer would be able to apply to LLS for an exemption if their property contains a priority weed and they want to sell within the region where the weed is already prevalent and sale would not risk spreading the weed further.

Registered businesses should be recorded as 'Registered Suppliers' by NSW DPI, LCAs and the relevant industry associations. This will allow purchasers, including interstate purchasers, to check if their supplier is registered. This is consistent with other on-farm assurance systems, such as Freshcare for the Australian Fresh Produce Industry.[67] 'Registered Supplier' status will not ensure a bonus for certified produce, but may avoid price discounts in good seasons when fodder supply is greater than the demand for fodder. Fodder users should only source fodder from 'Registered Suppliers' to reduce weed control costs on the property where livestock are fed, and to maintain or achieve weed status certification for their property.

Submissions were mixed in regards to this recommendation, with several supporting it but others citing concerns about limiting trade of fodder. Although it is poorly enforced, the knowing distribution of weeds through fodder is already prohibited in NSW. Section 29 of The *Noxious Weed Act 1993* requires that: "*An occupier of land (including a public authority) must not use or permit the land to be used for the purpose of disposing of, transporting or selling soil, turf or fodder, if the occupier knows, or ought reasonably to know, that there is a plant on the land that is a notifiable weed in any part of the State.*"

Weeds in Classes 1, 2, and 5 are notifiable weeds. Weeds in Class 3 and certain plants in Class 4 *must be fully and continuously suppressed and destroyed and the plant must not be sold, propagated or knowingly distributed.*[68] Therefore under current regulation it is illegal to sell fodder cut from land the vendor knows or ought reasonably to know contains weeds including the following:

Serrated Tussock	(Class 2 and 3)
Chilean Needlegrass	(Class 2)
Fireweed	(Class 3 and 4)
Coolatai grass	(Class 4 with the class 3 sale/propagation and distribution prohibition)
African lovegrass	(Class 4 with the class 3 sale/propagation and distribution prohibition)

Effectively, the proposed recommendations aim to create a system that will allow current legislative requirements to be enforced.

The recommendation for registration of fodder traders is aimed at controlling weed spread at the source by preventing sale of fodder from properties in NSW known to contain high-risk weeds. Therefore, the proposed recommendation to register NSW distributors does not cover the movement or purchase of fodder from interstate.

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65 Department of Environment and Primary Industries Victoria, viewed 1 April 2014, depi.vic.gov.au/agriculture-and-food/horticulture/property-identification-codes.

66 Australian Fodder Industry Association Fodder Care Domestic, viewed 22 April, 2014).afia.org.au/index.php/fodder-care.

67 Freshcare: the national on-farm assurance program, viewed 1 April 2014, freshcare.com.au.

68 Weed Control Order 30.

It is recognised that in times of drought farmers may prioritise livestock welfare over weed risk concerns. The NSW Government approach to drought focuses on pre-drought farm business and farm management preparedness and resilience programs. Producer training programs support timely decision making by NSW livestock producers going into, enduring and recovering from drought. Sound decision making including sourcing fodder from 'Registered Suppliers' should be incorporated into drought preparedness training programs, e.g., NSW DPI's StockPlan® package.[69]

Industry funding schemes and compliance agreements

Industry funding schemes have been implemented in Western Australia and use funding arrangements authorised under legislation to raise industry funds to tackle priority biosecurity issues. Since July 2010, three schemes have commenced to address biosecurity threats relevant to the grain, seeds and hay; sheep and goat; and cattle industries. In 2012-13 these schemes raised $4.5 million. An Industry Management Committee oversees each scheme and determines which threats require action, how best to deal with the threats, and what contributions will be needed from industry to tackle the problem. This arrangement allows for industries to self-manage biosecurity risks that may threaten their viability and sustainability.

Similar industry schemes could be effective in supporting industry to more effectively address specific weed concerns. For instance, if a particular weed impacts predominantly on graziers, graziers might wish to create an industry funding scheme to fund regional eradication of that weed. Additional regulation would be required to support such schemes including a requirement to register industry participants.

Compliance agreements allow for greater self-regulation of weed risks by those parties that can demonstrate that they have the capacity for proper management and want the responsibility for self-assessment. For example, compliance agreements might be used by public authorities to demonstrate how they are meeting their weed management obligations through their operational procedures. Greater self-regulation by parties will allow limited regulatory resources to be applied more effectively. Parties to compliance agreements should be periodically audited to ensure compliance with the terms of the agreements.

Aquatic weeds

Improvements to aquatic weed management arrangements were considered in the 2010 Review of the *Noxious Weed Act 1993* Issues Paper. It was proposed that the Act be amended to allow the Minister to appoint a person or organisation, or a group of persons or organisations, as having the responsibility for aquatic noxious weed management in particular circumstances or for specified waters.

While LCAs may take responsibility for controlling aquatic weeds under the current regulations they are not required to do so, even where coordinated control is clearly needed. Further, the LCA scale may not be the most effective for management of aquatic weeds. Watercourses often pass through or form the boundary between multiple local government areas, particularly in the more densely populated parts of the state. This can make coordination of actions difficult. The establishment of LLS provides an organisational structure to take responsibility **for coordinating** the management of aquatic noxious weeds at a more appropriate scale.

[69] NSW Department of Primary Industries, viewed 16 April 2014, dpi.nsw.gov.au/agriculture/profarm/courses/stockplan2.

The current responsibilities of landholders adjacent to waterways should remain for small water ways; however, where it is deemed "unreasonable" by the regional weed committee to expect individual landholders to undertake control, those responsibilities should be assigned through the regional plan. This may be the case for instance where the body of water is too large and/or crosses through too many properties for it to be reasonable for each landholder to take individual responsibility. This recommendation is not intended to include riparian weeds which remain the landholder's responsibility in all cases.

Aquatic weed management programs for these bodies of water and resourcing strategies should be included in the regional plans. Landholders, LLS and LCAs would be required as part of their general biosecurity obligation to meet the responsibilities specified in the plan and to participate in any duly authorised aquatic weed management program. LLS would be responsible for ensuring that aquatic weed management is coordinated and being carried out. LCAs would be responsible for surveillance and capacity building consistent with their responsibilities for terrestrial weeds. High-risk new incursions of aquatic weeds would be treated the same as terrestrial incursions – coordinated by DPI with support from the high-risk incursion fund.

Each LLS should determine the most cost effective mechanisms for delivering their aquatic weed management programs. Aquatic weed control should be undertaken by public or private organisations with the capacity to deliver the outcomes required. For example, the Hawkesbury River County Council has an extensive program for management of aquatic weeds and has the necessary equipment and skills for undertaking control. It is envisaged that they would continue their current role, which would be specified in the regional plan.

A resourcing strategy for aquatic weed management should be clearly specified in the regional plan. Currently funds for aquatic weed management come from several sources including some LCAs and county councils, DPI state-wide project funds, and other state and Commonwealth grant programs. Funds for aquatic weed management should be based on the same principles outlined elsewhere in this report: where risk creators can be identified they should be held responsible; where they cannot then the beneficiaries of weed management efforts should contribute. State-wide project funds should continue to be sought where an aquatic weed poses a state-wide threat and all ratepayers are beneficiaries. Management zones and weed specific levies may be applied to aquatic weeds consistent with how they are applied to all other weeds.

An alternative to the solution proposed above, suggested by several submissions, is that the NSW Government could take responsibility for funding and coordination of aquatic weeds management. LLS, LCAs and landholders would be required to cooperate with efforts, but the NSW Government would have overall responsibility for aquatic weed management. The rationale for this approach is that everyone benefits from clean and healthy waterways, therefore funding for control should come from a source paid into by all members of the community.

3.6 Accountability and performance improvement

Recommendation 6: Improve accountability and enforcement at all scales

The NSW Government should:

a. strengthen the enforcement provisions in the new legislation by:
   - providing for more substantial penalties, based on the severity and type of offence
   - allowing for weed notices to specify clear actions and outcomes that the landholder must demonstrate compliance with by a specified time
   - escalating enforcement action to LLS after failure to comply with a weed control notice, and simplifying the requirements for taking control or enforcement actions
   - enabling easier enforcement of obligations for public land managers through the independent Chair of the State Weeds Committee

b. require the State Weeds Committee to develop state-wide service delivery standards for LCAs. The Committee should commission independent audits of LCAs against these standards, with LLS given the resources and mandate to assume the LCA's surveillance responsibilities if the LCA is not meeting their obligations. LCAs would not be relieved of responsibilities to manage their own land or roadsides.

c. require the State Weeds Committee to commission audits of LLS and DPI's performance in weed management, and the extent to which funding has been allocated in line with strategic priorities

d. provide for consistent, state-wide weed mapping including:
   - adopting standard data protocols and record keeping requirements, which are mandatory for any body receiving government funding for weed management
   - developing and maintaining a state-wide data sharing system for tracking weed distribution and density that has current data from all LCAs
   - ensuring that data is readily available to stakeholders and regional managers for use in adapting management plans and actions.

Proposed institutional and regulatory changes will not lead to any change without improved accountability at all levels. In fact, many complaints about the current institutional arrangements are not problems with the arrangements themselves, but instead a lack of accountability for meeting obligations under the arrangements.

Enforcement provisions

Many submissions to the Issues Paper and draft report for this review noted that current enforcement mechanisms are insufficient to effectively enforce compliance.[70] This is due to a number of factors including insufficient penalties, the cost and time associated with elevating a

[70] Many submissions in response to the draft report specifically supported strengthening enforcement. Some submissions cited concerns regarding impacts on cooperative responses. These have been addressed through amendments to this section clarifying the role and importance of capacity building and allowing weed officers to use discretion in enforcement.

case to court or undertaking controls, and sometimes unwillingness to enforce vague requirements. Several changes to the enforcement provisions are needed to improve their effectiveness including:

- Providing for more substantial penalties, based on the severity and type of the offence. Penalties should be sufficient to encourage compliance.
- Simplifying the requirements and shortening the timeframes that exist under current legislation for allowing government to either undertake control on private and public land or take a case to court.
- Escalating responsibility for enforcement action to LLS if a landholder has not complied with a weed control notice. These responsibilities include potentially taking an issue to court.
- Allowing for weed control notices to specify clear action and outcomes the landholder must achieve by a specified date.
- Providing for statutory and enforceable Regional Weed Management Plans which specify regionally appropriate control measures.
- Providing an institutional structure that facilitates the enforcement of the obligations of public authorities.

Under the new arrangements educational programs for magistrates should also be implemented to ensure that they understand the general biosecurity obligation requirements.

The requirements surrounding compliance are currently inhibiting timely response to sometimes urgent weed management issues. While taking into consideration requirements for due process, proposed legislation should seek to streamline the process so that serious infringements can be more quickly addressed with enforcement actions. Currently a weed officer must issue a Section 18A notice indicating that they will issue a Section 18 notice if no action is taken. Officers often make more than one inspection of a property before even issuing the Section 18A notice.

Educational programs and the codes of practice to be developed as part of the general biosecurity obligation should ensure that landholders understand their obligations. However, the NRC recognises that one on one interaction is a valuable tool for building capacity. Weed officers should be provided some discretion in regards to whether or not to issue a weed control notice on an initial visit. It is anticipated that in most cases if weed issues are identified on an initial inspection the weed officer would specify management actions required to remedy the situation and return for a scheduled reinspection, prior to issuing a weed notice. However, where there is sufficient risk identified from an initial inspection, a weed officer should have the ability to issue an immediate notice. Further, an officer should be required to issue a notice upon a second inspection.

Current weed notices only specify the control indicated in the Weed Control Order, such as "continuously inhibit reproduction". It is difficult to prove whether a landholder has undertaken these actions. The new legislation should allow for notices to include specific actions and outcomes the landholder must meet and the timeframe provided for achieving the specified outcome. The landholder should be required to demonstrate that they have achieved the weed control outcome specified in the notice in the timeframe required or be subject to penalty.

If a weed control notice on private land is not complied with upon reinspection, the matter should be automatically escalated to the regional level (LLS) for further enforcement action. The State Weed Committee should be responsible for reviewing whether LLSs are sufficiently undertaking actions where appropriate. If they are not, then the State Weed Committee should be authorised to take action. Figure 6 illustrates the current and proposed enforcement procedure.

This would have several benefits over the current arrangements. An important aspect of effective enforcement provisions is that people are aware that they will be implemented when appropriate. Responses to this review have indicated that currently landholders know that in most areas there are rarely, if ever, consequences for refusing to comply with control orders; as a result they are ineffective where the recipient is unwilling to comply.

LLS may have access to greater funds and resources and are therefore better placed to either undertake control and seek reimbursement, or take the landholder to court. Enforcement by the LLS will provide more consistent enforcement on the regional scale, making it clear to all landholders that they will be held accountable if they refuse to meet their obligations. The LLS may also be more removed politically from local conditions and therefore in a better position to enforce weed management requirements without detrimental effects to LCA community engagement efforts.

Several submissions have raised concerns regarding how the escalation of a case to LLS would work in practice. To facilitate the escalation of compliance the LCAs will need to ensure that their evidence gathering processes are comprehensive and follow defined protocols. Evidence gathering and record keeping will be key elements of the service delivery standards for LCAs. To ensure continuity the relevant LCA officer may be required to give evidence at any court proceeding initiated by the LLS. The legislation should provide for any costs incurred by the LLS and LCA in enforcing compliance to be recovered from the landholder.

Enforcement of weed control notices on Lord Howe Island by LLS would be difficult due to the remote location. Joint management of enforcement would better support the Lord Howe Island Board to achieve its weed management responsibilities.

While this recommendation focuses on improving the enforcement mechanisms, it is not intended to indicate that enforcement should be the primary tool used by weed officers. Education and capacity building remain the core elements for building a sense of shared responsibility and supporting collective action. These recommendations are aimed at ensuring that when they are necessary, enforcement provisions are effective.

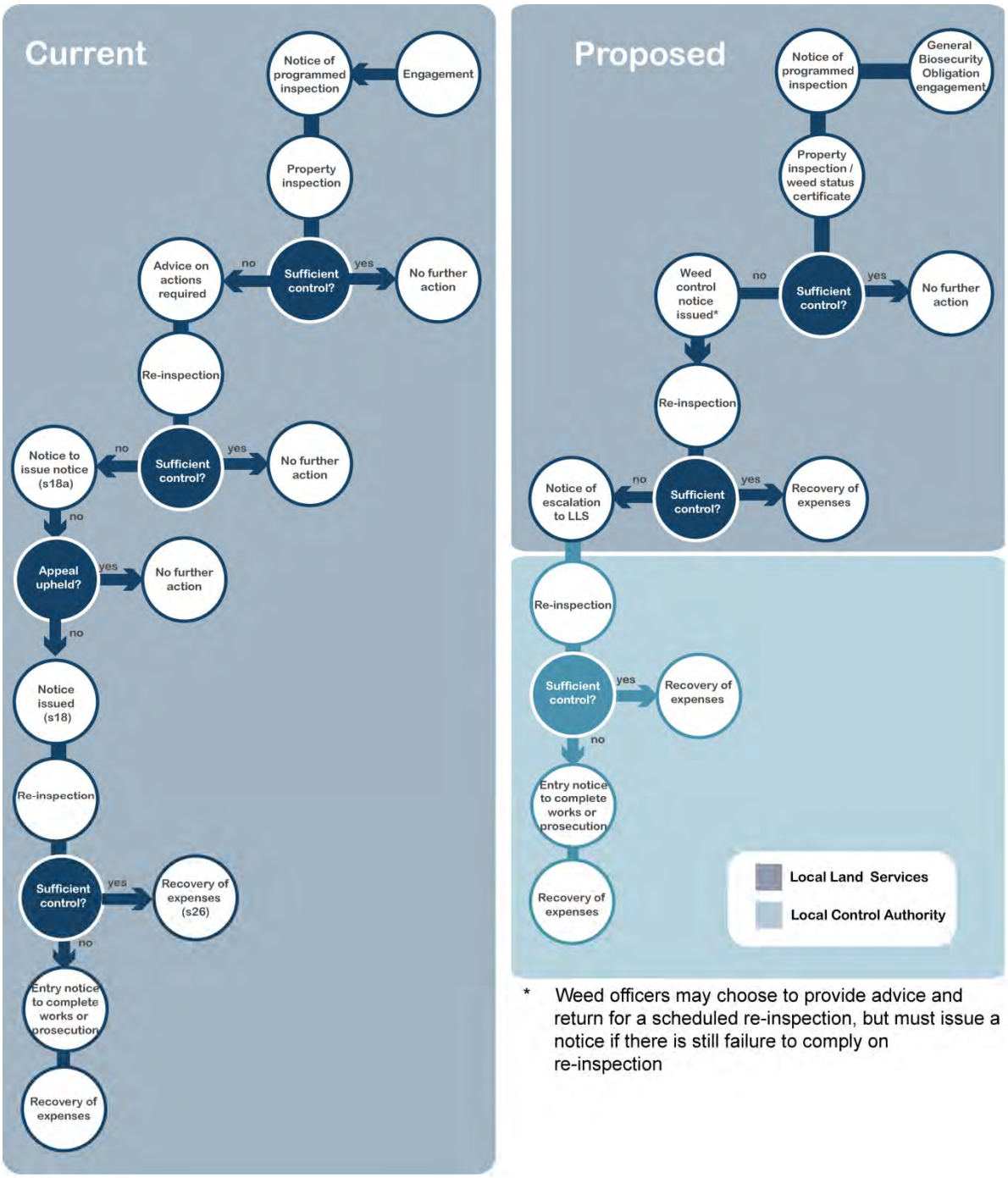

Figure 6: Current and proposed enforcement procedure

Enforcement on public land

A tenure neutral approach to integrated weed management requires a capacity to hold public authorities as accountable as all other land managers for weed control on the land they manage. Treating public authorities significantly differently from private landholders may erode confidence that all are contributing to regional weed management outcomes. The current mechanisms for holding public authorities accountable are cumbersome and ineffective. The proposed approach will reduce red tape approval processes, making it easier to hold public authorities responsible for meeting their obligations.

Holding public authorities legally responsible where there is a significant failure of duties requires different mechanisms than that for holding private land holders responsible. Figure 7 details the enforcement provisions proposed for public authorities.

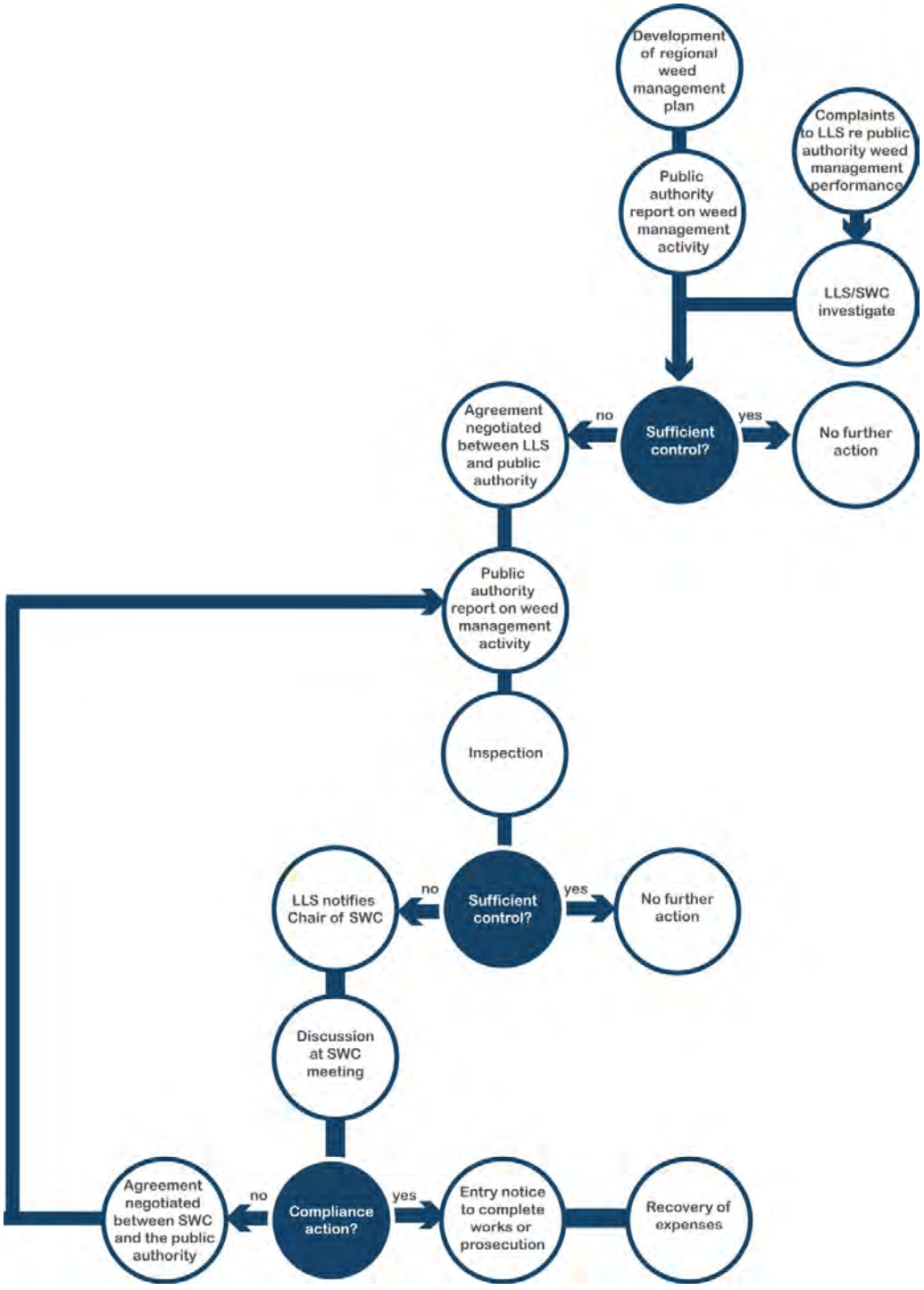

Figure 7: Enforcement of weed management obligations on public land

Public authorities should report to the Chair of the regional weed committee on activities associated with their obligations in the Regional Weed Management Plan, on a frequency determined by the committee, but no less than annually. Members of the community (including LCAs) may file complaints regarding public authority weed management with the LLS project officer, or to the State Weed Committee where LLS is the offender. The LLS or State Weed

Committee should consult with the relevant LCA and landholder and commission an inspection where appropriate. If an inspection indicates that the public authority is not meeting its obligations or where the quarterly report indicates there has been insufficient activity, the LLS (or the State Weed Committee if LLS is the offender) should negotiate an agreement with the relevant public authority on activities to be achieved by an agreed date. If the public authority refuses to negotiate or does not honour the agreement the LLS should notify the Chair of the State Weed Committee. The relevant public authority should be provided the opportunity to present its position and discuss the issue with the State Weed Committee.

Consistent with the *Rural Fires Act 1997* model,[71] the legislation should provide for the Chair of the State Weed Committee to approve entry to undertake weed management work on public authority land if the work has not been carried out as agreed upon through negotiations. The Chair should indicate who should carry out the work, for example, the local LCA. The Chair of the State Weed Committee should also have the authority to direct public authorities to undertake weed management work in response to complaints received[72] and again commission a body to enter the land and undertake the works if the public authority does not comply. Any costs incurred in carrying out work may be recovered from the public authority.

The Chair of the State Weeds Committee should be exempt from the control and direction of the Minister in respect to any decision to institute criminal or related proceedings against a public authority. This would give the Chair the same powers to prosecute public authorities for weed management breaches as the NSW EPA Board has for major environmental breaches by public authorities.

Service delivery standards

A set of service delivery standards should be developed by the State Weed Committee to ensure high quality and consistent service delivery across NSW. The State Weed Committee should be responsible for commissioning an independent auditor to audit LCAs against the standards as needed. The NRC further proposes that LCAs that repeatedly fail to meet the requirements of the standard would have their responsibilities, other than weed control on LCA land and roadsides, transferred to the relevant LLS. It is noted that the current legislation already allows the Minister to transfer responsibilities from an LCA if they are not meeting their obligations. In these cases IPART should be requested to evaluate the funds necessary to fulfil the LCA obligations, and these funds should be transferred to the LLS by the LCA. Respondents to the draft report were strongly in favour of the recommendation for service delivery standards.

Service delivery standards may cover topics such as but not be limited to:

- operational planning requirements
- property inspections – including frequency and standard inspection procedures
- information management – including data recording and evidence gathering
- business management – including basic accounting requirements
- compliance – including engagement and enforcement
- communication and educational program requirements.

[71] See s 73 of the *Rural Fires Act 1997(*NSW).
[72] As with s 74e of the *Rural Fires Act 1997(*NSW).

State and regional accountability

The new arrangements should also require that LLS and DPI be assessed against their legislated responsibilities and effectiveness of program delivery. The State Weed Committee should be responsible for commissioning an independent auditor to assess whether DPI and LLS are meeting their weed management obligations, including evidence-based strategic planning, assuring service delivery, efficient and effective funding allocation, and providing specified state-wide services. LLS performance in delivery of the regional management plans should also be assessed.

Reporting on weed management programs provides decision-makers with the information they require to either adapt or replace weed management policies and/or programs. Standards should be developed for regional reporting to ensure that all regions are consistently reporting on the same outcome and performance measures. The guidelines for the preparation of the regional weed management plans should specify the performance metrics that need to be recorded and reported upon. These performance metrics will include annual outcome measures, as well as longer term three year outcome measures. Consistent performance metrics across all LLS regions will ensure that weed management activity can be collated at the state scale.

The LLS should be required to report to DPI on annual output measures and to the State Weed Committee every three years on the implementation for their regional weed management plan and other annually measured outcomes. The State Weed Committee will collate the results of LLS reports provided to them and prepare a report for the Minister that clearly indicates the progress towards targets set in key strategic documents such as NSW 2021 and the NSW Biosecurity Strategy. In the interests of transparency all reporting should be made available to the public. Use of the state-wide data management system to assess weed distribution should minimise the amount of administrative work necessary to prepare the reports.

Improved monitoring, evaluation and information management

Improvements to current record keeping, monitoring and reporting are also essential for improving accountability. The ability to track progress and adapt decision making to current conditions is essential for addressing weed incursions and demonstrating performance.[73]

As soon as possible, DPI must implement standard weed mapping protocols, which will become mandatory for any party receiving government funds for weed management. They should seek to harmonise mapping protocols nationally to the degree possible to improve cross-border coordination and understanding of weed spread.[74] Biosecurity NSW should maintain a whole-of-government centralised data sharing system where weed tracking data is kept up to date.

[73] A large number of submissions specifically noted their support for this recommendation.

[74] Plant Health Australia has won an innovation grant from the Australian Government Department of Agriculture to develop a "virtual coordination centre" that is intended to contribute to real-time surveillance information on weeds and pests. DPI should coordinate with this project as much as possible.

Several LCAs have already implemented tracking systems whereby weed officers input key information including weed location and density estimates on each site visit. Feedback indicates that it would not be difficult to develop standard data protocols to allow the range of tracking systems currently in use to report into one centralised system. In addition to facilitating better planning and adaptive management, this will increase accountability as it will allow tracking of when inspections have been completed and what actions were taken. It will also provide the basis for creating property weed status certificates following inspections.

Protocols for data access and use by a range of stakeholders must address the standards, rights and obligations in relation to handling, holding, accessing and correcting personal information defined by the *Privacy Act 1988*. Landholder privacy rights must be considered in development of the data management system and access rights.

The data management systems should also provide an avenue for community groups and members to input weed surveillance information into a centralised system. This system should be used to inform weed officers in their planning and to identify potential incursions. Data in this system should be verified before being entered in the state-wide system used by weed officers.

This approach is currently used for tracking pests in Australia. FeralScan[75], a landholder, community, industry, government and business collaboration, is a freely-available, community online tool that allows farmers, local communities, Landcare groups, local government, pest controllers, schools and individuals anywhere in Australia to map sightings of pest animals. Computer and mobile phone users can:

- enter local pest animal sightings, damage and control activities
- examine the latest pest animal map for the local area
- create and print pest animal maps
- view or upload photos
- access the latest resources
- connect with other local community action groups.

[75] www.feralscan.org.au, viewed 5 May 2014.

3.7 Research and development

Recommendation 7: Support research and development

The NSW Government should:

a. commit long-term funding for the strategic rebuilding and maintenance of NSW weeds research capacity

b. prioritise and coordinate strategic research investment

c. work with other states to establish a permanent, national weeds research, development and extension organisation funded jointly by industry and state and Commonwealth governments

d. actively participate in this organisation through secure long-term investment, expertise and in-kind contributions

e. develop a centralised, accessible, web-based portal for collating research outcomes and sharing weed identification, distribution and management information and supporting researchers to effectively communicate research findings to land managers

f. ensure best available research and chemical choices are available to manage the risk of herbicide resistance on roadsides and in other areas where herbicides are regularly applied.

With the best available data indicating that the cost and impact of weeds in NSW is growing, the need for research and development to deliver innovative solutions to these problems is also increasing. Over the last few years however, government funding for weeds research has decreased and become more uncertain with the reduction in Australian Government funding reducing leverage and subsequently inducing a decline in state investment.

Importantly, the decreasing funding is resulting in a critical decline in research capacity, both in numbers of weed scientists and research infrastructure. The need to rebuild this capacity was noted in a large portion of the submissions to the draft report indicating the importance of this issue. The implications of this are serious for Australian agriculture, particularly given the increase in herbicide resistant weeds, growing public concern about the use of pesticides and inadequate global investment in new chemistry.

Researchers are also concerned that governments' current approach to weeds research lacks strategic direction, continuity and coordination. Available funding is short term and competitive, discouraging collaboration and leading to inefficient projects with few tangible outcomes. Long-term investment is fundamental to weeds research, particularly to discovering effective alternative control strategies such as biological control agents. A clear strategic plan, identifying the most critical priorities such as research into biological control, chemical choices and availability to avoid resistance and expertise regarding new incursions will help to direct investment, and improve the ability to leverage additional dollars.

There is potential for addressing these issues through a weeds focussed CRC as discussed previously, or alternatively through an enduring, national weeds research, development and extension organisation governed by a board and jointly funded by industry and state and commonwealth governments.

DPI has indicated the intent to submit a bid for a weeds focussed CRC in 2015. The NRC recommends that the CRC be pursued with a request for $4 million annually to be provided. This would allow significant additional funds to be leveraged from other sources and utilised in a coordinated manner across the country. The cost of weeds to the economy would more than justify such investment. This body could build research capacity, coordinate strategic investment in weeds research and ensure continuity.

Another concern is that research findings are not effectively communicated to on-ground managers.[76] For example, despite research demonstrating the need for management strategies to prevent herbicide resistance in weeds, some councils use the same chemical on the same roadside year after year, even though it is increasing the risk of resistance, creating risks for adjoining landholders. Reasons for this poor practice include cost to councils, human safety concerns, and a lack of awareness of resistance issues.

There should be management choices available for weed control and councils should have a rotation policy that they are audited against. APVMA and researchers need to provide chemical choices and research findings need to be effectively communicated to advance implementation of best available science.

The NRC recommends that the NSW Government take responsibility for improving the dissemination of latest research, ensuring that it is effectively communicated to farmers and weed management staff. Consideration should be given to making this one of the state-wide 'projects' currently funded by DPI under the WAP. Fulfilment of this recommendation may entail several aspects such as developing a 'virtual' research centre. This could be a centralised, publically accessible portal to collate and deliver up to date research outcomes, share weed identification, distribution and management information, and to develop extension and educational programs.

[76] This concern was raised in several submissions including: Dr Bill Johnston (farmer); Queanbeyan Landcare; The Weed Society of NSW; the Primary Industries Ministerial Advisory Council; NSW Farmers' Association; and several environmental groups.

3.8 Transitioning to new arrangements

Recommendation 8: Ensure effective implementation of reforms

The NSW Government should:

a. establish a working group of relevant agencies to detail the regulatory and administrative arrangements for implementation of the recommendations, oversee the transition and ensure that Government's timeframes are met

b. allow for each LLS to establish a position for a regional project officer to oversee implementation of weed management programs within its region

c. commission an evaluation of the implementation of the new arrangements in five years.

This review includes several recommendations which will require coordination and oversight in order to be properly and smoothly implemented. To facilitate the transition to new arrangements, the NRC recommends:

- A working group be established to oversee the state-wide transition to the new arrangements, and implementation of the recommendations. The working group should include members from DPI, OEH, LLS, Local Government, and the NRC, and should consult with the community, industry and weed officer organisations. The Minister should establish the specific responsibilities for the working group and specify a timeframe for their services.
- Each LLS should establish a position for a regional weed project officer to oversee the implementation of weed management programs within its region. Many stakeholders noted the importance of this role in enabling the successes of the WAP program. Project officers should work closely with the working group and provide input into the transition process and facilitate transition in their regions.

Together the working group and the project officers can work to build a coalition of practitioners to support implementation of the recommendations. The working group should provide quarterly reports to the Minister on progress towards implementing the recommendations, and plans for future steps during the first year of transition. Reporting frequency should be reduced based upon progress in the following years. This will ensure that the plans are progressing and allow for quick identification of any issues that may arise.

Ongoing monitoring of implementation of the government's response will also be assessed through audits of DPI, LLS and LCAs, and standard review of the legislation. The NSW Government should commission an evaluation of the implementation of the new arrangements after five years.

4 Proposed transitional arrangements

Implementing the changes recommended will be a significant undertaking. The transition will require resourcing at all levels of government including transitional funding for the new biosecurity legislation. As such political leadership and broad based support is required to prioritise prevention efforts. It will also take commitment from the range of participants including public land managers, Local Government, DPI, LLS, and private landholders to work together to enable the reforms to be implemented.

This section outlines the NRC's proposed transition plan for migrating current weed management systems to full implementation of the recommendations. These timelines are indicative. The Government is encouraged in its response to the review to address transitional arrangements and timing. The proposed timelines for implementing the recommendations are detailed in the following sections.

Many of the recommendations will require legislative changes. Changes proposed to requirements in the *Noxious Weed Act 1993* should be made through the proposed Biosecurity Act, which is currently under development by DPI. As it is not known when that Act will be passed, the transitional arrangements requiring legislative change are presented in the following sections as Year 1 through Year 5, with Year 1 beginning with the passage of the Biosecurity Act.

Several of the recommendations are dependent upon others in order to be effective. The inter-relationships between the recommendations and how they are intended to work as a package are described in Section 4.3.

4.1 Funding

Several of the recommendations discuss changes to current funding arrangements. These recommendations are based on better implementing the IPART principles outlined in the draft funding framework for LLS,[77] to achieve equitable and efficient funding of weed management programs. This section outlines the principles and summarises the proposed funding arrangements.

The draft IPART funding framework for LLS specifically identifies weeds as a case of a market failure involving "negative externalities". If landholders do not manage weeds that have production impacts, they pose a potential threat to their neighbours, while other weeds pose risks to the environment or the community, for example, where weeds threaten biodiversity or create health issues.

The framework indicates that for "regulatory activities" the next step is to select the funder by identifying "who is the most feasible, efficient and cost effective party to charge, and applying the appropriate cost recovery approach," using the principle that the risk creator or impactors should first pay and then beneficiaries of the activity should pay. It is noted that for regulatory activities it should generally be the "impactor" who pays.

In the context of weeds it is often very difficult to identify the original risk creators. Research on high-risk pathways indicates that over 60% of weeds historically were introduced through garden escapes. In this case nurseries as well as gardeners who plant the weeds are risk

[77] Independent Pricing and Regulatory Tribunal of New South Wales (2013), "Review of funding framework for Local Land Services: Other industries – draft report September 2013", Independent Pricing Regulatory Tribunal of New South Wales, Sydney.

creators/impactors. However, once the weeds have escaped and become widespread anyone who owns land may be considered an "impactor", as the weeds have potential to spread from their land. In this case, landholders would be beneficiaries of any mitigation efforts. Further, transport corridors are high-risk pathways meaning that anyone who uses transport is a potential risk creator. Given these issues, efforts should focus on ensuring high-risk industries mitigate risks at the source. As identification of specific risk creators/impactors can be difficult, weeds that are already established should be managed on a local/regional basis with all involved landholders being considered beneficiaries of control and regulatory action.

Table 2 outlines principles for funding various weed management activities and proposed changes to current arrangements outlined in on the following page.

In addition to these funding changes funding will be required from the NSW Government to facilitate the transition to the new arrangements. This should include funds for:

- developing the permitted list - including development of a proposed list by the nursery industry, followed by assessment of the list by the State Weed Committee
- developing regional plans
- initial education surrounding the new legislation, general biosecurity obligation and new institutional arrangements.
- State Weed Committee to establish the new weed categories and state level guidance for regions.

Table 2 : Proposed funding principles and changes to current arrangements

	Who should pay?	Rationale	Recommended changes to current arrangements
High-risk industries – mitigating risk	Industries	Industries should be responsible for mitigating risks to reduce the likelihood of introducing or spreading weeds. This is more cost effective and feasible than trying to hold them responsible later for weed incursions that would be difficult to tie to a particular source.	Industries should mitigate risks and pay for accreditation and registration programs to demonstrate compliance.
Property inspections	Whole community through local government rates and NSW Government funds	Weeds can be spread by activities of all people within the state – e.g. by driving along a highway, having a garden, walking in a park. All members of the community also benefit from mitigating weed risks which impact on economic, environmental and social well-being.	Local governments should report the amount that they are contributing to inspections and at least match WAP funding provided for inspections.
High-risk incursion fund	Whole community and main beneficiaries	All members of the community may create risks and also benefit from mitigated risks. However, larger landholders / the agricultural industry are likely to be the main beneficiaries from immediate mitigation. As such, the costs should be shared between the NSW Government and LLS ratepayers*. Including Government contributions ensures that risks created by public lands, small land holders and non-rural private lands are covered.	A high-risk incursion fund should be established initially through NSW Government funds and a levy on LLS rate payers.
Eradication plans	To be determined based on LLS framework principles	Eradication efforts may take place over a variety of scales and depending on the type of weed and its impacts (economic, environmental and/or social) different parties may be risk creators and/or beneficiaries. Funding for eradication efforts should therefore be established through weed specific plans by applying the LLS framework principles on a case by case basis.	DPI will negotiate resourcing for eradication plans with relevant stakeholders based on IPART principles.
Impact reduction	To be determined based on LLS framework principles	Impact reduction efforts may take place over a variety of scales and depending on the type of weed and its impacts (economic, environmental and/or social) different parties may be risk creators and/or beneficiaries. Funding for impact reduction efforts should therefore be established in the regional plans with the regional weed committee applying the LLS framework principles to determine resource allocation.	Stakeholders will negotiate resourcing for regional plans based on IPART principles. Various funding sources including LCAs, Catchment Action NSW, Australian Government and community organisations should be aligned through the single regional management plan. LLSs may raise levies to address specific weed issues.

* The draft IPART report recommends that the size of rateable properties be reduced to 2 hectares (from the current 10 ha). The NRC supports this recommendation as landholders of this size create risks and benefit from biosecurity programs.

4.2 Initial steps

Not all of the NRC's recommendations rely on the proposed Biosecurity Act to be finalised before implementation can begin. This section outlines steps that can be implemented in the short term.

State-wide data management system

The implementation of the state-wide data management system should be completed as quickly as possible as this is a critical step for improving weed management in NSW. DPI has already begun a pilot program to incorporate data collected during weed inspections into the Biosecurity Information Systems. Many LCAs already collect data via a variety of data management systems that could communicate with the Biosecurity Information System as long as standard data protocols are agreed upon. The following timeline indicates how a state-wide data system could be fully implemented within three years.

Figure 8: Timeline for implementing the state-wide data management system

Weeds Action Program funding

The WAP is based on applications for five-year programs submitted by groups of LCAs. The current applications run through the end of the 2014-15 financial year. In order to facilitate a smooth transition to the proposed regional arrangements, the next round of funding should be distributed through the current WAP lead agencies, until such time as LLS determines they have the structure in place to take over allocation of the WAP funds. A transitional plan for distributing funds through LLS should be developed by the Project Officer for each region in consultation with the relevant stakeholders. It is recommended that funds be distributed by each LLS no later than the 2016-17 fiscal year. Transfer of this responsibility will encourage the regions to begin to develop the new regional weed committees and make modifications to adjust to the new borders.

Many regions have developed strong forums for networking between weed officers, sometimes within subregions. The NRC encourages these groups to continue to share information, build capacity and help to facilitate implementation of the regional plans developed through the regional weed committees.

The transitional plan should include provisions for a pilot to be developed in a particular LLS region where a levy is raised (with support from the community) to target a specific weed across tenures to the benefit of both productive lands and conservation. The overall resourcing should be

a provided from LLS, LCAs, WAP and public land managers, with inclusion of community groups. This will help to demonstrate how this approach could work for regional plans.

Research and development

The research and development recommendations are not dependent on new legislation. Therefore, DPI can begin coordinating a response to these immediately. As soon as possible, DPI should develop the suggested centralised portal for collating research information and sharing weeds identification, distribution and management information. Good scientific information such as bio-control or other new management options should be readily available to those on the ground.

There has already been considerable discussion within the Australian Weeds Committee on establishing a permanent national weeds research and development organisation. This debate should be resolved and action taken as quickly as possible. Some coordination and focus can be achieved via the research portal but NSW has an opportunity to lead the way in identifying and committing long-term funding and resources to such an organisation. The security of long-term funding and the potential for collaborative research with a pathway to implementation would create real momentum in the rebuilding NSW weeds research capacity. DPI has indicated that they are preparing a bid for a new weeds CRC to be submitted in 2015.

4.3 Institutional changes and accountability

Changes to the governance of weed management and implementation of improved accountability measures will require several steps, some of which are interrelated. **Figure 9** on the following page indicates the sequence proposed to achieve implementation of new organisational arrangements within the five year time frame.

Education and capacity building

Success of the new organisational arrangements relies heavily on effective education and capacity building programs. The general biosecurity obligation requires significant education and outreach at relevant institutional scales to ensure that all parties understand their obligations. It is critical that educational programs begin early and are strongly sustained through the implementation of the recommendations.

In Year 1 training and outreach should begin to explain to all stakeholders how their responsibilities will be established under the new arrangements through regional plans and codes of practice. In Year 2 when the codes of practice and regional plans are complete, education can begin regarding specific requirements. The education efforts must be sustained through Years 3 to 5 and into the future to support the new approach.

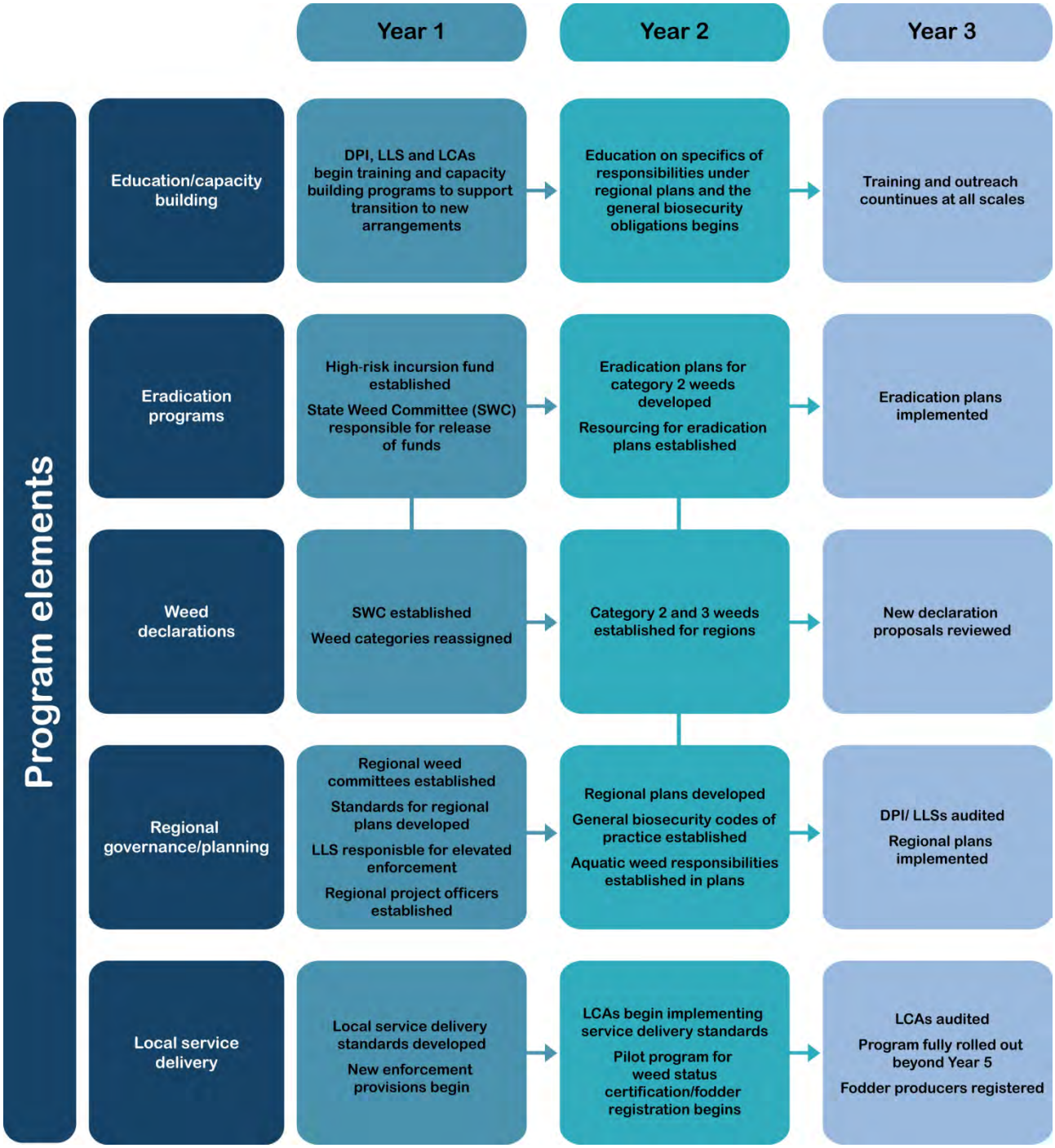

Figure 9: Implementation of organisational arrangements and accountability measures

Eradication program:

A high-risk incursion fund should be established as soon as practicable, as the ability to respond quickly to new incursions is critical to preventing establishment of new weeds. DPI should organise the development of this fund as soon as possible in cooperation with LLS.

It is proposed that the State Weed Committee be responsible for the release of funds for incursions based on an established set of rules. If there is significant delay in establishing the Biosecurity

legislation, the NSW Government should examine alternative methods of implementing the incursion fund.

The State Weed Committee will be responsible for determining the categorisation of weeds under the new system, with input from the regional weed committees. Once Category 2 (eradicate) weeds are established, DPI is responsible for coordinating development of eradication plans, including negotiation of resourcing for implementation of those plans. These plans should be completed by Year 3 following passage of the legislation.

Weed declarations

Category 3 (impact reduction) weeds will be recommended based on the regional weed committee plans. There will need to be cooperation between State Weed Committee and the regional committees during Year 2 to ensure that weeds are proposed, assessed and declarations finalised so that the regional plans can be fully completed.

It is expected that the State Weed Committee will re-categorise the current declared weeds into the three proposed categories. This will allow a clear starting point for regional weed committees to consider Category 2 and 3 weeds for their regions. Category 1 (excluded) weeds and state-wide Category 2 (eradicate) weeds will have been determined by State Weed Committee and will be required to be covered in all regional plans.

Community members may propose weeds for declaration to their regional weed committees. Regional committees will submit their proposals for regional weed declarations to the State Weed Committee. The Committee will consider those proposals and make final declarations following opportunity for public comment. Regionally declared weeds will be incorporated into the regional weed plans.

Regional governance

In Year 1 following passage of the legislation, the regional weed committees should be established and the standards for regional plans developed. Details of the committee make up are provided in Section 3.3. Regional project officer positions for each LLS should also be established and provide oversight of the transition within each LLS to the new arrangements. DPI and LLS should develop the regional plan guidelines in Year 1.

In Year 2 the regional plans will be developed according to the standard format. During Year 2 the codes of practice and guidelines for land management that will be required as part of the general biosecurity obligation will also be established. These will be referenced in the regional plans as appropriate.

The regional weed committee will establish which waterways should be managed regionally rather than by individual land holders (see Section 3.5). The regional committee will establish the specific weed control responsibilities in the regional plan.

Audits by an independent party of LLS and DPI performance as requested by the State Weed Committee will commence in Year 3.

It is recommended that beginning in Year 2 a pilot program for issuing weed status certificates begin in at least two of the LLSs. This will allow LCAs and LLSs to begin trialling certification and

fodder registration programs to further identify and resolve any operational issues associated with this recommendation. In this way by Year 5 the operational details of the certification program will be fully understood facilitating roll out of certification programs to all LCAs.

Local service-delivery

The local service-delivery standards will be completed by the end of Year 1 so that LCAs can begin implementing them in Year 2. At the release of the new legislation changes to the enforcement provisions will commence. This will include elevation of enforcement to the LLS after failure to comply with a weed control notice. Increased penalties will likely be established through the regulations rather than the Act and will be implemented as soon as the new regulations are in place.

In Year 3 audits of LCAs will begin. It is understood that not all aspects of the delivery standards may be in place at this time. For instance, not all properties will have been inspected; however a plan should be in place for meeting the inspection requirements in the standards. By the end of Year 5 the standards should be fully implemented. This will include the ability for all LCAs to perform inspections according to the service delivery standard time frames and issue weed status certificates.

Nursery certification

The Nursery and Garden Industry Australia should develop the industry standards required for registration within Year 1. In Year 2 nurseries should be required to begin implementing the standards, and the NSW Government should prepare for registering nurseries. Registration for all nurseries should be completed by the end of Year 3.

Permitted list

The permitted list is anticipated to take four years to develop as shown below:

Figure 10: Timeline for implementing the permitted for sale list

Part II - Findings

5 Distribution and impacts of weeds in NSW

Key findings:

- Distribution mapping of weeds in NSW is highly inconsistent, making it difficult to get a complete picture of how weed density and extent are progressing across the state. While there are success stories with measurable outcomes, there are insufficient data to track the outcomes of most weed management efforts. This is a fundamental problem with current systems, as managers cannot accurately assess progress or effectively plan where and how to best target weeds.
- Evidence indicates that the impacts and distribution of weeds are increasing and weeds cause considerable economic, environmental and social impacts across all of NSW.
- A consistent set of data protocols and a centralised mapping system are urgently needed to enable outcomes to be assessed and facilitate adaptive management to ensure resources are spent where they are most effective.

As part of its terms of reference, the NRC is required to assess the distribution and abundance of weeds across NSW, including their economic, social and environmental impacts. This chapter examines impacts of weeds, historical trends (where possible), likely pathways and trajectories for weed distribution, and associated risks.

As will be discussed throughout the chapter, **there are significant limitations to the evidence that is available.** However, best available information sourced for this analysis includes:

- spatial datasets from DPI, OEH, Royal Botanic Gardens & Domain Trust (PlantNET) and the Atlas of Living Australia
- relevant literature
- relevant databases, including PlantNET
- climatic modelling
- advice from weeds specialists.

5.1 Economic, environmental and social impacts

5.1.1 Economic impacts of weeds

Weeds can significantly impact on primary production including in the cropping, grazing, horticulture and forestry sectors. Weeds in agricultural systems directly impact on crop and pasture yields, increase production costs, reduce product quality and result in product contamination.[78] The latter can result in price penalties[79] or market access barriers.

[78] Groves, RH, Boden, R and Lonsdale, WM 2005, *Jumping the Garden Fence: Invasive garden plants in Australia and their environmental and agricultural impacts*, CSIRO report prepared for the World Wildlife Fund Australia, Sydney.

[79] Jones, RE, Vere, DT, Alemseged, Y and Medd, RW 2005, 'Estimating the economic cost of weeds in Australian annual winter crops', *Agricultural Economics*, vol. 32, issue 3, pp. 243 –265.

A recent economic study focused on the agricultural sector estimated the cost of weeds to the NSW economy to average $1.8 billion per annum, based on current weed management practices and weed populations. The economic values of environmental and social impacts were not assessed for this study, but would add significantly to the total economic impact. Based on this study, agricultural producers are estimated to bear almost three quarters of those costs.[80] Future research into the value of environmental assets and environmental and social impacts of weeds were recommended and should be supported so that the full costs of weeds are better understood.

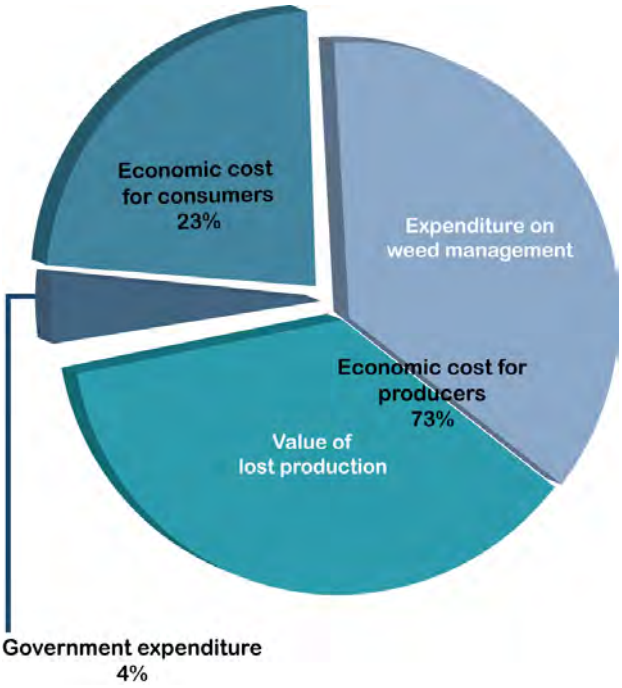

Figure 11: Economic costs of weeds in NSW

Within agriculture, the annual cost of weeds in NSW is greatest for the livestock sector at $0.9 billion followed by the cropping sector at $0.7 billion. While the cropping sector has higher per hectare expenditure on herbicides, machinery and labour to manage weeds and losses due to residual weeds, losses in the livestock sector are higher due to the number of livestock farms and hectares operated in NSW.

The estimated cost of $1.8 billion to the NSW economy comprises:

- the cost of labour, chemical and machinery on agricultural lands
- the value of lost production on agricultural lands
- the lost value due to price responses in agricultural markets
- the value of expenditure by public agencies.

The decreased value of production resulting from weed-related problems is recognised at the state and national scale as one of the most significant problems for agricultural businesses.[81] As

[80] Kalisch Gordon, C 2014, *The economic cost of weeds in NSW: Final Draft*, Grain Growers Limited commissioned by the NRC.

[81] Australian Bureau of Statistics 2008, *Natural resource management on Australian farms: 2006-07*, no. 4620.0, ABS, Canberra.

demonstrated by the examples below, weed invasion significantly affects returns and property values.

- Complete crop failure can occur if weeds are not controlled in rice crops, hence the majority of Australian rice crops are treated with herbicide.[82]
- Pasture-carrying capacity can be reduced from 7-15 dry sheep equivalent per hectare to an average of 0.5 where there is a heavy infestation of serrated tussock (*Nassella trichotoma*).[83]
- Contamination of sheep carcasses by weed seed, such as Chilean needle grass (*Nassella neesiana*), is estimated to reduce carcass values by as much as $1 per kilogram.[84]
- Lantana (*Lantana camara*) was estimated to cost the NSW grazing industry $33.4 million in lost production in 2005-06.[85]

Weed management is one of the most significant production costs and takes resources away from other activities. Based on farm surveys undertaken by the Australian Bureau of Statistics, NSW agricultural businesses made the greatest expenditure (including chemicals and equipment) of any jurisdiction on weed management in 2006-07, at $475 million. Management of weed-related problems was the most reported activity undertaken by NSW agricultural businesses compared with pest-related, and other land and soil activities. Herbicide application was the most common weed management activity. The 2014 study of economic impacts of weeds in NSW indicates that in total NSW agricultural business incur more than $1.3 billion per annum including lost productivity, labour, machinery and chemical costs.[86]

As shown in Table 3, weed management involves the highest cost and most intensive effort by area compared with other pest, land and soil problems. These costs could potentially escalate in the future given that there is a pattern of increasing herbicide resistance in some crop weeds, particularly annual grasses.[87] The resistance of weeds to certain herbicides has become a significant challenge for the Australian grains industry.[88] [89]It threatens minimum and no tillage practices that have helped to address other land management problems such as soil erosion and declining soil structure.

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82 Cattanach, G, Harris, A and Horris, J 2013, *Mapping Australia's Weed Management System*, no. 13/019. RIRDC, Canberra.

83 Campbell, MH and Vere, DT 1995, *Nassella trichotoma* (Nees). Arech., in RH Groves, RCH Shepard,and RG Richardson (eds.), *The Biology of Australia Weeds, Volume 1*, Melbourne, Victoria.

84 o*p.cit.* Cattanach *et al.* 2013.

85 Department of Natural and Water Resources 2007, 'Economic impacts of lantana on the Australian grazing industry', *Report prepared for the Department of Natural and Water Resources*, viewed on 2 December 2013, weeds.org.au/WoNS/lantana/docs/60_Lantana_Grazing_EIA_Final_Report_(b).pdf .

86 Kalisch Gordon, C 2014, *The economic cost of weeds in NSW: Final Draft*, Grain Growers Limited commissioned by the NRC.

87 Groves, RH, Boden, R and Lonsdale, WM 2005, *Jumping the Garden Fence: Invasive garden plants in Australia and their environmental and agricultural impact*s, CSIRO report prepared for the World Wildlife Fund - Australia, Sydney, NSW.

88 Broster, J C, Koetz, EA and Wu, H 2011, 'Herbicide resistance levels in annual ryegrass (*Lolium rigidum* Gaud.) in southern New South Wales', *Plant Protection Quarterly*, vol. 26, issue 1, pp. 22-28.

89 Broster, JC, Koetz, EA and Wu, H 2011, 'Herbicide resistance in wild oats (*Avena* spp.) in southern New South Wales', *Plant Protection Quarterly*, vol. 26, issue 3, pp. 106-110.

Table 3: Expenditure and effort reported by NSW agricultural businesses on problems related to weed, pest, and land and soil for 2006-07[90]

	Weed related activities	Pest related activities	Land and soil related activities
Proportion of agricultural businesses reporting activities	90.9%	82.0%	62.4%
Total expenditure	$475 million	$242 million	$216 million
Average expenditure per 1,000 hectares	$10,528	$4,565	$5,672
Total effort (in person days)	1,396,019	1,026,249	715,224

Weed impacts vary greatly by agricultural industry. Consequently, yield losses due to weeds also vary extensively. For example, losses incurred by fruit and vegetable producers are estimated to be one per cent, grazing industries are estimated to incur losses of around five per cent, while one estimate of losses incurred by the cotton industry is at 15 per cent.[91] For 2001-02, yield losses by broad industry groups nationwide were estimated as $346 million for cropping, $1.87 billion for livestock and $2 million for horticulture, totalling $2.2 billion for Australian agriculture.[92]

Invasive garden plants are considered to pose one of the greatest threats to agriculture, including the grazing sector. Two hundred and eighty-one species of garden plants potentially pose a significant threat to Australian grazing industries.[93] A third of these species (33 per cent) are considered toxic to livestock and the majority are perennials (83 per cent). Serrated tussock is one of the most problematic weeds for grazing systems and is estimated to cost the industry of south-eastern Australia, around $50 million per year.[94] Other invasive plants that have significantly impacted the grazing sector include Paterson's curse (*Echium plantagineum*), which is toxic to livestock, and Lippia (*Phyla canescens*) which is unpalatable to livestock.[95] African lovegrass (*Eragrostis curvula*) is also threatening the viability of grazing industries.

Broad-leaved and grassy weeds both impact on cropping systems in Australia. They directly compete with crop species, contaminate harvest and increase resource requirements (labour, equipment, energy consumption and herbicide applications). The incidence of grassy weeds has increased as cropping frequency has intensified.[96] This increase was so significant that weeds were at one stage the primary factor affecting crop performance, until herbicides and other techniques for weed management were developed. Annual ryegrass (*Lolium rigidum*) is considered one of the

90 This table has been adapted to include the Australian Capital Territory, sourced from: Australian Bureau of Statistics 2008, 'Weed, Pest and Land and Soil Management, Expenditure and Effort', table, in *Natural resource management on Australian farms: 2006-07,* no. 4620.0, ABS, Canberra, ACT.

91 Sinden, J, Jones, R, Hester, S, Odom, D, Kalisch, C, James, R and Cacho, O 2004, *The economic impacts of weeds in Australia*, CRC for Weed Management, Technical series no. 9.

92 *ibid.*

93 Barker, J, Randall, R and Grice, T 2006, *Weeds of the future? Threats to Australia's grazing industries by garden plants,* Meat & Livestock Australia Limited, North Sydney, NSW.

94 Briese, DT, Pettit, W and Anderson, F 2001, *Biological control of serrated tussock and Chilean needle grass*, no. 01/27, RIRDC, Canberra, ACT.

95 Groves, RH, Boden, R and Lonsdale, WM 2005, *Jumping the Garden Fence: Invasive garden plants in Australia and their environmental and agricultural impacts*, CSIRO report prepared for the World Wildlife Fund - Australia, Sydney, NSW.

96 Reeves, TG 2008, 'Global changes: impacts on weeds in cropping systems', *Proceedings of the Sixteenth Australian Weeds Conference*, Cairns, Queensland, viewed in December 2013, caws.org.au/awc/2008/awc200810011.pdf

most problematic weed species in cropping systems[97], particularly in the southern grain region of Australia that includes a large area of central and southern NSW.[98] This region experienced some of the greatest losses from grain contamination. Wild oats (*Avena sativa*) has had the greatest impact on yields in the northern growing region, which includes cropping areas of northern and central NSW.

Aquatic weeds may also become problematic for primary industries. They have been found to reduce the flow capacity of irrigation canals, thereby impacting on water available for farm use and increasing costs due to pump damage and weed control.[99] Weeds may also contaminate water supplies, increase transpiration rates, and compete with native aquatic plant species. In cases where aquatic weeds blanket the surface of dams and other waterways, the water may become de-oxygenated, which can result in the death of fish and other aquatic species. However, oxygen depletion may also result from aquatic weed control programs if dead plant material is left to decompose in the water.[100]

5.1.2 Environmental impacts of weeds

Weed invasion can have significant impacts on biodiversity. The impact of weeds on the environment creates a substantial cost to society, but the NRC has not attempted to quantify the economic value of that impact. Weed invasion of native plant communities is a key threatening process under the NSW *Threatened Species Conservation Act 1995*[101] and the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth).[102] A quantitative analysis of the threat that weeds pose to biodiversity concluded that weeds threaten around 40 per cent of vulnerable and endangered species in NSW and 89 per cent of endangered ecological communities in NSW.[103] The majority of these weeds are widespread, with the greatest density of observations recorded in coastal areas. This demonstrates the relative importance of managing weed species to minimise environmental impacts, particularly at a landscape scale.

Modelling of weeds that pose the greatest threat to biodiversity identified three species that are an extreme priority for biodiversity protection.[104] They include Madeira vine (*Anredera cordifolia)*, lantana (*lantana* spp.) and bitou bush (*Chrysanthemoides monilifera*). A further 20 species were identified as very high priority weeds (Table 4).

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97 Nikman, SR, Moerkerk, M and Cousens, R 2002, 'Weed seed contamination in cereal and pulse crops', *Proceedings of the Thirteenth Australian Weeds Conference*, Perth, WA, viewed on 1 December 2013, caws.org.au/awc/2002/awc200210591.pdf

98 Jones, RE, Vere, DT, Alemseged, Y and Medd, RW 2005, 'Estimating the economic cost of weeds in Australian annual winter crops', *Agricultural Economics*, vol. 32, issue 3, pp. 243–265.

99 International Commission on Irrigation and Drainage 2002, *Aquatic Weeds and their Management*, ICID, New Delhi, viewed in December 2013, icid.org/weed_report.pdf

100 Gorham, P 2008, NSW DPI Primefacts: Aquatic weed management in waterways and dams. Primefact 30, November 2008, viewed in December 2013, dpi.nsw.gov.au/__data/assets/pdf_file/0020/256403/Aquatic-weed-management-in-waterways-and-dams.pdf

101 Details of the 37 key threatening processes listed under the NSW *Threatened Species Conservation Act 1995*, viewed in December 2013, environment.nsw.gov.au/threatenedspecies/KeyThreateningProcessesByDoctype.htm

102 Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants is listed as a key threatening process under the *Environment Protection and Biodiversity Conservation Act 1999*.

103 Coutts–Smith, AJ and Downey, PO 2006, Impact of weeds on threatened biodiversity in New South Wales, Technical Series no. 11, CRC for Australian Weed Management, Adelaide, SA.

104 Downey, PO, Scanlon, TJ and Hosking, JR 2010, 'Prioritizing weed species based on their threat and ability to impact on biodiversity: a case study from New South Wales', *Plant Protection Quarterly*, vol. 25, no. 3, pp. 111- 126.

Table 4: Extreme and very high priority weeds that pose a threat to biodiversity in NSW

Priority	Common name	Scientific name	Weed of national significance	NSW noxious weed control class (under order 30) *
Extreme	Madeira vine	*Anredera cordifolia*	✓	Class 2, 3 and 4
Extreme	lantana	*Lantana* spp.	✓	Class 2, 3 and 4
Extreme	bitou bush	*Chrysanthemoides monilifera* subspecies *rotundata*	✓	Class 2, 3 and 4
Very high	ground asparagus	*Asparagus aethiopicus*	✓	Class 3
Very high	blackberry	*Rubus fruticosus**	✓	Class 3 and 4
Very high	scotch broom	*Cytisus scoparius* subspecies *scoparius*	✓	Class 4
Very high	Japanese honeysuckle	*Lonicera japonica*		Class 3 and 4
Very high	large leafed privot	*Ligustrum lucidum*		Class 2 and 4
Very high	narrow-leaf privot (small leafed privot)	*Ligustrum sinense*		Class 2 and 4
Very high	alligator weed	*Alternanthera philoxeroides*	✓	Class 2 and 3
Very high	cat's claw creeper	*Macfadyena unguis-cati*	✓	Class 4
Very high	salvinia	*Salvinia molesta*	✓	Class 2, 3 and 4
Very high	gorse	*Ulex europaeus*	✓	Class 2 and 3
Very high	boneseed	*Chrysanthemoides monilifera* subspecies *monilifera*	✓	Class 1
Very high	serrated tussock	*Nassella trichotoma*	✓	Class 2, 3 and 4
Very high	cape ivy	*Delairea odorata*		Class 3
Very high	blue morning glory	*Ipomoea indica*		Class 3 and 4
Very high	balloon vine	*Cardiospermum grandiflorum*		Class 4
Very high	lippia	*Phyla canescens*		Class 4
Very high	bridal creeper	*Asparagus asparagoides*	✓	Class 3
Very high	ochna	*Ochna serrulata*		Class 3 and 4
Very high	turkey rhubarb/ rambling dock	*Acetosa sagittata*		Class 4

* Weeds are listed by LCA boundary except for Class 1, which is state-wide.

More than half of the species that fall in these categories are WoNS (Weeds of National Significance)[105]. All but one of these 20 are listed as noxious weeds under the NSW *Noxious Weeds Act 1993.* However some are only declared in a small number of LCAs, even though they are known to be more broadly present. As such they are causing impacts in many areas where they are not currently declared as noxious. For instance, OEH indicated that Madeira vine, an extreme priority, is only declared noxious in the Sydney region although it is creating significant impacts in

[105] Weeds on this list are those regarded as the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts on several states and territories. See Attachment B for more information on WoNS.

north-eastern NSW.[106] Japanese honeysuckle *(Lonicera japonica*) is not currently recognised as a noxious weed and is commonly grown in gardens. Two species are aquatic weeds (alligator weed (*Alternanthera philoxeroides*) and salvinia (*Salvinia molesta*)) and pose a serious threat to the river health and ecology of the Murray-Darling Basin.[107]

5.1.3 Social impacts of weeds

Weeds can have negative and positive social impacts. They may be valued for their visual amenity, but are also disliked due to the health problems that arise from weed allergens (such as respiratory illnesses and skin irritation), land access issues and their impacts on recreational users. For example, an outbreak of salvinia that occurred in the Hawkesbury-Nepean system during the summer of 2003-04, significantly disrupted recreational users and affected the income of local industries including tour boat operators, ski and caravan parks and commercial fishers.[108] The significant impacts of the outbreak led to a mayoral forum to determine how to control the salvinia infestation and mitigate its impacts.[109] An outcome of this forum was the development of the Hawkesbury-Nepean River Health Strategy (by Hawkesbury-Nepean CMA).

The social impacts of weeds are generally difficult to quantify as the values placed on ecosystem services are highly subjective.[110] Given the difficulty of quantifying these impacts, limited literature is available on the social costs of weed invasion. A recent literature review found that a number of weed interactions were under-represented in scientific research, notably the social impacts of weeds.[111] Without this research, it is difficult to ascertain how the presence of weeds influences people's behaviours, including how they use a landscape.

Perhaps the more widely researched fields are the impacts of weeds on human health, recreation and tourism. This is because economic indicators can be used to quantify these weed impacts. For example, the per capita expenditure arising from allergic reactions to parthenium weed was estimated to be $6.90 per person ($19.90 per household) in affected areas in 2001, and annual benefits from controlling the weed were estimated at $6.8 million.[112]

Much of the social research into weed impacts has historically focused on farmers and rural landholders, with less focus on urban stakeholders, culturally diverse groups and Indigenous people.[113] This is possibly because the interaction between weeds and cultural and spiritual values is so complex.[114] A recent investigation into the Aboriginal community's perspectives of weeds identified a number of impacts that are of concern to Aboriginal people, namely how weeds

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106 Personal communication with the Office of Environment and Heritage, 9 February 2014.

107 Low, T 2009, *Climate change and weeds and pests in the Murray-Darling Basin*, Report prepared for the Murray-Darling Basin Authority, Canberra, ACT.

108 Hawkesbury-Nepean Catchment Management Authority 2007, *Hawkesbury-Nepean River Health Strategy*, HN-CMA, Goulburn, NSW.

109 Penrith City Council 2004, *Mayoral Aquatic Weeds Forum, Control the Outbreak of Salvinia in the Hawkesbury-Nepean River System*, organised by Penrith City Council, Penrith, NSW, viewed in December 2013, penrithcity.nsw.gov.au/uploadedFiles/Website/Your_Council/Publications/ARBluettAward/2004-2005/Environment.pdf

110 Pejchar, L and Mooney, HA 2009, 'Invasive species, ecosystem services and human well-being', *Trends in Ecology and Evolution*, vol. 24, no. 9, pp. 497-504.

111 Cousens, R, Kennedy, D, Maguire, G and Williams, K 2013, *Just how bad are coastal weeds? Assessing the geo-eco-psycho-socio-economic impacts,* no. 013/0132, RIRDC, Canberra, ACT.

112 AEC group 2002, *Economic impact of State and Local Government expenditure on weed and pest animal management in Queensland*, a report for the Local Government Association of Queensland.

113 Alsin, HJ, Krouger, H, Thompson, LJ and Duncan, AJ 2013, *Systematic review of Australian weed related social surveys*, RIRDC publication no. 13/018, RIRDC, Canberra, ACT.

114 *op.cit.* Pejchar and Mooney 2009.

restrict access to land, alter culturally significant landscapes, destroy the habitat of valued food species and affect the integrity of cultural relationships to the land.[115]

5.2 Plant naturalisation

Plants introduced either for cultivation or accidentally may become naturalised, establishing wild, self-sustaining populations.[116] Naturalised plants may include non-native species and, in some circumstances, native species that have expanded their range into new areas.[117]

Around 27,000 plant species are thought to have been introduced into Australia, with approximately 2,800 of these having become naturalised.[118] The number of recorded plant naturalisations varies from year-to-year, largely in line with the effort invested in research.[119]

Over 1,749 plant taxa have been introduced and naturalised in NSW, or new areas of NSW since European settlement.[120] This includes plants that are considered exotic to Australia; those exotic to NSW, but native to Australia; and those native to NSW, but have expanded their range into new areas.

Following European settlement in 1788, the average number of plants naturalised in NSW was approximately 8 taxa per year.[121] Other areas of Australia reported a higher plant naturalisation rate of 10 taxa per year.[122] [123] From 2000, higher rates of recorded plant naturalisation in NSW (18.7 taxa per year based on data records for the period 2000-12[124]) coincided with increased research into naturalisation[125] [126] [127] and improved detection methodology.

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115 Rural Industries and Research Development Corporation 2012, 'Weed management on indigenous lands: Indigenous values, perceptions and capacity', *National weed research: a summary of research outcomes from the National Weeds and Productivity Research Program 2011-2012*, RIRDC, Canberra, ACT.

116 Virtue, JG, Bennett, SJ and Randall, RP 2004, 'Plant introductions in Australia: how can we resolve 'weedy' conflicts of interest', in Sindel, BM and Johnson, SB (eds.), *Proceedings of the 14th Australian Weeds Conference,* pp. 42-48.

117 Brodie, CJ and Reynolds, TM 2012, *Review of recent plant naturalisations in South Australia and initial screening for weed risk*, DENR Technical Report 2012/02, South Australian DEWNR, Adelaide, SA.

118 Virtue, JG, Bennett, SJ and Randall, RP 2004, 'Plant introductions in Australia: how can we resolve 'weedy' conflicts of interest' in Sindel, BM and Johnson, SB (eds.), *Proceedings of the 14th Australian Weeds Conference,* pp. 42-48.

119 Hosking, JR, Conn, JB, Lepschi, BJ and Barker, CH 2007, 'Plant species first recognised as naturalised for New South Wales in 2002 and 2003, with additional comments on species recognised as naturalised in 2000–2001', *Cunninghamia*, vol. 10, no. 1, pp. 139-166

120 J. Hosking (personal communications, January 2013) cited in Johnson, S.B. (2013). *Some weeds have no boundaries. What are the next steps we need to take with species that jump the fence?* Proceedings of the 17th Biennial NSW weeds conference, Corowa. (NSW DPI, Orange).

121 Johnson, SB 2013, 'Some weeds have no boundaries. What are the next steps we need to take with species that jump the fence?', *Proceedings of the 17th Biennial NSW weeds conference*, Corowa, NSW DPI, Orange, NSW.

122 Brodie, CJ and Reynolds, TM 2012, *Review of recent plant naturalisations in South Australia and initial screening for weed risk*, DENR Technical Report 2012/02, South Australian DEWNR, Adelaide, SA.

123 Groves, RH and Hosking, JR 1997, *Recent incursions of weeds to Australia 1971-1995*, Technical Series no. 3, Cooperative Research Centre for Weed Management Systems, Adelaide SA.

124 *op cit.* Johnson (2013).

125 Hosking, JR, Conn, JB and Lepschi, BJ 2003, 'Plant species first recognised as naturalised for New South Wales over the period 2000-2001', *Cunninghamia,* vol. 8, no. 2, pp. 175-187.

126 Hosking, JR, Conn, JB, Lepschi, BJ and Barker, CH 2007, 'Plant species first recognised as naturalised for New South Wales in 2002 and 2003, with additional comments on species recognised as naturalised in 2000–2001', *Cunninghamia*, vol. 10, no. 1, pp. 139-166.

127 Hosking, JR, Conn, JB, Lepschi, BJ and Barker, CH 2011, 'Plant species first recognised as naturalised or naturalising for New South Wales in 2004 and 2005', *Cunninghamia*, vol. 12, no. 1, pp. 85-114.

Under recently replaced Weed Control Order 28, 24 of the 243 taxa recorded as being naturalised between 2000 and 2012 were declared as noxious weeds[128], after being assessed within the NSW Weed Risk Management System.[129] They include three *Bryophyllum* species (Mother-of-millions), *Celtis sinensis* (Chinese celtis), seven *Cylindropuntia* species (rope pears including Hudson pear), *Echinochloa polystachya* (Aleman grass), *Heteranthera reniformis* (Heteranthera), three *Hieracium* species (Hawkweeds), *Hymenachne amplexicaulis* and hybrids (Hymenachne), *Miconia* species (Miconia), *Nassella tenuissima* (Mexican feather grass), *Rubus niveus* which was not formerly recognised in the species aggregate *Rubus fruticous* (Blackberry), *Schinus terebinthifolius* (Broad-leaf pepper tree), *Solanum viarum* (Tropical soda apple), *Spartium junceum* (Spanish broom) and *Triadica sebifera* (Chinese tallow tree). Occurrence records for these species are shown in Figure 12.[130]

Research indicates that the North Coast district had the highest number of introduced species recorded over the past four years, at 51 new species.[131] This district, which primarily falls within the North Coast LLS region, includes one of Australia's 15 biodiversity hotspots and is considered the most biologically diverse area in NSW.[132] It supports the greatest number of native plants and animal species of any area in NSW, including the greatest number of threatened species.[133]

The higher number of weeds recorded in the North Coast district is likely a reflection of monitoring and detection efforts by weeds officers[134] and the community, habitat suitability for weeds, the diverse micro-climates of the region, and incursions from Queensland.

128 Personal communication with NSW DPI, 30 October 2013.

129 The NSW Weed Risk Management system includes a series of questions that are used to derive a score for weed risk (which covers invasiveness, impacts and potential distribution) and the feasibility of coordinated control (which includes control costs, persistence, and current distribution). Further details on the Weed Risk Management system can be found at dpi.nsw.gov.au/__data/assets/pdf_file/0004/279958/INT09-54079-revised-Weed-Risk-Management-Background-information-book.pdf, viewed 2 December 2013.

130 This is based on noxious weeds declared in Weed Control Order 28.

131 Royal Botanic Gardens and Domain Trust 2013, *PlantNET - The Plant Information Network System of the Royal Botanic Gardens & Domain Trust,* viewed on 22 April 2014, plantnet.rbgsyd.nsw.gov.au

132 The Border Ranges North and South, which straddles northern NSW and southern Queensland, includes a range of habitats that are threatened by weeds, fire and recreational activities, viewed 2 December 2013, environment.gov.au/node/13909 - hotspot3

133 Coutts–Smith, AJ and Downey, PO 2006, *Impact of weeds on threatened biodiversity in New South Wales*, Technical Series no. 11, CRC for Australian Weed Management, Adelaide, SA.

134 In 2011, the North Coast region had the second highest number of full-time council staff (24) and the highest number of part-time staff (7.4) responsible for weed management in NSW, based on data provided by the NWAC.

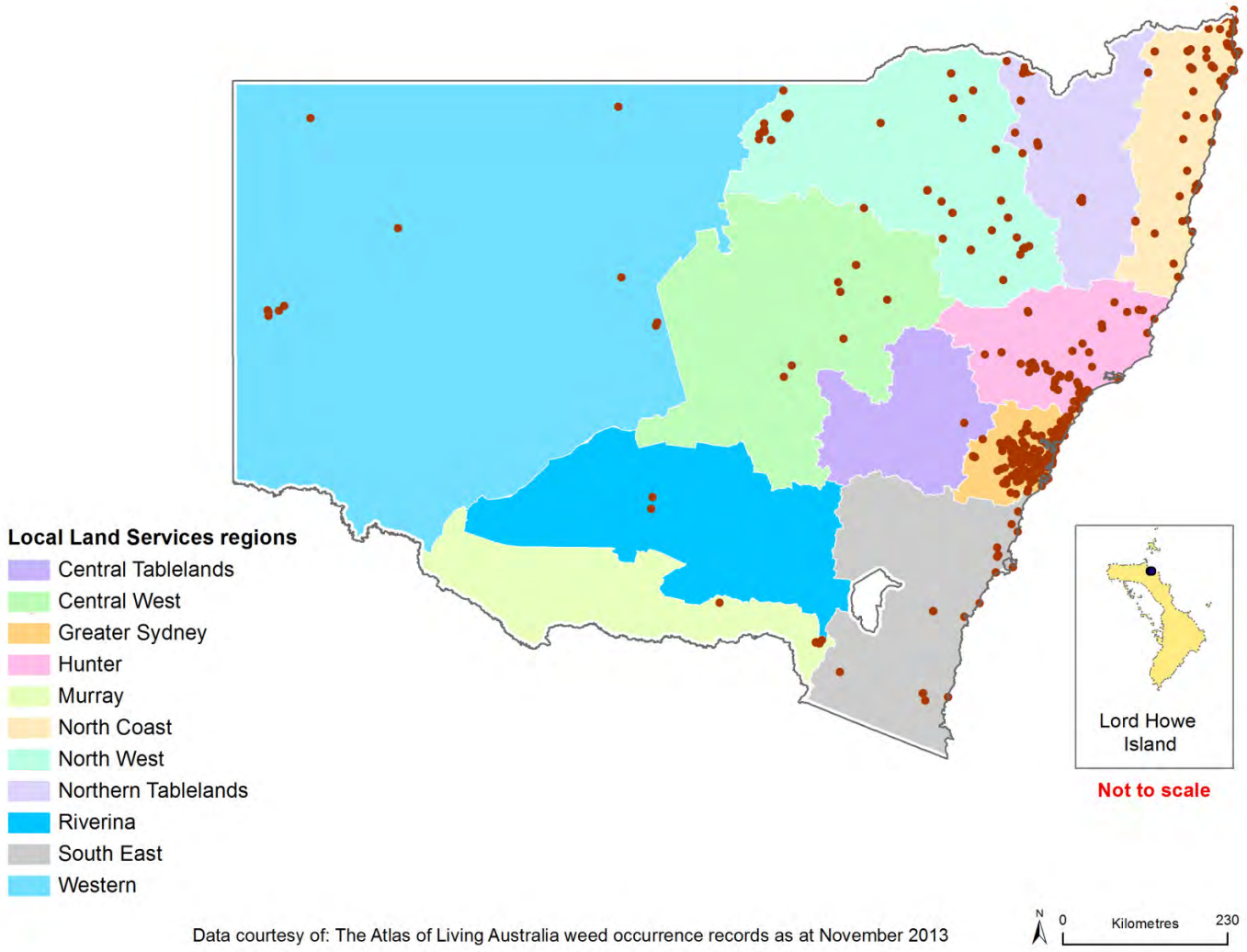

Figure 12: Occurrence of declared noxious weeds recorded as naturalised in NSW between 2000 and 2012

5.3 The distribution and abundance of weeds

The distribution and abundance of weeds across NSW is influenced by a number of factors and must be monitored regularly in order to understand the scale of weed invasion, the effectiveness of eradication efforts and where management effort should be prioritised. It is beneficial to capture such change in real time as part of inspection and surveillance programs. This information builds an understanding of the scale of weed invasion that can inform decision-making.

Availability of information on weed distribution and abundance

State-scale distribution and abundance maps are available from DPI for 142 weeds[135] but these maps have significant limitations in terms of coverage, reliability and accuracy. They are based on information collated from surveys of LCAs that scored the abundance and distribution of weeds in their respective areas, thereby capturing local knowledge of weed infestations for a particular point in time.[136]

In 2007-08, 134 weeds were mapped. They included noxious weeds (listed under control classes 1, 2, 3 and 5), WoNS (including alert species) and 20 species identified as new and emerging threats by Regional Weeds Committees or from existing CMA weeds strategies.[137] The dataset was subject to an expert panel review; however, weed presence for 123 of these weeds was not known for more than 50 per cent of the state.[138]

In 2010, 87 weeds were mapped, including 80 weeds that were mapped in 2007-2008 and seven new weeds.[139] There appears to be greater coverage of weed presence/absence in this dataset; however, the 2010 data was not subject to expert panel review.

These datasets represent the most current information on weed distribution and abundance at the state scale, but have limitations, particularly given the coarseness of the mapping and the absence of robust documentation that describes the datasets.[140] The datasets also do not include Class 4 declared weeds.

Furthermore, a comparison of this data with up-to-date occurrence records for WoNS demonstrates the need for regular updates of weed distribution and abundance mapping; the dataset should be dynamic. For example, occurrence records of a sagittaria (*Sagittaria platyphyla*) infestation in southern NSW indicate presence in areas where the distribution and abundance is categorised as 'absent' and 'unknown' in the DPI dataset. Distribution and abundance data therefore needs to be updated to reflect this information.

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135 NSW Department Primary Industries, *Distribution and abundance maps for priority NSW weed species,* viewed on 2 December 2013, dpi.nsw.gov.au/agriculture/pests-weeds/weeds/weed-maps/nsw-weed-maps

136 The NRC attempted to acquire the metadata that underpins these maps. However, this information was not available. The metadata would provide clarity regarding the purpose of the dataset, its intended use, how it was created, data reliability, accuracy and limitations, when the dataset was published and by whom.

137 Brindle, S 2008, *Invasive species monitoring – local government weeds survey (2007-08)*, NSW DPI, Sydney, NSW.

138 This statistic was derived from an analysis of the spatial data that underpins the weed distribution and abundance maps.

139 These species were added as they were new and emerging weeds that had become a priority - Personal communication with NSW Department of Primary Industries, 6 November 2011.

140 The mapping uses 50 kilometre grid cells. It cannot be assumed that the abundance category applied to a particular cell is homogenous across the entire cell. There is also no clear lineage for the dataset, i.e. metadata is not well documented.

Weed hotspots

While there are significant limitations to the datasets available from DPI, the NRC has developed maps of potential weed 'hotspots' in NSW as shown in Figure 13 and Figure 14. These maps are based on the 2007-08 dataset described above. This dataset formed the basis of hotspot mapping in this report as it includes a larger number of weeds than the 2010 dataset and had undergone expert panel review.

Two different maps were developed. The first shows weed diversity based on the number of noxious weed species present in a given area. The second shows the severity of weed infestation. It is based on an abundance score of weed cover for a given area. Proportional weighting was applied according to the severity of infestation, as listed below:

- Where a weed was categorised as abundant (widespread) or abundant (localised), a cover abundance weighting of 75 per cent was applied.
- Where a weed was categorised as common (widespread) or common (localised), a cover abundance weighting of 30 per cent was applied.
- Where a weed was categorised as occasional (widespread) or occasional (localised), a cover abundance weighting of 5 per cent was applied.
- Where a weed was identified as being present but the density was unknown, the presence was not known or the weed was identified as being absent, a cover abundance weighting of 0 per cent was applied.

It is important to remember when viewing the weed hotspot maps that **weed presence was not known for more than 50 per cent of the state** for most of the weeds that have been mapped. This is particularly true in the western half of the state.

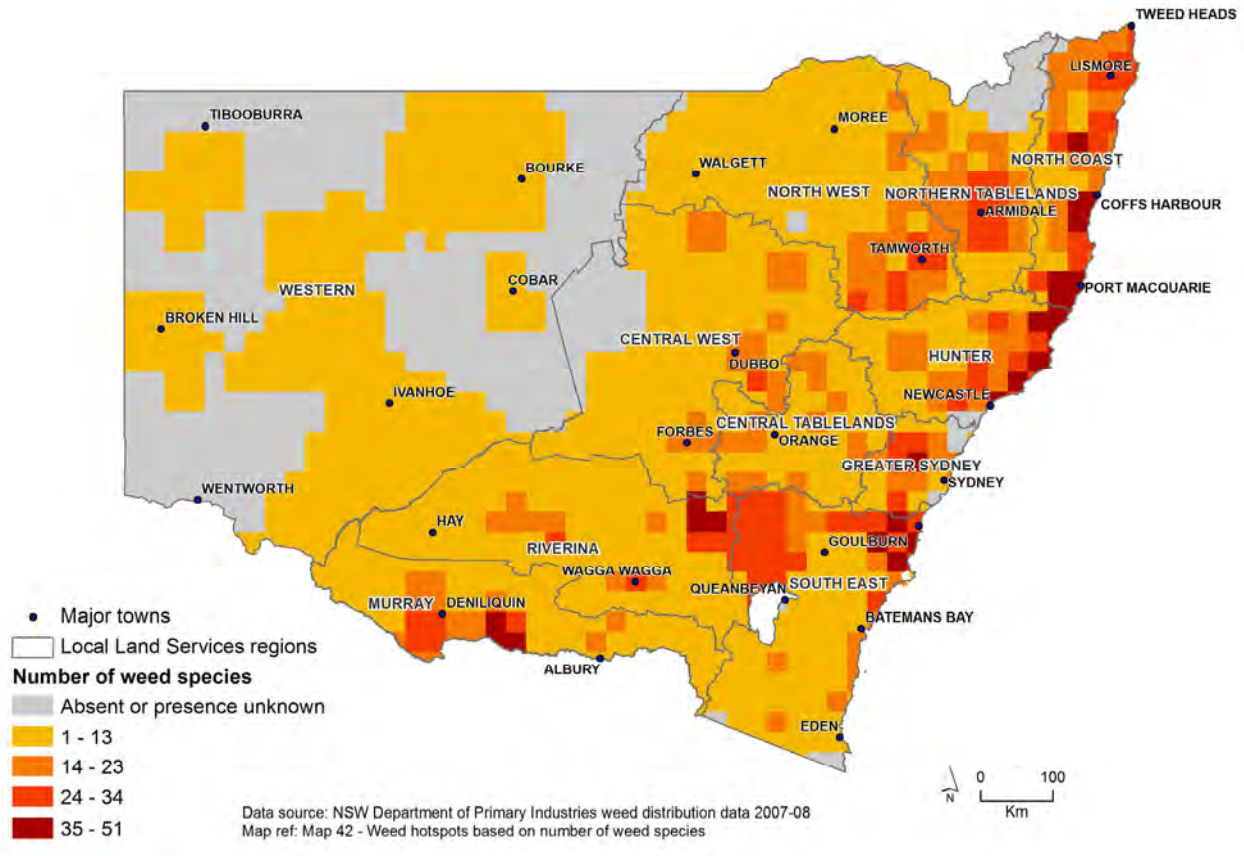

Figure 13: Weed hotspots based on weed diversity (number of weed species)

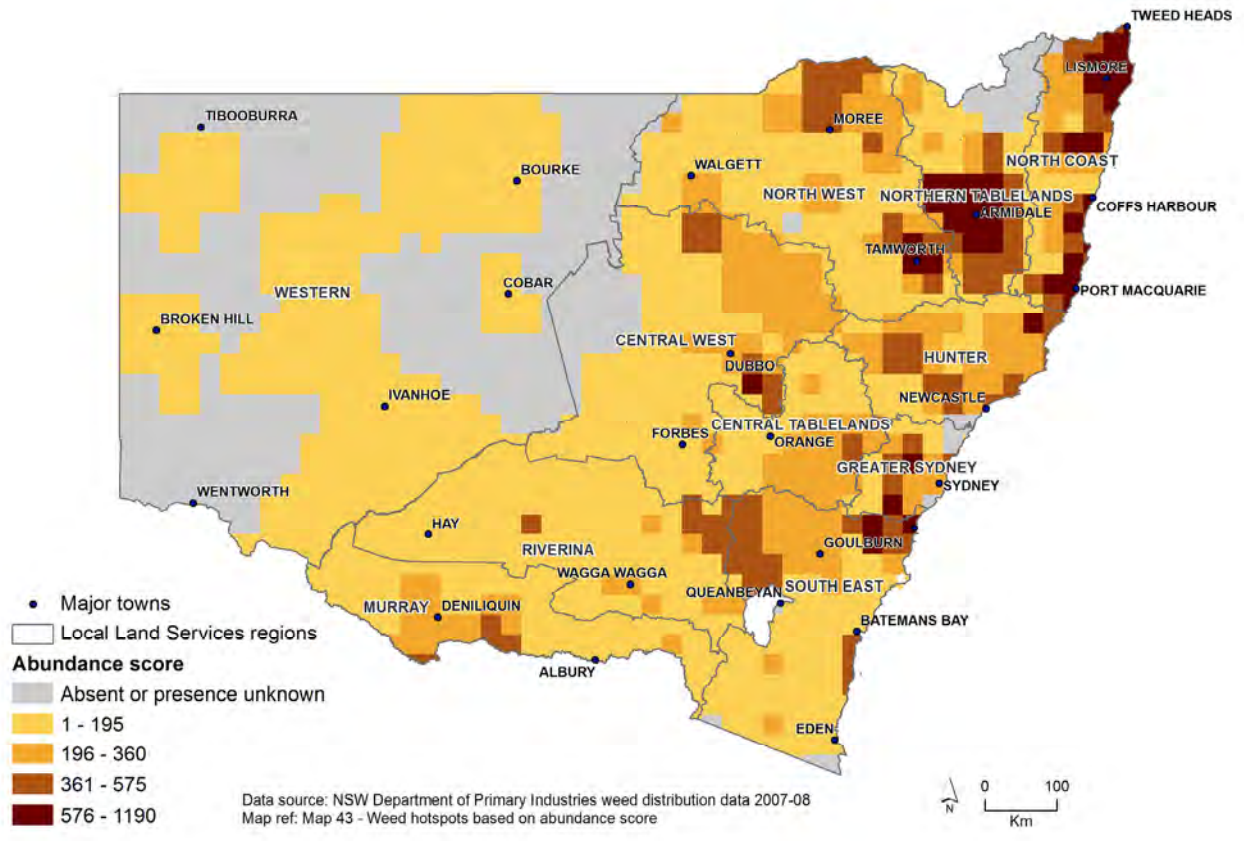

Figure 14: Weed hotspots based on weed abundance (aggregate score)

Table 5 summarises the location of hotpots based on weed diversity and weed abundance.

Table 5: Weed hotspot mapping categories and results

Category	Number of weeds mapped	Location of hotspots based on weed diversity (number)	Location of hotspots based on weed abundance score
Weed species that affect production, the environment and human health (Figure 13 and Figure 14)	134	Weeds hotspots primarily occur along the coastal zone, but also around major regional centres. Areas with the greatest weed diversity (35 species or more) occur in six LLS regions including the North Coast, Hunter, Greater Sydney, South East and Murray.	The greatest areas of weed abundance occur in the Central West (south-east of Dubbo and south of Walgett), Greater Sydney, North Coast, Northern Tablelands, North West (to the north of Moree and around Tamworth). South East and concentrated areas of the Riverina and Murray.

Local weed mapping

Up-to-date local scale mapping is available for some areas of NSW where infestations or incursions are detected, monitored and reported. For example, Tamworth Regional Council mapped recent records of an alligator weed infestation in the Peel River (Figure 15). Sharing of such real time information with neighbouring authorities and state agencies is critical given the main pathway for spread of this weed is water movement and it poses a threat to wetlands, rivers and irrigation systems downstream of the current infestation. This information is also critical for national coordination of management efforts, as it is a WoNS. However, the availability of this type of data is inconsistent, and often where it is available it is not shared across borders.[141]

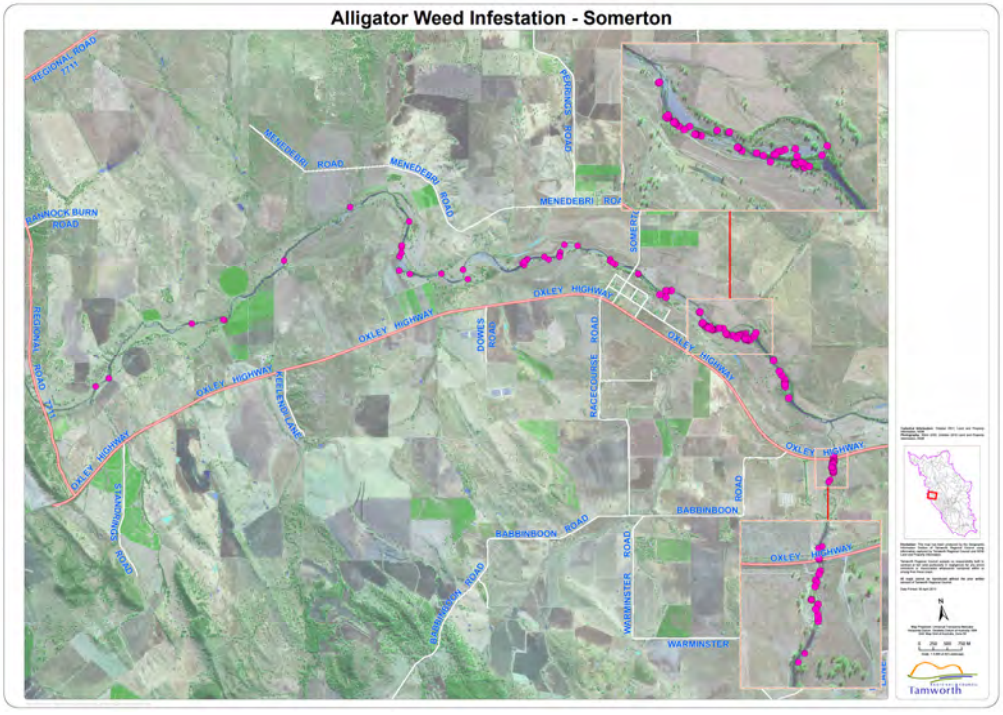

Figure 15: Alligator weed infestation recorded by Tamworth Regional Council

[141] For example, an area was identified where even though multiple LCAs in the region are using the same mapping program, they are not sharing data to create regional mapping.

Weed data management systems

LCAs, weed management committees, state agencies and herbariums collect spatial information on weed distribution and abundance to varying degrees. This information is valuable for detecting changes in weed range and density, facilitating rapid response to new incursions and for informing strategic planning (prioritising surveillance and response efforts). However, there is currently no standardised approach for collecting, managing or sharing this information. Instead, each organisation has adopted a surveillance and response system that suits its individual needs. Example programs currently used on the ground by weeds officers include Weed Tr@cer and WeedMap Pro. While these programs enable weeds officers to record data on weed infestations, including their location and geographic trends, the benefits of collecting the data are diminished if they are not shared with stakeholders and used to evaluate outcomes and inform strategic planning.

Government agencies have adopted their own systems for managing the land for which they are responsible. For example, the NPWS has developed a Pest and Weed Information System so that it can report on the effort, costs, outputs and biodiversity outcomes of its pest and weed management programs.

The lack of a consistent approach to data capture and storage has hindered the ability to share information for effective and efficient weed management across the state and across borders. In addition, the absence of a centralised information management system that facilitates data sharing has compounded this issue.

Biosecurity NSW has initiated a trial of a central data portal - the Biosecurity Information System - to determine if it is a suitable platform for sharing weed identification and surveillance information. This trial is being undertaken in partnership with the NWAC and the North Coast Weeds Advisory Committee, and includes the development of a metadata policy and data sharing agreements. Respondents indicated that it should be relatively simple to implement standard data protocols that the various systems currently in use could all use to allow for consistent state-wide data collection. Expediting agreement on standard metadata protocols and adoption of a state-wide data portal would help to address a number of issues. It would significantly improve weed management, particularly through the capture of real-time information, if key stakeholders commit to using the database and adopt associated standards and protocols.

5.4 Changes in weed distribution

Trends in weed distribution and abundance are available for a limited number of species. This is partly due to detection and surveillance efforts and resourcing, but also because the technology that supports efficient detection of trends is relatively recent.

One exception is bitou bush, a WoNS, for which there is good data available regarding changes in distribution and density. Comparison of area and density changes in the core distribution of bitou bush demonstrated that the total area of land infested by the weed increased by approximately 20 per cent between 2001 and 2008. However, the density of infestations decreased substantially, with a 43 per cent reduction in infestations that had greater than 40 per cent cover (heavy density).[142] Figure 16 illustrates areas where there has been an improvement in the density of bitou bush. Reduction in weed density was observed at a number of locations, including but not limited to

[142] Hamilton, MA, Winkler, MA, Cherry, H and Downey, PO 2012, 'Changes in the distribution and density of bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata* (DC.) (T.Norl.) in eastern Australia', *Plant Protection Quarterly*, vol. 27, no. 1, pp. 23-30.

Dunbogan, Port Stephens, Botany Bay and Jervis Bay. The containment lines for bitou bush were also modified to reflect control of the weed. These findings demonstrate the value of bitou bush control programs and reinforce the need for effective monitoring and evaluation programs across a broader range of weeds.

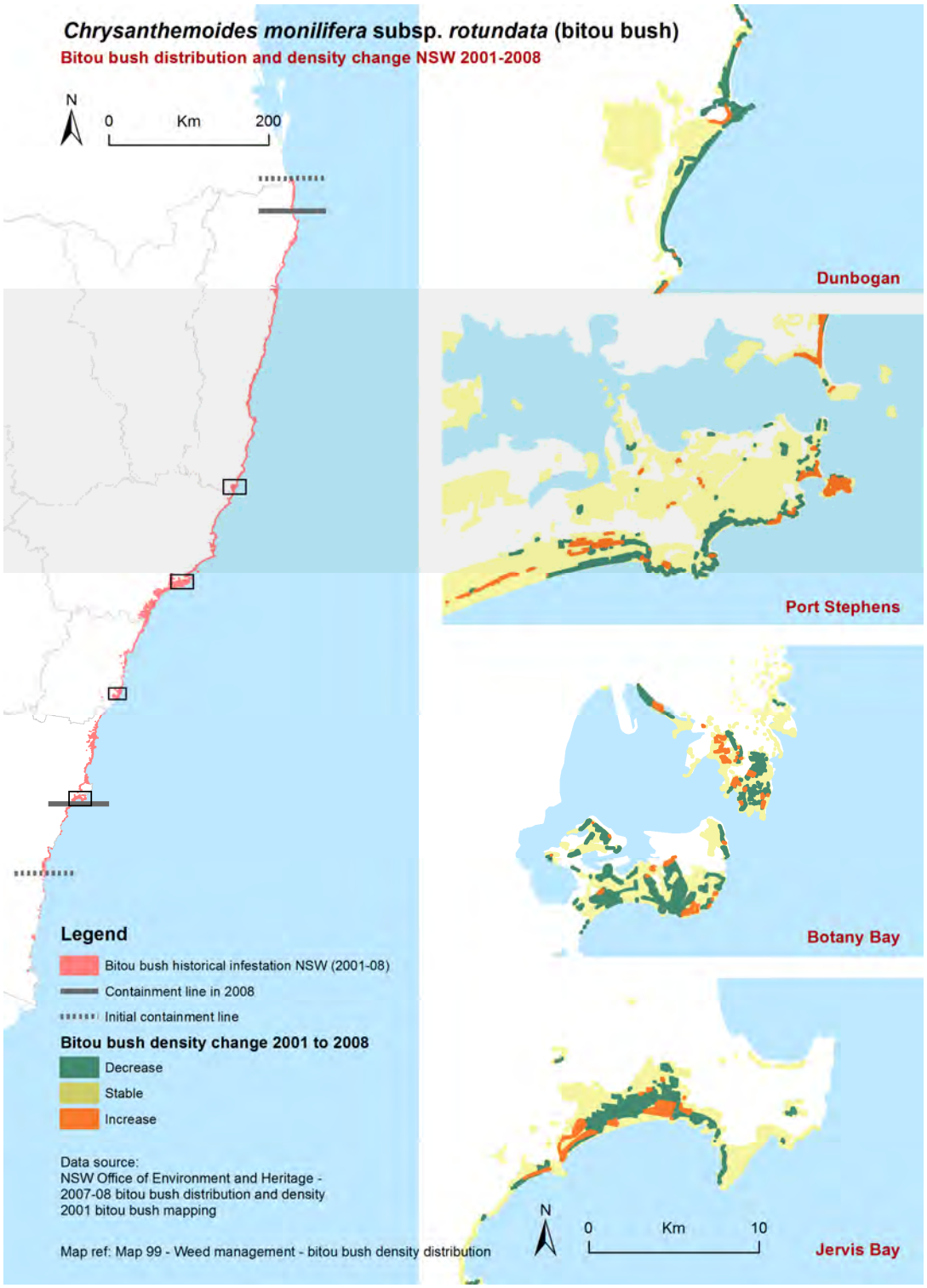

Figure 16: Change in the density and distribution of bitou bush between 2001 and 2008

Projected changes in climate suitability for weeds

Climate modelling by Australian academic and scientific institutions indicates that the south east and south west regions of Australia are most at risk from weeds, and that there will be a general shift southwards for most species.

The Commonwealth Scientific and Industrial Research Organisation's (CSIRO's) modelling predicts that, under current and projected climatic conditions, the regions most at risk of incursions of weeds on the national sleeper and alert lists[143] [144] are in the south-east of Australia.[145] Weed displacement to the south could be in excess of 1,000 kilometres for wet tropical species, while displacement of coastal weeds will be restricted by landmass. Of the 41 weed species modelled by CSIRO, the two that pose the greatest threat of establishment are white weeping broom (*Retama raetum*), which is listed on the National Environmental Alert List[146] and fringed dodder (*Cuscuta suaveolens*), a parasitic plant that poses a threat to legumes and other crops.[147] These species have previously been recorded in NSW.[148] However, only one taxon, *Cuscuta* species, is declared as a notifiable weed in NSW.

Modelling of national priority weeds[149] by Macquarie University and OEH identified two potential invasion hotspots in Australia - the largest being in the nation's south-east (an area which covers approximately 340,000 square kilometres and includes NSW).[150] Projections for 2050 show the size of this hotspot reducing in size to 100,000 kilometres.[151]

The studies found that the current climate of the south east hotspot is suitable for 69 of the modelled species. The majority of these species have not reached their potential distribution under current climate conditions, and therefore their range and abundance has the potential to increase. For example, alligator weed is estimated to occupy less than one per cent of the range that it is capable of occupying in the Murray-Darling Basin.[152] Projections showed climate suitability declining to 64 species by 2020 and 58 species in 2050 as a result of increased temperatures, changed rainfall patterns and elevated carbon dioxide levels. Species predicted to see the greatest decline in overall climate suitability include alligator weed, Chilean needle grass and serrated tussock. However, the climate suitability of a number of species affecting northern Australia (and not yet listed in NSW) could expand southwards.

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143 Australian Government, Department of the Environment 2012, *Sleeper Weed*s, Department of the Environment, Canberra, viewed on 22 April, environment.gov.au/biodiversity/invasive/weeds/weeds/lists/sleeper.html and environment.gov.au/biodiversity/invasive/weeds/weeds/lists/alert.html.

144 See Attachment B for a description of these weed lists.

145 Scott, JK, Batchelor, KL, Ota, N and Yeoh, PB 2008, *Modelling climate change impacts on sleeper and alert weeds: final report*, CSIRO Entomology, Wembley, WA.

146 Australian Government, Department of Sustainability, Environment, Water, Population and Communities 2012, *National Environmental Alert List*, Department of the Environment, Canberra, viewed on 2 December 2013, environment.gov.au/biodiversity/invasive/weeds/weeds/lists/alert.html.

147 *op.cit.* Scott *et al.* 2008.

148 According to the Atlas of Living Australia records, viewed on 15 November 2013, ala.org.au/

149 Comprised of the original 20 WoNS, shortlisted WoNS, National Environmental Alert List weeds and four invasive grasses.

150 Wilson, PD, Downey, PO, Gallagher, RV, O'Donnell, J, Leishman, MR and Hughes, L 2011, *Modelling climate suitability for exotic plants in Australia under future climates: Final report on the potential impact of climate change on the distribution of national priority weeds in Australia*, Macquarie University and NSW Department of Environment, Climate Change and Water, Sydney, NSW.

151 O'Donnell, J, Gallagher, RV, Wilson, PD, Downey, PO, Hughes, L and Leishman, MR 2011, 'Invasion hotspots for non-native plants in Australia under current and future climates', *Global Change Biology*, vol.18, issue 2, pp. 1–3.

152 Low, T 2009, *Climate change and weeds and pests in the Murray-Darling Basin*, report prepared for the Murray-Darling Basin Authority, Canberra, ACT.

In 2013, the National Climate Change Adaptation Research Facility published species distribution modelling, addressing how projected changes in climate may alter the patterns of naturalised, but not yet invasive non-native plants.[153] Individual species profiles were developed for 292 plants and hotspots of climatically suitable habitat were identified. The southerly coastal areas of Australia were found to have the highest risk of invasion, under both current and future climate scenarios.

Forty-one plants were assigned a high-risk of invasion for NSW under current climate conditions, and 36 were assigned a high-risk under future climate conditions. The modelled changes in plant distribution provide a powerful tool for the NSW Government as they can be used to prioritise which naturalised plants should be targeted for weed risk assessment and potential future intervention.

Some distribution modes will likely require greater focus due to climate change, in particular, fodder trade and natural water movements. Fodder trade to drought affected areas will likely increase, thereby heightening the risk of introducing fodder contaminated with weed seeds.[154] The importance of water as a natural pathway for weed dispersal will likely increase due to projected increases in climate variability (prolonged droughts followed by extreme floods).[155] The following are some changes that are likely to occur:

- Prolonged drought conditions will likely favour weed colonisation by reducing vegetation cover, providing increased area for weeds to colonise and increasing potential for flood runoff and weed seed dispersal when rain does fall.
- Reduced river flows could favour aquatic weeds that prefer stagnant water, such as water hyacinth. The floods that follow prolonged drought could spread plants and their seeds further downstream, enabling them to establish in new locations.

5.5 Weed dispersal pathways

Plants have been introduced to Australia deliberately and unintentionally for a range of reasons and through a variety of pathways. Historically, the deliberate introduction of exotic plants occurred for economic gains (agricultural and livestock production, and horticulture) and aesthetic appeal in gardens (ornamental plant trade).[156] While introduced plants have increased plant diversity in Australia, they have also increased competition for resources and had adverse impacts.[157] Subsequently, a number of introduced species that were once valued for their economic and amenity values are now declared as agricultural and environmental weeds.[158]

153 Hughes, L, Downey, P, Duursma, DE, Gallagher, R, Johnson, S, Leishman, M, Roger, E, Smith, P and Steel, J 2013, *Prioritising naturalised species for threat assessment; developing a decision support tool for managers,* National Climate Change Adaptation Research Facility, Gold Coast, Queensland.

154 Sindel, BM, van der Muelen, A, Coleman, MJ and Reeve, IJ 2008, *Pathway risk analysis for weed spread within Australia,* University of New England, Armidale, NSW.

155 Low, T 2009, *Climate change and weeds and pests in the Murray-Darling Basin*, report prepared for the Murray-Darling Basin Authority, Canberra, ACT.

156 Groves, RH, Boden, K, and Lonsdale, WM 2005, *Jumping the garden fence: invasive garden plants in Australia and their environmental and agricultural impacts,* CSIRO report prepared for the World Wildlife Fund – Australia, Sydney, NSW.

157 Coutts – Smith, AJ and Downey, PO (2006), *Impact of weeds on threatened biodiversity in New South Wales,* Technical Series no. 11. CRC for Australian Weed Management, Adelaide, SA.

158 Cook, GD and Dias, L 2006, "It was no accident: deliberate plant introductions by Australian government agencies during the 20th century", *Australian Journal of Botany,* vol. 54, no. 7, pp. 601– 625.

Increased awareness of the threats posed by exotic plants entering Australia has led to considerable effort in understanding and managing associated risks.[159] However, further research is required to better understand pathways for weed spread that may be influenced by direct or indirect human activity.

Knowledge of weed dispersal pathways is critical to weed management. For example, it has greatly contributed to the success of the NSW parthenium weed program and preventing the establishment of this weed in NSW.[160] Parthenium is a WoNS that has been a high priority for NSW since 1976 due to the threat it poses to agricultural production and human health. Human-assisted weed spread was identified as the key vector for entry into NSW from Queensland where the weed has established. A combination of measures has assisted in managing the spread of this weed, including amendments to the *Noxious Weeds Act 1993* that require machinery wash-down, the set-up of clean-down sites at key border crossings, and end point inspections of machinery and livestock transport vehicles.

A comprehensive pathway risk analysis for Australia completed in 2008 identified 24 weed sources and 17 weed dispersal pathways in Australia.[161] A summary of the weed sources and pathways identified is shown in Figure 17 below.

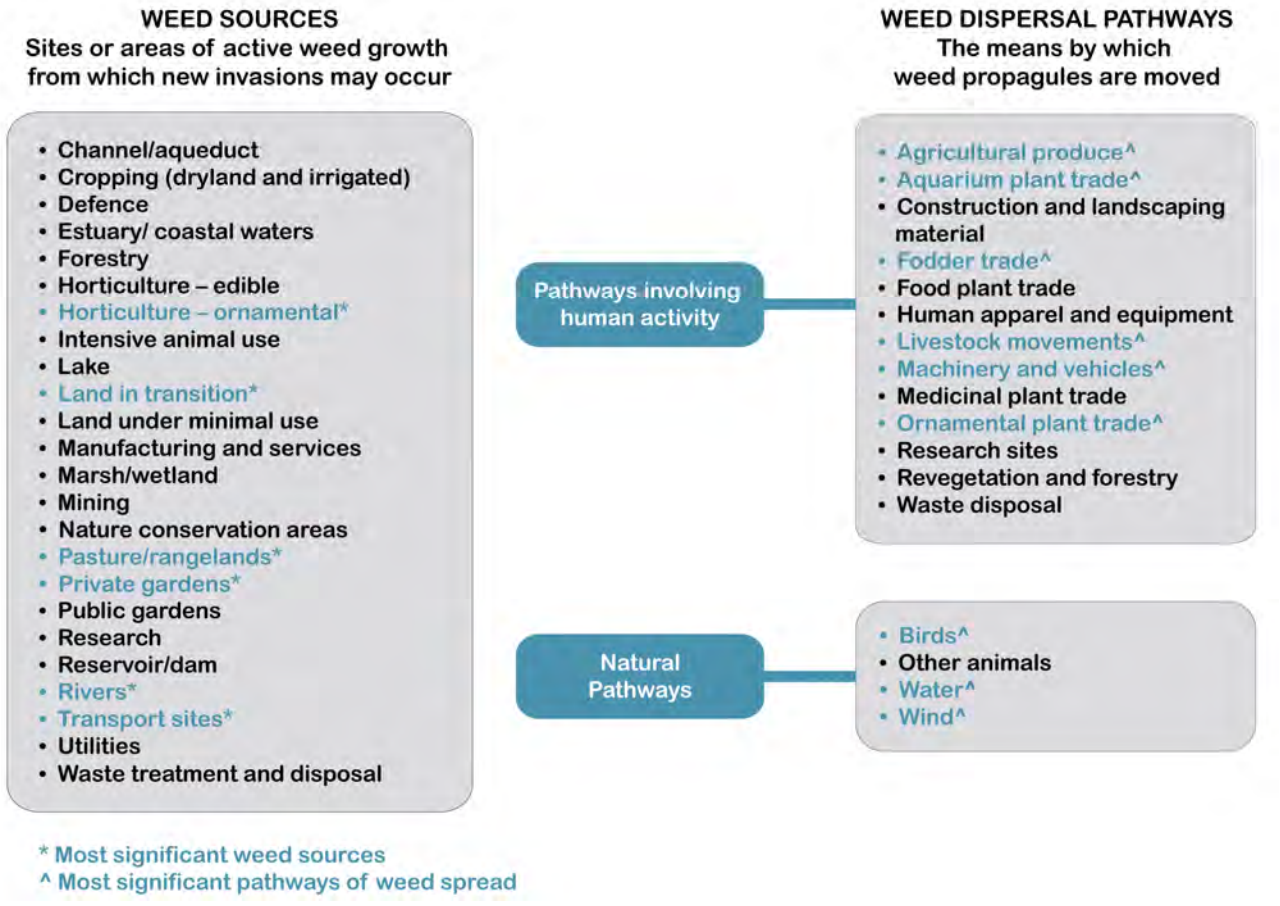

Figure 17: Sources and pathways for weeds spread (adapted from Sindel et al 2009[162])

[159] Coleman, MJ, Sindel, BM, Schneider, AW and Reeve, I J 2010, *Assessing weed spread in Australia using pathways risk analysis*, Proceedings of the 17th Australasian Weeds Conference, Christchurch, New Zealand.

[160] Blackmore, P 2011, *Parthenium weed in NSW – a model for continuing success*, Proceedings of the 16th NSW Weeds Conference, Coffs Harbour, NSW.

[161] Sindel, BM, van der Meulen, A, Coleman, M and Reeve, I 2009, *Pathway risk analysis for weed spread within Australia*, final report to Land & Water Australia, project no. UNE61, Braddon, ACT.

This research ranked the most significant pathways based on their ability to:

- transport weeds quickly over long distances, i.e., more than 1 kilometre
- transport a high diversity of weed species
- transport large numbers of weed propagules of one or more species in a single event
- transport weeds frequently, making it a regular/ongoing instead of occasional event
- deliver live plants or viable propagules into hospitable environments
- avoid/overcome prevention and management strategies
- transport weeds into sensitive areas, for example, areas where the weed may have a high impact.

Identification of the commercial (ornamental and aquarium) plant trade as an important weed pathway is consistent with other literature that indicates:

- garden plant introductions are the major source of new naturalised plants and weeds in Australia, accounting for 66 per cent of introduced plants that have established[163]
- the ornamental plant trade has contributed to the introduction of around 75 per cent of Australia's water weeds, including water hyacinth (*Eichhornia crassipes*) and salvinia.[164]

Fodder has been identified as one of the highest risk pathways. More than 50 per cent of NSW is grazing land.[165] Grazing land is considered at greatest risk of weed importation through contamination of fodder, while cropping land is considered at most risk through weed imports in contaminated seed at sowing time and weed seed being spread from contract machinery.[166] A study of weed seeds in hay bales conducted during the 1980–81 drought [167] found that almost all the sampled bales in the Yass, Young and Gundagai districts of NSW contained viable seeds of prohibited or restricted weeds.

Weed seeds in properly managed silage are considered to be no longer viable. While Australian specific studies were not identified, a Canadian study[168] identified low levels of viability in ensiled broadleaf weeds. The study showed that three per cent of black bindweed (*Fallopia convolvulus)* seed remained viable following ensiling, compared to no viability in wild oats (*Avena fatua*). Additionally, silage is not typically moved off property.[169] As such, silage is not considered to be a major risk pathway.

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162 Sindel, BM, van der Meulen, A, Coleman, M and Reeve, I 2009, *Pathway risk analysis for weed spread within Australia*, final report to Land & Water Australia, project no. UNE61, Braddon, ACT.

163 Groves, RH, Boden, R, and Lonsdale, WM 2005, *Jumping the Garden Fence: Invasive garden plants in Australia and their environmental and agricultural impacts,* CSIRO report prepared for World Wildlife Fund-Australia, Sydney, NSW.

164 Petroeschevsky, A 2007, *Reducing the water weed risk: how government and industry can contribute to a safer trade,* Nursery Papers, technical, issue 6, Nursery and Garden Industry Australia, Epping, NSW, viewed in December 2013, ngia.com.au/files/nurserypapers/NP_2007_06.pdf.

165 Department of Agriculture, Fisheries and Forestry 2012, *Land management practice trends in NSW and the ACT grazing (beef cattle/sheep) industries*, viewed on 7 May 2014, daff.gov.au/__data/assets/pdf.../nsw-act-farm-practices-grazing.pdf .

166 Trounce, B, and Dellow, J 2007, NSW DPI Primefacts: Weed Strategies following drought, fire and flood, Primefact 372, viewed on 7 May 2013, dpi.nsw.gov.au/agriculture/emergency/drought/recovery/plants/weed-strategies

167 Thomas, AG, Gill, AM, Moore, PH and Forcella, F 1984, 'Drought feeding and the dispersal of weeds', *Journal of the Australian Institute of Agricultural Science,* vol. 50, no. 2, pp. 103–107.

168 Blackshaw, RE and Rode, LM 1991, 'Effect of ensiling and rumen digestion by cattle in weed seed viability', *Weed Science,* vol. 39, no.1, 104–108.

169 Rural Industries Research and Development Corporation 2009, *The Australian Fodder Industry - an overview of production, use and trade*, RIRDC publication no. 09/001, project no. PRJ-000806.

In NSW, linear reserves under public ownership such as transport and utility corridors, travelling stock routes, and other Crown lands are important weed pathways, and make up as much as six per cent of the state.[170]

In urban regions, hubs of human activity around plant nurseries, railway lines, train stations and markets are high-risk pathways for weed spread. Major infrastructure developments increase the likelihood of weed entry from increased transport traffic, and may also provide invasion corridors[171] radiating out across the state.

Urban areas are also the focus of intense land use change particularly on the fringes. Peri-urban development and the subdivision of productive land into lifestyle blocks introduce a range of factors that increase biosecurity risks including the sometimes limited knowledge of new residents.[172]

Education programs that build community ownership of weed management and change human behaviour, particularly at high-risk urban/bushland interfaces, are essential to ensure land managers are clear about their regional weed management obligations.

170 Personal communication with the NSW Roadside Environment Committee, 29 October 2013.

171 Hulme, PE, Bacher, S, Kenis, M, Klotz, S, Kuhn, I, Minchin, D, Nentwig, W, Olenin, S, Panov, V, Pergl, J, Pysek, P, Roques, A, Sol, D, Solarz, W and Vila, M 2008, 'Grasping at the routes of biological invasions: a framework for integrating pathways into policy', *Journal of Applied Ecology*, vol. 45, issue 2, 403-414.

172 Low Choy D and Harding J 2010, *Upper Murrumbidgee Catchment Coordinating Committee peri-urban weed management study - exploring agents of change to peri-urban weed management*, Land & Water Australia publication, viewed on 30 March 2014, molonglocatchment.org.au/Documents/News%20Page/Peri-urbanStudy2010.pdf.

6 Regulatory arrangements

Key findings:

- The current legislation includes different responsibilities for public and private landholders, leading to inconsistent management across the landscape, and creating tension among landholders.
- Several specific areas of legislation and regulations should be improved. Many of these were identified as concerns in previous reviews, particularly the most recent review of the *Noxious Weeds Act 1993*, but were deferred for further assessment. These remain important areas to be addressed:
  - several high-risk pathways including commercial plant trade, fodder and spread via waterways require stronger controls to mitigate risks
  - the weed declarations are currently fragmented; the process for declaration could be more transparent
  - the current enforcement mechanisms are insufficient to compel compliance
  - required actions on weed notices are limited to the control requirements of the weed order, which are often unclear
  - there is no requirement for notifying prospective land purchasers of a property's weed status, or to ensure the subdivision of land does not exacerbate weed problems
  - there are barriers to obtaining a minor use permit for an off-label herbicide use inhibiting response to new incursions.
- Current legislation applies a similar command and control approach for incursions and widespread weeds. This is relatively effective for addressing incursions, but for widespread weeds can be counterproductive to shared responsibility, collective action responses, and adaptive management.

6.1 Land manager obligations

Weeds spread across all tenures of land, do not recognise boundaries, and can only be successfully managed by consistent actions and cooperation of all parties across the landscape.

The *Noxious Weeds Act 1993* places different weed control responsibilities on private landholders and public authorities, other than LCAs. Private owners or occupiers of land are required to control noxious weeds on their land in accordance with a Weed Control Order. LCAs have the same responsibility for any land that they control. In contrast, other public authorities are required to control noxious weeds on their land only to the extent necessary to prevent weeds from spreading to adjoining land.[173]

Feedback from a range of stakeholders, as well as results of previous reviews, indicate that this differential treatment is seen by many as contributing to substandard weed management on some public land, and the imposition of unfair costs on private landholders. The NRC observed examples where different obligations and fragmented land tenure resulted in patchy and

[173] *Noxious Weeds Act 1993* (NSW) s 13.

inefficient weed control and inspection efforts. Many public land managers implement minimal weed controls, and there is little enforcement of weed management requirements on public land.

However, this is not true for all public land managers. For example, NPWS has a proactive approach to weed management, as it aligns with their core business of biodiversity conservation. It has taken an integrated, risk-based approach to developing priorities in Regional Pest Management Strategies, and effectively works with volunteers to manage impacts on key assets.

In general, the public land managers consulted indicated they primarily focus weed management efforts on those actions consistent with meeting their land management objectives in the most practical, cost effective manner, and they had differing opinions regarding what is required to ensure weeds do not spread off their land.[174] Many public land managers have made efforts to build good relationships with private landholders that adjoin the land under their control, and to work jointly to control weeds on borders where neighbours have raised concerns. However, there is still a strong public perception that poorly managed public lands are a significant source of weeds.[175]

In general, public land managers consulted supported a landscape based approach to weed management.[176] However, they identified several potential barriers to a tenure-neutral approach which applies to public landholders the same obligations currently applied to private landholders:

- **configuration of land:** Public land managers are often responsible for large tracts of land that spread across regions. The Crown Land estate in particular is comprised of many small parcels of land distributed across the landscape making weed management difficult and expensive.
- **capacity concerns:** The capacity of public authorities to meet their weed management obligations varies considerably. Most retain a limited weed management capacity 'in house' and rely on the procurement of vegetation management services from contractors, who may not have the required skills for effective weed management.
- **cost implications:** Most of the public land managers raised concerns over the cost implications of increased responsibilities. Furthermore, they questioned the logic and cost effectiveness of having to control widespread weeds across their entire holding. For example, it would be inefficient to require a large public landholder to treat all of their land for a particular weed, when treating a buffer area around their property might mitigate impacts to them, their neighbours and the environment.
- **current governance arrangements:** Most indicated that the complexity of governance arrangements and weed control classes were major barriers to implementing a landscape approach. Some felt that punitive Weed Control Orders don't encourage co-operation.

[174] For instance, one public land manager indicated that they have requirements to wash down vehicles, and felt that is all that is required to meet their obligations. Others indicated that they perform some maintenance along borders with neighbours to create a buffer zone. OEH has comprehensive strategic plans for managing pests including weeds, focused on protecting priority assets within the parks.

[175] This comment was made in many submissions to the NRC weed management review 2013, including: Primary Industries Ministerial Advisory Council, Clarence Valley Council and The Serrated Tussock Working Party for NSW and ACT.

[176] See Attachment E for a full list of public land managers consulted.

- **lack of engagement:** Many public land managers indicated that they were not adequately engaged in strategic pest management planning and therefore plans created often do not adequately cater to their operational requirements. Engagement of public land managers in RWACs is inconsistent across the state. Public land managers consistently indicated that while these groups are good forums for sharing information, they do not, for the most part, provide the strategic direction required. Most who do participate in these committees indicated that they are predominantly observers, with a few exceptions where LHPAs and NPWS are paying members and receive funding through the WAP.

Most public authorities have management systems in place that guide the operation of their business. Many of these management systems are subjected to external audit procedures to ensure that they meet specified outcomes. For example, the Forestry Corporation of NSW management systems are independently certified to the Australian Forestry Standard. Therefore, most public authorities indicated that auditing of weed management responsibilities could be implemented. Public land managers also typically undertake compliance risk assessments, and noted that clearer identification of legislative responsibilities would facilitate their incorporation into operational practice.

6.2 Management of risk

A major concern for weed management is that the parties responsible for introducing the weeds are generally not held responsible for the costs associated with managing them. As more weeds have been introduced, costs have continued to increase for private and public landholders, particularly farmers for whom weeds can have considerable productivity impacts. Furthermore, impacts on the environment and community continue to grow.

The Independent Regulatory and Pricing Tribunal (IPART) review of the funding framework for LLS[177] indicates that costs should be assigned first to risk creators, followed by beneficiaries of mitigation efforts, and finally the taxpayer (public) where it is too difficult to define the creators or beneficiaries, or the general public is the beneficiary. This type of 'beneficiary' should not be confused with those who benefit from taking risk. For instance, nurseries may import a weedy species and gain economic benefits from its sale. If that plant escapes and infests farms causing negative impacts, the farmers become impact bearers. According to the IPART definition (used in the NSW Biosecurity Strategy), such farmers would become beneficiaries of any mitigation efforts.

Under the NSW *Noxious Weeds Act 1993* the following costs have been allocated:

- Landholders (private occupiers) are responsible for the costs associated with controlling weeds on their land, as required under the Weed Control Order.
- LCAs, as occupiers of land, are responsible for the costs associated with controlling weeds on the land, as well as on any road (other than a freeway, tollway or state work within the meaning of the *Roads Act 1993*) in the local area of the authority as required in an order. In this instance funds are sourced from public monies through local council rates (and in some instances levies).

177 Independent Pricing and Regulatory Tribunal of New South Wales 2013, *Draft Report - Review of funding framework for Local Land Services NSW*, viewed on 2 December 2013, ipart.nsw.gov.au/Home/Industries/Other/Reviews/Land_Services/Review_of_a_funding_framework_for_Local_Land_Services_NSW/10_Sep_2013_-_Draft_Report/Draft_Report_-_Review_of_funding_framework_for_Local_Land_Services_NSW_-_September_2013.

- Public land managers are responsible for the costs associated with the control of noxious weeds on the land as required under the order, to the extent necessary to prevent the weeds from spreading to adjoining land. In this instance funds are sourced from public monies through taxes and agency revenues.

In addition to the responsibilities assigned under the Act, the NSW Government and Australian Government currently contribute significant funds for weed management through a variety of programs discussed further in Chapter 8.

Governance of weed management could be improved if the parties responsible for the introduction or the spread of a weed are made accountable for the negative impacts incurred or for better reducing risks created by their activities. Risk creators would therefore be made responsible through market-based and regulatory instruments. Where risk creators cannot be held responsible the beneficiaries of government funded weed management should contribute towards weed control and eradication. In some cases this may be the entire community.

A 'polluter pays' model for recovering the cost of weed management has been advocated by a number of stakeholders, including the Invasive Species Council.[178] While this model would encourage parties responsible for weed introduction or escape to contribute towards weed eradication and control, there are several barriers to this approach:

- it would be challenging to quantify the environmental and social values that may be impacted by a weed[179]
- legacy issues make it difficult to adopt a risk creator/impactor pays model based on historical decisions[180]
- difficulties would arise in pinpointing the original source of a weed and ultimately who is responsible for its establishment in a new area[181]
- the risk creator may be too diffuse to incur the cost i.e. the role of the risk creator and/or their responsibility for the problem could be difficult to define[182]
- imposing a charge for the risk creation may not be cost-effective.[183]

[178] Invasive Species Council, Australian Association of Bush Regenerators, Greening Australia, National Parks Association of NSW and Nature Conservation Council of NSW, 2013, *Review of Weed Management in NSW*, submission to the Natural Resources Commission, December 2013.

[179] Johnson, SB, 2012, 'Economic tools ≠ policy actions. Why benefit cost analyses are not a policy panacea for weedy, but commercially valuable plant species', *Proceedings of the Eighteenth Australasian Weeds Conference*, Melbourne, Victoria, viewed on 22 April 2014, caws.org.au/awc_contents.php?yr=2012

[180] Independent Pricing and Regulatory Tribunal of New South Wales 2013, *Draft Report - Review of funding framework for Local Land Services NSW*, viewed on 2 December 2013, ipart.nsw.gov.au/Home/Industries/Other/Reviews/Land_Services/Review_of_a_funding_framework_for_Local_Land_Services_NSW/10_Sep_2013_-_Draft_Report/Draft_Report_-_Review_of_funding_framework_for_Local_Land_Services_NSW_-_September_2013 .

[181] Environment, Communications, Information Technology and the Arts Reference Committee 2004, *Turning Back the Tide: Invasive Species Challenge*, report on the regulation, control and management of invasive species and the *Environment Protection and Biodiversity Conservation Amendment (Invasive Species) Bill 2002* (Cwlth), The Senate, Commonwealth Government.

[182] *op.cit.* IPART (2013).

[183] *ibid.*

Improved regulation of risk pathways

Despite the fact that risk creators cannot be held accountable for **all** risks regarding weeds, current regulations could be improved by providing mechanisms to better control risk in relation to high-risk pathways, particularly:

- the ornamental plant and aquarium industries
- fodder trade
- machinery movement
- aquatic weeds

Several stakeholders have also argued that small landholders are often not held accountable for their risks (particularly at the urban fringe). This is an issue of enforcement of the regulations, rather than the regulations themselves, which require all private landholders to comply with the *Noxious Weeds Act 1993.*

Progress has been made in recent years to better mitigate risks associated with high-risk pathways. For example, the WAP requires each region to develop a plan identifying high-risk pathways and requirements for monitoring those pathways.

Other initiatives have been introduced to mitigate the weed risks posed by the ornamental plant trade including:

- public and industry education awareness programs such as the national *Grow Me Instead* program developed by the Nursery and Garden Industry Australia in partnership with the Australian Government[184]
- introduction of national plant labelling guidelines to standardise labelling and marketing material developed by the nursery industry, including dealing with potentially harmful plants.[185]

Ornamental plants /aquarium industry

Plant traders are required to comply with the *Noxious Weeds Act 1993;* however, they do not bear the full costs of risk created by their activities as demonstrated by the proportion of weeds that are escaped ornamentals and which are now costing landholders millions of dollars to control.

Stakeholder feedback and WAP documentation indicates that inspection of nurseries and aquariums by LCAs is highly variable across the state. Some stakeholders noted that inspection is difficult because there is currently no requirement for nurseries or aquariums to be registered, and therefore many may fall under the inspector's radar. It has also been noted that there is limited or no weed surveillance in some areas around Sydney where major plant trade is conducted via nurseries, farmers markets, and street sales in locations where there is limited or no weed surveillance. Risks would be reduced if plant traders had to be registered, and surveillance and enforcement was improved.

184 Nursery and Garden Industry Australia 2009, *Grow me instead – how the nursery industry is addressing the spread of invasive plants*. Nursery Papers, Issue 5, June 2009.

185 Nursery and Garden Industry Australia 2013, *National Plant Labelling Guidelines,* Version 2, January 2013.

Fodder

Under the NSW *Noxious Weeds Act 1993,* the transport or sale of fodder from land with notifiable weeds is prohibited. Sale, distribution or transport of material containing many Class 3 and Class 4 weeds is also prohibited. This applies to both private and public land managers. However, lack of monitoring and enforcement limits the effectiveness of this prohibition.[186] DPI advises hay importers to obtain a vendor declaration stating that none of the noxious weeds declared in NSW are on the property from which the hay was harvested[187], but the effectiveness of this approach is uncertain.[188]

The total value of hay production nationally was estimated at $1.6 billion in 2006-07. Around 70 per cent of fodder is used on the farm where it is produced; however there is an increasing trend in the volume of hay being traded.[189] Large commercial users of fodder[190] grow their own fodder, sourcing extra fodder locally where the weed risk is known and managed. Opportunistic fodder producers pose the greatest risk to weed spread via fodder movement. This risk increases during drought when up to 55 per cent of fodder produced may be traded[191]. Fodder is a nationally traded commodity and the industry is very informal, making it difficult to regulate as it includes both major players and minor participants for which fodder production is a sideline, rotational crop.

Commercial fodder distributors employ professional agronomists to assess the weed status of fodder crops on-farm prior to baling, and regularly source hay from specialist fodder producers. They expressed concern about a perceived decline in LCA weed inspections on agricultural land[192].

The fodder industry has a history of vendor declaration of the pesticide and herbicide used in fodder production. Use of these declarations was driven by the impact of pesticide residue on market access in the meat industry. The industry has introduced a national voluntary vendor declaration system[193], which could be easily adapted to include details and declarations of weed risks.

Respondents to a national survey[194] indicated vendor declarations need enforcement provisions to be effective. An audit[195] of the mandatory National Vendor Declaration system based on PICs for cattle transferred from seller to buyer showed a 99 per cent rate of compliance. Regular auditing, supported by compliance and enforcement activities has proven essential to achieve this rate of compliance.

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186 A high proportion of participants in a recent study (76.2 per cent) indicated that this trade is not sufficiently regulated - Sindel, BM, van der Muelen, A, Coleman, MJ and Reeve, IJ 2008, *Pathway risk analysis for weed spread within Australia,* University of New England, Armidale, NSW.

187 NSW Department of Primary Industries 2011, *Factsheet - information on importing fodder into NSW*, September 2011, viewed on 22 April 2014, dpi.nsw.gov.au/__data/assets/pdf_file/0006/409974/Information-on-importing-fodder-into-NSW.pdf .

188 Personal communication with the Australian Fodder Industry Association, 16 October 2013.

189 Rural Industries Research and Development Corporation 2009, *The Australian Fodder Industry - an overview of production, use and trade*, RIRDC Publication No. 09/001 Project No. PRJ-000806.

190 Personal communication with Moxey Farms on 11 April, 2014.

191 Rural Industries Research and Development Corporation 2009, *The Australian Fodder Industry - an overview of production, use and trade*, RIRDC Publication No. 09/001 Project No. PRJ-000806.

192 Personal communication with Canowindra Produce Company on 11 April, 2014.

193 Australian Fodder Industry Association, *Fodder Care*, viewed on 22 April 2014, afia.org.au/index.php/fodder-care .

194 Baker, M 2005, *Strategic analysis and scoping study of human spread of weeds,* report to the Natural Heritage Trust, Department of Natural Resources and Mines, Queensland, viewed on 17 April 2014 weeds.org.au/docs/Strategic_Analysis_and_Scoping_Study_on_Human_Spread_of_Weeds-part_1.pdf .

195 NSW Department of Primary Industries 2009, *Agriculture Today*, March 2009 edition, viewed on 17 April 2014, dpi.nsw.gov.au/archive/agriculture-today-stories/ag-today-archives/march-2009/errors-creep-into-national-vendor-decs .

Machinery

A recent amendment of the *Noxious Weeds Act 1993* that broadened requirements for cleaning of machinery/equipment from any state or territory should assist in managing the entry of weedy material into NSW.[196] Equipment is no longer confined to agricultural machinery, but now encompasses any machinery or equipment specified by Ministerial order. These amendments are timely given the growing reliance on machinery contractors in the agricultural sector.[197] Expanding the vehicle types covered by the legislation is also appropriate given the findings of a recent study into utility vehicles in south-east Queensland which found these vehicles are capable of distributing large numbers of viable weed seeds throughout the year.[198]

NSW weed officers report that wash-down of vehicles from Queensland has improved with the installation of stations at key points on the border. However, similar protections are not applied at the Victorian or other borders mainly because of the typical southward migration of harvesters. Furthermore, consultation indicates that wash-down tends to focus only on farm machinery and that wash-down of other types of machinery may be necessary. The powers to inspect machinery as required to regulate seed movement should be retained in new legislation, and proactively enforced based on risk, for example, for new major projects.

Education programs should highlight the risks of contract machinery moving from site to site, and encourage farmers and others who hire contractors to require the wash down of machinery before arriving at their property.

Aquatic weeds and spread via waterways

Previous reviews raised concerns over the impact of current regulations on the effectiveness of aquatic weed management.[199]The effective control of weeds along waterways is critical as spread via water-flow and floods is a major risk pathway, the importance of which is projected to increase with the impacts of climate change[200].

Aquatic weed management is difficult and can be expensive. Specialised equipment and knowledge, which individual landholders may not have, is also required for managing aquatic weeds. The *Noxious Weeds Act 1993* places responsibility for the control of aquatic noxious weeds in waterways with adjoining land occupiers, who are responsible for the area up to the midpoint of the waterway adjacent to their land.[201] For large bodies of water, this diffusion of responsibility to hundreds of disparate public and private landholders impedes the effective management of aquatic weeds required to control spread. Furthermore, the mobility of aquatic weeds makes enforcing this responsibility difficult.

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196 Johnson, SB, Blackmore, PJ and Lisle, SD 2013, 'Noxious Weeds Act 1993– Moving with the times: what does it mean for you?', *Proceedings of the 17th NSW Weeds Conference*, Corowa, NSW.

197 Australian Bureau of Statistics 2013, *9309.0 - motor vehicle census, Australia, 31 January 2013,* viewed on 2 December 2014', abs.gov.au/ausstats/abs@.nsf/mf/9309.0/

198 Khan, I, O'Donnell, C, Navie, S, George, D and Adkins, S 2012, 'Weed seed spread by vehicles: a case study from Southeast Queensland, Australia', *Pakistan Journal of Weed Science Research*, vol. 18, special issue October 2012, pp. 281-288.

199 NSW Department of Industry and Investment 2011, *Report on the Statutory Review of the Noxious Weeds Act 1993,* Department of Industry and Investment, Sydney. NSW.

200 Department of Environment, Climate Change and Water NSW 2010, NSW Climate Impact Profile – the impacts of climate change of the biophysical environment of New South Wales, State of NSW and the Department of Environment, Climate Change and Water NSW, Sydney, NSW, viewed in December 2013, environment.nsw.gov.au/resources/climatechange/10171climateimpactprof.pdf

201 *Noxious Weeds Act 1993* (NSW) s 17a.

While the current regulation allows for the LCA to assume the aquatic weed management responsibilities of riparian landholders, if in its opinion "it would be unreasonable" to apply the provisions making the riparian landholder responsible, it does not require them to do so.[202] Some LCAs including Hawkesbury River County Council and Lake Macquarie have indicated in their submissions that coordinated control is more effective for control of aquatic weeds on substantial bodies of water.

6.3 Weed lists and declaration processes

Noxious weeds declarations in NSW

In NSW, weeds are declared as noxious under the *Noxious Weeds Act 1993*. The Minister has delegated the authority to declare noxious weeds to the Director-General and the Executive Director of Biosecurity NSW. Proposals for new weed declarations are made to the NWAC, which makes recommendations to the Minister regarding weed declarations. This ministerially appointed committee includes representatives from major stakeholders including Local Government, NSW Farmers, OEH, the Nature Conservation Council, and LLS (formerly CMAs). Proposed declarations are advertised and submissions considered before recommendations are made. However, the deliberations of the NWAC are not made public.

For the Government to declare a weed, the proposal must demonstrate a benefit to the community above the cost of implementing control programs.[203] The Committee's recommendations regarding weed declarations are informed by the NSW Weed Risk Management System, which is used to assess the risk created by a weed and the feasibility of coordinated control. The risk analysis is based on the national post-border weed risk assessment protocol, a well-supported national standard.[204]

Feasibility of controlling a weed species is assessed by considering:

- the persistence of the species
- its current distribution
- the cost of control.

While there is currently an informal process through which DPI and LCAs deliberate on risk assessment results, along with other information, this process is not formalised. The deliberation process should include people with a broad range of skills to ensure that environmental and social impacts, which are particularly difficult to value, are duly considered. The process should also be transparent so that stakeholders understand how the declarations are determined.

The risk assessment is fit for the purpose of determining the appropriate control class under the current regulatory system. However, it is not a cost benefit analysis, and assumes only existing levels of financial and technical capacity of land holders.

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[202] *Noxious Weeds Act 1993* (NSW) s 17a.

[203] NSW DPI Weed Definitions & FAQs http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/definition accessed 12 May 2014

[204] NSW Department of Primary Industries (2009), *New South Wales Weed Risk Management System, Instruction Book*, viewed 1 December 2013, http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/307761/INT09-54080-revised-Weed-Risk-Management-Instruction-book.pdf.

While eradication programs are expensive, particularly where an incursion is not quickly identified, there may still be a high return on investment for eradication. The long term impacts and costs of having a weed become widespread should be considered, relative to the eradication costs. In some cases, raising additional resources for eradication may be justified and ultimately cost effective. Current processes may favour the classification of a species in a lower control class, rather than using regulation as a complement to weed control programs designed to achieve higher levels of control.

Other criticisms of the declaration process expressed in consultation and submissions included:

- **fragmented** – while weeds are often proposed to DPI for declaration by groups of LCAs, listings are made by local control authority boundaries, with 126 local control authorities this has led to fragmented listings.
- **slow** – the time it takes to get a species listed can be too long, creating risks that the critical period for eradication may be lost.
- **lack of transparency** – there is a lack of understanding amongst stakeholders regarding how weed declaration decisions are made.
- **inconsistent** – the known distribution of weed species can be inconsistent with the areas where species are listed; and species are often listed in one local government area but not in adjacent council areas even though they may be present and causing similar impacts in both.

Some attribute the inconsistency of weed declarations across the state to the disincentive for LCAs to support the declaration of a weed if it is a considerable problem on LCA land and would therefore require significant investment by the local government.

Several stakeholders also noted that there can be a disincentive to having a weed declared, as it then becomes the landholder's responsibility and is no longer eligible for many government funding arrangements. Costs to control some incursions may be beyond the capacity of individual landholders, and there may be a broader community benefit to government intervention.

Permitted list

The *Noxious Weeds Act 1993* uses a prohibited list approach, which places prohibitions on any species on the list. Evidence indicates that prevention of the introduction of new weedy species into the state could potentially be improved. For instance, several new species are naturalising in NSW each year as described in Section 5.2.

There is ongoing debate as to whether the current approach of a prohibited list would be more or less effective than creation of a 'permitted list' whereby only plants on the list are allowed to be imported or sold within the state. A complementary prohibited list would identify plants that have not passed the risk assessment or that are already declared and prohibited.[205]

A 'permitted list' approach is currently established at the national scale, in Western Australia and in the Northern Territory for aquatic weeds. Any plant not on the list must first be assessed for potential risks. Once plants are already in the country, managing them becomes the responsibility

[205] Csurhes, S, Randall, R, Goninon, C, Beilby, A, Johnson, S and Weiss, J 2006, 'Turn the tap off before you mop up the spill: Exploring a permitted-list approach to regulations over the sale and interstate movement of potentially invasive plants in the States and Territories Australia', *Proceedings of the 15th Australian Weeds Conference*, Adelaide, SA, pp. 95-98.

of the states and territories. A recent bio-economic evaluation of Australia's risk assessment system found that it delivers positive net economic benefits, whilst achieving environmental outcomes.[206]

A permitted list system is well suited to national borders but can also be effective in countries like Australia where states have weed declaration responsibilities.[207] The porous borders between eastern Australian states could make the permitted list approach difficult to implement. In Western Australia, the system works effectively;[208] however, it is supported by comprehensive interstate quarantine measures.

The costs and benefits of a permitted list approach have been considered[209] and were discussed in the 2011 review of the *Noxious Weeds Act 1993,* which concluded that a feasibility assessment and consultation be undertaken. Although the benefits of precautionary approaches are hard to quantify,[210] Lippia (*Phyla canescens*) provides an example of how costly an ornamental species can be. Sold as a low maintenance lawn plant, the weed is estimated to cost the grazing industry $38 million per year with an environmental cost estimated at $1.8 billion per year.[211]

A barrier to this approach is that interstate participation and cooperation is preferable. This is demonstrated by current inconsistencies between jurisdictions and between Australian Government and state law which have hindered effectiveness of current weed lists. For instance:

- some species may be legally traded within one jurisdiction, but not in another[212]
- plant seeds that are listed on Schedule 5 of the *Quarantine Proclamation 1998* are permitted into Australia under section 63 (importation of seeds), however they may be listed as noxious weeds in state legislation and banned from sale.

The declaration of native species as weeds

A native plant may be declared as a noxious weed under the *Noxious Weeds Act 1993* following the same process for declaring a non-native species. However, the Minister for the Environment must approve the declaration.

The Minister for the Environment is also responsible for listing native species as feral native species or invasive native species under the *Native Vegetation Act 2003* and associated regulations. These are native species that behave in a typical weed-like manner, impacting both environmental and economic values.[213] However, the *Native Vegetation Act 2003* has no legislative triggers,

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206 Keller, RP, Lodge, DM and Finnoff, DC 2007, 'Risk Assessment for invasive species produces net bioeconomic benefits', *Proceedings of the National Academy of Sciences of the United States of America,* USA, vol. 104, no. 1, pp. 203–207.

207 Wittenberg, R and Cock, MJW (eds.) 2001, *Invasive Alien Species: A Toolkit of Best Prevention and Management Practices*, CAB International, Wallingford, UK.

208 Office of the Auditor General Western Australian 2013, *Managing the Impact of Plant and Animal Pests: A State-wide Challenge*, Office of the Auditor General Western Australia, Perth, WA.

209 Csurhes, S, Randall, R, Goninon, C, Beilby, A, Johnson, S. and Weiss, J 2006, 'Turn the tap off before you mop up the spill: Exploring a permitted-list approach to regulations over the sale and interstate movement of potentially invasive plants in the States and Territories Australia', *Proceedings of the 15th Australian Weeds Conference*, Adelaide, SA, pp. 95-98.

210 Cole, DH 2012, *Reconciling Cost-Benefit Analysis with the Precautionary Principle,* viewed on 4 March 2014, regblog.org/2012/03/reconciling-cost-benefit-analysis-with-the-precautionary-principle.html

211 CSIRO 2011, *Researching management and control options for lippia,* viewed on 22 April 2014, csiro.au/en/Outcomes/Food-and-Agriculture/LippiaBiocontrol.aspx

212 Petroeschevsky, A 2007, *Reducing the water weed risk: how government and industry can contribute to a safer trade,* Nursery Papers, Technical, Issue 6, Nursery and Garden Industry Australia, Epping, NSW, viewed on 2 December 2013, ngia.com.au/files/nurserypapers/NP_2007_06.pdf

213 NSW Government 2006, *Native vegetation management in NSW - managing invasive native scrub, info sheet no. 9*, viewed on 2 December 2013, environment.nsw.gov.au/resources/vegetation/nvinfosheet9.pdf .

obligations or incentives to require a landholder to prevent invasive or feral native species spreading within existing areas, or into new areas.[214]

Under former native vegetation regulations, landholders needed approval from former CMAs to clear or treat invasive native species, whereas feral species could be cleared as a *routine agriculture management activity* (subject to specified conditions). Under the new *Native Vegetation Regulation 2013*, both feral and invasive native species can be cleared as a *routine agricultural management activity*, rather than seeking approval.[215]

There are now greater opportunities for LLSs to provide a strategic and coordinated whole-of-landscape approach to weed management in their regions, for example, developing coordinated approaches with their communities and LCAs to control invasive and feral native species as routine agricultural management activities.

Conflict species

Many species introduced because of the benefits they can provide have the potential to be invasive. Common examples are radiata pine (*Pinus radiata*) and buffel grass (*Cenchrus ciliaris*). Such 'conflict species' create a considerable problem from a management perspective, requiring a clear and unbiased analysis of the costs and benefits of their use. For instance, in excess of 100 plant species that are grown for human foods and edible oils have naturalised in NSW. The benefits that come from the cultivation of most of these species are presumed to outweigh their management cost.[216] Given the increasing international focus on food security and Australia's role as a key food exporter, Australian growers and graziers are under pressure to increase production at least cost.[217] However, to remain economically viable, it is essential to have cost-effective weed control measures in place that minimise potential environmental, economic and social impacts and enable growers and graziers to continue production.

The management of the weed risk posed by commercial species was an issue considered in the 2011 review of the *Noxious Weeds Act 1993*, which indicated that there could be considerable advantage in having specific provisions in the Act for the management of conflict species. The report also indicated that providing a regulatory framework for managing conflict species will help protect the considerable investment of those currently cultivating conflict species. However, a means for addressing this issue through the Act was not identified and this issue was deferred for further investigation.

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214 Natural Resources Commission 2012, *Listing Yellow Mimosa (Vachellia farnesiana) as a feral native species – Recommendations*, Natural Resources Commission, Sydney, NSW.

215 While the regulations have shifted towards a self-assessment model, land managers will still be required to meet certain management prescriptions under Ministerial Orders and potentially guidelines. The first three draft Ministerial Orders and landholder guidelines, including one for clearing invasive native species, were released for public comment in March 2014.

216 Johnson, SB 2012, 'Economic tools ≠ policy actions. Why benefit cost analyses are not a policy panacea for weedy, but commercially valuable plant species', *Proceedings of the 18th Australasian Weeds Conference*, Melbourne, Victoria, pp. 195-198, viewed on 22 April 2014, caws.org.au/awc/2012/awc201211951.pdf.

217 McFadyen, REC 2012, 'Food security for a 9 billion population: More R & D for weed control will be critical', *Proceedings of the 18th Australasian Weeds Conference*, Melbourne, Victoria, viewed on 22 April 2014, pp. 306-309, caws.org.au/awc/2012/awc201213061.pdf.

6.4 Enforcement mechanisms

In practice, many weed officers are reluctant to use the enforcement provisions of legislation. The NRC was unable to identify accurate reports of how many notices and fines have been given by LCAs.
Consultation suggests that the enforcement mechanisms provided in the current legislation are ineffective. The penalties are insufficient to encourage compliance and mechanisms for undertaking control or compelling landholders to undertake control are costly and difficult to implement.

Penalties for non-compliance do not vary based on the degree or type of offence. The standard penalty for any violation is only $200. There is no difference in penalty, for instance, for the extent of weeds uncontrolled on a property. The fines are often significantly less than it would cost to meet the requirements of the weed control notice.

Further, the requirements for compliance with an order allow the landholder to repeatedly delay action when delay can seriously jeopardise successful weed eradication. Currently an officer must first issue a Section 18A notice of intent to issue a Section 18 notice, reinspect and issue a Section 18 weed notice, and then inspect a third time to verify if the order was complied with. Many officers don't issue an 18A notice until a second visit. While due process needs to be followed, the current arrangements provide for unreasonable delay.

Notices are also difficult to enforce as the requirements of the notice are limited to the control requirements listed in the Weed Control Order. These requirements are not specific and provide scope for different interpretations making it difficult in some circumstances to prove that a landholder has failed to comply with them.

The Act provides for circumstances where the control authority can enter land and undertake weed management at the expense of the landholder[218], but most LCAs do not have sufficient funds to undertake significant weed control first and recover the costs later.

The cost of prosecuting a landholder who refuses to comply can be prohibitive for LCAs. Furthermore, evidence indicates that judges are often disinclined to give significant penalties to local landholders who may be in difficult financial situations, and control authorities are often unable to recover their costs. For example, in *Tonkin v Cooma-Monaro Shire Council* [2006] NSWCA 50 (7 April 2006) a landholder appealed against a ruling in favour of the local council requiring payment of recovery of costs ($113,482.13) incurred in carrying out weed removal (under s26 of the *Noxious Weeds Act 199*3). The weed removal was undertaken by the council following inaction after the issuance of Weed Control Orders for removal of African lovegrass and serrated tussock. The appeal was granted leaving the council with the costs.[219]

[218] *Noxious Weeds Act 1993* (NSW) s 20.
[219] Martin, P, Verbeek, M, Rile, S, Bartel, R and Le Gal, E 2012, *Innovations in institutions to improve weed funding, strategy and outcomes – proposals for a national weed institutions research agenda*, RIRDC publication No. 12/091 Project No. PRJ-006906.

6.5 Notification on sale or sub-division of property

Many submissions, as well as previous reviews, have identified that transfer of land ownership and the subdivision of land can contribute to ineffective weed management.

There are two primary issues:

- where the sub-division of land passes weed management obligations to a greater number of land managers, often with lower capacity for weed management
- where prospective purchasers are unaware of the weed management obligations attached to the land being considered for purchase.

These two issues are of primary concern in peri-urban and coastal regions where the sub-division of land and land transfer is most prevalent. However, this is also becoming a greater issue in rural areas where sub-division is occurring to create 'life-style' blocks.

Some councils have found ways to address these issues. A Local Government's approval of sub-division applications can be made contingent on the reduction of the weed management risks to prospective purchasers. For example, Eurobodalla Shire Council has a standard condition of consent that requires that the applicant liaise with, and comply with requirements specified by, the council's Invasive Species Officer prior to issue of a subdivision certificate.[220]

The proposed NSW Planning Bill 2013, as with current legislation, provides for the provision of planning information certificates in relation to particular parcels of land, which must be given to all purchasers of property to notify them of certain information about the property they are buying.[221] Currently, such notifications do not include information about the property's weed status.

Section 64 of the *Noxious Weeds Act 1993* allows Local Government, on request, to provide prospective purchasers with information regarding any outstanding weed control notices or money owed for weed control activities. Although this provides important information it does not provide the prospective purchaser with a clear understanding of the weed management obligations on the land. Further, several weed officers reported that this information is rarely requested.

6.6 Minor use permits

The use of herbicides is regulated under the *Agricultural and Veterinary Chemicals Code Act 1994*, which is administered by the Australian Pesticides and Veterinary Medicines Authority (APVMA). The law requires that all agricultural and veterinary chemical products sold in Australia be registered by APVMA. Registered products must only be used for purposes that are specified on the label.

Circumstances arise where herbicides are required for unapproved uses, generally for incursions of new weeds. These off-label uses must be authorised by APVMA through a minor use or emergency permit. Stakeholders in consultation have criticised the process for obtaining minor use permits as being both too slow and expensive to support effective weed management, particularly in emergency situations. In 2008, the Productivity Commission found that the efficiency of the

220 Eurobodalla Shire Council 2013, *Review of Weed Management in NSW*, submission to the Natural Resources Commission, December 2013.

221 Planning Bill (NSW) 2013, Division 11.3.

APVMA assessments could be improved by rectifying dysfunctional arrangements for low risk products and uses, and through the greater use of international assessment data.[222] The Commission also recommended that the costs of APVMA assessments be commensurate with risks, and the resolution of inter-jurisdictional inconsistencies.

6.7 Effectiveness of regulation for widespread weeds

The current legislative approach to the management of both incursions and widespread weed infestations under the *Noxious Weeds Act 1993* is fundamentally the same. Landholders in a defined area are obligated to undertake activities in accordance with the control class of a declared weed species on land under their control.

This type of approach is consistent with the dominant tools and approaches used at the time the Act was written. Since that time DPI and LCAs have evolved weed management considerably through a range of policies and tools including the Biosecurity Strategy, the Invasive Species Plan, WAP and education and capacity-building. New legislation should continue this progression towards use of a broader range of more modern legislative and policy tools.

A legislated 'command and control' approach is relatively effective for weed incursions where time and centralised coordination are critical and the risks of further spread are acute. Regulation is an important mechanism to ensure everyone meets their responsibilities; however, the unsuitability of a 'command and control' approach to the regulation of widespread weeds in particular is evident in the persistence and distribution of weeds that have been the focus of government attention for more than a century.[223] This approach focuses attention on the symptoms, rather than causes of weed invasion, such as vegetation removal, land being used beyond its capacity and inappropriate herbicide use.[224] It can lead to indiscriminate spraying of weeds rather than long-term solutions such as improved pasture management and capacity-building.

Management of widespread weeds is a human behavioural challenge[225] as it requires the broad adoption of management strategies by different landholders across the landscape. If regulations are not flexible, they can inhibit trialling and experimentation necessary for adaptive management. In fact, the continual threat of enforcement and government intervention can work counter to the establishment of the cooperative relationships on which collective action is based.[226] Regulation should be but one strategy supported by others focused on co-operative community action.[227] Management approaches should have a greater focus on the social aspects of landscape management and methods to motivate landholders to cooperate and reciprocate.

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222 Productivity Commission 2008, *Chemicals and Plastics Regulation*, Research Report, Melbourne, Victoria.

223 Invasive Species Council, Australian Association of Bush Regenerators, Greening Australia, National Parks Association of NSW and Nature Conservation Council of NSW 2013, *Review of Weed Management in NSW,* submissions to the Natural Resources Commission, December 2013.

224 Southern Rivers Catchment Management Authority 2013, *Review of Weed Management in NSW,* submission to the Natural Resources Commission, December 2013.

225 Martin, P, Verbeek, M, Rile, S, Bartel, R and Le Gal, E 2012, *Innovations in institutions to improve weed funding, strategy and outcomes – proposals for a national weed institutions research agenda*, RIRDC publication No. 12/091 Project No. PRJ-006906.

226 Graham, S 2013, 'Three cooperative pathways to solving a collective weed management problem', *Australasian Journal of Environmental Management*, vol. 20, no. 2, p. 116.

227 Thorpe, J and Lynch, R, 1999, 'The impact of the national weeds strategy on weed management within Australia', *Proceedings of the 12th Australian Weeds Conference,* Hobart, Tas., viewed on 22 April 2014, caws.org.au/awc_contonents.php?yr=1999.

The need for an alternative approach in dealing with widespread weeds is evident in how weed officers carry out their jobs, and in LCA and DPI support for alternative solutions and capacity-building. In discussions with weed officers it was evident that their successes rely heavily on building cooperative responses within their local regions. In many regions, approximately one-third of the officers' time was spent on engagement and capacity-building with landholders. For this reason, many LCAs indicated that they do not strictly enforce requirements for some widespread weeds, where the requirements are seen to be unreasonable or unclear, but rather work with landholders to mitigate risks.

An example of a more adaptive approach was presented in the New England Weeds Authority LCA region where weed officers have assisted land managers in developing property management plans, which they can implement over time to demonstrate they are making progress in addressing widespread weed issues. New legislation should be more flexible and better support cooperative action and innovative, integrated solutions to widespread weeds.

7 Organisational arrangements

Key findings:

- Local level service delivery is a strength of the current system and should be continued. Weed officers are generally dedicated, well-trained and have established a strong network. However, there is a lack of consistency in weed management across the state in regards to funding, performance, and planning.
- Recognising the importance of working across local boundaries, LCAs have already begun working together through a variety of regional arrangements. These provide a strong foundation upon which to build.
- Despite progress, the regional arrangements for weed management overall are confusing and inefficient. The complexity of these arrangements and lack of coordination between bodies and across borders has reduced the effectiveness of programs. Specific opportunities for improvement include:
  - reducing the number and types of regional planning bodies
  - improved governance arrangements
  - coordinating strategic planning
  - clarifying roles and responsibilities.
- Response to high-risk incursions would be better coordinated at the state scale, with sufficient funds readily obtainable for the duration of the response program.
- Research and development is poorly coordinated and underfunded. Weed managers are unsure where to go to find the latest information, and results of research are not being effectively disseminated to those on the ground. Improved institutional arrangements are needed to facilitate this sharing.

7.1 Current organisational arrangements

Section 2.3 provides an overview of institutional arrangements for weed management. Under the *Noxious Weed Act 1993*, DPI has state level responsibility for weed management. Many responsibilities including monitoring, surveillance and enforcement are allocated to LCAs, of which there are over 120.

The institutional arrangements for managing weeds within NSW are complex, particularly at a regional level where relevant organisations include: WAP project committees (predominantly made up of LCAs), RWACs, CMAs (now LLS), OEH, other public land managers, and community groups such as Landcare. The result of these confused arrangements is:

- unclear roles and responsibilities for all groups at a regional level
- overlapping and duplicative planning creating a lack of clarity for stakeholders
- inconsistent approaches across the state
- a lack of coordination and cooperation between many regional bodies.

The boundaries of the different regional organisations are inconsistent (Figure 18). Roles and responsibilities are not clearly defined and vary for each group from region to region. In some regions the WAP boundaries and committees are consistent with the RWACs, but in other regions there are up to three WAP projects within one RWAC region, and one WAP project covers two RWAC regions. The degree to which the RWAC and WAP project teams work together varies from region to region. WAP projects and RWAC regions have different borders from the former CMAs and the new LLS regions, as demonstrated in the map below. There is significant overlap of plans and strategies, with some RWAC regions overlapping with up to four former-CMA regions, and containing up to three WAP project groups. The result is overlapping and duplicative regional plans and strategies.

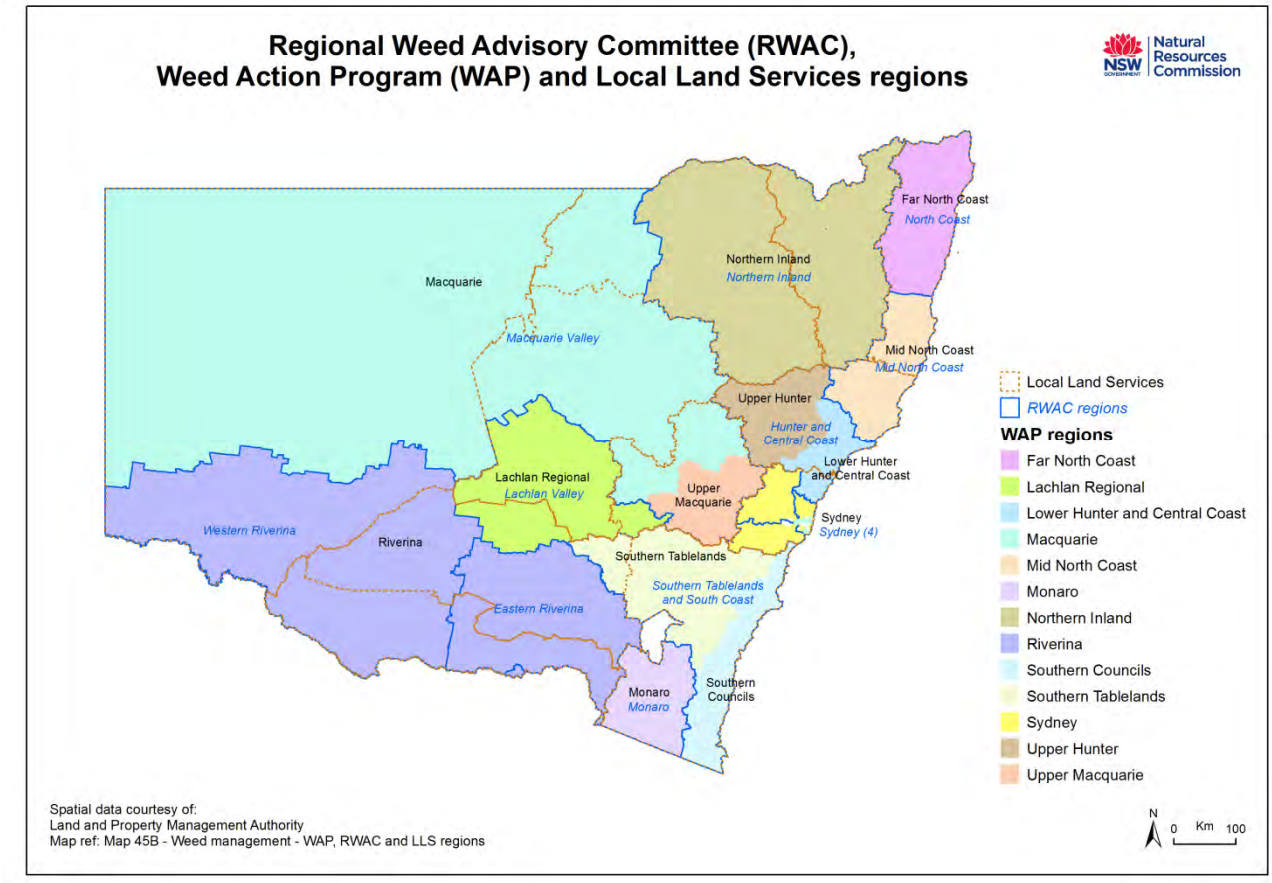

Figure 18: Boundaries of regional organisations

Research indicates that there can be 8 to 12 different weed management plans covering areas within one LLS region. Most of the regional organisations (WAP, RWACs and CMAs/LLSs) have strategies or plans that identify their priority weeds and direct their investment and/or activities. Each of the regional bodies has determined their priorities based on their own objectives, with limited coordination in areas where objectives are aligned. The number of different regional plans, and lack of coordination between many of them, indicate that current arrangements are inefficient and uncoordinated. The various types of plans are shown in Table 6.

Coordination between the regional organisations in development of plans was inconsistent. In some regions they were unaware of each other's plans, or were not coordinating with one or more of the other organisations. Awareness of, and coordination with, the OEH strategy (Biodiversity Priorities for Widespread Weeds) was also inconsistent. Pest management in National Parks is guided through Regional Pest Management Strategies, which include pest plants and animals.

Feedback indicates that combining pest plants and animals into one management plan is effective and efficient for national parks, where workers may be trained across both issues.

Table 6: Plans for weed management in NSW

Organisation	Plans
Australian Government	Australian Weed Strategy Intergovernmental Agreement on Biosecurity
NSW	Biosecurity Strategy Invasive Species Plan
RWACs	Regional weed management plans (often for specific species)[228]
CMAs	Catchment Action Plans (broad strategic plans) Invasive species / weed management plans
WAP project teams	Required to prepare plans covering five topics – new incursions, high-risk pathways, rapid response, inspections and communications
OEH (in conjunction with CMAs)	Biodiversity priorities for widespread weeds Regional Pest Management Strategies (NPWS)
LCAs	Some have prepared local weed management plans (e.g. Blue Mountains Council Weed Management Plan) and some LCAs (particularly county councils) have a range of plans
Various	Weeds of National Significance Strategic Plans Weed specific management plans (e.g. Bitou Bush Threat Abatement Plan, NSW Tropical Soda Apple Plan, Macleay Catchment Tropical Soda Apple Control Plan)

There is also evidence that bodies are often not cooperating across boundaries. These concerns were raised for LCA, WAP project, CMA, and state borders. Several stakeholders provided examples where weed management actions stopped at a border with no coordination with the other side. Many also complained that they couldn't get cooperation from the other side of the border.

While there is a clear need to improve coordination and reduce duplication, the regional organisations have made progress that can be built upon. Many of the regional bodies have made excellent progress in building relationships between LCAs and other partners. Several weed officers and public land managers indicated that the RWACs provide an important forum for sharing information. Most regional WAP project teams have developed various plans used by all LCAs in the region, improving consistency of management practices within their regions.

[228] Some of these are consistent or developed in concert with the WAP plans but many are not.

7.2 Regional roles and responsibilities

Representatives from CMAs, WAP projects, and RWACs consistently expressed that there is a lack of clear roles and responsibilities at the regional level. For example, one respondent noted, "*Most people wouldn't be able to tell you who is in charge of weeds, but everyone agrees that it is an important issue*". Many were unable to articulate the role of the other groups, or provided different explanations for their roles than the organisations themselves described. In particular:

- The roles and responsibilities of the RWACs and the WAP project teams were not clear to many stakeholders. This is in part because their roles are not consistent across the state, with each having their own governance structure. Respondents from different regional organisations believed they were responsible for organising the same actions in that region. This was most evident in regards to response to new incursions, where roles and responsibilities are particularly unclear.
- CMAs provided widely differing responses as to their own role in weed management, with priorities ranging from only widespread weeds to only new incursions. Some CMAs indicated that they were 'prohibited' from investing in widespread weeds management due to funding arrangements. All agreed that they continued to experience huge demand to undertake weed management activities from their communities.

The lack of clear roles and responsibilities reduces efficiency and effectiveness of both response to new threats and management of widespread weeds. Many stakeholders expressed that weed management could be improved through more clearly defined roles, allowing each party to focus on their agreed responsibilities. This would also assist landholders to understand where and how to seek assistance when needed.

7.3 Local Control Authority responsibilities

Local service delivery is a key component of weed management in NSW. Many weed officers have built strong relationships with local landholders and have significant local knowledge. The state has established a weed officer certification program, to build weed officer skills and knowledge, and weed officers are, in general, highly professional and skilled workers.

However, LCA performance across the state is inconsistent. There is significant variation in amount of funding provided and number of staff dedicated to weed management. Some LCAs have no weed officer, even in high-risk areas. The plans for monitoring and surveillance were also found to vary in quality across the state (discussed further in Section 7.3). Currently there is no clear performance standard and no auditing program to ensure that LCAs are meeting their obligations. LCAs also varied in the frequency and coverage of inspections, whether they inspect public lands, and in willingness to pursue enforcement.

There is a range of local arrangements for delivery of services under the *Noxious Weed Act 1993.* Types of LCAs include individual local councils, county councils and regional weed authorities. While examples of high performance for each type of arrangement were identified, no one particular governance arrangement was found to ensure high performance.

Economies of scale were observed where local councils have grouped themselves into a larger LCA. These groupings provide additional resources for training, equipment and working across council boundaries. County councils were found to have advantages in responding to incursions as they can quickly move staff across LCA borders when needed.

The NRC identified the following as indicators of good practice in high performing LCAs:

- sufficient size and resources to meet responsibilities
- robust governance arrangements, with defined roles, responsibilities and objectives
- clear operational plans for fulfilling inspection duties
- personnel with a range of skills including operational planning, capacity building and local weed expertise.

7.4 State-level responsibilities

The recent release of the NSW Biosecurity Strategy, the creation of Biosecurity NSW and the integration of the weeds unit into Biosecurity NSW will allow the principles that are used in other areas of biosecurity, particularly that biosecurity is a shared responsibility, to be adopted and used for weed management.

DPI developed the Invasive Species Plan 2008-15 with input from government, industry and the community. It is focused on exclusion and eradication of new incursions, effective management of established species and capacity-building. The plan provides a high level state-wide strategy for consistent management of all invasive species. Stakeholder feedback indicates that this plan has led to an improved understanding of strategic priorities across the state.

The WAP provides funds for service delivery, monitoring and surveillance, and capacity-building. While recent improvements have been made through the WAP, including the requirement to develop high-risk pathway plans, the NRC found that response to incursions in particular would benefit from greater coordination and oversight at the state level. Weed management staff frequently indicated that there is also a need to improve how responses to new and emerging weeds are funded.

Progress has been made through the creation of an incursion fund by DPI through the WAP, but further improvements are needed. An LCA or regional organisation can only apply for incursion funding for one year. LCA funds and activities are often reorganised to cover an incursion. This may be appropriate but often there are insufficient LCA funds to eradicate an incursion. For example in the recent tropical soda apple incursion, LCAs including the New England Weed Authority and the Mid-north Coast Weeds Coordinating Committee provided what funds and staff they could, Border Rivers-Gwydir CMA provided funds, and funds were acquired through the DPI incursion fund. However, the amount of funds and resources provided, and the time it took to acquire them, inhibited their ability to fully eradicate the incursion. Some LCAs have set aside emergency funds, but the requirement to spend their allocation within the WAP project time frame is a disincentive for them to do this.

The WAP is discussed further in Chapter 8.

Research and development

The increasing loss of weeds research capacity at both national and state levels has been a consistent theme of this review. There is additional concern that some capability, such as biological weed control, is at risk of being lost altogether. Communication of research findings has also been found to be insufficient, constraining knowledge and the implementation of new management strategies and technologies, and significantly reducing the return on weeds research investment. Research and development concerns raised by stakeholders included:

- difficulty in securing long-term funding
- increasing loss of capacity
- prioritisation of funding between emerging weed species and widespread weeds
- limited collaboration among practitioners (both government and landholders) and researchers
- poor dissemination of information
- slow uptake of new technologies.

An example of decreasing research capability is in biological control (biocontrol) staff numbers. In the late 1990s there were large and active biocontrol teams in all states[229] and federally in CSIRO, which cooperated and shared resources and information. There are no longer any biocontrol teams in Western Australia, South Australia or Tasmania. Victoria has two staff from ten remaining, Queensland two from six, and CSIRO staff in temperate Australia has been cut from 20 to three. Today NSW has three biocontrol scientists, no technical officers, no biocontrol officers funded through consolidated revenue and no biocontrol budget.[230] There are concerns that without sustainable funding in the next twelve months, the remaining national biocontrol infrastructure, such as plant quarantines and insectaries, will close.

The implications of declining investment in biocontrol are serious for Australian agriculture. Whilst biocontrol is unlikely to eradicate weeds, effective biocontrols help manage the impact of weeds and therefore, reduce control costs.[231] Research into control measures other than herbicides is particularly important given the increase in herbicide resistant weeds, growing public concern about the use of pesticides and inadequate global investment in new chemistry.

There is a clear opportunity to improve coordination and dissemination of research and development. Representatives from the various regional organisations indicated that there is poor coordination and dissemination of research and development, and that research is not well funded. Several indicated that they either rely on other organisations to be up to date, or that they would perform web searches and it was "sheer luck" if they happened upon the latest information. CMAs varied in where they obtained latest research with some having in-house expertise and others relying on other regional or local weed management staff for up to date information.

The NRC did not find evidence of state-level strategies to indicate the highest research and development priorities. Consultation highlighted significant issues that have yet to receive research attention, such as treatment options for African Lovegrass. Yet, it is not clear how issues get on the state research agenda, or if there is one. Respondents also believed it would be helpful if there was some central repository for the latest research and development so that practitioners can quickly and easily identify the latest information and technologies in relation to particular weeds. Between 1995 and 2012 the Australian Government funded the following major programs that specifically invested in weeds research and development:

- The Cooperative Research Centre (CRC) for Weed Management Systems, 1995-2005 ($15.4 million)
- The CRC for Australian Weed Management, 2001-08 ($20.3 million)

[229] Western Australia, South Australia, Tasmania, Victoria, NSW and Queensland.
[230] Personal communication with the NSW Department of Primary Industries on 5 February 2014.
[231] Ivory, S and Mantel, S 2013, A guide to Biological Control in South Australia, South Australian Research and Development Institute.

- Defeating the Weed Menace R&D program, 2006-08 ($5.4 million)
- The National Weeds and Productivity Research Program, 2008-12 ($15.3 million).

The Australian Government is the major investor towards industry based Research and Development Corporations (RDCs) and also supported other large research and development programs such as Grain & Graze and Land, Water & Wool, which delivered integrated outcomes including weed management. The roll out of these programs attracted matching cash or in-kind contributions from program collaborators such as state governments, RDCs, universities, and landholders, effectively doubling the government investment.

Since 2012, government funding for weeds research has decreased and become more uncertain. Compounding this uncertainty, researchers are concerned that governments' current approach to weeds research lacks strategic direction, continuity and coordination. There is none of the long term funding necessary to develop sustainable weed control strategies, and the available short-term funds frequently lead to inefficient projects with few tangible outcomes. In addition, the competitive nature of the funding constrains collaborative research effort.[232]

There has been continuing government investment in biosecurity research but only a small proportion of this goes to invasive weed species. The 2012 National Biosecurity Research and Development Capability Audit showed that of the $66,411,070 per annum spent on wages for staff across biosecurity research and development, 8 per cent ($5.5 million) was for invasive weed species (70.3 full time equivalents (FTEs)). Of the total capability, 48 per cent was classified as researchers, 45 per cent technical support while only 3 per cent and 4 per cent were postgraduate and postdoctoral researchers respectively.[233]

In early 2012, DPI had a total biosecurity research capability of 100.3 FTEs with 17.8 of these in invasive weed species, the highest capability of all research organisations other than Queensland Department of Agriculture Fisheries and Forestry.[234] However this included temporary employees. There are nine permanent weeds research staff currently in DPI, eight researchers and one technician.[235] In 2013 it was reported that similar to other states, there had been no new permanent DPI research officer/scientist appointments in weeds in over 20 years resulting in an aging, as well as a declining, capability. Stakeholders also noted that there used to be a taxonomist position funded within the NSW Herbarium (at the Royal Botanical Gardens) to identify potentially new weed species, but that this position no longer exists.

In addition to its alliance with Charles Sturt University in the Graham Centre for Agricultural Innovation, 2013-14 weeds research funding in DPI is approximately $2.375 million which includes the $1.1 million WAP Innovation grants for research, development and extension and $1.275 million of external funds.

The NRC notes that the NSW Biosecurity Strategy lists "Strengthened biosecurity science and research capacity and capability" as one of its outcomes and specifically recognises weeds as an area needing greater emphasis, particularly investing in biological controls for key pests and weeds.

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232 Australian Weeds Committee 2013, National workshop on collaborative weeds RD&E investment models, Canberra, ACT, 15 October 2013.

233 Intergovernmental Agreement on Biosecurity – Research, Development and Extension Working Group 2012, *National Biosecurity Research and Development Capability Audit*, July 2012.

234 *ibid.*

235 Personal communication with the NSW Department of Primary Industries on 5 February 2014.

Biosecurity NSW has recently advertised a weeds research officer position and is working with other states, industry and the Commonwealth to develop a national research program to pull together the existing expertise and resources for weeds research. The aim is to develop a critical mass of research effort nationally, to refocus and to address combined government and industry priorities. A partnership approach is preferred so the Commonwealth, CSIRO, states, universities and industry RDCs can co-invest for joint benefits. To this end, DPI is proposing to submit a bid for a weeds focussed CRC in 2015.

Despite the lack of major Australian Government funded weeds programs, other investors such as the industry based RDCs, have continued to fund weed management research. The largest of these, the Grains RDC, has maintained new investment in the order of $3 million to $6 million over the last six years. The NRC has requested, but not received, weeds research investment data from other RDCs, except for information provided by Sugar Research Australia. It is understood that other RDC investment is generally lower than Grains RDC, in some instances by an order of magnitude. By implication, research into weeds of grazing systems and environmental and aquatic weeds is relatively small. However, the NSW NPWS reports contributing between $120,000 and $200,000 per annum as cash and in-kind over the last three years to support a range of environmental weeds research projects.

Monitoring and evaluation are other important research related issues and require increased attention and investment. They are essential to provide information to:

- indicate if management actions are working[236]
- trigger new or changes to management action(s)[237]
- establish the cost-benefit of the research program.

Without effective monitoring programs there is no solid basis on which to assess, compare, understand or improve weed management and control. In a climate of decreasing weeds research capacity, monitoring and evaluation become essential to prioritising research and maximising the return on research funding.

Education and capacity-building

Many of the submissions emphasised the importance of awareness and education programs. Awareness and education programs take place at all scales and serve several purposes including: alerting the public to specific weeds; raising awareness of the serious impacts of weeds; and informing participants of their roles, responsibilities and methods for weed control.

Several good educational programs were highlighted in consultation and submissions including:

- the Southern Rivers Small Farmers Network program, which provided small farmers with targeted training and education on relevant local weeds, and developed an awareness program for priority weeds in cooperation with local councils.[238]
- the North Coast Weeds Advisory Committee Look Learn Act weeds awareness campaign, which provides information on how to identify and eradicate weeds. The campaign invites

[236] Possingham, HP 2001, 'The business of biodiversity: Applying decision theory principles to nature conservation', *Tela Series* No. 9, The Australian Conservation Foundation.

[237] Elzinga, CL, Salzer, DW, and Willoughby, JW 2001, *Measuring and monitoring plant populations*, BLM Technical Reference 1730-1, US Department of the Interior Bureau of Land Management, Colorado, USA.

[238] Southern Rivers Catchment Management Authority 2013, *Review of Weed Management in NSW,* submissions to the Natural Resources Commission, December 2013.

community members to participate by joining the Weed Spotters network and receiving regular updates and alerts on activities in the area.

- the DPI 'No Space 4 Weeds' program, which in 2011 included a roadside billboard campaign focused on informing the community about the risk of weed spread from gardening and recreational activities such as boating and camping.
- the weed officer certification/training program and regional weed advisory committees which help ensure knowledge sharing and ongoing training to ensure timely identification of new weeds.
- DPI has recently provided training for weed officers and project officers regarding social marketing to help improve the effectiveness of weed management educational programs in driving behavioural change.

The submissions also noted areas where education programs could be improved including:

- better coordination of long-term programs
- focusing on a range of impacts and relaying goals, objectives and responsibilities
- ensuring programs are targeting the right audience
- better promotion of integrated land management practices.

8 Funding and program delivery

Key findings:

- Stakeholders indicate that the changes made through the WAP have improved surveillance, introduced standardised reporting of outputs and helped improve the standard of performance for many LCAs by clarifying responsibilities. Project officers have played a significant role in making the regional approach work.
- Current programs could be improved through better accountability and reporting on outcomes, rather than outputs, to demonstrate progress towards objectives. Examples of good practice for monitoring and outcome reporting should be built upon such as:
  - The bitou bush program has coordinated responses around shared goals and demonstrated clear outcomes of reduced density and movement of the containment line, providing a strong example for outcomes reporting.
  - CMAs often required long-term monitoring (over ten years) for projects which they have funded, including ongoing monitoring for new weeds where weed management was an aspect of a project.
- Community and volunteer programs deliver critical on-ground weed management and education. Successful projects include those that take a total farm management approach and build a sense of community ownership.
- Funding for weed management comes from a variety of uncoordinated sources at the Australian Government, state, regional and local levels. Evidence indicates that private landholders spend significantly more on weed management than governments.
- It is difficult to accurately quantify weed expenditure, in part because much weed management investment is integrated into broader land management projects. Additionally, many projects take place over several years, making it difficult to calculate and compare annual expenditure.
- Program funds are allocated based on multiple, often uncoordinated, strategic plans, resulting in a fragmented approach, and reducing administrative efficiency.
- Funding is currently too short-term, inhibiting integrated land management approaches, which would replace weeds with more desirable vegetation in the long term.

This section details information gathered regarding the weed management activities funded in NSW. The NRC has attempted to determine the amount of funds provided over the past three years (from 2010-13). Findings are followed by a discussion of the funding sources including: WAP, Catchment Action NSW, Caring for our Country, Biodiversity Fund, OEH, and Public Reserves Management Fund.

8.1 Funding sources

Weed management in NSW is funded through several sources including:

- LCAs funds – Local Government
- WAP funding – DPI
- Catchment Action NSW funding – NSW Government
- Caring for our Country (now National Landcare Programme) – Australian Government
- Environmental Trust – NSW Government
- OEH /NPWS
- Public Reserves Management Fund
- Other public land managers
- Private landholders
- Community groups/volunteers.

Each of these funding sources has different objectives. It is difficult to determine the exact amount of money spent by each agency on weed management. Many of the funding streams allocate funds to natural resource management projects, which incorporate weed management into broader landscape restoration projects. As such, the NRC was unable to quantify a specific dollar amount, but has attempted to assess broadly the amount of funds allocated to weed management.

Table 7: Summary of funding information[239]

Funding provider	Summary of funding information
Farmers	It is estimated that NSW farmers spend approximately $907 million annually on weed management, based on a recent economic study.[240]
LCAs	LCAs reported spending $45.5 million on weed management for the years 2010-2011 to 2012-2013, an average of $15.2 million annually.[241] This includes spending on meeting their own landholder requirements under the *Noxious Weed Act 1993*. A Local Government NSW survey of LCAs outside Sydney for the 2012-13 period indicated that councils provided $16,212,196 towards weed management activities, slightly higher than the values reported through WAP.
WAP	DPI provided $29 million through the WAP for the years 2010-11 to 2012-13, an average of $9.7 million annually.[242]
Catchment Action NSW	Nine of the 11 CMAs provided more than $2.7 million for projects focused on weed management from 2010-11 to 2012-13.[243] Additionally, a portion of approximately $74 million allocated to CMAs in this period was spent on integrated land management projects with a weed management component, but this could not be quantified.
Caring for our Country	The NRC identified $13 million of funding for Caring for our Country projects primarily focused on weed management funded from 2009-10 through 2011-12. Additionally a portion of the $141 million in base-level funding to CMAs and other competitive bid projects awarded in NSW over that time was spent on weed management – a specific value could not be determined.
Biodiversity Fund	The NRC identified Biodiversity Fund projects primarily focused on weed management totalling $8.6 million and an additional $30 million for projects with a significant weed component provided through two rounds of funding in 2010-11 and 2013-14. The first round of funding was allocated for projects with a three to six year time frame, and the second round to projects with a two to four year timeframe.
Environmental Trust	The Environmental Trust provided an estimated $10.3 million from 2010-11 through 2012-2013 for weed management projects, an average of $3.4 million annually.[244]
NPWS	NPWS is estimated to have spent $54.7 million on weed management from 2010-11 through 2012-13, an average of $18 million annually.[245]
Public Reserves Management Fund	Crown Lands Division spent $585,000 to fund more than 166 weed management projects in 2011-12.[246] It has been recommended that approximately $1.25 million be provided to fund more than 140 weed management projects in 2013-14.[247]
Forestry Corporation of NSW	Forestry Corporation of NSW spent $1,018,984 on weed control in 2010-11, over half of which was spent on treating blackberry.[248]

239 The NRC assessment focused on available records for the years 2010-11 to 2012-13 to correspond with data available from the WAP where possible.
240 Kalisch Gordon, C, 2014 "The economic cost of weeds in NSW", A GrainGrowers Ltd Research Report, commissioned by the NRC. According to this report NSW farmers spend approximately $696 million per annum on chemicals and machinery for weed management and the labour used is valued at $211 million per annum.
241 Figures taken from WAP annual reports provided to DPI by the regional project teams.
242 Data provided by DPI – annual Weed Action Program reporting, 1 November 2013.
243 Two CMAs were unable to provide data in time for this report.
244 Data provided by OEH, 2 October 2013.
245 Data provided by OEH, 2 October 2013 and 6 December 2013.
246 NSW Parliament Legislative Council General Purpose Standing Committee No. 5 (2013), *Management of public land in New South Wales*, NSW Parliament Legislative Council, Sydney, NSW.
247 Data provided by Crown Lands Division of NSW Trade & Investment, 9 December 2013.
248 NSW Parliament Legislative Council General Purpose Standing Committee No. 5 (2013), *Management of public land in New South Wales*, NSW Parliament Legislative Council, Sydney, NSW.

A considerable amount of weed management is also performed by volunteers through community groups such as Landcare, Bushcare, and other local conservation groups. The NRC has not attempted to determine the total value provided by volunteers and in-kind donations from community groups. However, the following information provides some indication of the significance of these contributions.

- The Invasive Species Council estimates that the annual contribution of community organisations to weed management equates to approximately 569 full time volunteers and 900 full time paid staff, which can be valued at $28.4 million and $50 million of effort respectively.[249] This estimate is based on a 2013 survey of management effort on invasive species.
- NPWS indicated that a review of volunteer hours in parks for 2009-10 found that approximately 43 per cent of all volunteer hours were spent on weed management, providing an estimated value of $1.3 million annually.[250]
- Estimates collected for the WoNS program indicate that community in-kind donations exceeded $500,000 annually for bitou bush and boneseed alone in 2009-10.[251]

Landholders (particularly farmers) spend the most on weed management to improve productivity, meet their obligations under the *Noxious Weed Act 1993*, and protect biodiversity. Agricultural land makes up over 70 percent of NSW.[252] However, based on available data it is likely that private landholders incur costs five to ten times the funds provided by governments for weed management, with additional significant contributions being made by volunteers and community organisations. This is without consideration of the substantial losses in productivity due to weed infestations. Private landholder and volunteer efforts are predominantly focused on control of widespread weeds, demonstrating the enormous cost of the failure to prevent incursions.

8.2 Coordination of funds

Funding for each weed management organisation is managed separately and the allocation of funds appears to be inefficient, with funding in some cases flowing back and forth between two entities. In a survey of 190 government agency representatives, from all levels of government, the Rural Industries Research and Development Corporation found that while there is a wide range of funding sources for weed management, one of the significant barriers to improved weed management is "a need for better coordination of information and funding efforts".[253] The diagram on the following page (Figure 19) illustrates the complexity of funding sources and recipients. The complicated funding and institutional arrangements create significant administration costs, reduce clarity of roles and responsibilities, and limit the potential for coordinated action across landscapes.

Many respondents noted that as several programs are moving towards competitive grants, weed funding is becoming more short-term and fragmented. Long-term funds are essential for both garnering broad stakeholder support, and for supporting integrated land management practices that will have greater benefits in the longer term than temporary killing of weeds by spraying alone.

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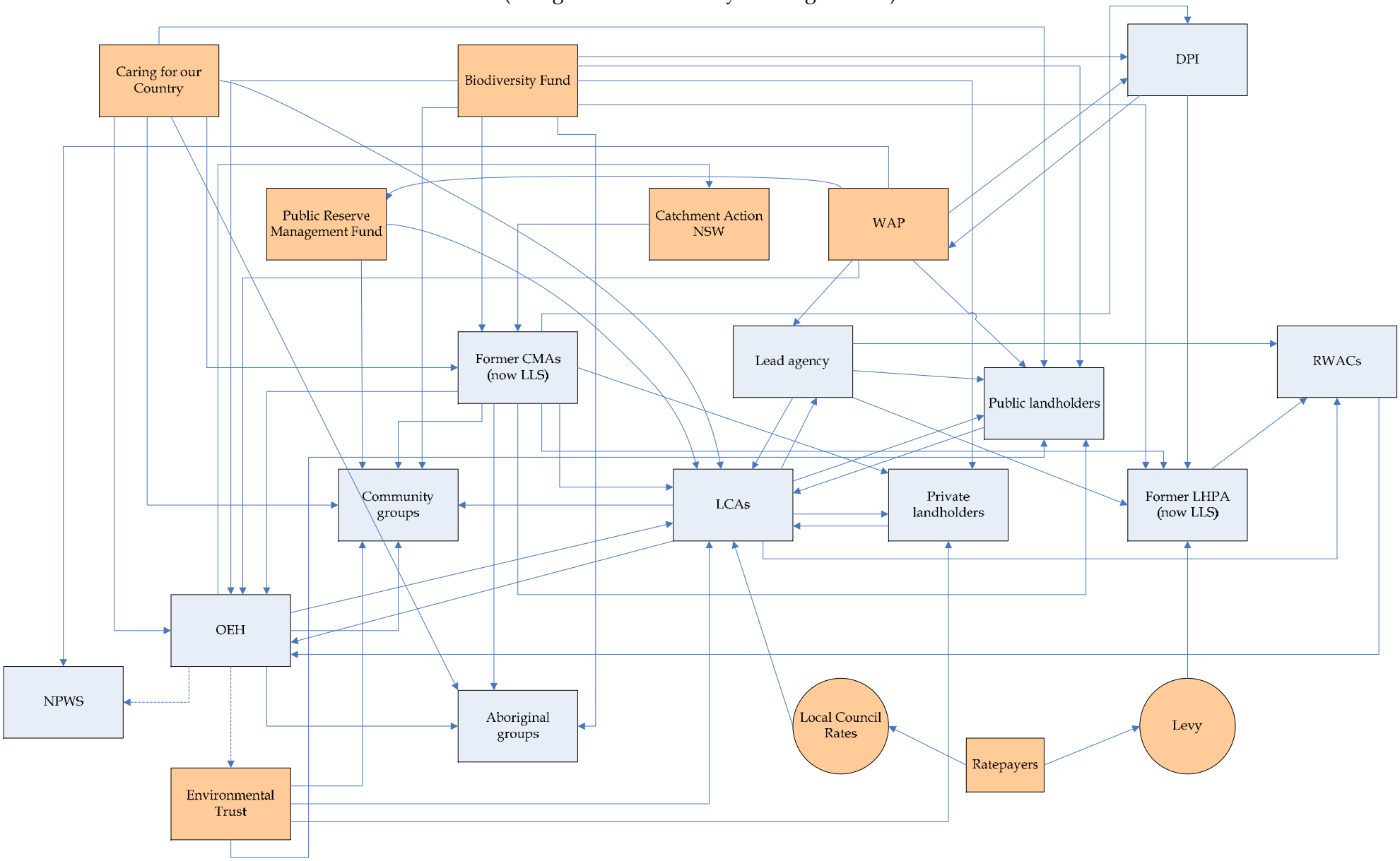
249 Invasive Species Council submission to the NRC Weed Management Review 2013.
250 Personal communication with NSW National Parks and Wildlife Service, 6 December 2013.
251 Personal communication with Weeds of National Significance National Coordinator, 6 December 2013.
252 NSW Farmers' Association 2012, *Submission to the NSW Government in response to delivery of the 'Strategic Regional Land Use Policy'*, NSW Farmer's Association, Sydney, NSW, viewed 22 April 2014, planning.nsw.gov.au/Portals/0/DevelopmentAssessments/OnExhibition/Submissions/29_Ag3.pdf.
253 Rural Industries Research and Development Corporation, "*Who's involved in weeds: a social network analysis of funding and information networks for weed management*", publication No. 13/065, June 2013.

Figure 19: Flow of funds for weed management in NSW
(orange boxes denote key funding sources)



8.3 Weeds Action Program / Local Control Authority funding

WAP provides state funding for management of weeds under the *Noxious Weeds Act 1993.* In 2010, DPI developed WAP to replace and streamline a range of previous funding programs. The program provides funds to regional projects as well as for state-wide projects and 'innovation projects'. Its aim is to align weed management activities with the goals of the Invasive Species Plan.[254] In particular, WAP targets Goals 1, 2 and 4 related to excluding new weeds from entering NSW, eradicating new and emerging species, and capacity building. This shift was to ensure that DPI funds are targeting the most cost effective actions. Prevention of incursions has far greater return on investment than dealing with a widespread weed.[255]

Funding for LCA activities is provided by local councils, and is therefore funded predominantly through local council rates. LCAs provide funding for their landholder responsibilities, as well as compliance and inspection duties and extension services they provide.

Under the WAP there is no specific requirement for the amount of co-contributions. Co-contribution commitments are negotiated at the WAP project level and included in the WAP applications.

The NRC has evaluated activities funded by WAP through review of the WAP Annual Reports, WAP Guidelines, documentation provided for each region by the project officers, and interviews with DPI staff, regional project officers, local weed officers, and representatives of other organisations such as former CMAs and OEH. Activities and outcomes were assessed relative to stated objectives.

Weeds Action Program funding allocation

Data was received from four of the regions regarding both WAP funding and co-contributions for individual LCAs.[256] This data demonstrates that co-contributions vary across the state. Individual LCA co-contributions as a percentage of the WAP funding within those regions ranged from 14 per cent to 394 per cent, with the majority of LCAs at least matching the WAP funding. While some variance may be appropriate, such differences should be justified and based on a clear assessment of risks.

It is understood that DPI historically allocated funding directly to LCAs based on analysis of factors such as population, land area, and weed risk used to assess how many weed officers would be needed in each area. Funding for regional projects was also provided.

Under current arrangements WAP funding is distributed to 13 regional projects via a 'lead agency'. The previous government instructed DPI to allocate WAP funding to regional areas on the basis of the historical distribution of funds plus CPI, including the noxious weed grants and regional project funding provided for 2008-09. Most regions understood this to mean that each LCA should continue to receive what they had received previously. As such, all but one WAP region distributes funds to individual LCAs based on historical allocations. Strategic allocation of WAP funds can be improved by considering up to date assessments of greatest needs and risks.

254 NSW Department of Primary Industries 2010, *NSW Weed Action Program Guidelines*, Department of Primary Industries, Sydney, NSW, viewed 15 November 2013, dpi.nsw.gov.au,

255 NSW Department of Primary Industries 2010, *2010-2015 Invasive Species Plan,* Department of Primary Industries, Sydney, NSW, viewed 15 November 2013, dpi.nsw.gov.au,

256 Data provided by regional project officers with permission of the local councils in the region.

Each region, except Upper Macquarie, employs a project officer to coordinate the program. In most cases this person is a representative of the lead agency. The lead agency is typically one of the local councils or a county council within the regional project area, who agrees to take on administrative responsibilities for the project. Funding for program administration is inconsistent and unnecessarily complicated. There is no standard requirement for funding a regional project officer, with some being full time, some part time, and one region not having one.

Table 8 indicates the amount of WAP funding provided to each region and the total co-contributions reported by LCAs for 2010-13. Based on the information reported, LCAs are contributing on average 66 per cent of the funding for weed management activities that they carry out, including management of weeds on LCA land. It is important to consider that the NRC was unable to perform any quality assurance on these values, and **there is a considerable amount of uncertainty in these values.** For example, most project officers indicated that the co-contribution values to their knowledge only include actual dollars provided by local government. However, most also indicated that this has not been verified with LCAs.

Information provided to date does not distinguish between dollars spent on councils' own land management versus other activities. Project officers consistently indicated the co-contribution amounts include **all** activities undertaken by the LCAs. Some project officers estimated that approximately one third of their co-contribution dollars are spent on weed control on LCA land. Data regarding the amount of LCA versus WAP funds spent on inspections was not consistently available. However, information provided by some LCAs indicates that some LCAs rely almost entirely on WAP funding to pay for inspection efforts, whereas others make significant contributions towards inspection efforts.

Table 8: WAP funding and regional co-contributions 2010-11 to 2012-13[257]

	Totals (2010-11 to 2012-13)		% LCA contribution
	WAP	**Regional LCA contribution**	
Far North Coast	$2,707,053	$4,110,306	60%
Lachlan	$896,174	$1,485,001	62%
Lower Hunter /Central Coast	$1,278,706	$2,423,910	65%
Macquarie	$3,300,887	$6,044,474	65%
Mid North Coast	$1,297,739	$3,864,186	75%
Monaro	$809,615	$2,461,853	75%
Northern Inland	$3,134,037	$4,793,439	60%
Riverina	$3,783,596	$7,842,964	67%
Southern Councils	$1,342,173	$2,484,976	65%
Southern Tablelands	$1,811,024	$2,446,995	57%
Sydney	$2,215,514	$2,420,711	52%
Upper Hunter	$600,290	$850,342	59%
Upper Macquarie	$644,729	$4,242,326	87%
Total	**$23,821,537**	**$45,471,483**	**66%**

* Sydney actually reported $10,809,239 of LCA contribution for 2010. However, the following year it was reported that this reflected all funds spent on weed management for the region, from a wide range of funding bodies. Reporting for 2011 was adjusted to only reflect LCA contribution. For consistency with other regions, the NRC has estimated that Sydney expenditure for 2010-11 was approximately the same as for 2011-12.

Data was provided regarding **proposed** DPI funding and co-contributions for the WAP regional projects against the four goals in the Invasive Species Plan. These values are based on the applications which span a five-year time frame and are **not actual dollars** spent as the project is currently in its fourth year. DPI has indicated an intent to increase focus on monitoring and evaluation in later years.

There is little assurance provided for whether funds are actually spent on what they were allocated for. For example, the annual WAP reports only include a total value for amount of funds received and the amount of co-contributions. Given the lack of surety of these values, the NRC has assessed them only to indicate what the intended funding allocation is under the WAP.

The proposed values show that over 70 per cent of total funds are intended to be spent on Goals 3 and 4 i.e., management of widespread weeds and capacity building, and just under 30 per cent of total funds is intended for Goals 1 and 2 i.e., prevention and eradication of incursions.

Based on these proposed values, LCA proposed co-contributions are allocated predominantly to managing widespread weeds and capacity building/education (Figure 20); and WAP funding is allocated primarily to eradicating incursions and capacity building/education (Figure 21).

257 Figures from WAP annual reports provided to DPI by regional project teams, provided to the NRC on 1 November 2013.

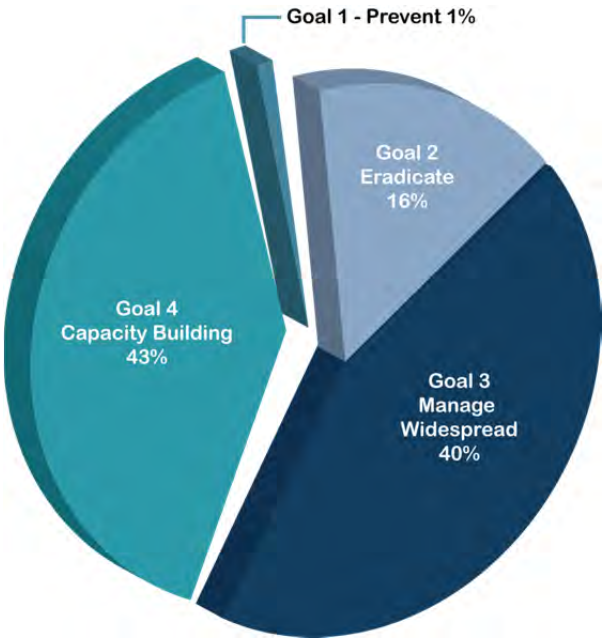


Figure 20: Allocation of LCA proposed co-contributions

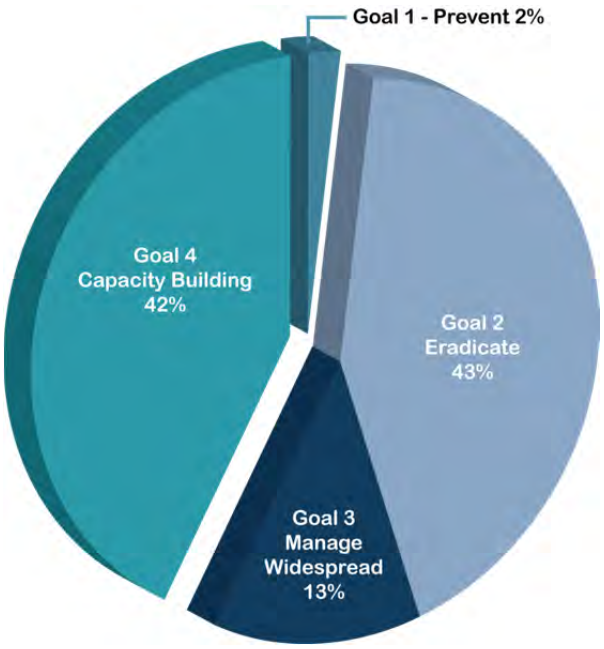


Figure 21: Allocation of WAP funding

DPI also provides WAP funding for state-wide projects and 'innovation projects', through a competitive bidding process. State-wide projects range from addressing a specific weed, to broad issues like Crown Land management and aquatic weeds. The NWAC determines funding for state-wide projects and DPI is the lead agency for several of them. Table 9 shows the total allocations for state-wide and innovation projects for the first three years of the WAP.

Table 9: WAP state-wide and innovation project funds[258]

	2010-2011	2011-2012	2012-2013	Total
State-wide projects	$924,049	$1,447,685	$1,395,408	$3,767,142
Innovation projects			$1,090,005	$1,090,005
				$4,857,147

Weeds Action Program planning

The WAP is intended to support the Invasive Species Plan. Respondents indicated that the Invasive Species Plan provided a clear step forward in planning at the state level, providing concise guidance for state and regional level planning.

Each WAP project is required to prepare five key management plans: a new incursions plan, a rapid response plan, a high-risk pathways plan, an inspection plan and a communications plan. These plans should guide actions and spending. A review of these plans indicates that the quality and content varies greatly across the state. For example:

[258] Funding allocation reports obtained from extranet.dpi.nsw.gov.au/weeds/grants, viewed 22 April 2014.

- The specificity and purpose of the plans varies, with some briefly expressing high level regional strategy and others providing detailed LCA level plans. Some regions combined the plans into one comprehensive strategy and some regions have five separate plans.
- The audience of the plans differs with some being targeted at all stakeholders and others specifically for WAP participants.
- High-risk pathways are not consistently defined, and the frequency of inspections required for both high-risk and general priority sites varies considerably and is not specified for all regions.
- Weeds are not classified consistently. Some plans refer to the Noxious Weed listing categories (Class 1-5) whereas others use a four category system (A-D) and rapid response plans vary in which classes they focus on.

Project officers indicated that these plans would benefit from more state-level guidance. DPI provided training for project officers at the start of the project. Some project officers also noted that adherence to regional plans varied across LCAs. NRC did not find evidence of a systematic quality assurance or assessment process to ensure the quality and consistency of the plans across the state.

Weeds Action Program results

Interviews indicate that the majority of participants feel that the WAP has created significant improvements in weed management by LCAs. Specific improvements cited by many of those interviewed included:

- The WAP emphasis on surveillance and eradicating new and emerging weeds has led to an improved focus on this area and greater regional understanding of the importance of these aspects of weed management.
- Having specified outputs/targets that must be reported has clarified for LCAs what the required actions are and improved surveillance.
- Many LCAs that were previously poor performers have reportedly improved their performance partially due to clearer requirements and partially due to coordination by the project officers and peer pressure from WAP project partners.
- There has been some improvement in strategic planning and coordination between LCAs, although this varies by region.
- Some councils are working more effectively and cooperatively. For example, some regions are implementing consistent weed tracking systems to inform regional planning. However, in other regions LCAs are not sharing data with each other.
- The program has improved DPI administrative efficiency as they used to process applications from more than 100 LCAs and now they only process 13 regional applications. However, the administration work is now largely borne at the regional level.

The NRC found that having a dedicated project officer played a critical role in coordinating programs across regional LCAs and ensuring some consistency and adherence to commitments made under the WAP program. Many respondents attributed much of the success of the WAP to the strong performance and contributions of the regional project officers.

The initial years of the WAP were devoted to rolling out an improved framework for the planning and funding of weed priorities at both a state and regional level, while also building the capacity of participants to undertake the work required and to improve their ability to meet monitoring, evaluation and reporting standards.

While good progress has been made by implementing the WAP, the NRC's evaluation indicates there are several areas where there are still opportunities for improvement:

- **Greater outcomes focus** - It is difficult to determine whether the WAP has improved outcomes. There are measures that each LCA must report, such as number of priority high-risk sites inspected. These are outputs, rather than outcomes. DPI has acknowledged that improved outcomes reporting is needed and will be considered in the future.
- **Clarifying roles and responsibilities** – Respondents consistently expressed that roles and responsibilities at all levels of the WAP are not clear and are not consistent across the state. Regional and local level staff could not consistently articulate the responsibilities of the DPI staff in the WAP, and many stated that it would be helpful to have their roles more clearly defined.
- **Lack of accountability** – Stakeholder feedback indicates that there continues to be a wide range of performance by LCAs, with little or no consequences for those who are not meeting their obligations. The monitoring and reporting required by DPI does not allow for assessment of whether these responsibilities are being carried out.

  WAP has gaps in the coverage. Some local councils do not participate in the program and do not have weed officers, including some Sydney councils that have high-risk activities such as farmers markets. Certain regions of the state were consistently identified by neighbours and DPI staff as poor performers, and in some cases there has been a lack of coordination between WAP and CMA weed related programs. Yet to date, there has been little evidence of action being taken to address poor performance.
- **Quality and consistency of reporting** – Limited quality assurance is performed on the WAP reports. Little guidance was given regarding what definitions or standards should be used for reporting on outputs and there is likely to be significant variance from region to region. The quality and consistency of reports depends greatly on the level of engagement of the project officers and lead agencies.

8.4 Catchment Action NSW funding

The NSW Government provided Catchment Action NSW funding to CMAs for implementation of Catchment Action Plans (CAPs). CMAs have become part of LLS under new arrangements. CMAs typically focused on integrated land management, with the aim of achieving multiple outcomes. Integrated land management is particularly important for weed management, where failure to replace a weed with something more desirable can lead to re-infestation. A high percentage of on-ground projects have a weed management component, but the amount of money allocated specifically to weed management is difficult to ascertain, as this was not the sole focus of CMAs.

CMAs also focused on leveraging additional investment from other parties. A significant portion of their funds were acquired from Australian Government programs including Caring for our Country and the Biodiversity Fund, which are discussed further in the following sections.

In order to assess this funding stream, the NRC interviewed representatives from ten of the 11 former CMAs, and received a submission from the eleventh. In addition, the NRC reviewed publically available reports including the CAPs and CMA annual reports, but quantitative data regarding project spending was not taken from these reports as the funding sources could not be verified. The NRC requested data directly from CMAs regarding funding that was provided specifically for weed management projects. Many of the CMAs stated that the figures provided were indicative only.

An estimated $2.7 million of Catchment Action NSW funding was allocated by nine of the 11 CMAs to projects predominantly focused on weeds over a three year period from 2010-11 to 2012-13. Two of the CMAs were unable to provide estimates in the time provided. CMAs emphasised that this is an underestimate of what was actually spent on weeds as some portion of the approximately $74 million Catchment Action NSW funding provided to CMAs over the past three years has also been dedicated to weed management. Co-contributions from project partners, financial or in-kind, vary significantly between CMAs and projects and are not included. However, most CMA funds are granted with a partner co-contribution required. Often this was provided through in-kind donation via volunteer labour.

Allocation of Catchment Action NSW funds to the CMAs was based on an independent six-stage assessment process[259] that considers priorities, return on investment, and likely effectiveness of programs. Effectiveness was assessed through NRC's audits of the CAP implementation.

Weed management activities supported by CMAs varied, from on-ground control works such as spraying and hand-pulling, to extension activities including workshops, 'weed safaris' and training, to monitoring activities. CMAs often collaborated with groups, such as Landcare, to strengthen a bid for funding of weed control projects. CMAs undertake and fund weed management work on both private and public land, where it is necessary to work across tenure to achieve results. Several CMAs were unable to quantify the split of funding across tenure; however, seven of the CMAs indicated that the majority of work is taking place on private land, typically 70 per cent of works or more.

CMAs' coordination with LCAs, RWACs, and other CMAs varied. For example, one CMA has coordinated and funded a weed tracking program for all regional councils in its area. Another contracted sprayers directly to do weed control works, rather than work through local councils, indicating it is too difficult to coordinate with all the LCAs. Several CMA representatives noted that coordination between CMA regions could be improved. For instance, one respondent provided an example where two CMAs were planning large projects to handle a new incursion on a border region, but had not worked together on their applications or plans.

CMA strategic planning

CMAs typically prioritised their actions based on their CAPs, which are high level strategic plans. The priority placed on weed management varies among the CAPs. Most CMAs have a specific weed, invasive species or 'pest' plan informed by regional input. The degree of alignment between these plans and other regional plans varies by region.

The majority of CMAs indicated that despite strategic plans, actual funding of weed management projects has historically been skewed by investor preferences. In some cases the CMAs can identify common goals with funding partners, but overwhelmingly, they felt investor preferences had hampered their ability to make decisions based on local issues. Some noted that the funding requirements prohibit them from tackling weeds that are the landholders' responsibility (under the *Noxious Weeds Act 1993*), which fails to recognise that widespread weeds can rapidly progress to a point where a regional response is needed, or the significant impact they can have on agricultural productivity and environmental systems. Another restriction noted was that annual funding models are too short term to address weed problems and require them to commit their funds early,

[259] Natural Resources Commission 2010, *Review of Catchment Action NSW funding allocations to Catchment Management Authorities*, Natural Resources Commission, Sydney, NSW, viewed 22 April 2014, nrc.nsw.gov.au/Workwedo/Fundingallocation/CatchmentActionNSWFundingAllocationToCatchmentManagementAuthorities.aspx.

reducing flexibility. As a result they are particularly limited in their ability to tackle new incursions.

CMA monitoring and outcomes

CMAs all reported certain standard outputs to DPI. Standard outputs related to weeds include total hectares treated and the per cent that represents initial treatment. Reports for 2011-12 indicate that almost 2.5 million hectares were treated with initial treatment of around 580,000 hectares. However, this is for all CMA funding. The NRC was unable to verify hectares treated solely from Catchment Action NSW funding.

Similar to the WAP, this reporting is related to outputs rather than outcomes. While some CMAs are implementing additional outcome measures, such as the distribution tracking discussed below, there is no consistent measurement of outcomes related to CMA weed management. This makes it difficult to assess the overall effectiveness of CMA weed management projects.

CMAs varied in their capacity to use spatial information systems to track weed infestations. Several used the Land Management Database to map where the CMA's funded projects were carried out, but indicated that currently it provides limited information regarding weed location and distribution. The Border Rivers-Gwydir CMA used a weed mapping system called Tr@cer Weeds, in conjunction with local councils. The system collects point data on weed infestations, locations and densities as part of each local council's property inspection activities. The information is then uploaded into the CMA Geographical Information System. However, only WoNS are included. For these reasons current spatial mapping has limited use in driving effective and efficient investment decisions, including where to direct follow-up works. Local council representatives in some areas are using weed tracking programs, but indicated they are only sharing this information with CMAs on a limited basis as requested by the CMA.

CMA's typically required project partners to agree to ongoing maintenance requirements, generally over 10 years. Many of the CMAs required annual reports with photo points, weed inspection reports, and any required follow-up actions. Most CMAs were unable to do on-ground inspections themselves, and where they did they may only have targeted 5-10 per cent of projects per year. Some CMAs stated that even with such reporting requirements in place, weed projects are hard to keep on top of with little if any authority to enforce ongoing responsibilities.

8.5 Australian Government funding

The Australian Government has provided funding for weed management in recent years through two key streams, Caring for our Country and the Biodiversity Fund. The contributions of these programs to weed management are discussed below.

Recent changes have been made to funding programs and previous Caring for Our Country programs and funding are now part of the National Landcare Programme. The Australian Government has also introduced the Green Army Programme 2014-17, which has up to $300 million available to support 250 projects in 2014-15, 500 projects in 2015-16 and 750 projects in 2016-17. Participants will be involved in activities such as restoring and protecting habitat, weeding, planting, cleaning up creeks and rivers and conserving cultural heritage places over 20-26 weeks. These are not cash grants, rather the programme covers costs directly associated with a Green Army Team, including: participants' allowances, uniforms, safety equipment, basic materials (e.g. hand tools, first aid kits), training costs, transport costs (typically involving local transport to project sites and training) and insurance to cover participants and team supervisors.

In addition, the programme will support consumable project specific materials with an average value of $10,000 per project.

8.5.1 Caring for our Country

The Caring for our Country program provided funding for a range of natural resource management issues. It included both base funding, provided to CMAs (now LLS) in NSW, and grants provided through a competitive bidding process.

Over the past several years there has been a focus on WoNS in the Caring for our Country competitive bid process. This funding was seen as very effective in areas where the relevant WoNS was a high regional priority. However, in several regions, respondents indicated that the Australian Government funding was skewing their actions away from the highest priorities identified through strategic planning. For example, in the Monaro area several million dollars were spent on management of willows (*Salix* spp.) a WoNS, whereas stakeholders indicated that African lovegrass was a higher priority.

Caring for our Country projects typically focused on integrated land management, making it difficult to determine the total amount spent on weed management. The NRC reviewed the project descriptions of all projects funded through the competitive bidding stream from 2009-11 and attempted to identify those primarily focused on weed management. This review showed that CMAs received around $7.8 million to undertake projects specifically related to weed management. A further $5.3 million was awarded to state agencies (former Department of Environment Climate Change & Water and OEH), local government (councils), a range of Care groups (e.g. Landcare, Rivercare), and other community conservation and volunteer groups specifically for weed management projects.

These figures do **not** include all projects that included weed management, only those specifically targeted at weeds, or where weed management was the primary focus; as such, this is a low estimate of what is spent on weed management. In total approximately $178 million was allocated for Caring for our Country competitive bid projects nationwide from 2009-11. A large portion of these projects included some weed management aspect. The competitive bid funding is in addition to the $141 million of base level funding awarded to NSW CMAs by the Australian Government from 2009-2011, some of which was directed to weed management projects (or those which incorporated it), in line with their CAPs. For example, from 2009-13, Western CMA funded approximately $510,000 of WoNS projects (Hudson Pear (*Cylindropuntia rosea*), Mesquite (*Prosopis* spp.) and Parkinsonia (*Parkinsonia aculeata*)). This was sourced from base level Caring for our Country funding and is therefore not included in the $7.8 million estimate above.

Caring for our Country outcomes

The NRC reviewed publically available information regarding outcomes and also requested example project reports from the Australian Government for Caring for our Country projects. Project outcomes were focused on the number of hectares treated. Therefore, similar to other weed programs, reports typically do not provide significant indication of weed management outcomes.

Some of the Caring for our Country funds were directed to WoNS, for which the Australian Government also funded national coordinators for specific weeds; funding for coordinators ceased in 2013. National and state-wide strategic plans are used to guide activities related to WoNS. In addition, coordinators developed business plans for their specific weeds. A number of specific species have been actively mapped through this program. Standardised surveillance protocols and

monitoring and mapping prior to, and following control have allowed the coordinators to determine trends in distribution and density. This information can then be fed into subsequent planning for weed management in an adaptive management approach.

Bitou bush mapping is perhaps the best example of the demonstration of effectiveness of control efforts. Although the distribution of this species has increased between 2001 and 2008, spatial analysis has been able to show a significant reduction in the density of the weed, particularly the higher density category (greater than 40 per cent cover). This demonstrates reduced impacts. As a result of control efforts, the containment lines for the core infestation have contracted. This type of outcomes tracking represents good practice in monitoring of weed management programs.

Other Australian Government funding is outlined in the summary table at the beginning of this Chapter.

8.6 Community programs

Community and volunteer programs such as Landcare and Bushcare are a vital part of delivering on-ground weed management in NSW. Community programs deliver services in the areas of outreach, education, capacity building and weed control.

The experience in Towamba Valley illustrates this point. In their submission the Far South Coast Landcare Association describes the current culture of widespread weed management as 'don't do anything until you are told to' and of 'walking away from serious infestations'. They argue that the current arrangements do not support widespread weed management and that LCAs do not want to risk legal action.

The Towamba Valley Landcare Group commenced a project in 2008 that in just five years has engaged more than 60 per cent of landholders in weed control with general support from another 20 per cent.[260] The project has effectively stopped serrated tussock from seeding, an infestation that once covered 20 per cent of the valley. The group is now also controlling African lovegrass reducing both its spread and density.

The Towamba project adopts collective action principles, developing a culture of co-operation and reciprocation. Meetings and events are attended by 25-60 people and social cohesion is a focus, reducing the isolation of farmers who are often overcome by tackling weeds and other pest problems alone. The project is based on a 'set of rules' that target coordinated effort and long-term monitoring programs. It accommodates the capacity of individuals by tailoring agreed management plans and providing incentives. This project has adopted a total farm management approach, engaging farmers in farm planning and increasing knowledge in natural resource management, pasture management and pest animal control.

[260] Far South Coast Landcare Association submission to NRC Review of Weed Management in NSW, 2013.

Attachments

Attachment A: Terms of Reference

Terms of Reference for review of weed management in NSW

NSW 2021 sets out a range of actions to improve economic growth in regional NSW and strengthen local environment and communities. One of these actions is to reduce the impact of weeds on our production and natural assets, such as prime agricultural land and the reserve system. Under the recently released NSW Biosecurity Strategy, NSW intends to develop new biosecurity legislation that will further enhance the current risk-based approach to managing weeds (and disease and pests).

Weeds impact production and natural assets in varying ways. 'Noxious' weeds are declared under the *Noxious Weeds Act 1993*, and subject to a range of different controls. This Act obliges private and public landholders and managers to control declared noxious weeds on their land. Local Weed Control Authorities (i.e. Local Shires and Councils) have the primary responsibility to administer this Act. Other Acts such as the *National Parks and Wildlife Act 1974*, *Threatened Species Conservation Act 1995* and *Fisheries Management Act 1994* also provide for the management of terrestrial, freshwater and marine weeds and noxious vegetation. Native species acting in a weed-like manner (such as Invasive Native Scrub) are regulated under the *Native Vegetation Act 2003*.

Other mechanisms such as intergovernmental agreements and funding for regional bodies under Australian and NSW Government programs provide alternative drivers to promote the weed management outcomes sought by the NSW Government.

Evaluation of weed arrangements in NSW

The Minister for Primary Industries requests the Natural Resources Commission (the Commission) to evaluate the effectiveness and efficiency of the current weed management arrangements in NSW, with the view of informing the further development of the NSW Biosecurity Act and other relevant strategies under the NSW Biosecurity Strategy.

In developing its advice the Commission should:

- assess (based on existing data) the distribution and abundance of weeds across NSW and their impact on production and natural assets, having regard to historical trends and likely trajectory, current condition and risk creators and bearers
- evaluate current regulatory and institutional arrangements in meeting state agreed outcomes across both public and private tenures, including identifying characteristics of any constraints, barriers and best practice
- evaluate weed management activities funded by the Australian and NSW Government incentive and grant programs such as (but not limited to) *Caring for our Country* and *Catchment Action NSW*, *NSW Weeds Action Program*, including identifying characteristics of any constraints, barriers and best practice
- identify and assess viable alternative weed management arrangements, including risks and opportunities.

Any recommendations should include potential transitional arrangements for the future implementation of the NSW Biosecurity Act and NSW Biosecurity Strategy.

For the purpose of this work, 'weeds' is defined as both introduced and native species but is limited to terrestrial and freshwater aquatic species only.

The Commission should also have regard to the following in undertaking the work:

- the likely future trajectory in the distribution of weeds in States bordering NSW, including the potential implications of climate change on range extension, conflicting commercial plant usage and food security
- NSW Biosecurity Strategy, NSW Invasive Species Plan and NSW State-wide Framework of Biodiversity Priorities for Widespread Weeds
- arrangements for weed management in other jurisdictions
- community expectations and feedback
- previous reviews on weed management in NSW
- any reports and recommendations from the Independent Local Government Review Panel and NSW Crown Lands review
- functions and services of Local Land Services
- intergovernmental agreements for biosecurity
- any monitoring, evaluation and reporting arrangements for weeds.

The Commission should work closely with Department of Primary Industries and consult with relevant stakeholders and agencies, including Noxious Weeds Advisory Committee, Office of Environment and Heritage, NSW Aboriginal Land Council, Local Control Authorities, Local Government NSW, Catchment Management Authorities, Regional Weed Advisory Committees, Livestock Health and Pest Authorities, peak farming, industry and environmental groups and relevant Australian government bodies. The Commission will also undertake public consultation to inform its assessment and development of recommendations.

The Commission is to provide:

- a Draft Report, including draft recommendations, within six months of receiving the terms of reference
- a Final Report, including outcomes of consultation, within three months of providing the Draft Report.

Attachment B: Regulatory and institutional arrangements

1 Regulatory arrangements

Table 2 of the report outlines the legislation that influences weed management in NSW. The key pieces of legislation are:

- *Noxious Weeds Act 1993* (NSW) (and the *Noxious Weeds Regulation 2008*)
- *Native Vegetation Act 2003* (NSW) (and the *Native Vegetation Regulation 2013*)
- *Threatened Species Conservation Act 1995* (NSW)
- *Environment, Protection and Biodiversity Conservation Act 1999* (Cwlth)
- *Quarantine Act 1988* (Cwlth).

In general, this legislation seeks to prevent new weed incursions and minimise negative impacts of both native and non-native species on economic, environmental and social values. This is to be done through surveillance and inspections to prevent incursions, eradication of incursions, management of widespread weeds, and capacity-building and education.

For the remainder of this report, an '**incursion**' is a weed invasion that is either newly identified or for which a determination has been made that it can and should be eradicated; and an '**infestation**' is a weed for which a determination has been made that regional eradication is either unfeasible or undesirable.

Noxious Weeds Act 1993

The *Noxious Weeds Act 1993* is jointly administered by the Minister for Primary Industries, the Minister for Natural Resources, Land and Water, and the Minister for Regional Infrastructure and Services. The Act aims to prevent the establishment of significant new weeds; prevent, eliminate or restrict the spread of particular significant weeds; and effectively manage impacts of widespread significant weeds. These goals align with the goals of the NSW Invasive Species Plan developed in 2008 to align actions for all invasive pests (plants, animals and diseases).

The Act provides for the making of Weed Control Orders, which declare weeds as noxious and specify the area to which the order applies, objectives of control and the specific control measures required.

A new order (Weed Control Order (order 30)) comprising 241 taxa has been released.[1] Weeds are listed by Local Control Authority (LCA) boundary or state-wide. Some native taxa are included in this order; native plants can be declared as noxious with the consent of the Minister responsible for administering the *National Parks and Wildlife Act 1974*.[2]

Five classes of noxious weeds are defined as shown in Table 1 below. The DPI website indicates that noxious weeds are "*plants that have potential to cause harm to the community and individuals, can be controlled by reasonable means and have the potential to spread within an area and to other areas. A weed*

1 Department of Primary Industries 2014, *Noxious Weeds Weed Control Order 2014,* viewed on 22 April 2014, dpi.nsw.gov.au/aboutus/about/legislation-acts/noxious-weeds

2 *Noxious Weeds Act 1993* (NSW) s 7(5).

is declared noxious because its control will provide a benefit to the community over and above the cost of implementing control programs."[3] This definition is consistent with DPI policy that the benefits of action should outweigh the costs, but is not specified in the legislation or regulations.

Table 1: Control classes of noxious weeds – definitions and control requirements

Control class	Weed type (definition)	Typical control requirements[4]
Class 1	Plants that pose a potentially serious threat to primary production or the environment and are not present in the **state** or are present only to a limited extent.	The plant must be eradicated from the land and the land must be kept free of the plant. The weeds are also "notifiable" and a range of restrictions on their sale and movement exist.
Class 2	Plants that pose a potentially serious threat to primary production or the environment of a **region** to which the order applies and are not present in the region or are present only to a limited extent.	The plant must be eradicated from the land and the land must be kept free of the plant. The weeds are also "notifiable" and a range of restrictions on their sale and movement exist.
Class 3	Plants that pose a potentially serious threat to primary production or the environment of a **region** to which the order applies, are not widely distributed in the area and are likely to spread in the area or to another area.	The plant must be fully and continuously suppressed and destroyed.
Class 4	Plants that pose a potentially serious threat to primary production, the environment or human health, are widely distributed **in an area** to which the order applies and are likely to spread in the area or to another area.	The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction.*
Class 5	Plants that are likely, by their sale or the sale of their seeds or movement within the **state** or an area of the state, to spread in the state or outside the state.	There are no requirements to control existing plants of Class 5 weeds. However, the weeds are "notifiable" and a range of restrictions on their sale and movement exists.

*Some Class 4 plant declarations require that the growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and some Class 3 and 4 weeds are prohibited from sale, knowing propagation or distribution.

[3] NSW Department of Primary Industries, *Weeds Definitions and FAQ*, viewed on December 2013, dpi.nsw.gov.au/agriculture/pests-weeds/weeds/definition

[4] Specified in Weed Control Order 30.

The *Noxious Weeds Act 1993* has undergone a number of amendments to improve its implementation.[5] The most recent suite of amendments was made in 2012 following a five-year statutory review of the Act and a separate review of Primary Industries legislation.[6]

Native Vegetation Regulation 2013

Native plants that are considered weedy can be declared under the *Native Vegetation Regulation 2013* as either feral native species or invasive native species. Feral native species generate impacts outside of their natural range and for ground cover, within their natural range. Invasive native species are those that generate impacts within their natural range through dense regeneration or are invading plant communities in which they do not generally occur.

The clearing of feral native species or invasive native species is deemed a routine agricultural management activity, if carried out in accordance with a relevant order. Clearing of these species is also permitted on land identified as protected riparian land by a natural resource management plan.[7]

Currently listed under this regulation are:

- **Invasive native species –** Over 40 native species are recognised as having invaded vegetation communities where the species have not been known to occur previously (but are within their natural range) OR the species regenerates densely following natural or artificial disturbance.
- **Feral native species –** two native species are currently recognised as having invaded vegetation communities outside of their natural range, including coastal tea-tree (*Leptospermum laevigatum*) and yellow mimosa (*Vachellia farnesiana*).

Threatened species regulations

The NSW *Threatened Species Conservation Act 1995* and the *Environment, Protection and Biodiversity Conservation Act 1999* (Cwlth) provide for the listing of invasive species, including weeds, as key threatening processes. Key threatening processes listed under the NSW legislation are intended to be consistent with those listed under the Commonwealth Act.[8] The listing reflects the threats posed by weeds to biodiversity, specifically threatened native species or ecological communities. The NSW Office of Environment and Heritage (OEH) and the Australian Government Department of Environment develop threat abatement plans to address these key threatening processes.

Biodiversity priorities for widespread weeds

The *Biodiversity Priorities for Widespread Weeds* plan was developed by DPI, OEH, and CMAs in consultation with other regional partners. This list is based on an assessment of the weeds that cause the greatest impact to high-priority assets from a conservation perspective. A separate list of priorities was developed for each CMA region. The National Parks and Wildlife Services (NPWS) use these lists to prioritise weed management on their lands.

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5 Montoya, D. (2012), *Noxious weeds briefing paper no 02/2012*. Parliamentary Library Research Services.
6 NSW Department of Industry & Investment (2011), *Report on the Statutory Review of the Noxious Weeds Act 1993*, Department of Industry and Investment, tabled 7 September 2011.
7 *Native Vegetation Regulation 2013* (NSW) cl 58.
8 Cattanach, G, Harris, A and Horris, J 2013, *Mapping Australia's Weed Management System*, RIRDC publication no. 13/019, Canberra, ACT.

Australian Government weed lists

The Australian Government has several non-statutory lists including WoNS, the National Environmental Alert Weeds list and the sleeper weeds list. These weeds are listed as priority weeds for control in non-enforceable agreements between the Australian Government and states and territories. WoNS are chosen based on a process agreed to by the Ministers for Forestry and Conservation, Agriculture and Environment. Weeds on this list are those regarded as the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts on at least several states and territories.[9] The selection of these weeds is based on specific criteria, including the requirement that management of the weed must benefit from national coordination.

Weeds on the National Environmental Alert Weeds list are non-native plant species in the early stages of establishment and with the potential to become a significant threat to biodiversity if they are not managed. Sleeper Weeds are non-native plants that have naturalised, but have not yet reached their potential to form large and widespread populations (despite being naturalised for some years).

2 Institutional arrangements

A complex set of institutional arrangements has developed to manage weeds at national, state, regional and local scales.

National arrangements

The Australian Government is responsible for preventing new weedy species from entering the country. This is done through implementation of the Australian Weed Risk Assessment System to assess the risks of newly proposed species, border control measures and quarantine operations.

Australian and state governments work together through several national committees related to biosecurity and weed management. The Australian Government has recently announced that they will be merging the Australian Weeds Committee, the Biosafety and Biosecurity Working Group and the Established Pests and Diseases Working Group with the National Biosecurity Committee into one group. The committees guide and coordinate the various institutions responsible for delivering plant biosecurity outcomes. There are also intergovernmental agreements and a national strategy for management of weeds. The descriptions below describe the arrangements prior to merger of these groups, as the merger has not yet occurred.

National Biosecurity Committee

The National Biosecurity Committee supports the Primary Industries Standing Committee. It was established in July 2008 to provide strategic leadership in managing national approaches to emerging and ongoing biosecurity policy issues across jurisdictions and sectors. The National Biosecurity Committee takes an overarching, cross-sectoral approach to national biosecurity policy, and works collaboratively to achieve national policy objectives for biosecurity in Australia. The committee provides leadership to a range of supporting committees.

[9] Australian Government Department of the Environment 2012, *Weeds of National Significance,* Department of the Environment, Canberra, ACT, viewed on 28 April 2014, environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html.

Australian Weeds Committee

The Australian Weeds Committee is a sub-committee of the National Biosecurity Committee and provides an inter-governmental forum for identifying and resolving weed issues at a national level. It aims to ensure an integrated and effective national approach to the prevention and management of weed problems by reporting to and advising the National Biosecurity Committee.

Australian Weeds Strategy

The Australian Weeds Strategy was developed by the Australian Weeds Committee. It was reviewed in 2013 and is currently being revised. It provides a national strategic approach and framework for establishing consistent guidelines. It identifies national priorities for weed management with the aim of minimising the impact of weeds on Australia's environmental, economic and social assets.

The Intergovernmental Agreement on Biosecurity

The Intergovernmental Agreement on Biosecurity (IGAB) is an agreement between the Australian, state and territory governments (with the exception of Tasmania) that came into effect in January 2012. The agreement aims to strengthen the working partnership between governments, improve the national biosecurity system by specifying roles and responsibilities, and outline the priority areas for collaboration.

National Environmental Biosecurity Response Agreement – (Council of Australian Governments Agreement)

The National Environmental Biosecurity Response Agreement (NEBRA) is the first deliverable of the IGAB, signed in November 2012. It sets out emergency response arrangements, including cost-sharing, for biosecurity incidents that primarily impact the environment and/or social amenity. NEBRA contains provisions for how the cost-sharing between governments will work in environmental biosecurity eradication responses, and is only geared for responses where eradication is the goal. While the NEBRA is a cost-sharing arrangement between the Australian and state governments, private beneficiaries (i.e. industries) also can be invited to participate if it is deemed necessary. NEBRA can only be used when the pest is declared eradicable by the National Biosecurity Management Group and there are no provisions for transition to management or other arrangements.

NSW institutional arrangements

A range of bodies at different scales have weed management responsibilities within NSW.

LCAs have a responsibility under the *Noxious Weeds Act 1993* for inspections and enforcement on private lands as well as control of noxious weeds on their own lands. LCAs are generally local councils or county councils. However, the LCA for land in the Western Division that is not within a local government area is the Western Lands Commissioner and the LCA for Lord Howe Island is the Lord Howe Island Board. Historically, DPI has provided funds to assist LCAs to carry out their duties. This is currently done through the Weeds Action Program (WAP).

There are several participants in weed management at the regional level:

- **Weeds Action Program (WAP) groups -** DPI administers funds to 'lead agencies' established for regional groups of LCAs. There are 13 WAP regions. Each region is responsible for developing a variety of plans for management of weeds.
- **Regional Weed Advisory Committees** (RWACs) - regional organisations developed to help strategically organise weed management at a regional level. Their objectives and activities vary, but they generally focus on providing a forum for weed-related information-sharing and supporting capacity-building and education.
- **Local Land Services -** incorporates functions of:
    - **CMAs –** strategic planning and funding for overall natural resource management, taking a landscape-based approach.
    - **Livestock Health and Pest Authorities (LHPAs) –** pest animal control, livestock health and maintenance of travelling stock reserves.
    - **Agricultural extension services –** providing advice regarding production issues and communicating agricultural research findings.

DPI supports administration of the *Noxious Weeds Act 1993*; as such it develops policies and legislation and provides state-level oversight of, and support for, weed management programs. Biosecurity NSW, part of DPI, develops state-wide policies and programs for management of all biosecurity risks, including the NSW Biosecurity Strategy 2013-21. In addition to funding LCA activities, DPI funds state-wide projects.

The NSW Biosecurity Strategy 2013-21 outlines how government, industry and the community need to work together to identify, minimise, respond to and manage biosecurity risks. It aims to highlight the importance of biosecurity for NSW. The objectives of the strategy are to manage pest, disease and weed risks by:

- preventing their entry in to NSW
- quickly finding, containing and eradicating any new entries
- effectively minimising the impacts of those pests, diseases and weeds that cannot be eradicated.

Under the *Noxious Weeds Act 1993*, the Minister may create committees to advise on weed management. The Minister has delegated one such committee - the Noxious Weeds Advisory Committee - to provide advice on a range of weed management issues, including the review of proposed weed declarations.

OEH administers the *Threatened Species Conservation Act 1995* and the *Native Vegetation Act 2003*, and is responsible as a public land manager for management of weeds in national parks.

Public land managers including OEH, Crown Lands, Forestry Corporation NSW, Sydney Catchment Authority, Country Rail Network, State Water, and Roads and Maritime Services are responsible for ensuring noxious weeds do not spread from land under their management. Public land makes up a large portion of the NSW land area. Private landholders are responsible for controlling all declared weeds in accordance with the Weed Control Orders.

Attachment C: Summary of Issues Paper submissions

The Natural Resources Commission (NRC) invited submissions to inform its review of weed management in NSW. 206 submissions were received, and can now be accessed through the NRC website at: http://nrc.nsw.gov.au/Workwedo/ReviewOfWeedManagementInNSW.aspx

The greatest number of responses were from individuals (71), followed by Local Government organisations (councils, county councils, weed authorities, etc.) (65) and other government organisations (23). Submissions were also received from community organisations (including Landcare and Bushcare groups), environment groups, industry groups, academics and the NSW Aboriginal Land Council.

The submissions highlighted the significance of effective weed management to the community, and provided useful insights and recommendations from a range of perspectives. The following summary provides an overview of the key issues raised in the submissions, but it is not exhaustive. The focus of this summary is on the solutions and opportunities identified in stakeholder submissions, rather than a restatement of the issues, the causes and the implications.

1 Community ownership

- With respect to education and awareness many submissions noted the confusion arising from the plethora of information available regarding weed management, which is sometimes incorrect, outdated or inconsistent. Many highlighted the need for a one-stop weeds portal to allow easy access for stakeholders seeking information on weeds.
- Suggested information included weed impacts and influences, the roles and responsibilities of government agencies, regulatory responsibilities, weed identification and best practice guides for weed management and information packages for new landholders.
- Submissions emphasised the importance of delivering communication and awareness programs at a local or regional level, to take into account local conditions and knowledge, as well as existing rapport built with the community. This is supported by the suggestion that for efficiency and consistency many communications could be developed centrally, then adapted to local needs. Other submissions stated that the scale for awareness-raising programs depended on the message being conveyed and the audience being targeted.
- There is general agreement that weed education needs to be delivered across the spectrum of the community and not just to landholders, and that the message and information for each group should be targeted.
- Some of the opportunities identified to facilitate community ownerships of weeds management included:
    - highlighting the public health implications of some weeds
    - public authorities leading by example and effectively managing weeds on their own land
    - integrating weeds education into the school curriculum
    - clear information regarding the social, environmental and economic impacts of weeds on agriculture and biodiversity.

- One-on-one engagement is identified as the most effective mechanism for education and capacity building with landholders. Submissions also highlighted that many landholders felt overwhelmed by the extent of the problem and that engagement is critical to support action.
- A wide range of stakeholders identified the significant role of community groups such as Landcare and Bushcare in influencing community practices and weed management. Submissions suggested greater support (for example, financial and training support) to more effectively leverage the involvement of these community organisations. The value of initiatives such as Weed Spotters is also well recognised.
- The proliferation of subdivisions and small rural holdings is commonly identified as a source of weed issues. Often these landholders are absentee, have no knowledge of the legal obligations or have no financial imperative as the land is not being used for agriculture (commercial/lifestyle). These landholders put a low priority on biosecurity in general, and this undermines a 'voluntary collective action' approach for widespread weeds.

Incentives and disincentives

- Submissions identified a number of opportunities to influence landholder practices and promote collaborative action within communities, including:
    - Requiring sellers to disclose the weed status of properties for sale so that buyers are aware of their legal liabilities for weed control, promoting links between property value and weed status. The primary mechanism proposed is amending Schedule 4 of the *Environmental Planning and Assessment Regulation 2000* which sets out those matters to be included in a s149 planning certificate, which must be provided to a prospective purchaser with a contract for sale under s4 of the *Conveyancing (Sale of Land) Regulation 2010*.
    - Requiring a weed-specific standard condition in development consents for subdivisions. For example, Eurobodalla Shire Council currently utilises a locally developed Standard Condition 12.37 (*Prior to the issue of a subdivision Certificate the applicant shall liaise with and comply with the requirements of the Council's Invasive Species Officer in relation to Part 3 Section 12 of the* Noxious Weeds Act 1993 *for control of weeds on the land*. [12.37 [0179]).
    - Valuing land at the point of sale according to how much it will cost to adequately control weeds that exist. Any land sold could by law have a costed management plan detailing the maintenance cost and expected management obligations and costs. LCAs would be allowed to pass on information regarding the weed history of the property to prospective buyers.
    - Developing location-specific community weed management plans with clear targets covering multiple properties (both public and private) to promote collective and peer pressure action. Collaborative actions are likely to have a higher chance of working if landowners and the public can see government authorities leading by example with respect to weed management and control.

- Preparing property-level weed management plans with clear timeframes and milestones to be achieved for public and private landholders. The requirements in these plans could then form the basis for compliance actions, such as imposing costs for weed control activities that could reasonably be expected of the landowner under the plan.

- A range of financial incentives were also proposed, including differential land rating systems and rebates for substantial reductions in weed infestations due to control and management activities, and a system of valuing volunteer labour as a tax-deductable charitable donation to encourage greater volunteerism. Financial disincentives proposed included increased penalties for non-compliance.
- Other proposed incentives and disincentives were based on social drivers and included: reward and recognition for voluntary continuous improvement systems; a weed free or weed smart accreditation program; and publicly available information (such as maps) regarding the precise locations of infestations in order to create social pressure to control noxious weeds.

2 Policy and regulatory framework

- Many stakeholders highlighted the current state of confusion with respect to weed management. Submissions stressed the need to rationalise and focus the broad range of policies and strategies that cover weeds, and to clearly document the roles, responsibilities and accountabilities of those involved in weed management. This ambiguity at a policy level has led to inconsistent, and sometimes conflicting, requirements (policy, procedures, priorities) for controlling weeds being set by LCAs and public land managers.
- A number of respondents called for an "optimal smart and responsive policy mix" that uses a variety of forms of social control and funding arrangements, and a combination of incentives and disincentives, rather than the current narrow policy approach to weed management.

<u>Policy</u>

- Submissions note an apparent misalignment between policy and regulation. In particular that the vision of the NSW Invasive Species Plan (ISP) is to protect against adverse impacts, while the legislation focuses on the management of declared noxious weeds. Furthermore, the required control measures are not always consistent with the ISP management objectives.
- A number of respondents across stakeholder groups proposed addressing environmental, 'noxious', and agricultural weeds as a single management issue in policy and legislation.
- A large number of respondents identified the need for a holistic, integrated landscape management approach to ensure effective ongoing weed management. The rationale is that weeds are a symptom of ecological decline, and generally healthy, robust areas will not be so degraded by weeds. Such an approach can apply at a property and regional scale and be supported by a long-term plan with achievable objectives for improved economic and biodiversity outcomes.
- Respondents indicated strong support for the WAP as a model for promoting a more holistic approach to weed management (rather than weed species-specific funding) and increased accountability through the associated reporting requirements.
- There is broad support for the current investment focus on preventing and eradicating new and emerging weeds.

Compliance and enforcement

- A range of stakeholders identified that monitoring and application of compliance and enforcement actions are inconsistent and ineffective between LCAs. Furthermore, the application of compliance provisions in the legislation has been very limited. Suggestions for improvement included:
  - providing greater support from state authorities when expensive control measures or litigation are required to enforce compliance
  - clearly separating LCA compliance and enforcement functions from the weeds extension advisory role, similar to the model currently in place under the *Native Vegetation Act 2003,* to ensure the confidence of participants.
- Submissions from all stakeholder groups supported increased penalties, possibly with a sliding scale for high-priority, high-risk weeds (Class 1, 2, 3).
- Some submissions suggested repealing landholder obligations to manage aquatic weeds, and allocating responsibility to a single organisation (see 'Institutional arrangements' below).
- Specific changes recommended to improve the *Noxious Weeds Act 1993* included:
  - Improving the notice system by removing section 18a "Notice of Intent to Issue a Weed Control Notice" notices, particularly for high-risk weeds. This is identified as an unnecessary step which creates confusion among landholders and creates an extra administrative burden on LCAs with no significant advantage to weed control.
  - Formalising re-inspection fees in the legislation.

Land tenure

- The general consensus is that public land managers should be held accountable to the same standards as private landholders and LCAs for weed management. Several respondents noted that this would require increased resourcing.
- The accountability of public land managers could be improved through annual audits and working with LCAs through consistent inspections and demonstration of on-ground weed control works.

Weed declarations and listings

- Several respondents noted their concern regarding the current weed declaration process involving the Noxious Weeds Advisory Committee and LCAs, and the potential it affords to remove or not include difficult and persistent weeds from the list because their control is deemed unachievable and/or too costly. To address the issue it was suggested that the review and declaration process be undertaken by an independent, scientific panel to avoid politicisation or regional bias.
- Submissions argued that the declaration process for new and emerging weeds is too complex and slow, and as a result species may spread or become established before action can be taken.
- Respondents also argued that the wording of the Class 4 weed declaration control requirements is too open to interpretation and does not provide sufficient legal basis to take action.

- A variety of suggestions were made to improve the listing approach for weeds, including:
  - a 'permitted', 'safe' or 'white' list detailing the plant species that can be introduced and sold in NSW
  - a single, standardised and consistent 'invasive species' list for NSW which aligns with any national lists and those of neighbouring states especially for border areas
  - aligning the listing system to the Invasive Species Plan and WAP. That is, categorising weeds where the focus is on: a) prevention or exclusion of high-risk weeds not yet present; b) eradication or containment of new and emerging weeds; and c) management of established and widespread weeds.
- A common concern is that some declared noxious weeds can be sold, and many submissions recommended that all declared weeds be prohibited from sale.
- Many submissions argue that the burden of responsibility on the commercial sector needs to be strengthened. For example, that all plants for commercial trade should be cleared for weed potential, rather than just imported plant species, and a list of plants permissible for commercial trading should be established based on the current Weed Risk Assessment system.
- Furthermore, many submissions argue that potential risk generators be held to account under the 'polluter pays' principle by requiring, for example, bonds and levies to cover costs of the risk assessment, monitoring and control of high-risk species used commercially, or those wanting to include new species, even low-risk plants, to a safe list.

<u>Widespread vs new and emerging weeds</u>

- It is generally agreed that regulation is adequate for new and emerging weed threats, but is not so effective for widespread weeds. It is also recognised that it is not possible to allocate sufficient resources to the management of widespread weeds wherever they occur.
- The most common recommendation is for a management approach based on regionally negotiated widespread weeds plans that identify strategic goals, particularly to control impacts on high conservation or agricultural production assets.
- Such plans can be driven using a variety of mechanisms, including social motivators, financial incentives, rebates and collaborations. Non-compliance can then be managed with the option of a government agency undertaking control works and redeeming the expense.

3 Institutional arrangements

- The submissions reveal a general confusion regarding the current institutional arrangements and legislative requirements across all stakeholder groups, as evidenced by incorrect information being presented.
- There is broad backing from LCAs for the responsibility for local weed management to remain with local government. The reasons include the extensive knowledge and expertise built up in local government, along with rapport and relationships with community stakeholders; the weed funding derived from rates; the weed control equipment and resources owned by councils; the lower salaries paid by local government as compared to state government agencies; and the relative stability of local government compared to government agencies that change frequently.

- LCAs also supported the formalisation of regional weeds advisory committees.
- In contrast, a number of stakeholders suggested that the local government model is variable and inefficient, and that the functions and responsibilities of LCAs (in whole or in part) be transferred either to the new LLS or to a new authority (comprising agency, community and industry stakeholders) established to coordinate action on weeds and feral animals. The Bush Fire Coordinating Committee model was promoted by a number of respondents.
- A number of respondents suggested that the management of aquatic weeds would be more effective if a catchment approach was adopted, and management responsibility assigned to a single body/agency. The licencing requirements to apply herbicides on or over water under the *Protection of the Environment Operations Act 1993* were identified as a hindrance to landholders meeting their obligations under the *Noxious Weeds Act 1993*.
- Several LCAs advised that they felt accountability has improved and is sufficient under the WAP reporting requirements. However, many others proposed increasing accountability for performance through independent or peer auditing of funding and delivery of project actions and outcomes.
- Participants identified the WAP as being highly effective as a result of its regional approach to strategic planning and cooperation, establishing a level of accountability through reporting (although it is noted that the regional averaging screens local performance), and providing long-term certainty through five-year funding. There is also broad support for the model of regional weed advisory committees.
- Restructures and the loss of Department of Primary Industries staff, particularly Invasive Species Officers and researchers, were identified as having a significant impact on the overall capacity, knowledge and coordination of stakeholders responsible for weed management.

Funding

- It was generally agreed that weed management is underfunded across all areas (education, communication, research and development, monitoring and surveillance, compliance and enforcement, and implementation of control activities) and that funding arrangements need to be more long term and strategic.
- Some suggest funding should be determined based on a 'standards of cover' approach (similar to that applied to bushfires) that includes measures for impacts on biodiversity and determines a fair level of contribution from government, landholders, business and industry.
- New sources of long-term funding should be investigated for weed management programs, including levies from risk creators and beneficiaries, to maximise the potential for success.

4 Evidence-based decision making

- Respondents stated strong support for standardised approaches for weed mapping, information management, and monitoring and reporting. Data is necessary to clearly demonstrate that weeds are an extremely serious threat to agriculture and native biodiversity, and evidence is essential for effective decision making across all aspects of weed management, including building confidence in program priorities, understanding impacts, and assessing the outcomes and cost-effectiveness of management actions and programs.
- Submissions note that surveillance and early response capacity should be improved to respond quickly to new weed incursions.

- Examples of effective weed management information and mapping systems included:
  - commercial software such as WeedTr@cer and Weedmap Pro
  - the Department of Primary Industries website and extranet
  - council in-house registers and mapping programs
  - airborne remote-sensing hyper spectral imagery with filter mapping algorithms
  - time lapse aerial photography
  - the Land Management Database currently used by CMAs for collating spatial data relating to on ground investment
  - MCAS-S, a multi-criteria analysis spatial data tool
  - Atlas of Living Australia
  - the Bushfire Risk Information Management System style of electronic database/portal
  - stakeholder identification, for example, exhibiting local maps at local events and asking landholders to record known infestations
  - weeds GIS smart phone apps for weed reporting, mapping, and identification.
- Examples of standardised monitoring, evaluation and reporting included:
  - MERV (Monitoring and Evaluation of the Restoration of Vegetation)
  - Reflect
  - MERI (for example the Riverina MERI plan for WAP).

5 Research and development

- There was general consensus that funding for weed R&D is nowhere near sufficient considering the impacts and potential impacts of weeds, and that funding has been declining for the past 15 to 20 years. Submissions stated this was likely to have a long-term impact on our ability to develop best practice and maintain an effective knowledge base.
- The two factors identified for the decline in weed R&D were the loss of the Cooperative Research Centre for Weed Management and a significant reduction in DPI research capabilities as a result of restructures. There was support for a national weed research facility.
- Submissions agreed that strategic, long-term funding is required and that research initiatives should be coordinated at a state level, through the DPI, with input from all stakeholders to identify topics and priorities. The involvement of LCAs and landholders in research trials was proposed to increase the value of research outcomes and facilitate adoption and dissemination.
- Suggested research priorities included Integrated Pest Management techniques to target high-priority species, understanding the ecology and spread of new and emerging weeds, biological control agents, weed pathways, and the potential effects of climate change on weed threats and spread.

Attachment D: Summary of submissions to the draft report

The Natural Resources Commission (NRC) invited submissions on its draft report and recommendations. A total of 108 submissions were received, and can now be accessed via the NRCs website: http://nrc.nsw.gov.au/Workwedo/ReviewOfWeedManagementInNSW.aspx. In addition, 206 submissions were received in response to the initial issues paper released in 2013.

The greatest number of responses were received from Local Government organisations (councils, county councils, weed authorities, etc). Submissions were also received from individuals, community organisations including Landcare and Bushcare groups, environment and other government organisations and industry groups.

Almost half the submissions (52) supported the draft report and recommendations; 16 submissions did not support the draft report and its recommendations; and 40 submissions commented only on specific content or particular recommendations.

While the seven draft recommendations were generally supported, submissions raised concerns about adequate, long term funding models and practical steps to implement each recommendation.

The following summary provides an overview of the key issues raised in the submissions, but it is not exhaustive. The focus is on the level of support for and extra detail required to implement the draft recommendations. Some alternatives to the recommendations are described.

1 Revised model for weed management in NSW

1a. Tenure neutrality

Submissions in support of the revised model for weed management in NSW sought "greater consistency in how weeds are approached and managed across different types of land tenure". There were calls for minimum obligations and standards to be set for weed control on all public lands.

Community and environmental groups requested "control of environmental weeds receive the same priority as control on agricultural land, as part of the 'whole of landscape' approach involving all land tenures for effective control."

Other submissions did not see the definition of "tenure-neutral" in the report as truly "tenure-neutral", noting changing the legislation to allow Local Control Authorities (LCAs) to issue Section 18 notices directly to government authorities would achieve the same outcome.

1b. Simplified weed categories

Submissions generally supported the three simplified weed categories that align with the NSW Invasive Species Plan (ISP) goals to "exclude and eradicate or contain new invasive species, and effectively manage widespread invasive species".

Other submissions expressed concern that the "widespread" weed category may contain too large a number of weed species for the community to manage.

A simple categorisation of "noxious" and "non-noxious" weeds was described as the way landholders currently understand their weed management obligations.

2 Accountability for new weed incursions

2a. Reserve fund

General support for a reserve fund for responding to new high-risk incursions was tempered by requests to extend the levy from Local Land Services (LLS) ratepayers to a much broader levy base, including all ratepayers and risk creators like the plant nursery industry. Government seed-funds or a co-contribution were requested. A single state-wide biosecurity levy could be an alternative to rate-based levies.

$1.5-2 million reserve fund was considered an appropriate quantum for the fund.

2b. Enforceable weed eradication plans

Enforceable weed eradication plans were supported. Local government submissions sought the inclusion of LCAs and the Regional Weed Committees in funding negotiations for enforceable eradication plans between the NSW Department of Primary Industries (DPI) and LLS.

Questions relating to the implementation of these plans included:

- define the boundary between rapid response and implementation of eradication plans
- what happens to weed incursions that are not eligible for reserve funds?
- who will enforce the plans?

Respondents recommended eradication plans include:

- modelling of incursion impacts
- protocols for quick funding access, clearly communicated to LCAs
- monitoring and reporting on environmental weeds
- planning at any level, but always down to the local level
- application of the precautionary principle to recognise that environmental impacts of new weeds are difficult to predict
- a maximum length of time to develop implement plans so that the response fund is not unduly taxed.

Submissions that did not support enforceable weed eradication plans recommended the formation of a single body – either a State Coordinating Committee or Weed Authority similar to the Prickly Pear Destruction Committee – to plan, set policy and fund eradication of new weed incursions. Others recommended the State Government fund and implement eradication plans.

3 Simplified, transparent weed declarations

3a. Three weed categories

The submissions generally agreed with the simplification of weed categories from five down to three. The three categories align with the NSW ISP goals for invasive species prevention and management.

Concern was expressed that the proposed three weed categories do not align with the five weed categories in neighbouring Victoria, and that five categories can better reflect regional requirements.

Better definitions were requested for "weed", "eradication" and "management". It was suggested that weed categories should be defined at finer-than-state scale, e.g., by region, within a local control area, and that regional weed plans be allowed to define independent weed category lists for each region.

At least six LCA boundaries straddle the new LLS regional boundaries and there are calls to clarify the involvement expected of these local councils in Regional Weed Committees.

Environmental groups sought a revision of the *Noxious Weeds Act 1993* to allow reporting on the full extent of the NSW weed problem, not just reporting of activity against the limited listed weeds.

3b. Ministerial Weeds Advisory Committee

The submissions generally agreed with the proposal to establish a Ministerial Weeds Advisory Committee (MWAC) responsible for transparent weed declarations. Formation of MWAC should consider:

- balancing membership to be representative across all tenures including professional weed officer, local government, stakeholders, landholders, agri-business managers and the Office of Environment and Heritage
- a skills base that includes sound science, economics, social science, ecology, best practise, operational weed management, weed risk assessment, systems thinking and scenario planning
- 3-5 year terms for representatives
- establishing a reference group with membership from LCAs, Regional Weed Committees, weed officers
- offers to participate from the Australian Association of Bush Regenerators, the NSW Farmers Association, the Nature Conservation Council, existing Regional Weed Advisory Group members, and the Weed Officers Association.

Recommendations for a "terms of reference" for MWAC included:

- applying the principle that "all weeds will be declared in areas where impacts exceed the cost of enforcement" then consider other influences
- visits to consult with communities
- clear processes to remove weeds from lists and manage risk, and policies based on ecologically sustainable development principles

- coordination of noxious weed management
- communication of recommendations and releasing meeting minutes to the community
- environmental weeds and their impacts
- frequent opportunities for weed listings
- development of a standard strategic plan template for Regional Weed Committees, and building connections with and between these committees.

Submissions that did not support the establishment of a MWAC were concerned that weed declaration would not be timely. Alternative proposals were:

- LCAs should declare economic weeds, subject to a light audit of outcomes
- Regional Weed Committees could temporarily declare weeds under Section 10 of the *Noxious Weeds Act 1993*
- a State Weed Coordinating Committee providing technical advice and consistency across state and regional levels.

3c. Permitted list

The proposal to establish a permitted list was well-supported by the submissions, with suggestions to develop education programs to increase the awareness of the list amongst residents near bushland, and plant nursery and pet store owners.

Issues suggested for consideration when developing and implementing the permitted list included:

- experts in weed risk assessment to prepare the list, not the nursery industry which was perceived to have a conflict of interest
- establish thresholds for permitted plants and develop risk assessment protocols
- plan and resource monitoring and compliance, and consider enforcement at cost recovery to plant nurseries
- consider regional permitted lists
- align existing lists, including the Commonwealth Department of Agriculture ICON database and the Lord Howe Island Bureau prohibited and approved species lists, and consider an "eastern seaboard" approach to align with Queensland, ACT, Victoria and South Australian weed listings.

To ensure internet plant sales comply with the permitted list, DPI was nominated to monitor internet plant sales and advise LCAs to enforce.

The permitted list was seen as harder to enforce than the prohibited list.

4 Regional and local management of widespread weeds

4a. Continued local level service delivery by Local Control Authorities

Respondents generally supported the continued delivery of local weed management services by Local Control Authorities. Some recommended the use of the term "LCA" in the report be replaced with "Local Government" or "Council" to acknowledge these organisations as local weed management service providers.

Submissions highlighted the need for funding and grant levels to be at least maintained to continue to support existing resources, experienced and skilled staff, landholder relationships, and property weed management plans.

Respondents questioned the impact of the potential formation of larger regional councils on local service delivery by LCAs.

There were calls to clarify enforcement on Travelling Stock Reserves.

It was suggested that the LLS should coordinate regional weed management to support LCA local service delivery. The Monaro Regional Weed Committee was offered as a model for local delivery and sub-regional coordination.

One submission suggested roadside weed control would be more cost-effective if opened to tender.

4b. Statutory Regional Weed Committees

Submissions were generally supportive of the formation of Regional Weed Committees, although some concerns were raised.

Increased administration costs and the "creation of an extra layer of bureaucracy" were some of the concerns raised. One LCA noted that the Bush Fire Management Committee model had increased bush fire related administration costs by 43% and resulted in untimely advice.

A respondent noted research by the DPI that found weed management is a human behavioural challenge, making legislative approaches alone, like enforceable regional plans an ineffective way to manage widespread weeds.

Submissions that were not certain that the proposed Regional Weed Committee model would significantly increase effectiveness over the current model offered alternatives:

- retaining the existing Regional Weed Advisory Groups with LLS committing a person to participate in the WAP and be the point of contact for LCAs and other weed stakeholders
- using each community's preferred model of support, e.g., Landcare networks, larger producer groups, some local governments or LLS
- establishing an agency, community and industry Authority to coordinate action on both weeds and pest animals based on the Bush Fire State and Regional Committee model
- under the *Local Land Services Act 2013*, LLS should establish three committees: Environmental Management (incentives, agreements), Agricultural Land Management (integrated land management) and Vegetation Technical advice. The roles and scope of these committees would be:

- control of widespread economic weeds with grass-roots landholders
- membership: all relevant LCAs and LLS
- five year sunset
- grant funds for public good work and fee for service for individuals or landholder groups
- minimal overheads.

The transfer of weed management responsibilities to a "joint organisation" was considered consistent with the Independent Local Government Review Panel proposal but inconsistent with the guiding principles for quality weed management systems.

Submissions in support of statutory Regional Weed Committees advised committee membership should represent a range of interests and skills:

- environmental (Office of Environment and Heritage, Nature Conservation Council)
- weed management (NSW Weed Officers Association, nominated local government)
- private landholders (NSW Farmers, rural and urban landholders)
- public land managers with the authority to make decisions and commit resources on behalf of their organisation
- committee-appointed Chair
- coordination by a Regional Weeds Coordinator/Project Officer, possibly shared by several LLS.

Suggestions for the administration and scope of a Regional Weed Committee included:

- a modest, part time secretariat funded by 10 per cent of Weed Action Program (WAP) funds to avoid LCAs contributing management fees
- sub committees for compelling reasons, e.g., large LLS regions, regions with large urban populations
- cross-regional and cross-border interaction
- tenure-neutral inspection, control and investment programs for each LCA supported by monitoring, evaluation and reporting processes and structures
- extension delivery, training, coordinated management of plans at regional and local scales
- retain the structure and membership of existing, well-performing Regional Weed Advisory Groups, and build upon existing regional and WAP plans
- work with existing stakeholder communication structures, e.g., NSW Farmers, to facilitate government-farming community communication
- oblige and enable public land managers to regularly meet environmental land management obligations.

4c. Regional Weed Committees to develop regional plans

Submissions were generally supportive of Regional Weed Committees developing regional weed plans, although this recommendation was not supported by some submissions.

One submission stated that "farmers and Shires know where weeds are and how to control them" and another, that existing audit functions provided adequate control. Submissions opposing this recommendation wanted the existing planning structures to continue.

Submissions supporting this recommendation suggested a range of existing information be incorporated into regional weed plans:

- existing Invasive Species, Regional Weed Advisory Group and WAP plans, and proposed biosecurity legislation
- intense extension and education programs and government intervention and enforcement activities to make the community aware of the plan contents, similar to the Victorian approach
- the guideline for development and assessment checklist for strategic weed control plans developed by the Invasive Plants and Animals Branch of DPI
- coordination with the State Water Environmental Management Plan and future Environmental Management System planning.

It was proposed that the structure and content of regional weed plans should:

- define clear reporting and accountability functions driven by competent individuals based on a consistent template that ensures regional and cross-regional consistency
- use cost/benefit analyses when determining regional priorities
- be more strategic than the "operational Bush Fire Management Plans"
- educate and establish community ownership of weed management, e.g., weed densities at bushland/urban interfaces, urban impacts on the world-heritage listed Blue Mountains, to ensure land managers are clear about their regional weed management obligations
- develop effective ecological approaches to weed management, e.g., links to land clearing, fire and nutrients; manage vectors like pest animals; incorporate the principles of bush regeneration; ecological burns with regular follow-up
- document the extent and impacts of environmental weeds on biodiversity to identify solutions
- clarify interaction between regional weed plans and the roles and responsibilities of NSW government.

Funding considerations for planning, drafting and implementing regional weed plans included:

- the potential for administration costs to reduce funds available for on-ground weed control
- the need for a framework for LCA and State funding that provides funding certainty for at least five years
- the ability to carry over weed management funds allocated in the plan, due to seasonal impacts on programs
- applying a risk management framework to allocate funds for each sub-region, then the broader LLS region
- current WAP and levy funds being inadequate to support the additional activities and staff resources identified for LLS

- meeting community expectations of the proposed weed management arrangements will rely on local government support
- clarifying who will draft the plan/s.

Six inland LCAs straddle LLS regional boundaries, requiring consideration of how differing regional weed management priorities will be enforced by these LCAs.

4d. Regional Weed Plan content and adoption

Submissions generally supported the process for developing Regional Weed Plans. Comments relating to awareness, education and extension, included:

- targeting audiences appropriately:
  - education programs for urban audiences at a different scale to rural audiences, as well as joint training for volunteers and landholders in bush regeneration and weed control, to strengthen the sense of community
  - use of DPI Community Based Social Marketing techniques to change behaviour
  - advertising the potential to transport seeds and mud in soil on vehicles to excavation, harvesting and recreational industries
  - using a Google-based central weed database to allow the public, Bushcare, Coastcare and other community groups to enter data on weed species, locations and control activities across Australia similar to www.feralscan.org.au
- encouraging and rewarding compliance with good practice and the law
- preparing and making available educational materials, codes of practice, case studies and new and existing tools that capture best management practice from research, practical knowledge, experience and ecological approaches to assist public land managers and landholders to effectively deal with weeds
- voluntary land management plans.

A suggested alternative was a commercial cooperative based on incentives that reduce the cost of herbicide for landowners with a Property Weed Management plan.

4e. Align state and national funding with regional priorities

Submissions generally supported this recommendation.

It was noted that number of problems arose from past allocations of national and regional funding at the local level:

- a bias toward new programs rather than adequately funding longer-term control, reducing community confidence in wasteful, stop-start projects
- national priorities over-riding regional priorities, e.g., funding willow control under the Weeds of National Significance when regional stakeholders identified African lovegrass control as a higher priority
- state funding for weed control solely to protect natural assets rather than roadside and verge weed control programs that also protect bushland, parkland, farm land and regional biodiversity.

Submissions supported the development of a funding model to determine a fair level of contribution from governments, landholders and businesses/industries. Increases in State and Local Government funding were recommended for prevention, early-action and long-term control of environmental weeds.

Alignment of cross-border policies was supported to ensure weeds are not deliberately or accidentally introduced into the state.

5 Improved performance and accountability

5a. Strengthening enforcement provisions

A majority of submissions supported strengthening enforcement provisions.

Opposition to this recommendation focused on the transfer of enforcement action from LCAs to LLS. One submission suggested a "bias" in the report towards LLS being the governing structure with enforcement capability for weed management in NSW. Several questioned why LLS would have more resources and capability for enforcement, and if it could provide a more timely response to non-compliance. Stronger legislation could break down existing capacity-building relationships between LCAs and landholders. The LLS model would be difficult to implement in remote Lord Howe Island.

A review of "red tape" around the proposed handover of enforcement duties from LCA to LLS would determine any reduction or need to increase resources for:

- separate data systems
- court appearances by both LCA and LLS staff
- administrative costs of contracting control work back to LCA through LLS.

Several submissions suggested increasing the capacity of landholders to identify and manage weeds through education and awareness programs. A stewardship incentive could offer a 150 per cent tax write off for effective use of "fit for purpose" chemicals exclusively targeting noxious weeds.

Several alternative models were suggested for prosecution of non-compliant landholders:

- train Weed Officers in prosecution of non-compliant land managers to prevent weed spread in a more timely manner
- the NSW Environmental Protection Authority could prosecute serious breaches of the *Noxious Weeds Act 1993*
- the Land and Environment Court could hear appeals against enforcement decisions by LCAs (or LLS), rather than Local or District Courts
- LLS could seek an order from the Land and Environment Court to undertake weed control work estimated to cost more than $15,000 on properties larger than 40 hectares
- allow third parties to enforce weed laws so that any person can take civil proceedings to remedy weed control breaches.

It was suggested that increasing the ability to prosecute breaches of the *Noxious Weeds Act 1993* may increase the demand for professional weed identification services to verify weed status in

prosecutions. Escalating more cases to prosecution may overwhelm LLS resources and the court system.

Suggestions about the compliance model included:

- Test the proposition that proposed government agencies not involved in natural resource management should enforce compliance. Separate enforcement roles from roles designed to assist, advise, offer incentives, reward and provide information to land managers.
- Establish and fund a small, experienced regional biosecurity team to ensure compliance across pest and weed legislation.
- Establish a state-wide body answerable only to the Minister to achieve compliance with pest and weed legislation.

Many LLS positions are funded to manage specific, externally funded projects, not enforcement activities. It was suggested that the proposed LLS enforcement obligations risk duplicating administrative and legal functions in other government agencies, e.g., the NSW Environmental Protection Authority.

5b. State-wide service-delivery standards

Developing state-wide service-delivery standards for LCAs was one of the more strongly supported recommendations in the Draft Report. It was not supported by a small number of submissions.

Several submissions emphasised that the *Noxious Weeds Act 1993* adequately defines the standard. Reports against the Weed Action Plan and independent audits of LCAs were deemed adequate audit processes, and concerns were raised about the impact of proposed audit costs on on-ground work.

Responses expressed doubt that specific delivery standards could apply across the range of LCA scales, populations, landuse types and socio-economic levels.

The capacity and commitment of a government agency to audit another government agency against standards was questioned. Some submissions suggested the appointment of an independent auditor from the NRC or the Internal Audit Bureau.

Submissions offered several audit standards for consideration:

- ensure all audit measures against LCAs are supported upwards within DPI to enable performance of LCAs to be managed for improvement
- use a generalised, state-wide standard under the proposed Biosecurity Act, consistent with accepted Australian/industry standards
- consistency with current duties of Councils for noxious weed management
- allow recognition of excellent performance by LCAs.

It was suggested that where LCAs do not meet their obligations, legislation should allow for all weed-related LCA funding to be handed over to LLS to support the extra compliance and enforcement duties. An alternative model is for County Councils to take over the roles of non-compliant LCAs via a "directive from the Minister" to encourage voluntary compliance by LCAs.

Submissions requested an adequate funding model to allow LCAs to meet their obligations and maintain data.

Several submissions interpreted "audit" as limited to financial audits, not organisational performance to achieve outcomes.

Many submissions requested service-delivery standards should also be developed for the DPI and LLS.

5c. Independent state-level audit of LLS and DPI performance

Submissions supporting this recommendation emphasised the need for better measurement and reporting of outcomes, and the need to hold organisations and individuals responsible.

A small number of submissions did not support this recommendation, with some stating that the level of reporting to acquit WAP grants was adequate.

Submissions suggested that the role of auditor could be done by a State Wide Coordinating Committee that is independent of stakeholders in weed management, or the Auditor General under the *Local Government Act 1993*. An auditor should have sufficient expertise to understand any reasons behind variation in performance. One submission rejected auditing of the DPI by the current Noxious Weeds Advisory Committee.

5d. Consistent state-wide mapping

Support was strong for consistent state-wide mapping.

Several effective weed management information and mapping systems were recommended for review. These suggestions were consistent with those offered in submissions to the Issues Paper (2013).

Privacy issues were commonly raised in submissions. However, some submissions assumed that data and reports would be accessible to a wide range of end-users including community groups and individuals.

One submission recommended a public on-line system where data on weed species and locations could be entered by individuals, organisations and community groups. Data could be interrogated by land managers and LCAs to identify and remove weeds before they get out of hand. The website could show a dot with different colours indicating 'reported', 'removal in progress', 'removal complete' and 'monitoring' and the type of weed reported with a picture, similar to www.ausgrid.com.au/streetlight .

Submissions suggested a number of design principles for the proposed state-wide mapping system:

- innovative, fit-for-purpose, user-friendly with an easily-edited spatial database to help land managers strategically manage landscapes
- capture monitoring and reporting data, control work, outcomes, and property weed status certificates
- a staged implementation based on mapping new incursions first, then widespread weeds at priority sites and along containment lines, then broader widespread weed infestations
- determine user access levels that meet privacy requirements and reporting needs.

Several submissions nominated DPI to evaluate software options, fund/provide at no cost and manage the mapping system, make WAP funding contingent on using the recommended mapping system and train system users. LLS should maintain a dedicated mapping systems team.

5e. Data readily available to stakeholders and regional managers

Submissions generally supported this recommendation although the number of responses and comments were low. Data was seen as valuable to improve accountability to all stakeholders and when adapting management plans and strategy in response to environmental and financial constraints to programmed weed control activities.

To protect landholders' rights to privacy, guidelines and standards for data input and access should be clarified for a range of stakeholders:

- the general community
- volunteer groups, e.g., Bushcare, Landcare, Coastcare and others working on weed management projects
- planners
- agency managers and staff.

6 Risk management

6a. General biosecurity obligation

Creating a general biosecurity obligation for all stakeholders was supported by the submissions. Concerns were raised about the scope of the obligation and the risk that application of codes of practice to some but not all stakeholders, e.g., rural not urban populations, was not consistent with the "tenure-neutral" approach to integrated weed management.

It was emphasised that the obligation should be supported by a robust and meaningful public engagement and education strategy to ensure a good understanding of the concept of "shared responsibility for weeds", particularly for weed management outcomes on a cross-tenure basis.

Suggestions included:

- preparing educational materials and codes of practice focusing on high-risk pathways and incorporating the principles of bush regeneration and integrated pest control
- emphasising the importance of a nil-tenure approach
- focusing on preventing weed incursions.

Questions relating to the general biosecurity obligation included:

- What is the impact on cooperative action of local government's exclusion from the Intergovernmental Agreement on Biosecurity?
- Clarify the term "reasonable and practical".

6b. Property weed status certification scheme

While support for a property weed certification was high, several submissions did not support this scheme. Submissions focused on the certification process, rather than regular inspection of

properties for weeds. In many submissions, support for this recommendation was contingent on the issue of a weed status certificate on the sale or transfer of land only.

Adoption of the proposed inspection and certification program drew many suggestions from a range of submissions, including:

- develop a schedule of fees for certification to be based on the size of a holding, not a simple fee per inspection. Cootamundra Shire Council has a voluntary fee of $54 for new owners to check for outstanding Notice for Noxious Weeds on a property.
- landholders should sign the certificate, agreeing to maintain the property at the assessed weed status for 3-5 years
- acknowledge that a certificate cannot provide an absolute "weed-free guarantee" but rather weed status at a point in time
- consistent inspection and certification protocols, including disclaimers on certificates
- consider the impact of introducing this scheme on other duties including re-inspections, on-ground weed control and educational activities and programs
- inspectors on public land be permitted and funded to control minor incursions of readily-controlled weeds during inspections
- establish a register of landholders requiring help with weed removal for assistance from professional bush regenerators, the Green Army and volunteer groups
- funding is not available to inspect public lands
- running a pilot to evaluate the scheme prior to state-wide implementation.

Many LCAs endeavour to have properties with serious weed issues under notice if they are for sale. Some also provide an estimate of costs to control the weed in information provided to prospective buyers. If certification of weed status prior to sale or transfer of land is mandated:

- consider extending the certification to all properties, including urban and industrial
- attach the weed status certificate to a contract for sale similar to the Section 149 Certificate, with a certification fee charged to the vendor when the property is put on the market. If the property is not already in the inspection program, purchasers could request an updated weed certificate for a fee, similar to Building Inspection Certificate, although these cannot be provided to a third party, e.g., conveyancer, land agent.
- acknowledge that a certificate cannot provide an absolute "weed-free guarantee" but rather weed status at a point in time.

Questions included:

- How will compliance work if weeds are identified on the certificate?
- How will LLS know when land is being sold?
- Could compulsory certification delay property transactions?
- What liability will a Council General Manager have for certification inaccuracies and any impacts on landholder's commercial enterprise and land value?
- Can historical weeds data be used as part of the certification scheme?

Alternative models to the inspection and certification model proposed in the draft report included:

- landholders self-certify the noxious weed status of land, providing a statutory declaration to the LLS
- LCAs or LLS generate a weed status document for sales/transfers from weed data within (say) a 1km radius, based on extreme (red), high (amber) and moderate (green) risk assessment of established declared weeds in that locality. Urban red zones may be properties in the vicinity of bushland.

Many funding issues were raised. Concerns were raised that this model represents cost shifting from state to local government. One submission stated that LCA prioritisation of resources for inspections will be a key component of positive weed reform in NSW.

6c. Registration of commercial entities

The proposal to register commercial entities whose activities generate weed risks was generally supported. Submissions indicated stronger support for registration of plant nurseries than fodder producers. Other entities recommended for registration were:

- florists
- pet shops
- construction
- public utilities
- road maintenance
- livestock movements
- landscapers
- gardeners
- horticulture
- plant importers
- quarries
- sand mines
- livestock agisters
- lawn turf producers
- tourism companies.

Supporters of this proposal described registration as "a market-based incentive to control weeds."

Suggestions for plant nursery registration included that:

- monitoring and compliance by LCAs and LLS should also cover plant sales over the internet and community trading in plants
- registration should be supported by an education campaign, incorporating on-line tools to educate consumers about invasive plants, e.g., the Invasive Plant Assessment Tool in development for Nursery and Garden Industry Australia.

Suggestions for fodder registration included:

- a voluntary or mandated certification system should show a net benefit exceeding the costs to avoid additional administrative burdens
- address the lack of interstate fodder certification to avoid perverse outcomes during drought (vendors trading outside of area to attract a higher price)
- clarify who would implement and enforce the procedure and the mechanisms
- limit certification to priority weeds of improved pasture, eg, invasive grass some broadleaf weeds. Weed lists to be determined by LCAs in consultation with LLS and DPI.
- establish buffer zones around identified high priority weeds where no commercial activities are undertaken
- consider whether a weed is an issue in the receiving location
- clarify the proposal is to certify the weed status of the property where fodder is produced, not the product or distributors
- running a pilot to evaluate the scheme prior to state-wide implementation.

Clearly defined "eligible entities" should register through a state government managed and maintained database for a prescribed fee that is not a barrier to smaller operators. Weed status certification should be required for (re-)registration.

The Australian Fodder Industry Association (AFIA) stated this proposal is not an appropriate tool to enact the provisions of the *Noxious Weed Act 1993* in relation to fodder. AFIA prefers an approach that specifies the noxious weed status of hay via a voluntary vendor declaration.

Other suggestions to reduce weed risk from fodder included:

- a quality assurance program for farm weed-free accreditation based on weed significance (potential for spread), and presence of weed at destination (i.e., weed in shipment would not be a major concern at destination)
- a farm hygiene scheme similar to those in the grains and intensive agricultural industries
- a regional assessment system similar to "scores on doors" for food establishments
- voluntary scheme to certify free of declared weeds at time of inspection for vendor "premium" for specialist hay producers.

Objections to registration focused on the potential of the proposal to increase red tape and that the review should focus on preventing weed incursions at key state and national entry points.

6d. Greater self-management of weed risks

This recommendation was supported by many submissions, although several submissions did not support greater self-management of weed risks by competent parties.

The proposal prompted many calls for long-term funding from state and local government and the WAP, along with range of questions on how such a scheme would operate and achieve compliance, for example:

- certification of farms against best management practice
- clarify who will manage the scheme/s and externally audit compliance agreements, and fit with the Biosecurity Act working paper
- running a pilot to evaluate the approach prior to state-wide implementation.

Objections to this proposal focused on industry self-interest reducing any commitment to assessing weed risks, and the imposition of more fees and charges in addition to industry contribution fees, LLS levies and certification fees on the farming community.

6e. LLS as the authority to control aquatic weeds

The recommendation to appoint LLS as the single authority to control declared aquatic weeds appeared to attract the lowest level of support of all the draft recommendations.

Submissions opposing this recommendation often interpreted the term "control" as on-ground aquatic weed control rather than planning and coordination. Many responses suggested restricting the LLS role in aquatic weed management to "planning and coordination" functions, suggesting support for the intent of this recommendation. The recommendation should be re-written to reflect a coordination role for LLS, rather than "control".

The recommendation to advocate for a review for obtaining a minor use permit to improve access to herbicides for weed incursions was generally supported. This recommendation was not supported if it reduced research investment in new herbicides.

Alternate models for aquatic weed control were proposed, for example:

- A single, state-level organisation or group should be responsible for aquatic noxious weed management, based on a clear strategic framework and the economics of control for both aquatic and environmental weeds. Splitting planning and control functions may lead to treatment delays.
- Waterway surveillance for waterweed detection should be a "Capacity Building" exercise, locally. Landowner's obligations to search for, locate, report and ultimately to manage, should be reinforced, not diminished.
- DPI should maintain and fund aquatic weed management at state level.

Several submissions sought a clearer explanation of how the proposed "tenure neutral" approach would affect aquatic weed management.

Interim arrangements should ensure on-ground control of aquatic weeds in streams and in irrigation channels continues.

7 Research and development

7a. Rebuilding and maintaining NSW weeds research capacity

Rebuilding and maintaining NSW weeds research and capacity was strongly supported by the submissions, particularly for research findings that help local agencies, weed management professionals and landowners improve their capacity to implement effective weed control programs.

Extra investment was sought to increase research into weed ecology and biocontrol.

One submission noted that "most of the work has been done by private as well as government organisations and is available on the internet".

Suggested research priorities included: integrated pest management techniques to target high priority species; understanding the ecology and spread of new and emerging weeds; biological control agents; weed pathways; and the potential impacts of climate change on weed threats and spread.

7b. Secure, long-term funding strategy

Submissions generally supported the development of a long term funding strategy for weeds research and development, noting that funding should not allow for cost-shifting to local government, and the impacts of climate change may exacerbate weed issues.

7c. Prioritising areas for research and strategic investment

Submissions supporting this recommendation also suggested involving local weed managers and the Regional Weed Committees in setting weed research priorities. The active involvement of weed managers in salvinia weevil research was cited as a good example.

Weed research priorities were recommended in many of the submissions:

- understand, quantify and utilise the crop-weed biomass dynamics for carbon capture and medicinal uses
- more effective ecological approaches to management and a better understanding of the consequences of NSW environmental weed problems
- a biocontrol agent for fireweed and other widespread weeds
- weed identification, categorisation and the environmental/economic/social impacts
- large scale techniques and rehabilitation specifications to prevent the widespread development of weed nurseries on disturbed ground, particularly along roadsides, railway lines
- genetic or species detection by satellite imaging systems so that specific weeds can be located, targeted and defeated
- research into control options to eradicate new weed incursions
- alternative weed control treatment to reduce reliance on chemical herbicides.

One submission proposed the outcome of prioritising weed investments should be a long term, substantial, triple bottom line benefit that:

- improves animal and human health outcomes
- increases and improves food and fibre production with expanded job opportunities
- preserves, protects or revitalises isolated and endangered or depleted biodiversity populations or ecological systems.

7d. Communicate research findings to land managers

Submissions supported the communication of research findings to land managers, proposing the design and implementation of a comprehensive extension program by a professional extension workforce, rather than by researchers.

Roles in extension of research findings were identified for LCAs, DPI, LLS and schools.

Tools identified for extension included existing packages delivered through Technical and Further Education (TAFE) colleges, a virtual research centre or central repository to organise and make available the latest findings, a smartphone app to identify weeds and note the location, field days, and timely distribution of fact sheets with rate or levy notices.

One submission noted that "every farmer knows all the control and eradication methods – it is not difficult to work out what needs to be done for each weed type".

7e. Manage risk of herbicide resistance on roadsides

This recommendation was generally supported by the submissions, although public land managers noted that legal and practical restrictions may mean that sometimes the same chemicals/techniques must be used, e.g., the four-month withholding period for flupropanate means only glyphosate can be used on travelling stock reserves.

Public land managers offered to share recently published guidelines on integrated weed management practices to better manage herbicide resistance.

Attachment E: Summary of consultation

The Steering Committee was consulted throughout the review. The Steering Committee consisted of Cr Reg Kidd, Chair of the Noxious Weeds Advisory Committee; Dr Bruce Christie, Executive Director of Biosecurity NSW, Department of Primary Industries; and Mr Mick O'Flynn, Senior Manager Nature Conservation, Office of Environment and Heritage. Staff from the Department of Primary Industries and the Office of Environment and Heritage also provided valuable input throughout the review.

Review meetings

Date	Organisation/Representatives
2013	
10 September	NSW Weeds Officers Association Presentation to Association meeting at the 17th NSW Weeds Conference and meeting with representatives
11 September	Hawkesbury River County Council and New England Weeds Authority
27 September	Biosecurity and Resources Working Group of the Primary Industries Ministerial Advisory Council
30 September	Issues paper workshop - participant list below
10 October	LLS Regional Biosecurity and Emergency Service Managers
15 October	Australian Weeds Committee research workshop CSIRO, State and Commonwealth agencies, RDCs
17 October	Presentations to review Steering Committee: DPI, Biosecurity NSW, NSW Weeds Officers Association, National Parks and Wildlife Service
18 October	Meat and Livestock Australia
21–22 October	Regional tour - Mid-north coast and New England ▪ Mid-north coast regional weed coordinating committee, and weed officers of constituent councils ▪ National Parks and Wildlife Service ▪ New England Weeds Authority ▪ Northern Inland Weeds Advisory Committee ▪ New England Landcare ▪ DPI
23 October	Noxious Weeds Advisory Committee: NSW Farmers; Landcare; OEH; Southern Rivers CMA; Nature Conservation Council

Date	Organisation/Representatives
29 October	Linear Reserves Focus Group Meeting ▪ Senior Environmental Officer - Ausgrid ▪ Client Liaison and Environment Manager - Roads and Maritime Services ▪ Institute of Public Works Engineering Australia NSW ▪ Local Government NSW ▪ Nature Conservation Council ▪ Executive Officer - Roadside Environment Committee
30 October	Forestry Corporation of NSW
5-6 November	Regional tour – South east and Monaro ▪ Bega Valley Shire Council ▪ Eurobodalla Shire Council ▪ Towamba Landcare ▪ Bega Valley Fireweed Association Southern Rivers CMA ▪ Monaro Regional Weed Advisory Committee ▪ NPWS ▪ DPI ▪ Cooma-Monaro Shire Council ▪ Snowy River Shire Council ▪ Bombala Council ▪ Towamba Landcare ▪ Maclaughlin River Landcare ▪ Snowy River Interstate Landcare ▪ Local landholders
7 November	Regional tour – Western Sydney ▪ Hawkesbury River County Council ▪ NPWS
8 November	Meeting with OEH on distribution and abundance of weeds and weed control orders
8 November	CMA Chairs Council
11 November	Australian Weeds Committee
11 November	Department of Agriculture Biosecurity Policy Division
11 November	Department of Agriculture Sustainable Resources Management Division
11 November	NSW Aboriginal Land Council
13 November	NSW Treasury

Date	Organisation/Representatives
13 November	Public Land Managers - Focus Group Meeting ▪ NSW Crown Lands ▪ Forestry Corporation of NSW ▪ Sydney Catchment Authority ▪ State Water ▪ Office of Environment and Heritage
22 November	NSW Environmental Trust
25 November	Nursery and Garden Industry Association NSW and ACT
28 November	Western Lands Commissioner and NSW Crown Lands
3 December	National Parks Advisory Council
4 December	Regional Tour - Orange ▪ Mid-Western Regional Council ▪ Orange City Council ▪ Lachlan Landcare ▪ Eastern Riverina Noxious Weeds Advisory Group ▪ DPI Emergency Operations ▪ Rural Fire Service ▪ NPWS ▪ Local landholders ▪ Lachlan Valley Weeds Advisory Committee
9 -10 December	Regional Tour - Lightning Ridge and Walgett ▪ Lightning Ridge Mining Association ▪ Glengarry Grawin Sheep Yards Miners Association ▪ NSW Farmers ▪ Western Lands Advisory Council ▪ Crown Lands ▪ Western Lands Commission ▪ Walgett Shire Council ▪ NPWS ▪ DPI ▪ Macquarie Valley Weeds Advisory Council ▪ Namoi Catchment Management Authority ▪ Western Catchment Management Authority
12 December	Sydney Trains

Date	Organisation/Representatives
2014	
6 February	Local Land Services
19 February	NSW Farmers
21 February	Local Government NSW
21 February	Nursery and Garden Industry Association NSW and ACT
21 February	Land and Water Advisory Panel
21 February	NSW Weeds Officers Association
11 March	Noxious Weeds Advisory Committee
19 March	Public meeting Grafton
20 March	Public meeting Armidale
20 March	Primary Industries Ministerial Advisory Council
21 March	Public meeting Dubbo
25 March	Public meeting Cowra
26 March	Public meeting Parramatta
27 March	Public meeting Wagga Wagga
28 March	Public meeting Nowra
3 April	State Water Corporation
4 April	Presentation to Sydney Weeds Professional Forum 2014
7 April	Local Land Services
8 April	Division of Local Government
15 April	Nursery and Garden Industry Association NSW and ACT
30 April	Australian Fodder Industry Association
6 May	Invasive Species Council

The NRC consulted with various NSW, local and Australian government agencies, organisations and groups throughout the review, as shown in the table below.

NSW Government
▪ Department of Primary Industries, Biosecurity NSW
▪ Office of Environment and Heritage, National Parks and Wildlife Service
▪ Primary Industries Ministerial Advisory Council (Biosecurity and Resources Working Group)
▪ National Parks Advisory Council
▪ State Water
▪ Roads and Maritime Services
▪ Forestry Corporation of NSW
▪ NSW Aboriginal Land Council
▪ Sydney Catchment Authority
▪ NSW Crown Lands Division
▪ NSW Environmental Trust
▪ Transport NSW
▪ Rural Fire Service
▪ Sydney Trains
▪ Local Land Services
▪ CMA Chairs Council and individual Catchment Management Authorities
▪ Livestock Health and Pest Authorities
▪ Western Lands Commission
▪ Division of Local Government
Local government (see also table of review meetings)
▪ Local Government NSW
▪ Local Government Managers Association
▪ Weed Action Program project officers
▪ Far North Coast Weeds
▪ New England Weeds Authority
▪ Hawkesbury River County Council
▪ Bega Valley Shire Council
▪ Eurobodalla Shire Council
▪ Cooma-Monaro Shire Council
▪ Snowy River Shire Council
▪ Bombala Council
▪ Mid-Western Regional Council
▪ Orange City Council
▪ Walgett Shire Council
Australian Government
▪ Australian Weeds Committee
▪ Department of Agriculture
▪ Department of Environment
Other jurisdictions
▪ Queensland Department of Primary Industries
▪ Primary Industries and Regions South Australia

Other organisations (see also table of review meetings)

- Weed Officers Association
- NSW Farmers
- Landcare NSW
- CSIRO
- Invasive Species Council
- Rural Industries Research and Development Corporation
- Australian Fodder Industry Association
- Meat and Livestock Australia
- Nursery and Garden Industry Association, NSW and ACT
- Institute of Public Works Engineering Australia NSW
- John-Holland Country Regional Network
- Australian Rail Track Corporation
- Nature Conservation Council
- Roadside Environment Committee
- Bega Valley Fireweed Association
- Towamba Landcare
- Maclaughlin River Landcare
- Snowy River Interstate Landcare
- New England Landcare
- Lachlan Landcare
- Mid-north Coast Weeds Coordinating Committee
- Northern Inland Weeds Advisory Committee
- Monaro Regional Weed Advisory Committee
- Eastern Riverina Noxious Weeds Advisory Group
- Lachlan Valley Weeds Advisory Committee
- Macquarie Valley Weeds Advisory Committee
- Royal Botanic Gardens
- University of Canberra
- University of New England

Workshop participants

Name	Organisation
Dr John Keniry AM	Natural Resources Commission
Cr Reg Kidd	Noxious Weeds Advisory Committee
Dr Bruce Christie	Biosecurity NSW
Mick O'Flynn	Office of Environment and Heritage
Sally Barnes	Office of Environment and Heritage
Pam Green	Southern Rivers Catchment Management Authority
Jim Willmott	Far North Coast Weeds
Chris Dewhurst	Hawkesbury River County Council
Susy Cenedese	Local Government NSW
Cr Maria Woods	Local Government NSW, New England Weeds Authority
Peter Turner	Office of Environment and Heritage
Rob Dulhunty	Landcare NSW
Prof. Bruce Auld	Charles Sturt University
Michael Danelon	Nursery and Garden Industry NSW and ACT
Terry Schmitzer	Mid North Coast Weeds Co-ordinating Committee
Wayne Deer	New England Weeds Authority
Dr Jeanine Baker	Department of Agriculture, Fisheries and Forestry
Cheryl Kalisch Gordon	Grain Growers Limited
Lorraine Wilson	NSW Farmers
Mitchell Clapham	NSW Farmers
Daryl Lawrence	Crown Lands Division of NSW Trade & Investment
Andrew Cox	Invasive Species Council
Prof. Deirdre Lemerle	Charles Sturt University
Rob Ferguson	Eastern and Western Riverina Noxious Weeds Advisory Groups
Rory Treweeke	Western Catchment Management Authority
Reece Luxton	NSW Weeds Officers Association, Clarence Valley Council
Robert Freebairn OAM	Agricultural consultant
Bob Makinson	Royal Botanic Gardens
John Tracey	Biosecurity NSW
Syd Lisle	Biosecurity NSW
Stewart Thompson	NSW and ACT Serrated Tussock Working Party
Robert Quirk	NSW National Parks and Wildlife Service
Mel Hall	NSW National Parks and Wildlife Service
Dr Andrew Leys	Former National Parks and Wildlife Service
Anne Herbert	Bega Valley Shire Council
Chris Scott	Landcare NSW
Tim Johnston	Livestock Health and Pest Authorities State Services
Bob Lawrence	Office of the Minister for Primary Industries

Name	Organisation
Andy Sheppard	CSIRO Biosecurity Flagship
Dave Anthony	Auscott Limited