



Australian Government

National Land & Water Resources Audit

An initiative of the Australian Government

ECOLOGICALLY SIGNIFICANT INVASIVE SPECIES

INDICATOR HEADING

Selected ecologically significant invasive vegetation species extent and impact

INDICATOR PROTOCOL

Impact of weeds on assets

Endorsed

This protocol has been endorsed by the National Land and Water Resources Audit Advisory Council. Version 1 – June 2007. The indicators will need to be further developed as identified within the protocol.

www.nlwra.gov.au

Impact of weeds on assets

Status of indicator agreement

The National Land & Water Resources Audit (the Audit) coordinates the collation of data to support reporting on natural resource condition required under the National NRM Monitoring and Evaluation Framework (National M&E Framework).

The National M&E Framework identifies three requirements for monitoring natural resource condition:

- a set of resource condition indicators to measure progress toward the agreed national outcomes on a medium and long term basis
- a set of indicators for monitoring community and social processes relevant to or affected by NRM programs, as well as measures of the adoption of sustainable development and production techniques
- contextual data pertinent to the indicator being considered.

The Audit Advisory Council has agreed to a process for achieving a practical set of indicators under the National Monitoring and Evaluation Framework.

This process is to:

- obtain on-going **recommendations** from the relevant **National Coordination Committees** for each thematic area (including “Matters for Target”) on appropriate indicators, protocols and information needs
- seek **endorsement** from the **Audit Advisory Council** that the indicators and protocols can be implemented at the national, state / territory and regional levels
- seek **agreement** from the Natural Resource Policies and Programs Committee (**NRPPC**) (or the Marine and Coastal Committee –**MACC**- for Estuarine, Coastal and Marine) that the indicators will be used and promoted by jurisdictions to underpin evaluations of NRM initiatives.

The NRPPC and MACC report to the Natural Resource Management Ministerial Council (NRMMC).

Recommended national protocol

Impact of weeds on assets

Matter for target:

Ecologically significant invasive species

Indicator heading:

Selected ecologically significant invasive vegetation species extent and impact

Indicator name: Impact of weeds on assets

This document presents the recommended monitoring protocol for assessing the impact of weeds on assets, for application at the regional, state/territory and national levels.

I Definitions

Impact: Any detrimental effect or cost of a weed on assets.

Assets: Includes biodiversity, the abiotic environment, aspects of primary production, human health and cultural values.

2 Rationale

2.1 Why monitor?

Invasive species are second only to habitat clearance as a threat to Australia's biodiversity. Weeds are ubiquitous as biological invasions. Of the 27 000 alien plant species that have been imported into Australia, approximately 2800 have naturalised (Virtue et al 2004). The rate of naturalisation is 10 species per year and rising.. These statistics are not surprising, given that roughly 8000 of the plant species that have been imported into Australia have histories of being invasive overseas (Csurhes et al 2006).

Weeds also impact on cropping, pastoral and forestry production, community health and safety, amenity, infrastructure, tourism, economic wellbeing and quality of life. Weed research and control are expensive, and often compete with other land management activities for scarce resources.

Uniform monitoring of the impacts of weeds, and consistent and reliable reporting processes, are essential if weeds are to be managed effectively. Monitoring is required to assess changes in species distribution and abundance and ultimately the impact of management actions. It will provide a better understanding of weed ecology and improvements in control programs.

Distribution and abundance of weeds are often monitored in management programs, but impacts are rarely recorded. Gathering broad-scale information on impacts across a range of assets is impractical and cost prohibitive. Monitoring impacts at this scale will therefore rely on indirect estimates from the results of monitoring of distribution and abundance; other variables, such as the

value of assets, will also be taken into account. (See Indicator Protocol: Extent, Density and Distribution of Weeds).

No institutions currently conduct ongoing assessments of the impacts of weeds on assets. However, considerable work has been done under extensive weed risk assessment programs within each jurisdiction and nationally, including development of frameworks for specific assessments (eg economic and environmental impact).

Many existing management programs monitor the impacts of weeds where they can be mitigated or where important assets are threatened. A case-study approach is recommended for monitoring impacts, based on the representative selection of sites and a cross section of species, impact types and assets. Further, it is recommended that existing monitoring programs, where available, are used to monitor and report on the impact of weeds on assets; if these yield insufficient information, new case studies should be undertaken and reported.

As indicated above, detailed monitoring of impacts of weeds is rarely feasible over large tracts of land. However, some form of monitoring of impacts is important in areas where management actions are concentrated, to allow the result of interventions to be fully assessed. Targeted monitoring (ie case studies), designed to enable inferences to be drawn for larger areas, should be considered best management practice in any weed management control program.

It is also important to be conscious of the broader ecological impacts of some weeds. For example, weeds can invade intact ecosystems and transform ecosystems, and some impacts are irreversible. Similarly, there can be economic impacts beyond production losses to individual landowners, including market loss, reduced property values and impacts further down the production chain. Finally, social impacts go beyond human health, including reduced recreational or aesthetic value of an area, public nuisance and property damage.

This indicator protocol is designed to monitor the impacts of weeds on assets. It aims to report trends in impact in targeted areas, which can potentially be extrapolated to larger areas. The indicator protocol addresses weed species of significance at the national level, while recognising that species of significance at the state/territory and regional levels may also be included.

3 Monitoring methodology

3.1 Monitoring scale and location

Impacts should be monitored within selected areas throughout the area of management. Impact monitoring sites should accommodate existing monitoring and management programs, and include any areas where impact information may be lacking. Ideally, monitoring of impacts should also include locations that are not subject to weed management programs, thereby providing an experimental control to allow comparisons between managed and unmanaged sites.

The impacts of weeds on assets may vary across the range of a species and with the type of asset. Representative monitoring sites should be selected to accommodate this variation. Modelling of impacts for both the current extent of the weed and its potential extent should also be considered. This approach will provide a base-level overview of the impacts of a species across multiple jurisdictions.

Establishing a detailed sampling framework across Australia is unlikely to be feasible. Therefore, strategic monitoring of impacts is necessary to allow assessment of program effectiveness, and aid

decision making on the most effective allocation of resources. It is important that impact monitoring is undertaken both before and after management intervention because this will indicate the success of various management actions.

Where it is difficult or impractical to monitor impacts, particularly when several species may be contributing to impacts, it may be possible to use weed density as a surrogate to indicate damage. However, the relationship between impact and density is known for only a limited number of weeds and then only in a limited number of situations.

3.2 Monitoring frequency

There is currently no formalised recommended frequency for monitoring the impacts of weeds in Australia. Monitoring should be ongoing and linked to management interventions. Monitoring before and after management actions at control (ie nil treatment) and treatment sites will be necessary. The appropriate frequency will depend on the speed of change in weed impact, with or without treatment, and the timing (with time of year) of impact. Fixed-interval monitoring may not be optimal. For example, some impacts will be influenced by particular events, such as heavy rainfall or drought. Impacts may be short-lived or chronic.

3.3 Data collection method

Methods for monitoring impacts will vary with species, environment and impact type. Monitoring impacts on a local or regional scale should use techniques from benchmark studies; these include Adair and Groves (1998), AECgroup (2002), Groves et al (2003), Sinden et al (2004), Coutts-Smith and Downey (2006), and Page and Lacey (2006). Also of note is the current work commissioned by the Australian Government Department of the Environment and Water Resources and being conducted by the Cooperative Research Centre for Australian Weed Management on developing a framework for assessing the impact of weeds on environmental assets; this has a specific focus on assets that are listed as matters of national environmental significance, as defined under the *Environment Protection and Biodiversity Conservation Act 1999*. Broad-scale impact monitoring may be achieved using questionnaires. An example is the Australian Bureau of Statistics *Natural Resource Management Survey 2004–05*.¹

As indicated above, a case-study approach to impact monitoring is recommended. However, because impacts can be difficult and expensive to assess, assessments are often undertaken on relatively small areas under short timeframes. The long-term impact of weed species (eg on soil degradation), the cumulative effects of several species and the indirect effects are less easily monitored.

Actual variables to be measured as part of impact monitoring include economic costs (eg damage to agricultural production), environmental costs (eg survival rate of threatened species, soil erosion, water quality), social costs (eg incidence of disease, employment rate, aesthetics, tourist visitation rate), and the cost of control and restoration. Economic costs are quantifiable in dollar terms, as are the costs of weed control and land restoration. In contrast, environmental and social costs are difficult to put in the same currency. However, this is possible in some situations by determining the amount of money stakeholders are willing to pay towards remediation.

Information that should be reported using case studies includes the location and area monitored, weed species involved, method involved in monitoring and sampling design, impact type,

¹ <http://www.abs.gov.au/AUSSTATS/abs@.nsf/mf/4620.0?OpenDocument>

magnitude of impact (quantitative and/or qualitative), area likely to be affected by impact, period and duration of impacts (eg seasonality), and likely consequence if impacts are not treated with appropriate management.

Where possible, the relationship between weed density and damage should be investigated to identify feasible management options to reduce impacts to an acceptable level. Quantitative information on damage and impacts should be collected, together with qualitative information that may assist in reporting species impacts.

3.4 Species selection

The process of selection of weed species for monitoring can be complex. It is largely determined by national, state and territory, regional and local priorities. A number of rating systems are available to guide the process of species selection, including:

- those developed for determining weeds of national significance (based on invasiveness, impact and current and potential distribution)
- the method of categorising production and environmental weeds developed by Groves et al (2003)
- various methods for post-border weed risk assessment (eg Virtue et al 2004).

For the 2006 national weed assessment report, it was agreed to monitor a list of 98 species, comprising the weeds of national significance (WONS), the list of weeds nominated for assessment as WONS (the WONS candidate list), the national environmental alert list and the agricultural sleeper list. Of course, not all species occur in every jurisdiction, and species vary in their regional significance with respect to investment under the National Heritage Trust.

Additional species can be accommodated as they become nationally significant or are deemed regionally significant and require assessment. A list of species, including the source for their inclusion, is given in Appendix 1.

In most cases, weeds are mapped at the species level. However, a different taxonomic level may be more appropriate in some cases. For example, the distribution and abundance of *Chrysanthemoides* should be recorded for both subspecies (boneseed and bitou bush), which occur in different habitats and have different control requirements. In addition, some WONS are not individual species but groups of species. For example, all species of ‘willows’ are grouped together as a WONS except for Weeping Willow, Pussy Willow and Sterile Pussy Willow.

3.5 Data storage and management

Responsibilities for storage and management of the data collected, collated and reported by regional groups should be determined by the relevant regional and/or state or territory authority. In principle, however, data should be maintained and readily accessible for state and national reporting. It should be stored and managed in accordance with nationally agreed policies and guidelines established by the Australia and New Zealand Information Council (ANZLIC, the Spatial Information Council). Relevant authorities at the state and territory level should be the custodians of their specific datasets (see also Section 4.6).

3.6 Data analysis and interpretation

Data analysis and interpretation should be undertaken by regions, or local, state and territory and Australian governments depending on specific needs. Case studies should be reported in consistent and repeatable ways to allow comparisons between regions and jurisdictions and over time.

Results of analyses should be disseminated within the public domain via existing mechanisms (eg the Natural Resource Atlas).

3.7 Reliability, validity and quality assurance

The quality and reliability of data will vary with monitoring activity, technique, season, and operator experience. A measure and statement of data reliability and quality should be recorded to enable the impact data to be accurately interpreted and to assist with determining the 'fitness for purpose' of the data.

Interpretation of reported impact information should remain the responsibility of the relevant authority involved in the collection of the information.

In addition, evaluation or review of monitoring activities (including the methods proposed within this protocol) is important to help refine and improve monitoring programs.

3.8 Metadata statement

A basic requirement is that metadata documentation is completed for all datasets. Such statements should be consistent with ANZLIC standards.²

ANZLIC is working towards the international ISO 19115 standard.³

4 Reporting and information products

4.1 Audiences

Information on the impact of weeds is of benefit to multiple users, at different scales. Information at the local and regional levels supports decision makers in designing and evaluating control programs, regional planning for natural resource management, and developing regional investment strategies. Information at the state and territory level assists decision makers and managers with the allocation of resources for control, disease surveillance, contingency planning, and other areas — such as informing policy, and developing and implementing legislation. Information at the national and state/territory levels is also useful for plant health and biosecurity authorities, and for industry, research organisations, regulatory authorities and quarantine services. In addition, information products support a range of other areas, including education, improving general awareness, engagement of the broader community, and water management.

4.2 Products

The products from impact monitoring programs are largely determined by the types of monitoring, the species involved, resources allocated to reporting, and duration of monitoring. Case studies

² <http://www.anzlic.org.au/policies.html>

³ http://www.osdm.gov.au/osdm/docs/resources/mwg_aus_gov_profile.pdf

should be used to report impacts of species under current management programs. Potential reporting products from impacts monitoring could include:

- national and state/territory maps showing locations of monitoring areas, and case studies reporting impact information
- graphical (chart and pictorial), statistical and tabular representations of impacts
- textual material documenting impacts for specific areas, species and monitoring programs at local and regional levels.

4.3 Confidentiality

Maintaining confidentiality of data will be the responsibility of the custodian of the data (eg the management authority at the state or territory level that is responsible for monitoring and reporting weed information).

Additional information on access to sensitive spatial data is available from ANZLIC.⁴

4.4 Data collation/calculation method

Products reporting impacts should consider impact measurements at the local scale, as well as information on population distribution and abundance at the regional or state and territory scale.

Regional organisations and state/territory and Australian governments should provide the necessary infrastructure for data collation.

4.5 Data analysis, integration and interpretation

Data analysis and interpretation should be undertaken by regional organisations, or state/territory and Australian governments, depending on specific needs. Actual methods will depend on the precise impact monitoring techniques applied and may be specific to the monitoring program.

Results of analyses should be provided to regional groups, and summary reports should be made publicly available.

4.6 Data access and storage

Information at the national level should have the potential to be updated via links to relevant regional and state/territory database and information systems. It is proposed that national information is reported through the National Land and Water Resources Atlas and Data Library, and, in the future, Australian Resources Online. The Australian Government will be responsible for hosting these services.

Data access arrangements need to be developed with various stakeholders and may influence data confidentiality (see Section 4.3).

4.7 Product definition statement

Each product should have a product definition statement. The product definition statement should follow the same general format as the metadata statement in Appendix 2.

⁴ <http://www.anzlic.org.au/get/2399972232>

5 Implications

Impact monitoring and reporting via case studies will present valuable information for decision makers at all levels.

6 Future development

Future development of the protocol includes new and standardised methods and techniques for assessing and monitoring impacts and reporting information to all stakeholders.

7 Links to other indicators

Other indicators relevant to extent, density and distribution of weeds are:

- selected ecologically significant invasive vertebrate species extent and impact⁵
- selected significant native species and ecological communities extent and conservation status⁶
- estuarine, coastal and marine habitat extent and distribution: pest species (number, density, distribution).⁷

8 Further information

Adair RJ and Groves RH (1998). Impact of environmental weeds on biodiversity: a review and development of a methodology. Prepared for the National Weeds Program, Environment Australia, Canberra.

AECgroup (2002). Economic impact of state and local government expenditure on weed and pest animal management in Queensland. Prepared for the Local Government Association of Queensland.

Coutts-Smith A and Downey P (2006). Impact of weeds on threatened biodiversity in New South Wales. CRC for Australian Weed Management Technical Series No. 11, Cooperative Research Centre for Australian Weed Management, Adelaide.

Csurhes SC, Randall R, Goninon C, Beilby A, Johnson S and Weiss JE (2006). 'Turn the tap off before you mop up the spill': exploring a permitted-list approach to regulations over the sale and interstate transport of potentially invasive plants in the states and territories of Australia. In: *Proceedings of the 15th Australian Weeds Conference*, Preston C, Watts JH and Crossman ND (eds), Adelaide, 24–28 September 2006, Weed Management Society of South Australia, Adelaide, 95–98.

Groves RH, Hoskings JR, Batianoff GN, Cooke DA, Cowie ID, Johnson RW, Keighery GJ, Lepschi BJ, Mitchell AA, Moerkerk M, Randall RP, Rozefelds AC, Walsh NG and Waterhouse BM (2003). *Weed Categories for Natural and Agricultural Ecosystem Management*, Bureau of Rural Sciences, Canberra.

McNaught I, Thackway M, Brown L and Parsons M (2006). *A Field Manual for Surveying and Mapping Nationally Significant Weeds*, Bureau of Rural Sciences, Canberra.

⁵ <http://www.nrm.gov.au/monitoring/indicators/vertebrate.html>

⁶ <http://www.nrm.gov.au/monitoring/indicators/signif-species.html>

⁷ <http://www.nrm.gov.au/monitoring/indicators/estuarine/pest-species.html>

Page AR and Lacey KL (AECgroup) (2006). Economic impact assessment of Australian weed biological control. CRC for Australian Weed Management Technical Series No. 10, Cooperative Research Centre for Australian Weed Management, Adelaide.

Sinden J, Jones R, Hester S, Odom D, Kalisch C, James R and Cacho O (2004). The economic impact of weeds in Australia. CRC for Australian Weed Management Technical Series No. 8, Cooperative Research Centre for Australian Weed Management, Adelaide.

Virtue JG, Bennett SJ and Randall RP (2004). Plant introductions in Australia: How can we resolve 'weedy' conflicts of interest? In: *Proceedings of the 14th Australian Weeds Conference*, Sindel B (ed), Wagga Wagga, 6–10 September 2004, Weed Society of New South Wales, Sydney, 42–48.

Further reading

Agtrans Research (2005). *Review of Progress on Invasive Species*, final report to the Department of Environment and Heritage, Agtrans Research, Brisbane.

CRC for Australian Weed Management (2001). The CRC for Weed Management Systems: an impact assessment. Report by the Centre for International Economics, Technical Series No. 6, Cooperative Research Centre for Australian Weed Management, Adelaide.

CRC for Australian Weed Management (2004). *Introductory Weed Management Manual*, Cooperative Research Centre for Australian Weed Management, Adelaide.

Standards Australia/Standards New Zealand/Cooperative Research Centre for Australian Weed Management (2006). *National Post-Border Weed Risk Management Protocol*, handbook 294:2006.

Thackway R, Yapp G, Cunningham D and McNaught I (2003). Towards a national set of core attributes for mapping weeds of national significance (WONS). Discussion paper, September 2003, Bureau of Rural Sciences, Canberra.

Thorp JR and Lynch R (2000). The determination of weeds of national significance. National Weeds Strategy Executive Committee, Launceston.

Virtue J (2004). SA Weed Risk Management Guide – July 2004. Animal and Plant Control Commission, South Australia.

Weiss JER and Iaconis LJ (2002). Pest plant invasiveness assessment. Keith Turnbull Research Institute, Department of Natural Resources and Environment, Frankston, Victoria.

Websites

- Australian Capital Territory — Environment ACT
<http://www.environment.act.gov.au>
- Australian Government Department of Agriculture, Fisheries and Forestry
<http://www.daff.gov.au>
- Australian Government Department of the Environment and Water Resources
<http://www.environment.gov.au>
- CRC for Australian Weed Management
<http://www.weeds.crc.org.au/>
- New South Wales — Department of Primary Industries
<http://www.dpi.nsw.gov.au>

- Northern Territory — Department of Natural Resources, Environment and the Arts
<http://www.nt.gov.au/nreta>
- Queensland — Department of Natural Resources and Water
<http://www.nrw.qld.gov.au>
- South Australia — Department of Water, Land and Biodiversity Conservation
<http://www.dwlbc.sa.gov.au>
- Tasmania — Department of Primary Industries and Water
<http://www.dpiw.tas.gov.au>
- Victoria — Department of Sustainability and Environment
<http://www.dse.vic.gov.au>
- Weeds Australia
<http://www.weeds.org.au>
- Western Australia — Department of Agriculture and Food
<http://www.agric.wa.gov.au>

9 Glossary

Abundance: Relates to the number of individuals or populations of species. In a quantitative situation, it might be a count (eg 100) or range (eg 100–150), whereas in a qualitative situation it might be ‘abundant’, ‘common’ or ‘occasional’.

Agricultural Sleeper weeds: ‘Sleeper weeds’ are plants from overseas that have established small wild populations but have the potential to spread widely and affect agricultural or natural environments. Huge environmental damage and control cost can be prevented if these weeds are eradicated before they become widespread.

Assets: May be in the form of biodiversity, environment, production service, goods or values.

Cover: The percentage of area a weed occupies over the ground or canopy — see Appendixes 3–5 in WONS Field Manual (McNaught et al 2006) for more information.

Density: A measure of abundance per unit area. In a quantitative situation, it might be 100/sq km or 100–150/sq km. In a qualitative situation, and for the purposes of reporting state/territory and national data in map format, it could be represented as a combination of abundance and distribution (eg occasional and localised).

Distribution: Relates to the spatial pattern of species over an area (eg widespread or localised within a given area).

Emerging species: A newly established weed species whose extent, distribution and abundance are expanding (ie trend is increasing), and whose impacts are likely to be significant.

Extent: Broad-scale distribution of weeds.

Impact: Any detrimental consequence of a weed on assets.

Investigative monitoring: Monitoring at the on-ground, project or local scale. Normally results in point, line or polygon data.

National Environmental Alert weeds: Weed species that are in the early stages of establishment and have the potential to become a significant threat to biodiversity if they are not managed.

New incursions: Any occurrence of an introduced (non-endemic) weed species that has not been recorded previously at a location and whose impacts are likely to be significant.

Occurrence: Relates to the 'presence' of a particular species within an area — whether it is present or absent, or no data are available (ie status is unknown, area unassessed). When additional information is available, the 'presence' class of occurrence can be described further in terms of distribution and abundance — see above. Occurrence information based on presence/absence is used to determine the extent of a weed.

Significant: Defined by state/territory and national declarations and recommendations from relevant national authorities.

Surveillance monitoring: Monitoring at regional, state or national level. May be vector (point, line or polygon) or grid/tiled information.

Trend: The change in distribution/abundance over time. Classified as increasing, decreasing, stable or unknown. For the purposes of current mapping work, trend is assessed as increasing/decreasing or stable over the last 5 years.

WONS: The weeds of national significance are nationally agreed priority plant species for control and management. Species are selected based on their high rankings for invasiveness, potential to spread, and impact on socioeconomic and environmental assets. There are currently 20 weeds of national significance: Alligator Weed, Athel Pine, Bitou Bush/Boneseed, Blackberry, Bridal Creeper, Cabomba, Chilean Needle Grass, Gorse, Hymenachne, Lantana, Mesquite, Mimosa, Parkinsonia, Parthenium Weed, Pond Apple, Prickly Acacia, Rubber Vine, Salvinia, Serrated Tussock and Willows.

WONS candidates: A list of 71 weed species nominated by states and territories for WONS status but were not ranked highly enough to be nominated as a WONS. Only the top ranked twenty species were nominated as WONS.

10 Appendixes

Appendix 1: Significant weed species chosen for a national assessment in 2006

Common name	Scientific name	Source list
African Boxthorn	<i>Lycium ferocissimum</i>	Nominated for assessment as a weed of national significance
African Love Grass	<i>Eragostis curvula</i>	Nominated for assessment as a weed of national significance
Alligator Weed	<i>Alternanthera philoxeroides</i>	Weed of national significance, target for biocontrol
Arum Lilly	<i>Zantedeschia aethiopica</i>	Nominated for assessment as a weed of national significance
Athel Pine	<i>Tamarix aphylla</i>	Weed of national significance
Barleria	<i>Barleria prionitis</i>	National environmental alert list
Bathurst Burr	<i>Xanthium spinosum</i>	Nominated for assessment as a weed of national significance
Bellyache Bush	<i>Jatropha gossypifolia</i>	Nominated for assessment as a weed of national significance, target for biocontrol
Bitou Bush/Boneseed	<i>Chrysanthemoides monilifera</i>	Weed of national significance, target for biocontrol
Blackberry	<i>Rubus fruticosus</i> agg	Weed of national significance, target for biocontrol
Blue Hound's Tongue	<i>Cynoglossum creticum</i>	National environmental alert list
Blue Thunbergia	<i>Thunbergia grandiflora</i>	Nominated for assessment as a weed of national significance
Brazilian Pepper	<i>Schinus terebinthifolia</i>	Nominated for assessment as a weed of national significance
Bridal Creeper	<i>Asparagus asparagoides</i>	Weed of national significance, target for biocontrol
Bridal Veil	<i>Asparagus declinatus</i>	Nominated for assessment as a weed of national significance
Broom Montpellier or Cape Broom	<i>Genista monspessulana</i>	Nominated for assessment as a weed of national significance, target for biocontrol
Broomrape (all species)	<i>Orobanche</i> spp	Nominated for assessment as a weed of national significance, Branch Broomrape is a jointly funded eradication species
Bulbil Watsonia	<i>Watsonia meriana</i> var <i>bulbillifera</i>	Nominated for assessment as a weed of national significance
Cabomba	<i>Cabomba caroliniana</i>	Weed of national significance
Calotrope	<i>Calotropis procera</i>	Nominated for assessment as a weed of national significance
Cane Needle Grass	<i>Nassella hyalina</i>	National environmental alert list
Cat's Claw Creeper	<i>Macfadyena unguis-cati</i>	Nominated for assessment as a weed of national significance

Common name	Scientific name	Source list
Chilean Needle Grass	<i>Nassella neesiana</i>	Weed of national significance
Chinee Apple	<i>Zizyphus mauritiana</i>	Nominated for assessment as a weed of national significance
Chinese Elm	<i>Celtis sinensis</i>	Nominated for assessment as a weed of national significance
Chinese Rain Tree	<i>Koelreuteria elegans</i> subsp <i>formosana</i>	National environmental alert list
Chinese Violet	<i>Asystasia gangetica</i> subsp <i>micrantha</i>	National environmental alert list, agricultural sleeper list
Creeping Lantana	<i>Lantana montevidensis</i>	Nominated for assessment as a weed of national significance
Cutch Tree	<i>Acacia catechu</i>	National environmental alert list
Cyperus	<i>Cyperus teneristolon</i>	National environmental alert list
False Yellowhead	<i>Dittrichia viscosa</i>	National environmental alert list
Fireweed	<i>Senecio madagascariensis</i>	Nominated for assessment as a weed of national significance, target for biocontrol
Garden Geranium	<i>Pelargonium alchemilloides</i>	National environmental alert list
Giant Parramatta Grass	<i>Sporobolus indicus</i> var <i>major</i>	Nominated for assessment as a weed of national significance
Giant Rat's Tail Grass	<i>Sporobolus natalensis</i> and <i>S. pyramidalis</i>	Nominated for assessment as a weed of national significance
Golden Dodder	<i>Cuscuta campestris</i>	Nominated for assessment as a weed of national significance
Gorse	<i>Ulex europaeus</i>	Weed of national significance
Grader Grass	<i>Themeda quadrivalvis</i>	Nominated for assessment as a weed of national significance
Heather	<i>Calluna vulgaris</i>	National environmental alert list
Holly Leaf Senecio	<i>Senecio glastifolius</i>	National environmental alert list
Honey Locust	<i>Gleditsia triacanthos</i>	Nominated for assessment as a weed of national significance
Horsetails	<i>Equisetum</i> spp	National environmental alert list
Hydrocotyle	<i>Hydrocotyle ranunculoides</i>	Nominated for assessment as a weed of national significance
Hymenachne	<i>Hymenachne amplexicaulis</i>	Weed of national significance
Hyptis	<i>Hyptis suaveolens</i>	Nominated for assessment as a weed of national significance
Karoo Thorn	<i>Acacia karroo</i>	National environmental alert list
Kochia	<i>Bassia scoparia</i>	Nominated for assessment as a weed of national significance, national environmental alert list
Lagarosiphon	<i>Lagarosiphon major</i>	National environmental alert list
Lantana	<i>Lantana camara</i>	Weed of national significance, target for biocontrol
Laurel Clock Vine	<i>Thunbergia laurifolia</i>	National environmental alert list

Common name	Scientific name	Source list
Leaf Cactus	<i>Pereskia aculeata</i>	National environmental alert list
Lippia	<i>Phyla canescens</i>	Nominated for assessment as a weed of national significance
Lobed Needle Grass	<i>Nassella charruana</i>	National environmental alert list, agricultural sleeper list
Madeira Vine	<i>Anredera cordifolia</i>	Nominated for assessment as a weed of national significance
Mesquite	<i>Prosopis</i> spp	Weed of national significance, target for biocontrol
Mexican Poppy	<i>Argemone ochroleuca</i>	Nominated for assessment as a weed of national significance
Mimosa	<i>Mimosa pigra</i>	Weed of national significance, target for biocontrol
Mission Grass	<i>Pennisetum polystachion</i>	Nominated for assessment as a weed of national significance
Mother of Millions	<i>Bryophyllum tubiflorum</i> and hybrids	Nominated for assessment as a weed of national significance, target for biocontrol
Myrtleleaf Milkwort	<i>Polygala myrtifolia</i>	Nominated for assessment as a weed of national significance
Narrow Leaf Cotton Bush	<i>Gomphocarpus fruticosus</i>	Nominated for assessment as a weed of national significance
Noogoora Burr	<i>Xanthium occidentale</i>	Nominated for assessment as a weed of national significance
Onopordum Thistles	<i>Onopordum</i> spp	Nominated for assessment as a weed of national significance, 4 species are targeted for biocontrol
Orange Hawkweed	<i>Hieracium aurantiacum</i>	National environmental alert list, agricultural sleeper list
Pampas Grass	<i>Cortaderia</i> spp	Nominated for assessment as a weed of national significance
Parkinsonia	<i>Parkinsonia aculeata</i>	Weed of national significance, target for biocontrol
Parthenium Weed	<i>Parthenium hysterophorus</i>	Weed of national significance, target for biocontrol
Paterson's Curse	<i>Echium plantagineum</i>	Nominated for assessment as a weed of national significance, target for biocontrol
Pond Apple	<i>Annona glabra</i>	Weed of national significance
Praxelis	<i>Praxelis clematidea</i>	National environmental alert list
Prickly Acacia	<i>Acacia nilotica</i> subsp <i>indica</i>	Weed of national significance, target for biocontrol
Privet Broad Leaf or Tree Privet	<i>Ligustrum lucidum</i>	Nominated for assessment as a weed of national significance
Privet Small Leaf or Chinese Privet	<i>Ligustrum sinense</i>	Nominated for assessment as a weed of national significance
Ragwort	<i>Senecio jacobaea</i>	Nominated for assessment as a weed of national significance
Rice Grass	<i>Spartina anglica</i>	Nominated for assessment as a weed of national significance
Rosewood	<i>Tipuana tipu</i>	National environmental alert list
Rubber Vine	<i>Cryptostegia grandiflora</i>	Weed of national significance, target for biocontrol

Common name	Scientific name	Source list
Salvinia	<i>Salvinia molesta</i>	Weed of national significance, target for biocontrol
Scotch Broom	<i>Cytisus scoparius</i>	Nominated for assessment as a weed of national significance
Sea Spurge	<i>Euphorbia paralis</i>	Nominated for assessment as a weed of national significance
Senegal Tea Plant	<i>Gymnocoronis spilanthoides</i>	National environmental alert list
Serrated Tussock	<i>Nassella trichotoma</i>	Weed of national significance, target for biocontrol
Siam Weed	<i>Chromolaena odorata</i>	National environmental alert list, jointly funded eradication species
Sicklepod	<i>Senna obtusifolia</i> and <i>S. tora</i>	Nominated for assessment as a weed of national significance, target for biocontrol
Sida species	<i>Sida</i> spp	Nominated for assessment as a weed of national significance, 3 species are targeted for biocontrol
Silver Leaf Nightshade	<i>Solanum elaeagnofolium</i>	Nominated for assessment as a weed of national significance, target for biocontrol
Snake Weed	<i>Stachylarpheta</i> spp	Nominated for assessment as a weed of national significance
Spanish Heath	<i>Erica lusitanica</i>	Nominated for assessment as a weed of national significance
St John's Wort	<i>Hypericum perforatum</i>	Nominated for assessment as a weed of national significance
Subterranean Cape Sedge	<i>Trianoptiles solitaria</i>	National environmental alert list
Tobacco Weed	<i>Elephantopus mollis</i>	Nominated for assessment as a weed of national significance
Uruguayan Rice Grass	<i>Piptochaetium montevidense</i>	National environmental alert list, agricultural sleeper list
Water Hyacinth	<i>Eichornia crassipes</i>	Nominated for assessment as a weed of national significance, target for biocontrol
White Spanish Broom	<i>Cytisus multiflorus</i>	National environmental alert list
White Weeping Broom	<i>Retama raetam</i>	National environmental alert list
Wild Mignonette	<i>Reseda luteola</i>	Nominated for assessment as a weed of national significance, target for biocontrol
Willows (Except Weeping Willows, Pussy Willow and Sterile Pussy Willow)	<i>Salix</i> spp (except <i>S. babylonica</i> , <i>Salix</i> × <i>calodendron</i> and <i>Salix</i> × <i>reichardtiji</i>)	Weed of national significance
Yellow Soldier	<i>Lachenalia reflexa</i>	National environmental alert list

Appendix 2: Information product template

Information product name		
Product ID or reference number	Jurisdiction, agency or custodian's reference number, if applicable.	
URL for product metadata	A webpage reference to where more comprehensive details of the product are recorded.	
Jurisdiction		
Custodian		
Contact details	Relevant person, position, branch/unit/section, location and phone, email contacts.	

Relevant matter for target	Which NM&EF matter for target does this product relate to?	
Relevant national indicator	Which NM&EF indicator(s), if any, does this product relate to?	
Relevant state/territory indicator	Which state/territory indicator(s), if any, does this product relate to?	

Description	Provide a brief description of the product, including the purpose and the output file format.	
Source data name and ASDD link	Name all the source dataset(s) used to produce the product. Provide references to metadata for source datasets used. This should be either the ASDD metadata reference or other URL. If any source dataset is not already described to ASDD Page 0 standard, please complete the accompanying template.	
Source data attributes used	Please list the attributes used from each of the source datasets to produce the information product.	
Processing of source data	Please describe the steps taken in processing and combining the source data to produce the information product.	

Status	What is the current status of the product? If the product is 'In progress' or 'Is planned', please complete as many of the remaining descriptors as are known.	Currently exists In progress Is planned
Coverage	How much of the state/territory distribution of the resource (or applicable part of the state/territory) is covered by the product?	80–100% 50–80% 20–50% 0–20%
Recency	When was the dominant contributing data established?	2005–2000 2000–1995 1995–1985 1985–1970 1970–1950 <1950
Trend	Does the dataset support trend interpretation?	Sequence (eg river flow, rainfall) Multiple (few) (eg land use 1990 and 2000) Single (eg soil type)
Usability scale	What is the finest resolution that maintains confidence in the product (eg not to be used at 1:100,000 or less)?	Local Regional State National
Availability	What is the public availability of the product? Is a licence required for outside users?	Open Restricted/licence Closed
Delivery	How is the product best delivered?	Web services Digital data Electronic document Paper document
Content type	What type of information does the product represent?	Real data Mixture of real and modelled data Modelled data
Update	What will be the frequency of update for the product?	Frequently At least once/planned Not planned/unknown
Other relevant information	Please add any other important information relevant to this information product that should be known.	