

A national set of core attributes for surveying, mapping and monitoring Weeds of National Significance.

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Summary A range of stakeholders and investors need information on the location and area of weeds of national significance (WONS) infestations over time and under different land management strategies. Consistent and reliable information is essential to demonstrate performance and investment returns by all engaged in treating weed infestations, to show real achievements in the prevention of incursions, and to counter the impression that weeds are a 'black hole into which money is being poured'.

A consultative process coordinated through national and state-based weed coordinators was used to establish a set of 13 mandatory core, and two optional, nationally agreed attributes for surveying, mapping, monitoring and reporting the 20 WONS. The challenge is now to promote the adoption and use of the agreed core attributes by all stakeholders to survey and monitor infestations and to report on effectiveness of weed control and management.

Keywords Core attributes, Optional attributes, Weeds of national significance, Weed surveying, mapping and monitoring, Measuring effectiveness, Weed control.

INTRODUCTION

The twenty weeds of national significance (WONS) are the weeds considered to currently pose the most serious threat to the productive capacity of Australian agriculture and its natural ecosystems (Thorpe and Lynch 2000).

Since that WONS report was published, national strategies for each of the 20 WONS were published by the Agriculture and Resource Management Council of Australia and New Zealand, Australian and New Zealand Environment and Conservation Council and Forestry Ministers in 2000. All of these Strategies or their subsequent Action Plans include the need to collect and map weeds to demonstrate change in distribution and density of the weeds.

Despite the expectation that the responsibility for collecting and recording this data would be widely shared from local and community level up to State and Territory agencies, and some national bodies, this has not always happened for reasons discussed below. The main reason may be the lack of a culture of surveying and mapping weeds or of collecting and reporting their effectiveness in weed control and

management and/or eradication (Thackway *et al.* 2003).

Data compiled into the Thorpe and Lynch (2000) report is based on a national WONS 1998 dataset where the resultant maps show WONS in a half degree cell (approximately 50km x 50km in Queensland). Under the new region-based model for delivery of government programs (Natural Heritage Trust (NHT) and the National Action Plan for Salinity and Water Quality (NAP)) there is now a requirement for up-to-date data and information on invasive species.

The annual economic cost of weed control across Australia is estimated at around \$4 billion (Sinden *et al.* 2004). Despite this considerable cost, key decision makers at local, regional, State, and national levels are unable to access the up-to-date and detailed spatial information necessary to define the issue and priority required, to assess whether existing management has solved the issue, or whether the investment in weed control has been cost-effective.

Three major uses of weed attributes, presented in Figure 1, are used to inform decision makers about:

- what weed is found, where and when;
- changes in area and density over time;
- the relationships between land management practices (treatments to control and eradicate weeds) and land use/land tenure;
- the basis for priorities for on ground and regional level work; and
- the basis for investments/resources needed to control and manage weeds in an area.

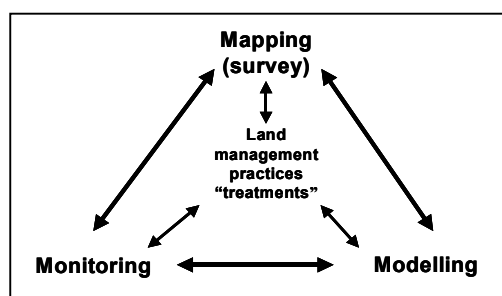


Figure 1. Schematic showing common uses of many of the agreed core WONS attributes (Schematic adapted from McKenzie *et al.* 2002)

We outline below the process used to develop an agreed national set of WONS core attributes for use in surveying, mapping, monitoring and reporting. Use of the core attributes in field manuals and to translate and compile existing datasets at regional and national levels is also discussed.

METHODS

A consultative process was used to engage with representatives from all stakeholders, anticipating that the participants in that process would also be the potential users and sponsors of the outputs.

Developing WONS core attributes A review and analysis of Australian and overseas vegetation (including weed-specific) datasets and mapping programs established that a common set of attributes was used in most well documented weed surveys, weed datasets and databases (Thackway *et al.* 2003). These attributes included identity, location, the collection date, descriptors of the area and cover/density, the type of treatments applied and the purpose for collections. Attributes that measured the effectiveness of control and management treatments were not as common.

Criteria for selecting core attributes included:

- easily understood and applicable by all levels of Government and the wider community;
- as small in number as possible for efficient adoption, collection, management and analysis;
- independence of the scale of collection and extrapolation/modelling, as far as possible;
- capable of being collected using a range of survey and mapping methods; and
- applicable to all weeds, not only the WONS.

The final draft of 16 WONS core attributes was circulated to key stakeholders, prior to consideration at a national workshop (Thackway *et al.* 2003).

In response to a request from that workshop's participants, the Bureau of Rural Sciences (BRS) agreed to consult a broader range of stakeholders in developing an agreed set of WONS core attributes; through:

- publishing the national workshop findings;
- convening State-based workshops;
- developing a draft field manual to support the collection of WONS attributes;
- consulting with State-based weed-mapping programs, WONS Coordinators and the Australian Weeds Committee; and
- compiling suitable, existing datasets.

RESULTS

Core attributes: One national and eight State-based workshops, convened between October 2003 and

February 2004, involved 92 representatives from government, regional communities, and academic and research organisations. Compared to the national workshop, the State-based workshops reduced the number of WONS attributes from 16 to 15 and increased the number of agreed mandatory attributes from 11 to 13 (Table 1). No new attributes arose from the State-based workshops. Most State government weed survey and mapping activities are already collecting and recording most of the agreed mandatory core attributes. The final set of core attributes was supported and accepted by the Australian Weeds Committee and the WONS Coordinators Committee.

Developing a field manual BRS obtained the support of all the major State and national agencies that collect and report weed data, in developing, field-testing and promoting a WONS field manual. Expressions of interest were received from most State and Territory agencies and the WONS Coordinators Committee to evaluate and field-test the WONS field manual (McNaught *et al.* in prep). The Australian Weeds Committee and the WONS Coordinators Committee both supported developing and field-testing a WONS field manual.

Access to regional and national WONS datasets BRS documented the national, State and regional agencies that collect and maintain digital datasets on weeds. The potential for using these datasets to create regional and national WONS datasets was also assessed.

Both Australian Weeds Committee and Australian WONS Coordinators Committee expressed their support for, and involvement in, establishing regular updates of WONS data and information at regional and national scales.

DISCUSSION

Core attributes The same core attributes are collected by many agencies but there is wide divergence in the methods used. This situation partly arises because much of the effort in weeds survey, mapping and monitoring is undertaken by separate agencies that have little if any requirement to coordinate these efforts or to develop and maintain a regional level State-wide annual update of WONS.

Coordination of data and information Most States/Territories do not have a formally designated lead agency responsible for dealing with weeds. Separate environmental and agricultural departments generally carry out the collection and management of weed information.

Table 1. Agreed WONS mandatory and optional core attributes

Attribute	Description
1. Data record	Unique identifier for the site record. Allocated and maintained by data custodian
2. Name of weed	Common name, genus, species, sub-species, variety, hybrid. Any uncertainty on naming recorded in the 'comments' field
3. Day/month/ year	Collection/observation date or the date the survey commenced. Prefer DD-MON-YYYY, e.g. 12-DEC-2001 as this format is less error-prone than pure numeric dates
4. Source of data	Name of collector or institution, identifies either personal contact details or the name of the institution where the record is derived
5. Purpose of visit	Reason/s site was chosen. For example, to assess type and extent of WONS prior to treatment or monitoring to determine effectiveness of management action after treatment
6. Place name or locality	Plain language description of location e.g. "10 km west of Bourke". Provides a useful cross-check against specified geocode (latitude and longitude)
7. Latitude	Latitude in degrees, minutes and seconds. Prefer decimal degrees or AMG coordinates with Zone and datum noted – for GPS entries
8. Longitude	Longitude in degrees, minutes and seconds. As for latitude
9. Precision of latitude-longitude	Precision of measurement in its locating the site. Measured in meters. Records how the latitude/longitude was determined (GPS, topographic map or estimated)
10. Area	Area of the infestation measured in hectares. Area of the infestation defined by the outside boundary. For infestations measured by transect, indicate length of transect (in metres)
11. Cover / density	Density measured by class intervals. Prefer data that records raw density as a percent. For rapid survey density data may be collected as classed data e.g. 51-100% cover = dense
12. Treatment/s	Type/s of control and/or management. Management could include subcategories of mechanical, chemical, biological. No treatment should also be recorded
13. Comments	Qualifications and factors likely to affect the adequacy of the record. e.g. inadequate time spent. Anecdotal observations of the site or photograph/s
<i>14. Core site number of records *</i>	<i>Number of records for the site or overlapping site. Records multiple sites spatially or multiple visits over time. May be left blank</i>
<i>15. Land use category *</i>	<i>Land use/s observed at the site according to agreed national classification. Select from Australian Land Use and Management Classification land use categories</i>

*Attributes 1-13 are mandatory core attributes and attributes 14 and 15 (shown in italics) are optional core attributes.

As a result, separate datasets are collected and maintained with gaps in the coverage of weeds at the regional level due to different agencies having responsibility for separate land tenures.

While States/Territories have the constitutional mandate to collect and report on weeds, they are unable to deliver it given the nature of weed management. Responsibility is therefore delegated to local government authorities in some States. In most States, Local Governments would argue they are not adequately resourced for this because they rely on their rate base.

In these instances, the State provides the funding for on ground works to the regions in association with land managers. This work includes collecting area and density data. It would appear this process is implemented as a one-way flow of resources with little if any hard data (evidence of effectiveness) flowing back to the purchaser of these services (*i.e.* the State).

Reporting on weed incursions in most States is divided into a number of themes *e.g.* broad

agricultural regions (*e.g.* WA), tenure types (eg agricultural/pastoral freehold/leasehold belt and National Parks (*e.g.* NSW, Vic, Qld, SA, WA, NT) and regions *e.g.* local government authorities and Catchment Management Authorities.

New region-based model Recognition for the new region-based model for natural resource management and planning (see NAP and NHT above) has been established. However, there is still much to be accomplished in the activities of this new model, such as the provision of a basis for collecting and reporting reliably scaled weed data into a regional and national database.

National versus State listing of weeds The use of State-based weed ratings can mean that no comprehensive and systematic data need be collected and reported on the WONS present at a location. Without this information it is difficult to demonstrate effectiveness of containment or eradication. In some instances it would appear data on the amount and

type of chemicals used and which contractors were paid is more important than assessing whether the on ground work was effective.

Privacy and commercial in confidence issues

Access to regular regional and national updates would enable the Australian and State Governments to set priorities for funding the control and management of weeds at regional and local levels. However, in some jurisdictions, where weed data can be traced to the land parcel or property, there are restrictions due to privacy and commercial in-confidence issues on releasing this data beyond the local area scale. In some States, weed data are typically generalised for compilation of information at the State-level because of this issue (e.g. half degree grid cells in Queensland http://www.nrme.qld.gov.au/pests/pest_assessment/).

Public access to weed data In most States and Territories, the State government does not provide the public with relatively high-resolution accurate and current data on WONS using Web-based technologies. Western Australia is an exception.

Vegetation survey and mapping While most State agencies involved in vegetation survey programs collect data on weeds at sites, only Queensland consistently utilises this data to classify and map weed infestations as an integral part of the description of the native vegetation types present in an area.

Field survey manuals Despite a considerable effort invested in weed control and management at local and regional levels, there is a general lack of manuals for field survey and mapping. Where manuals and tool kits have been developed, it appears that they were generally not widely disseminated or easily accessible. The recently published field manual on weed management for use by landholders and community groups incorporates the agreed WONS core attributes (CRC for Australian Weed Management 2004).

Computer-based mapping tools A wide range of computer-based survey and mapping tools are used for recording and storing weed data, many of which have been developed and implemented at the local and regional levels. These tools lack reference to an accredited State or national standard for documenting weeds, such as the agreed WONS core attributes.

CONCLUSION

A set of 13 mandatory core attributes and two optional attributes has been agreed nationally. The new challenge is to encourage widespread adoption and use of the core attributes. They can be used to inform investors in regional weed management programs about the relative effectiveness of these activities.

A lead agency is needed in each State and Territory to help develop a culture of consistent data collection and reporting. The core attributes have potential to be used in surveying and monitoring the condition of vegetation, biodiversity assessments, and resource management generally.

ACKNOWLEDGMENTS

The Natural Heritage Trust funded this project through the Natural Resources Management Business Unit of the Department of Agriculture, Fisheries and Forestry. Contributions from many people across Australia made this project possible. Adam Gerrard, Mark Parsons and Simon Veitch reviewed the draft.

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