Let's get strategic: Weed management for conservation in Western Australia

Kellie Passeretto

Ecosystem Health Branch, Parks and Wildlife Service, Department of Biodiversity, Conservation and Attractions, Locked Bag 104, Bentley Delivery Centre, Western Australia 6983, Australia
(kellie.passeretto@dbca.wa.gov.au)

Summary   Ten years on from its implementation, the status of the Department of Biodiversity, Conservation and Attractions (DBCA) internal Weed Prioritisation Process was reviewed. This process was instigated to provide an integrated approach to weed management in Western Australia (WA) that was both species-led and asset-protection-based. These two elements of the process are used to inform regional priorities and strategic allocation of funds for the best return on investment and the most effective long-term outcomes for weed management and asset protection.

The outcomes of the species-led process are being actively utilised by staff and the process itself is being applied to determine priorities at different management levels across the department.

The asset-protection-based approach has been the most challenging part of the prioritisation process. While Department staff are still investigating a more detailed approach, we have implemented an interim process based on the ratings from the species-led prioritisation process and expert knowledge of the assets for which weeds are a key threatening process. The outcomes of this interim process are being applied across the state.

The new Weed Occurrence and Treatment App has provided the department with a coordinated, strategic approach to weed mapping and monitoring. It is assisting the department to map weed occurrences, plan weed management efforts and more effectively monitor management effectiveness.

Keywords   Strategic weed management, management effectiveness, prioritisation, weed mapping application.

INTRODUCTION

With the continual decline in resources, it is imperative that we develop strategic approaches to weed management which allow us to determine our priorities, monitor our management effectiveness and apply effective adaptive management. In 2008, the Western Australia Department of Biodiversity Conservation and Attractions (DBCA, the Department) implemented an internal Weed Prioritisation Process designed to address the first of these issues by providing an integrated approach to weed management on DBCA-managed lands within Western Australia (WA). The aim of this process was to establish both a species led and an asset-protection-based approach to weed management.

The department recognised that implementing a coordinated, strategic approach to weed management involved more than just knowing what its priority weeds and locations/sites were. The new approach also involved establishment of an entirely new weed management framework for DBCA. This framework integrated a new policy direction that incorporated the prioritisation process for weed species and sites, and implementation of a new mapping system to standardise data collection and monitor management effectiveness of priority weeds on DBCA-managed lands.

Ten years on from its implementation, the Department reviewed the status of the prioritisation process and investigated how this process was assisting the department to prioritise its weed management efforts. This paper also touches on the department's weed management policy and the investigations into how its new Weed Occurrence and Treatment App is assisting the department to map weed occurrences and more effectively monitor management effectiveness.

POLICY DIRECTION

DBCA is the WA State Government agency responsible for managing WA's terrestrial, marine and estuarine parks and reserves, forests and islands to conserve biodiversity and manage key threatening processes. It has staff based around the state in nine administrative regions that deliver on-ground management activities and is supported by several specialist branches centralised in Perth and Bunbury.

In 2015, the Department updated its Weeds Management Policy (DPaW 2015) to focus on reducing the impacts of existing weed populations on key assets and values on department-managed lands (asset-protection), whilst also preventing new incursions and eradicating new (species-led) incursions, as cost-effectively as possible. These priorities are consistent with the Australian Weeds Strategy 2017 to 2027 (Invasive Plants and Animals Committee 2016).

The policy also has a focus on improving the performance of the department's weed management

effort. It aims to achieve this through the monitoring, review and continuous improvement of the effectiveness and applicability of weed management techniques and strategies, and implementation of adaptive management as required.

SPECIES-LED PRIORITISATION PROCESS
The species-led prioritisation process is focused on weed species that are considered to be high impact, rapidly invasive, and still at a population size that is feasible to eradicate or contain to a manageable size. This approach rates weeds against their ecological impact, invasiveness, current and potential distribution, and feasibility of control. The resulting five ratings are then assessed using a series of matrices to provide an overall ranking for each weed species within a region. These matrices were based on the National Post-Border Weed Risk Management Protocol (Anon. 2006).

Outcomes This process enabled us to develop the following weed lists:
• species with a ranking (Very High, High, Medium, Low or Negligible);
• species ranked as 'further assessment required (FAR)' due to more than one unknown rating;
• species with no ranking (as they were not rated through the process for various reasons); and
• species that are 'alerts' for the region.
Several species with a ranking of very high and high have since been targeted for management. *Cylindropuntia kleiniae* DC. F.M.Knuth was targeted for eradication in the Goldfields, with all known plants removed and deep buried. Also in the Goldfields, a population of brown spine Hudson pear (*Cylindropuntia tunicata* (Lehm.) F.M.Knuth) was identified and targeted for management. The alert lists have also triggered a number of finds across department managed lands.

Since its implementation in 2008, the species led prioritisation process has continued to be utilised by DBCA regional staff to determine their weed control priorities. Although the intent was to conduct biennial regional species-led prioritisation review workshops, the timeframe between reviews has varied due to the availability of staff and other resources. Having said this, staff continue to update the spreadsheet when new species or infestations are identified.

Staff have also used the spreadsheets to determine priorities at a district and park level by adjusting the ratings as appropriate. This has provided staff with a great tool to prioritise their works programs at the various levels required by management.

ASSET-PROTECTION-BASED PROCESS
The aim of the asset-protection-based approach was to focus on identifying high value assets, the weeds that pose a threat to these assets, and the sites where control will have the greatest biodiversity (or other relevant) benefit.

This has been the most challenging part of the prioritisation process. Departmental staff have researched several different methodologies from around Australia, and the world, and are yet to determine the most appropriate process for the department. A key factor in applying an asset-protection-based process is having enough information on the condition of all our assets, as well as the threatening processes impacting those assets, so as to implement a detailed scoring process.

While there is incomplete information in many areas regarding the assets and/or the weed threats, we still need to manage the ever-increasing weed threat to department-managed lands. As such, we have used the rankings and ratings from the species-led prioritisation process, and expert knowledge of assets from each of the department's nine regions, to inform an interim asset-protection-based prioritisation process.

Based on this knowledge, staff have developed a list of priority weed species and the priority locations where they need to be managed in each region. This list includes the management goal (localised eradication, containment or density reduction), the priority for the region and/or district, the assets at risk and any relevant comments. Resources are then allocated to the highest priority weeds or sites on the list.

The comments field can be used to highlight secondary priorities by identifying those species and locations that should be targeted as a priority if additional funding opportunities became available.

The outcomes of this interim process are being used by staff across the state to prioritise their weed management programs.

WEED APP
Prior to 2017, the methods of collecting and recording weed management data and the type of data collected varied widely across DBCA, and largely relied on the interest and experience of staff in each area.

To address these issues and implement a coordinated, strategic approach to weed mapping and monitoring, the Weed Occurrence and Treatment Mapping App (Weed App) was launched in August 2017. This app was developed in consultation with the department's Geographic Information Services (GIS) Branch and regional staff.

The department developed a standard operating procedure (SOP) in 2011 which provided advice on techniques for detailed mapping of the distribution and

cover of serious weeds in bushland and wetlands (DEC 2011). This SOP provided comprehensive advice and a list of standard attributes however, as it was developed while working in bushland reserves, of usually less than 1000 hectares in size, many staff found the methodology too onerous to apply to larger reserves.

To ensure the app would be useful across a State the size of Western Australia, and at a range of different scales, a more detailed list of attributes was developed based on those from the SOP and on previous discussions with staff around the state.

A consultation process was then undertaken to standardise this list for all weed management activities across the department and determine the most appropriate methodology for data collection. This consultation process also looked at the type of reporting required for weed management activities, which informed data capture needs.

To ensure staff were suitably trained to use the Weed App and allow for a final round of consultation before it was officially released in August 2017, a train-the-trainer workshop was held in Perth in June 2017 with at least one staff member from each of the department's nine regions being trained. These staff have since provided training to relevant staff in their work areas and an estimated 70% of work areas around the state are now using the Weed App to capture their weed management activities.

The Weed App, developed using Collector for ArcGIS (ESRI Australia 2018), provides several time-saving benefits allowing more efficient use of scarce resources. It allows staff to work off-line to collect weed occurrence and treatment information quickly and easily in the field. Once back in mobile or Wi-Fi range, staff can synchronise the map edits and the information is automatically uploaded to a corporate database. This information is instantly available for viewing by all named users on the system.

As staff accumulate information in the system, they will be able to report on weed occurrence and associated treatments in their region via predefined filters, also saving time. They will also be able to quickly report on various aspects of their weed management program including:
- weed species present in their region;
- weed distribution and/or density;
- what treatment methods were used;
- efficiency of treatment methods; and
- if weed management was effective in reducing distribution and/or density.

This information can then be used to report through a range of fora, such as the department's annual report, protected area management plans and conservation activity plans.

Into the future, it is planned that the system will be further developed to provide data analysis and reporting ability for weed management activities such as resources used (e.g. chemical type and quantity, control costs, person days), change over time in weed distribution and density, and aid in the development of regional weed management works programs.

The department is continuing to investigate opportunities to improve the Weed App and its accessibility to staff, with minor changes being made to the app throughout the first 12 months of operation. A full review will be scheduled now the Weed App has been in operation for a full 12 months.

LESSONS LEARNT
One of the idiosyncrasies of the species-led weed prioritisation approach is that high impact, rapidly invasive weeds that are already widespread across department-managed lands are ranked moderate or low. This is because these species are too widespread to control when viewed from a species-based approach across the landscape. These species would instead be dealt with through the asset protection-based approach. This has caused confusion and misrepresentation of the results both within and external to the agency, and highlighted the need to ensure that any material published regarding the Weed Prioritisation Process is very explicit when explaining how the rankings are to be interpreted and used to assist in determining weed management programs. As such, all public information was amended to only include the ecological impact and invasiveness ratings for each of the weed species rated for the region. The publicly available information also includes a list of priority alert species to keep an eye out for (WA, DBCA 2018).

Another key lesson learnt through this process is that asset-protection-based prioritisation is a big job. While implementation of a scoring system requires detailed information on both assets and key threatening processes, it is important not to let a lack of this information prevent the prioritisation process from occurring to inform development and implementation of works programs. Often staff have knowledge that is not formally recorded, and this can be utilised together with the information collected through interim processes to inform future prioritisation.

By gaining people's buy-in for the Weed App from the beginning, we now have a product that staff across the state are using and promoting to all involved in weed management in the department.

As more data is gathered on assets and weed threats via the Weed App, robust datasets will be provided that can be used to improve both the species-led and asset-protection-based prioritisation approaches.

WHERE TO FROM HERE

Species-led Prioritisation Process

DBCA will:

- continue with biennial reviews of regional weed lists; and
- investigate options of storing data and associated formulae for ease of maintenance of data into the future.

Asset-protection-based Process

DBCA will:

- continue to investigate processes to assist with the prioritisation of assets for which weeds are a key threatening process;
- work with regional staff to ensure all weed management programs include monitoring to assist in determining effectiveness of management on both the threat level and the condition of the asset; and
- continue to review current lists as more detailed information becomes available and use this information to implement adaptive management as required.

Weed App

DBCA will:

- continue to investigate opportunities to improve the Weed App and its accessibility to staff to ensure its continued use;
- ensure data collected using the Weed App is fed into the prioritisation processes and used to inform future management decisions;
- investigate reporting abilities within Collector for ArcGIS;
- undertake further research and development to meet remaining data analysis and reporting needs such as development of works programs and more detailed analysis of management effectiveness;
- explore alignment of DBCA weed mapping and monitoring information with that collected by external stakeholders, including potential for them to access the app or align attributes so data can more easily be shared; and
- investigate opportunities for publicly sharing DBCA collected weed data both within WA and nationally.

REFERENCES

Anon. (2006). HB 294:2006. National post-border weed risk management protocol. (CRC Australian Weed Management, Adelaide and Standards Australia, Sydney and Standards New Zealand, Wellington).

DEC (2011). 'Techniques for mapping weed distribution and cover in bushland and wetlands.' SOP No: 22.1. (Department of Environment and Conservation, Perth).

DPaW (2015). Corporate Policy Statement No. 14. Weeds Management. Department of Parks and Wildlife, Perth.

ESRI Australia, ESRI Australia Pty Ltd (2018). Collector for ArcGIS._https://esriaustralia.com.au/collector-for-arcgis (accessed 13 August 2018).

Invasive Plants and Animals Committee (2016). 'Australian Weeds Strategy 2017 to 2027 (Australian Government Department of Agriculture and Water Resources, Canberra).

WA DBCA, Western Australia Department of Biodiversity, Conservation and Attractions (2018). How does Parks and Wildlife manage Weeds? https://www.dpaw.wa.gov.au/plants-and-animals/plants/weeds/156-how-do-we-manage-weeds (accessed 13 August 2018).