

Royalties for Regions

Boosting Biosecurity Defences:  
*Agricultural Weed Surveillance in the South West to Protect Industry Profitability* sub-project

**Outcome Report**

**Full report**

April 2017

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# Executive summary

The outcome of the Agricultural Weed Surveillance (AWS) project is to increase stakeholder surveillance for significant agricultural declared plants in the state’s south-west, in order to support pest management and market access.

The project’s two key products to date are the WeedSpotter online weed identification training package, and the MyWeedWatcher online database for reporting and mapping weed detections. MyWeedWatcher is available as an app and as an interacting website.

The project has also conducted a drone trial that has demonstrated how innovative methods and new technologies can harness community involvement in weed surveillance.

Surveillance requires awareness of the weed and how to look for it, and an ability to report observations. The AWS project obtained input from stakeholders and technical specialists to determine a list priority weed surveillance targets for the South-West Land Division, and has publishing an agreed surveillance plan for these.

The project has also developed relevant information and resources on the target weeds in the form of declared pest information webpages, online weed identification training (via the WeedSpotter training package), and by linking the project’s resources to further information sources such as WAOL and webpages that provide weed control information.

Output 1 of the AWS project is that groups are engaged in collecting surveillance data following an agreed surveillance plan. The original objective was that members of 5-8 stakeholder groups would be engaged in collecting surveillance data, following the agreed surveillance plan. To date, three biosecurity groups have expressed interest in managing priority weeds in the South-West Land Division. Training enrolments and weed observations are being made by a large number of individuals belonging to several different stakeholder groups, suggesting this objective has been met.

The project has established the means and avenues for engaging individuals and groups in surveillance. MyWeedWatcher has received a sizeable amount of social media attention from a variety of community groups and individuals, while print media and radio interviews have contributed to raising awareness of MyWeedWatcher and surveillance target weeds.

Surveillance is an activity that is difficult to measure and evaluate. Most observations reported to date have been of weeds that are known to be present in WA, with a few records of high priority surveillance targets for the South-West Land Division. As the project’s primary goal is to increase early detection of weed incursions, this result is aligned with the project’s expectations.

The impact of effort expended by the project has been analysed to show the level of communications for each weed and the extent to which resources and tools developed by the project (namely MyWeedWatcher, WeedSpotter and information webpages) are being used.

Awareness of target weeds species and the use of tools and resources developed by the project resources vary considerably between weeds. This is due to a number of factors, including media attention from outside the project, seasonality and visibility of the weeds, or whether a weed is of particular interest to a community group or industry program.

Generally, weeds of community interest are receiving high level of communications and engagement from community groups. This translates to better outcomes for these weeds, and results in higher webpage visitation, more enrolments and more observations. The project aims to maintain these strong relationships with community groups, leveraging on their audiences and encouraging groups to spread messages to their members. The project will also focus its own communication efforts on the lesser-known, high priority surveillance targets.

The project’s Output 2 concerns developing interactive, customised databases that are accessible through the department’s external website. This has been achieved by releasing the MyWeedWatcher online database, which is available through an app for smart devices and through a web browser. MyWeedWatcher has been available since April 2016 and is being continually evaluated and updated, with a major update (version 2) currently in development.

The project has been developed with valued input from stakeholders such as biosecurity groups, industry groups, natural resource management groups, and state and local governments. Consultation and engagement have resulted in the development of weed surveillance resources and tools that are relevant and useful to the community. Communication and engagement with stakeholders have underpinned the delivery of the project.

A wide range of media and communication channels have been used to promote WeedSpotter and MyWeedWatcher, to highlight priority surveillance targets, and to encourage the community to search for and report priority weeds.

The MyWeedWatcher app is already proving to be useful to community weed management groups and DAFWA weed-related activities. DAFWA acts on reports of Category 1 and Category 2 declared weed that it receives via MyWeedWatcher, and is using MyWeedWatcher observations of cacti to inform its invasive species management programs and make decisions on how to raise awareness of cacti as priority weeds. DAFWA is also conducting online searches for sales of declared weeds and taking action by contacting the sellers or the relevant state/territory or federal officers.

Early indications are that the community is using the resources and tools developed by this project. Metrics such as webpage views, observations made and online training enrolments are steadily increasing. Continual, strategic and responsive communications will help spread awareness of the project and MyWeedWatcher, resulting in increased usage.

The project is now considering cost-effective and sustainable solutions that will enable the community to continue high levels of engagement with surveillance in the long term and continued use of MyWeedWatcher.

# Background

Western Australia remains relatively weed-free compared to the rest of Australia. About 2740 weed species have been recorded in Australia (Randall 2007) yet only 1276 have been recorded in Western Australia (WA) (Chapman 2016). In WA, 65 weed species are declared as pests (declared plants) under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) and several other weeds are declared as prohibited organisms.

Many declared plants are of high risk to agricultural industries. WA’s agricultural production capacity and its marketing identity rely on being secure from the impacts of declared or prohibited plants. Prevention and early intervention are the most cost-effective means of dealing with potential, new and emerging weeds.

The *Agricultural Weed Surveillance in the South West to Protect Industry Profitability* sub-project is one of 11 activities that contribute to the improved management of statewide biosecurity risks under the Boosting Biosecurity Defences project.

## Boosting Biosecurity Defences

The [Boosting Biosecurity Defences](https://www.agric.wa.gov.au/invasive-species/boosting-biosecurity-defences-royalties-regions) project was established in 2014 with the primary goal of increasing WA’s capacity to detect and respond to incursions that could impact adversely on our agrifood export markets, and to more effectively manage significant animal and plant pests and diseases that we have already.

The Department of Agriculture and Food, Western Australia (DAFWA) is the lead agency for the $20 million Boosting Biosecurity Defences project, which is funded by the state government’s Royalties for Regions program as part of the Seizing the Opportunity in Agriculture initiative.

## Agricultural weed surveillance in the South West

The $1.16 million [*Agricultural Weed Surveillance in the South West to Protect Industry Profitability* sub-project](https://www.agric.wa.gov.au/invasive-species/agricultural-weed-surveillance-project-royalties-regions) was established in 2014 as a three-year project.

This document reports on the achievement of outcomes to date from this sub-project, which is referred to subsequently as the Agricultural Weed Surveillance project or AWS project.

## Project objectives

Biosecurity surveillance is an official process that collects and records data on pest occurrence or absence by survey, monitoring or other procedures (ISPM 5 2007).

The AWS project’s key goals are to develop capacity for surveillance of high priority declared weeds that impact agriculture and to investigate options to improve market access. Targeted weed surveillance methods are being established for the high-value agricultural areas of the South-West Land Division.

The AWS project will:

* transform the way stakeholders and DAFWA handle surveillance data and present information on declared weeds
* transform the capacity of biosecurity groups to detect and respond to weeds
* train stakeholders to identify selected declared plants
* develop new systems, tools and applications to: find declared plants, map weed incursions, map weed-free areas, manage weeds and fulfil reporting requirements under the BAM Act
* involve biosecurity groups, producers and the community in targeted surveillance of agricultural weeds in the South-West Land Division.

The AWS project aims to empower the community to:

| Detect | detect weeds by raising awareness of priority weeds, building identification skills and increasing capacity for surveillance |
| --- | --- |
| Report | record information on weed distribution and meet reporting obligations under the BAM Act. |

Table 1 Outcome and outputs for the AWS sub-project

| **Outcome** | | |
| --- | --- | --- |
| Increased producer and community surveillance for significant agricultural pests and diseases supporting disease or pest investigation, pest management or market access | | |
| **Outputs** | | **Deliverables** |
| 1 | Groups engaged in collecting surveillance data following an agreed surveillance plan | Surveillance plan for priority weeds  WeedSpotter online training  Weed information webpages and identification packages  Drone trial  Community engagement and communications |
| 2 | Interactive customised database accessible through the external website | MyWeedWatcher app  MyWeedWatcher online database  MyWeedWatcher online reports and map |

# Output 1

The intent of the AWS project is to transform stakeholders in their capacity to detect and respond to weeds that are a major threat to trade and industry development.

Output 1 of the project is that groups are engaged in collecting weed surveillance information, following an agreed surveillance plan.

Delivery of output 1 involved establishing advisory groups for the project, determining which weeds to focus on as surveillance targets and developing a surveillance plan for each of the target weeds. Once priority weeds were selected for surveillance, resources were provided to the community to raise awareness of declared plants and improve identification skills.

The project also trialled using drones to detect weeds as an innovative surveillance technique and to engage the community in the collection of weed surveillance data.

## Advisory groups

The AWS project was informed by two advisory groups, formed for the purposes of this project.

The Declared Plant Reference Group comprises industry members and representatives from biosecurity groups, local government, Department of Parks and Wildlife and DAFWA. This group provides advice to the project to ensure that it is heading in the right direction. The group also assisted the project to decide which types of systems, tools and applications to develop and approved the surveillance plan. Establishment of the Declared Plant Reference Group was one of the AWS project’s deliverables.

The Weed Surveillance Technical Working Group comprises weed scientists and extension specialists in DAFWA. This group provides technical advice on weeds and on extension of material to the public. The group advised on the surveillance plan and selected 15 high priority weeds for targeted surveillance by this project.

## Declared plant selection process

Twenty-two weed surveillance targets were selected for this project (Appendix 1). The surveillance target selection process was described in [*Declared plant selection process*](https://agric.wa.gov.au/n/3835), published in April 2015. DAFWA’s Weed Surveillance Technical Working Group selected 15 of these weeds and the community was asked to select a further five.

The selection criteria were that the selected weed should:

* be a declared pest under the BAM Act
* be an agricultural weed that adversely affects agricultural production or farming systems
* be able to survive in the South-West Land Division of WA (that is, in the state’s agricultural regions)
* be able to be identified by the general public.

The weed selection process prioritised weeds that are in the earliest stages of invasion and establishment and, thus, in the prevention and eradication phases. This is in line with the AWS project’s scope and with the view that the greatest economic benefit is in finding new incursions of declared plants (and other threatening species) before they have a chance to spread throughout the state.

High priority declared plants are those that are thought to be absent from WA or that have a small number of localised populations. As these weeds are at low numbers or thought to be absent from the state, they are unlikely to be familiar to most stakeholders. For this reason, these high-priority declared plants were selected by the Weed Surveillance Technical Working Group.

Community, industry, biosecurity groups and grower groups were invited to select five other declared plant surveillance targets from a short list of 27 weeds presented by the technical working group. Input was sought via an online survey held in early 2015, which received 133 responses. Two additional weeds were chosen by many respondents and were included in the project, resulting in a total of seven extra weeds being selected by the community (see Appendix 1).

Declared plants neither selected nor eligible for selection as surveillance targets have had some of the weed surveillance resources and tools extended to them. However, extra extension or training material will not be developed for these weeds.

## Surveillance plan for priority weeds

The *Declared plant surveillance plan for agricultural weeds in the South West Land Division* (the surveillance plan) was published on the [DAFWA website](https://agric.wa.gov.au/n/3835) in August 2015. The surveillance plan was written with input from the Declared Plant Reference Group and the Weed Surveillance Technical Working Group. The completed plan was approved by the Declared Plant Reference Group.

The surveillance plan provides a structured approach to weed surveillance. It is a reference to enable participants from the community, industry, biosecurity groups and grower groups to search for, find and report declared plants in WA, especially those weeds identified as surveillance targets. This will enable the early detection of significant new weed incursions and a rapid response to the incursions, thus preventing the intercepted weeds becoming damaging pests in the state.

The surveillance plan describes:

* which declared plants are surveillance targets for this project
* where to find declared plants, by describing the most weed-prone sites and the most likely weed-carrying pathways
* how to report their occurrence to meet BAM Act obligations.

In line with the surveillance plan, the AWS project searches the internet for sales of declared weeds to and in WA and encourages the public to report online sales through MyWeedWatcher (see later).

When a website selling a declared plant is found, the following occurs:

* If the declared plant is from an Australian state or territory where it is also a declared plant, that state agency is notified.
* If the declared plant is from overseas or an Australian state or territory where it is permitted, a federal officer is notified. The officer contacts the seller asking them to amend the advertisement to let buyers know that the weed cannot be sold into WA. Webpages have now started to include wording such as “Cannot post to WA”.

### Further work

The surveillance plan will be updated to reflect developments from the AWS project. Information on searching for and reporting online sales of declared weeds may be expanded in the revised surveillance plan.

### The surveillance plan includes links to further information on each surveillance target. The information pages describe the weed and inform the community where to find the weed and when to look for each surveillance target.

## Weed information webpages

As part of the surveillance plan, declared pest webpages on the DAFWA website have been updated for all the AWS project’s surveillance targets. Major updates to the webpages were made between September and December 2015, with minor updates in 2016 and 2017.

Declared pest information webpages for priority surveillance targets include:

* a description of the appearance of the weed
* links to identification training (WeedSpotter) and materials
* agricultural and economic impact
* declared pest category, including links to WAOL
* requirements for land owners/occupiers and other persons
* instructions on how to search for, detect and report the weed – links to the Pest and Disease Information Service, MyWeedWatcher app and MyWeedWatcher Web
* links to information on the control method
* a management calendar
* links to further information
* contact information.

Declared pest information pages are also available for ~100 other weed species.

### Evaluation

DAFWA webpages relating to the AWS project, MyWeedWatcher and surveillance target weeds are growing in visitation levels, receiving a total of 25 307 visits in 2014, 40 921 visits in 2015 and 80 086 visits in 2016. The MyWeedWatcher webpage itself received 7228 visits in 2016.

Most views were of webpages for the surveillance target weeds that are known to be present in WA and were selected by the community (Figure 1). The target weeds receiving most webpage visits in 2016 were Paterson’s curse (15 697 visits), arum lily (11 153 visits), narrow leaf cotton bush (7828 visits), doublegee (6715 visits) and cape tulips (6585 visits). These are all Category 3[[1]](#footnote-1) weeds that were selected by the community for inclusion in the project.

Paterson’s curse was the most frequently visited surveillance target weed in 2016 and had the greatest increase in visitation from previous years. This is despite the project releasing very few communication activities on the weed (Paterson’s curse was mentioned as a weed to look out for in two MyWeedWatcher Updates). However, this is a highly visible and easily identified weed, due to its distinctive purple colour.

Arum lily was the most frequently visited weed webpage overall, receiving 24 034 webpage visits since the start of the project in December 2014, increasing on each year. The project has not released any communications on arum lily, because this is a community-led weed. As with Paterson’s curse, arum lily demonstrates that community surveillance targets need little or no engagement by the project to improve stakeholder awareness of the weed. However, project-led communications may be useful in directing the community to report their observations and use the MyWeedWatcher app.

Skeleton weed is an agricultural weed and a high priority surveillance target that received many visits, despite the project not releasing any communications on this weed. Skeleton weed webpages received 5042 visits in 2016, increasing from 4886 in 2015 and 2790 in 2014. Skeleton weed is of particular interest to the grains industry and is managed through the [Skeleton Weed Program](https://www.agric.wa.gov.au/declared-plants/skeleton-weed-program) funded by the Grains, Seeds and Hay Industry Funding Scheme[[2]](#footnote-2). This is a long-running program starting in the early 1970s and generating high interest in the grains industry.

Opuntioid cacti are one of the most often-visited DAFWA high priority targets, receiving 3447 webpage views in 2016 and 5836 since 2014. Cacti awareness has been promoted heavily by the project and by DAFWA, especially during ‘Cactus Month’ (November 2016), which saw a notable increase in webpage views. Interestingly, March 2016 saw the highest levels of webpage visitation. This was likely a combined result of cacti being featured in an ABC Gardening Australia video and the release of a car model named Cactus in early March 2016.

Figure 1 Visits to DAFWA information webpages on weed surveillance targets. Asterisk denotes a community surveillance target.

Unique page views[[3]](#footnote-3) for each weed ranged from 69% to 92% of all page views, with an average of 81% of page views being made by unique users. Both the numbers of page views and the proportion of unique page views have been increasing over the last 3 years, suggesting more people are using DAFWA’s website to find information on the target weeds.

Users are spending between 1 and 3 minutes viewing each page (1 minute 47 seconds on average), suggesting they are staying long enough to read the information (Figure 1).

Webpage views vary with season, with more webpage visitors at times when a weed is flowering or is otherwise highly visible. For example, visits to the webpage for arum lily increase around September/October each year (Figures 2 and 3).

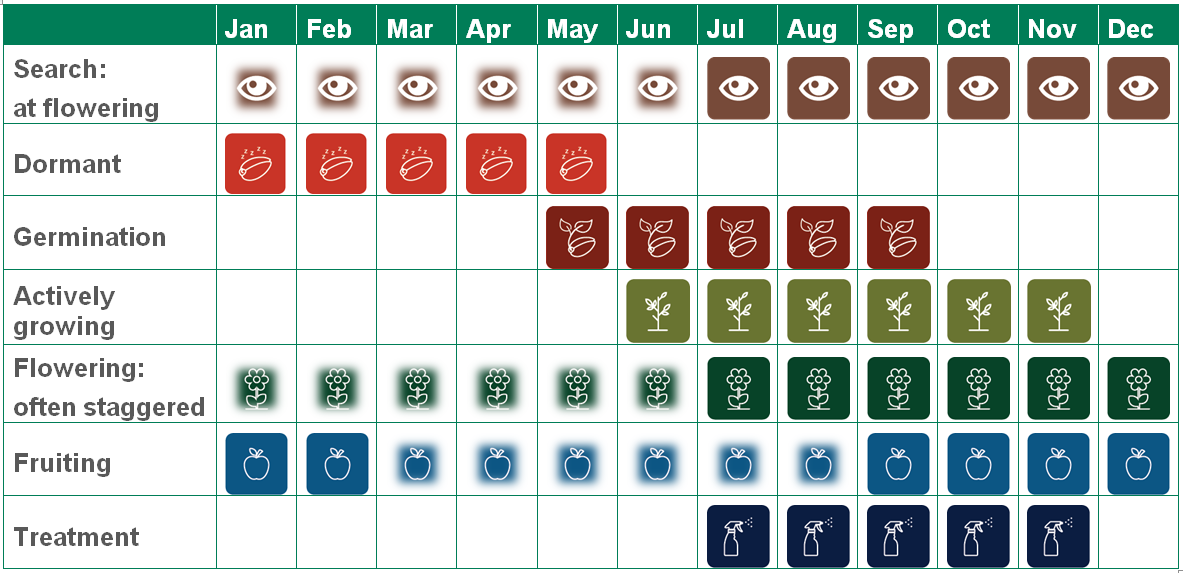


Figure 2 Arum lily management calendar; a faded icon means occasionally (DAFWA 2017)

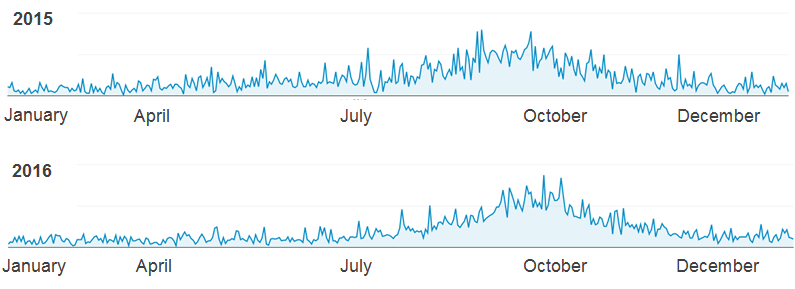


Figure 3 Daily page views for DAFWA webpages for arum lily in 2015 and 2016

## Western Australian Organisms List

The Western Australian Organisms List ([WAOL](https://www.agric.wa.gov.au/bam/western-australian-organism-list-waol)) is a publicly available online database of organisms declared under the BAM Act. There are currently 55 755 organisms in the list.

Information provided for each organism includes:

* legal status
* control categories
* presence in WA
* taxonomic classification
* keeping categories
* local government area
* authors
* links to other information.

WAOL was an existing DAFWA system which was identified for improvement through this project or through other DAFWA funding.

A new version of WAOL, released in November 2015, makes it easier for the public to search, refine and export organism declaration and taxonomic information. It is optimised for mobile devices as well as for desktop computers, and uses modern mapping features to depict control categories across the state. The new version of WAOL can be searched by string or by setting a pre-filter, with searching by local government area now available. Customised search results (on any search by string or pre-filter) can be exported to a number of different formats.

WAOL pages for the weed surveillance targets chosen for the AWC project have been updated to include links to the declared pest information pages developed under this project, and *vice versa*. This has been completed for all surveillance target weeds.

## WeedSpotter online training

Weed identification training is available through the [DAFWA website](https://www.agric.wa.gov.au/myweedwatcher-training-material-and-online-weed-identification-training) for biosecurity groups, community groups and the general public. WeedSpotter training courses explain the impact of the weed and show users how to find, identify and report weeds. There are now 23 courses available, one for each of the weeds selected for targeted surveillance (Appendix 2).

The training courses may be completed online using Moodle software. Each training course can also be downloaded as a PowerPoint presentation, enabling community groups to conduct their own weed identification training.

WeedSpotter engages trainees by providing badges for successful completion of a quiz at the end of the course, or for providing course feedback. Feedback is continually sought by asking trainees to complete an online survey for each training course.

### Evaluation

WeedSpotter training became available online in late January 2017. Therefore, there was little data available at the time of writing this report. However, early indications are that the community considers the online training courses to be useful.

As at 24 March 2017, 19 unique users[[4]](#footnote-4) had enrolled in 33 WeedSpotter weed identification courses (Figure 4). Users usually enrolled in one to four (1-4) weed identification courses. Eleven people had completed at least one course in its entirety. Only four people (12%) had enrolled in a course without then viewing any of the slides or attempting the quiz.

Generally, once a person had started viewing the online course, it was viewed in its entirety. Only three people (9% of enrolments) abandoned the course in its early stages, after viewing the first two to four slides. One person started viewing a course part-way through, having skipped the first four slides and starting at the first slide related to identification of the weed. A further five people (15% of enrolments) viewed the majority of the course, only missing the final slide that directs people to ‘further information’.

WeedSpotter training has been undertaken by the community for 12 weeds (Figure 5), out of the 23 available courses. These included six of the seven community surveillance targets, suggesting the community may be more interested in taking training courses for widespread weeds.

Users enrolled in training courses for six of the high priority surveillance targets for the South-West Land Division. These covered African acacias (which includes the karroo thorn acacia), skeleton weed, wheel cactus, branched broomrape, Bathurst burr and perennial thistle.

Twenty-one users completed the quiz at the end of a course and their scores were generally high (scoring 7 out of 10 or higher, average score of 8.56/10), indicating that information from the course was easy to understand and was being retained (Figure 5).

Nine people accessed the evaluation survey for 15 courses (Figure 4). However, only five evaluation surveys were submitted; these were for the training courses on narrow leaf cotton bush, doublegee, African acacias and apple of Sodom. After completing the course, users felt confident (78% average rating) identifying the weeds and were highly likely (average 97%) to recommend the course to others.

The evaluation survey asked how likely it was that the user would use the MyWeedWatcher app to report weeds. Respondents were, on average, 85% likely to use the app, with four of five respondents rating their likelihood as 97-100%. One respondent rated their chances at only 30%, explaining that they are largely office-based.

Eight unique users had accessed the downloadable weed identification material from 13 courses (Figure 4). One user viewed the downloadable identification material without having completed any part of the online course or attempting the quiz. One person provided feedback that they were more likely to recommend another person to use the online training than they were to use the PowerPoint presentation to conduct training.

Figure 4 WeedSpotter engagement: user access to course components

Figure 5 Use of WeedSpotter online training for each weed species. Asterisk denotes a community surveillance target. Average quiz grade is scored of 10.

### Further work

WeedSpotter has been available to the community since January 2017. Its use for online training is expected to increase significantly once more people are aware of its availability. The online training will be promoted through communications activities for the AWS project, including for “weed of the month” articles.

## Drone trial

Water hyacinth (*Eichhornia crassipes*) is a prohibited organism in WA and is assigned to Category 2 (eradication) under the BAM Act[[5]](#footnote-5). This weed has the potential to block large sections of rivers and spread into other waterways.

Water hyacinth was reported in the Serpentine River in June 2015. Immediate action was taken by the reporting landholder to control the infestation before it could spread into the Serpentine Dam and nearby waterways. This included the use of a helicopter from which to inspect the river and treat the infestation.

This presented an opportunity for the AWS project to undertake a drone trail with the community. It was recognised that a drone could be an effective way to survey the river for undetected water hyacinth. Given the high detectability of water hyacinth, aerial photographs of the survey area could be inspected by the community. The trial intended to demonstrate innovative methods of weed detection and involve the community in surveillance.

DAFWA commissioned the drone trial in February 2016. A drone collected 16 000 aerial photographs along a 27km x 150m section of the Serpentine River. As the fixed-wing drone was limited to flying in a linear pattern across the entire survey site, it also photographed the land adjacent to the river. The first step of processing the photographs was to select those images that contained the river.

Selected images showing the river were sent to [the Aquila citizen science project](https://friendsofthefitzroy.com.au/?page_id=1352). Members of the Serpentine-Jarrahdale landcare group (Landcare SJ) inspected the aerial images for water hyacinth presence online. Training images were provided to allow community members to become familiar with the imagery and improve their detection skills. Images were inspected twice by the community to improve reliability. The aerial images were very high quality (3.5cm resolution) and had GPS coordinates embedded in the image file.

Landcare SJ members reduced the 16 000 images to 105 images that contained water hyacinth. This information will be used to accurately map the distribution and density of water hyacinth infestations in the Serpentine River, significantly reducing the costs associated with the management of this declared plant.

The project had considered other weeds and locations for the drone trial. Weeds such as skeleton weed, cactus species, apple of Sodom and other water weeds such as salvinia were all considered. Water hyacinth was selected because it was a known infestation, stands out against the background and the river represents a defined study area.

The trial demonstrated how new technology and citizen science could be used to involve the community in weed surveillance and response.

### Further work

A helicopter survey of the Serpentine River was conducted on 9 March 2017 to provide a comparison in survey methodology. Data collected during the helicopter flight will be analysed in the coming months.

A cost comparison of using a drone, helicopter or walking to survey the river for water hyacinth will be conducted. Results of the drone and helicopter surveys will be compared against existing data from surveys conducted on-ground, which take approximately two days using two people.

## Community engagement and communication

A key component of the AWS project is engaging the community and providing information and resources to raise awareness of weeds, particularly for weeds that are currently absent or rare within the South-West Land Division. Regular and effective communication with stakeholders and the public is crucial to the success of the project.

The project’s communications aim to:

* raise awareness of the project and resources developed through the project, such as the surveillance plan
* raise awareness of, and identification skills for, weed surveillance targets
* raise awareness of, and increase participation in, MyWeedWatcher and WeedSpotter.

By increasing awareness of and engagement in the project, the state government aims to empower community groups and individuals to contribute to weed surveillance, thus increasing the likelihood of early detection (Table 2).

Table 2 Approach to communication and community engagement for the AWS project

| Aims | Channels | Measures |
| --- | --- | --- |
| Promote the project and MyWeedWatcher | DAFWA Website  Media releases  Newsletters  Newspapers (e.g. Backyard Buddies)  Radio  Social media | Page views of DAFWA project website.  Subscribers to emails. |
| Improve weed knowledge and identification skills | WeedSpotter  MyWeedWatcher  Weed information pages | Use of WeedSpotter. Page views of weed information pages. |
| Encourage reporting | MyWeedWatcher  Social media  Pest and Diseases Information Service | App installations.  Observations reported. |

Communications released through the AWS project are summarised in Appendix 3.

Community engagement and communication activities were targeted to ensure the greatest impact. Communications on specific weeds were released at seasonally appropriate times, when the weeds are most likely to be found. Communications also targeted relevant groups, based on industry, interests or location; for example, weeds that are associated with horse fodder may be targeted to equestrian groups.

For widespread declared plants there is often a high level of industry and community support to manage and control them, sometimes involving a Recognised Biosecurity Group[[6]](#footnote-6) or an Industry Funding Scheme to support their management. Industry and community may have a high interest in surveying some of these more widespread declared weeds for their own management programs. It is anticipated that community groups will lead communication efforts for the more widespread (community-selected) weed surveillance targets. As such, DAFWA focuses its communication activities on promoting the lesser-known or absent declared weeds (that is, the high priority surveillance targets for the South-West Land Division) and on promoting MyWeedWatcher and WeedSpotter.

All project communications are aligned with the marketing, communications, acknowledgment and branding guidelines and policies of the state government, DAFWA, the Department of Regional Development and Royalties for Regions. This requirement introduced some limitations to the amount and content of media that could be released by the project.

One of the challenges of the project has been obtaining photographs of prohibited declared plants, particularly images that are suitable for identification purposes.

### Stakeholder engagement

Throughout project implementation there has been ongoing engagement and consultation with the Declared Plant Reference Group, which includes industry and community representatives. The DAFWA Weed Surveillance Technical Working Group has also been consulted on specific aspects of the project.

Individuals and community groups have been encouraged to participate in the project by signing up to a mailing list. There are currently over 400 subscribers being sent information on the project and invitations to participate in consultation. Members of community groups are encouraged to disseminate information and training to other group members.

The AWS project is obtaining producer and community input into the development, implementation and progress of this project by releasing publicly accessible surveys on specific aspects of the project.

The project employs a number of engagement activities to encourage involvement of community groups in the South-West Land Division; for example, the project has generated interest from groups such as the Peel-Harvey Biosecurity Group, Shire of Murray, Town of Mosman Park, catchment councils and landcare groups.

### Workshops and presentations

DAFWA staff presented and demonstrated MyWeedWatcher at 20 conferences and workshops between December 2014 and February 2017. See Appendix 4 for details.

### DAFWA website

The DAFWA website includes a page dedicated to the [AWS project](https://www.agric.wa.gov.au/invasive-species/agricultural-weed-surveillance-project-royalties-regions), as well as [information on MyWeedWatcher](https://www.agric.wa.gov.au/myweedwatcher-information) and a page of [frequently asked questions](https://www.agric.wa.gov.au/biosecurity/weed-surveillance-project-frequently-asked-questions). Documents related to the project may be downloaded from the website.

### MyWeedWatcher Updates

MyWeedWatcher Updates are published on the [DAFWA website](https://www.agric.wa.gov.au/myweedwatcher-updates) and emailed to over 400 people to keep the community informed and engaged.

These reports contain news of updates to the MyWeedWatcher app and WeedSpotter training, new resources released, information on a weed of the month, weeds to look out for that month/season, features on new weeds or weed pathways (such as online sales), a report on new weeds mapped since the last update, and contact details for more information.

Four MyWeedWatcher Updates have been published to date, in October 2016, November 2016, December to February 2017, and March 2017. Further updates will be released, and will be used to promote the resources available through the AWS project.

The March 2017 MyWeedWatcher Update was the first to be distributed using Campaign Monitor. This allows the project to track engagement with each section of the update. Reports also provide information on how many people opened the email, clicked on the link or unsubscribed, as well as how many emails bounced, how many times the update was shared to social media and which links were the most popular. The content of future MyWeedWatcher Updates will be tailored according to which sections are more or less popular with readers.

### Media releases

All media releases are published on the DAFWA website and posted on social media. The project has made seven DAFWA media releases to date. They are listed in Appendix 3.

An additional six DAFWA media releases mentioned MyWeedWatcher and/or weed surveillance targets, while two DAFWA AgMemo newsletters featured articles on these topics (Appendix 3).

Information from media releases was shared in local newspapers, community papers, newsletters and website blogs/news by the press, local governments and community groups.

### Backyard Buddies

Backyard Buddies is a community update on animal and plant pests, diseases and weeds that is published every month in local and regional newspapers.

Five Backyard Buddies updates have been released by the AWS project (Appendix 3).

### Social media

DAFWA promotes MyWeedWatcher on Facebook and Twitter and has made 30 social media posts between the release of the app in April 2016 and March 2017 (Figure 6; Appendix 3).

DAFWA has made 13 Facebook posts relating to the project, including five posts about the MyWeedWatcher app and eight posts on specific target weeds that can be reported through the app. Facebook posts were displayed a total of 19 302 times (impressions) and had a total reach of 9257 (number of people receiving impressions). Links contained in Facebook posts were clicked 203 times.

DAFWA has made 18 tweets relating to the project, including nine tweets that mention specific target weeds that can be reported through the app. Tweets had a total of 20 494 impressions. Links contained in tweets were clicked 42 times.

Social media posts by DAFWA received 148 direct engagements (i.e. likes, shares/retweets and comments/replies), with each post averaging five engagements.

In addition to social media posts made by DAFWA, community groups and other stakeholders have been very active in promoting MyWeedWatcher and raising awareness of the targeted weeds. Based on the social media posts that were identified, over 100 have been made through 73 profiles belonging to several types of stakeholders, including biosecurity groups, catchment councils, landcare groups natural resource management groups, state and local government, not-for-profit organisations, industry, plant enthusiasts and individuals.

The Peel-Harvey Biosecurity Group and Landcare SJ appear to be the most active promoters of the MyWeedWatcher app and this project, while Peel-Harvey Catchment Council make the most posts on surveillance target weeds, but did not mention the AWS project directly.

African acacias are the most-mentioned weed group, with at least 50 posts about them in total. Interestingly, a large amount of social media attention surrounding African acacias came from Queensland, where the Desert Channels Group, Biosecurity Queensland, ABC Queensland, a drone company involved in weed management and a few other groups together made at least 31 posts on these acacias.

Social media attention to surveillance target weeds has increased since the release of MyWeedWatcher (Figure 6). Between January 2014 and March 2016, an average of 1.3 posts per month were made on Facebook and Twitter relating to surveillance target weeds. After the release of MyWeedWatcher in April 2016, social media activity rose to an average of 3.8 posts per month, with as many as nine posts made in one month. Note that these figures are an indication of social media activity only, as it is not possible to track all social media posts relating to weeds.

Social media activity peaked in April and May 2016 following the release of MyWeedWatcher app. September to December 2016 also saw significant social media attention. Events led by DAFWA and community groups contributed significantly, particularly the Twentieth Australasian Weeds Conference (Lanoiselet *et al*. 2016) and the South West Celebration (see Workshops and presentations), as did November being ‘Cactus Month’.

Figure 6 Social media activity by DAFWA and other stakeholders for MyWeedWatcher and surveillance target weeds

The project’s social media communications could benefit from increased posting of shareable content that includes images and mentions MyWeedWatcher. The most popular post relating to the project was made by Land for Wildlife, a program run by the Department of Parks and Wildlife, about Opuntioid cacti (Figure 7). The post received nine likes, six comments and was shared 18 times. The shared posts received at least 20 more likes and eight more comments[[7]](#footnote-7). Land for Wildlife’s post included a photo of people examining with a sizable weed. The description was informative, describing the weed and why it is important to manage, and urging people to report Opuntioid cacti to DAFWA through MyWeedWatcher.

The impact of the current level of social media engagement could also be increased by consistently posting on both Facebook and Twitter. To date, several posts on specific weeds have been made on one platform, but not the other (Appendix 3). Facebook and Twitter deliver information in very different ways and serve different marketing needs. Although there is some audience cross-over, posting on both social media platforms could greatly extend the project’s audience and reach.



Figure 7 Social media (Facebook) post relating to the AWS project with the highest level of engagement (Land for Wildlife 2016)

### Radio

DAFWA staff took part in seven radio interviews that discussed MyWeedWatcher and surveillance target weeds. These are listed in Appendix 4.

The Peel-Harvey Biosecurity Group conducted an interview discussing the MyWeedWatcher app that was broadcast on ABC South West (Bunbury), ABC Great Southern (Albany), ABC Great Southern (Wagin) stations in May 2016.

### DAFWA staff engagement

Eight training sessions were held for DAFWA staff at the department’s Kensington office between February and March 2017. Training was available in person or via web link.

The training sessions explained MyWeedWatcher and demonstrated how to use the app to identify, map and record weeds. Twenty-two staff members attended. Informal enquiries and discussions revealed promotion of the training sessions generated much broader interest within the department.

Training sessions were initially offered to one section of DAFWA, but were then offered to the whole of department as four lunchtime sessions offered during March 2017. After receiving feedback, the project now plans to refine the training sessions and deliver them to a wider audience beyond DAFWA.

### Evaluation of communication activities

AWS project communications are undertaken through a variety of media and channels. The project employs media releases, direct email, events, social media and radio to promote the MyWeedWatcher app and raise awareness about specific weeds, with a clear message for users to look for and report the weeds.

Communication and engagement activities have occurred continually since the release of the MyWeedWatcher app in late April 2016 (Figure 8). Weeds have been highlighted as ‘weeds of the month’ or as ‘topical weeds’, i.e. weeds to look out for at the moment. Media releases have always been seasonally appropriate, spreading the message at times when the weed is most visible, in line with the surveillance plan and weed management calendars published on information webpages for each weed.

In 2016, communication and engagement activities peaked in May to coincide with the launch of the MyWeedWatcher app on 29 April 2016. The app was well-promoted, with articles appearing in The West Australian and local newspapers, and community groups spreading the message on social media and in newsletters.

Communication activities peaked again in November 2016, dubbed ‘Cactus Month’, when messaging focused on raising awareness of wheel cactus and other Opuntioid cacti. The project also released media on branched broomrape and African acacias in November, further adding to the high volume of communications that month.

September to November 2016 saw several events promoting the MyWeedWatcher app, such as the Australasian Weed Conference that was held in Perth, and the South West Celebration. This caused a rise in social media attention, with community groups promoting the events and sharing photos while the events were taking place.

Some of the increased media attention in September 2016 was due to the popularity of DAFWA’s media release on cape tulips that was released in August 2016 (there were no media releases in September). Articles on cape tulip appeared in at least six publications, including The West Australian, both in print and online.

Low times were June and July 2016 and January 2017 (Figure 48). The project released few communications in December 2016 and none in January 2017, due to the Christmas/New Year holiday period. The level of communications by the community was minimal during this time.

In June 2016, the project released few communications: one media release, one Backyard Buddies article (on African acacias) and one presentation at an event. July communications focused on doublegee, with a media release, AgMemo article and three Twitter posts about the weed. These efforts did not result in any media attention to doublegee, with social media attention focusing instead on arum lily and African acacias. Posts on arum lily were made by people encountering them in the environment, which indicates that social media engagement on this weed was led by the community rather than DAFWA.

Figure 8 Volume of monthly communications activities, including those generated by external organisations

The project released communications on 17 surveillance targets (Figure 9, Appendix 3). Weeds for which there were no communications were early blackberry, arum lily, perennial thistle, kochia and Bathurst burr. Under DAFWA’s communications policies, some communications were unable to be released. While the community engaged on social media about arum lily, the remaining weeds appear to have received no attention. Early blackberry was only partially included in this project, meaning no communications activities would be extended to this weed.

There is a clear opportunity for future communications (if limitations can be overcome) on perennial thistle, kochia and Bathurst burr. These are all summer weeds and thus prime candidates for highlighting during the January lull in communications (Figure 8). The optimal times for searching for these weeds are December and January for perennial thistle, October to February for Bathurst burr, and October to April for kochia.

Bedstraw was only mentioned in a media release on the MyWeedWatcher app, and would also benefit from more communications effort. This priority agricultural weed is most visible from May to October, making it the ideal weed to feature in the June–July low period (Figure 8).

There is also a clear need for more communications and engagement of high priority surveillance targets that are currently receiving little community attention, such as bedstraw, ragwort, creeping knapweed, purple flowered devil’s claw, horsetails and gorse (Figure 8Figure 9).

Figure 9 Number of all communication activities for each weed by DAFWA and by the community in 2016 and 2017

### Further work

The project will continue regular media releases and social media engagement. DAFWA will prioritise promoting MyWeedWatcher and raising awareness of high priority surveillance targets while encouraging stakeholders to lead communications for community surveillance targets.

Recent changes in DAFWA’s communications policy have made it possible to more easily set-up social media pages relating to specific projects. The AWS project is considering starting a joint Facebook group with the Department of Parks and Wildlife since the two departments have joint interests in weed surveillance, reporting and control, and have many stakeholders in common. The Facebook group would provide a further forum for the community to discuss weed identification and share resources such as MyWeedWatcher and WeedSpotter. Members would also be encouraged to report using MyWeedWatcher. High priority weed observations posted in the Facebook group could be transferred to MyWeedWatcher by DAFWA staff.

# Output 2

The AWS project aims to provide stakeholders with tools to enable them fulfil reporting requirements under the BAM Act, andto providemaps and data to assist stakeholders to manage declared plants.

To deliver this output 2 the project has delivered an interactive customised tool/application/database that is accessible through DAFWA’s external website. Stakeholders can now use smartphone and tablet devices or an online web tool, MyWeedWatcher, to identify, map, survey and report weeds and view results online.

## Selection of tools, systems and applications

The project investigated different tools, systems and applications that could lead to improved capacity for surveillance of high priority declared weeds in Western Australia. The selection process that was used to determine what to develop was outlined in *Weed surveillance project: selection of tools, applications and systems to develop*, February 2015.

Applications were grouped into different types. Each application type was presented to the project’s Declared Plant Reference Group in January 2015. Members ranked the priority and provided comments and recommendations on application types.

Seven applications with a mean priority weighting of 0.80 and above (high priority) were chosen for inclusion in the project (Table 3). Four applications with a mean weighting of 0.70 to 0.79 may be partially developed by the project (Table 4). Partial development means that only a very basic recording mechanism will be developed or the application will be costed for development.

Table 3 Applications identified as the highest priority for this project to develop

| What was selected | What has been developed |
| --- | --- |
| A mobile (smartphone) application to report on the presence of declared plants | MyWeedWatcher app |
| A website tool to report on the presence of declared plant | MyWeedWatcher Web |
| Online weed identification training | WeedSpotter online training |
| Weed identification training package(s) developed for groups to use | Downloadable presentations available through WeedSpotter |
| Collecting requirements (ideas) for improving the Western Australian Organism List (WAOL) | A new version of the Western Australian Organism List was released in November 2015 |
| An online tool to identify weeds | A function within MyWeedWatcher app |
| Other declared plant information and navigation on the website for the selected declared plants | Information webpages were developed for each weed target. Pages were linked to WAOL, control pages and other relevant information. |

Table 4 Applications identified for potential partial development

| What was selected | What has been developed |
| --- | --- |
| Matching declared plant information from WAOL to information pages and vice versa | All surveillance target weeds cross-linked to declared pest information webpages and WAOL pages |
| Mobile smartphone application to identify weeds | The MyWeedWatcher app includes a detailed identification guide |
| A weed monitoring and evaluation dashboard to download reports, maps, etc. | The MyWeedWatcher Web allows users to export data and view maps produced from the data gathered |
| A website tool/mobile application to report control used on the declared plant | A basic mechanism to report control is being developed for MyWeedWatcher Phase 2 |

Prior to this project, DAFWA maintained an online database called WeedWatcher which allowed the public to report weeds. However, this database is no longer being used by the public. The WeedWatcher surveillance application is not considered accessible under national accessibility requirements and could not be used for surveillance purposes by this project. The WeedWatcher database could not be amended; therefore, development of a new (online and mobile) application was required. Data from the retired WeedWatcher database will be migrated to the new MyWeedWatcher.

## MyWeedWatcher

MyWeedWatcher is an online database that was designed and developed by DAFWA with input from stakeholders, and was released on 29 April 2016. It is available in the form of an interactive website (MyWeedWatcher Web) and a mobile device application (MyWeedWatcher app).

MyWeedWatcher was developed to help the community report new occurrences of potential weeds at an early stage so that preventative actions can be taken. MyWeedWatcher enables individuals and community groups to use an online tool or smartphone and tablet devices to identify, survey and map weeds and view results online. MyWeedWatcher involves the community to help maintain Australia’s pest-free status, support biosecurity and protect the natural environment.

MyWeedWatcher is designed primarily as an application to assist users to record the location of weeds of interest to the community, biosecurity groups and DAFWA. MyWeedWatcher produces maps that can be used to make more informed decisions on weed management. This helps community groups better manage their local weed problems.

### As of March 2017, MyWeedWatcher contained images and descriptions of 300 weeds, with more being added, and is supported by detailed web pages on high priority declared weeds.

The application is targeted at the South-West Land Division, but can be used anywhere in Western Australia.

MyWeedWatcher helps users to identify a weed, record an observation and view observations. The identification guide allows users to quickly search for a weed according to plant characteristics such as flower colour, leaf shape and plant type.

The reporting feature enables users to map weeds, add images and record survey data such as weed density, weed counts, confidence of identification and notes on control activities done. The location of a weed may be recorded using GPS functionality, by searching on a map or by entering GPS coordinates.

Weed reports are sent directly from MyWeedWatcher to DAFWA for identification or verification and potential response. High priority declared plant surveillance targets (Category 1 weeds not present in WA, and Category 2 weeds targeted for eradication) will be treated in a different manner to other weeds, because they can be a risk to WA trade and/or might require the landholder to employ specific or prescribed management methods. A DAFWA expert in weed diagnostics will verify the photos and reports before releasing them to the map, and the map will not show the exact location of the weed.

MyWeedWatcher includes declared plants that were neither selected as surveillance targets nor eligible for selection. The project has not developed extra extension or training material for these weeds.

Other weed surveillance targets are directly added to the map to advise biosecurity groups, industry and DAFWA of their location and to help determine future management options. Details of the property boundary, property manager or owner are not given to the general public.

### MyWeedWatcher app

This app is based on a concept led by Tamrika Lanoiselet (DAFWA) with input from industry, the community, local biosecurity groups, and employees of the Department of Parks and Wildlife and DAFWA. The application coding is held by DAFWA.

The app is part of a suite of pest surveillance tools developed by DAFWA to protect agriculture from biosecurity threats and supports WA’s access to international markets.

MyWeedWatcher app has four main areas (Figure 10): identify a weed, create observation, view observations and favourite weeds. It also has a ‘tips’ area to guide users through the app.

The app was designed primarily to allow users to identify and map weeds while in the field. The app can be used in or out of mobile range. A feature unique to the mobile version of MyWeedWatcher allows users to save their ‘favourite’ weeds for quick reference. Users may also view the observations they have made previously, allowing for a personalised weed surveillance tool.

The MyWeedWatcher app can be downloaded free from [iTunes App Store](https://itunes.apple.com/us/app/my-weed-watcher/id1090235081?mt=8) or for Android devices from [Google Play](https://play.google.com/store/apps/details?id=au.gov.wa.mobile_weedsurveillance&hl=en). Training material on how to use the app is available on the [DAFWA website](https://www.agric.wa.gov.au/myweedwatcher-training-material-and-online-weed-identification-training).

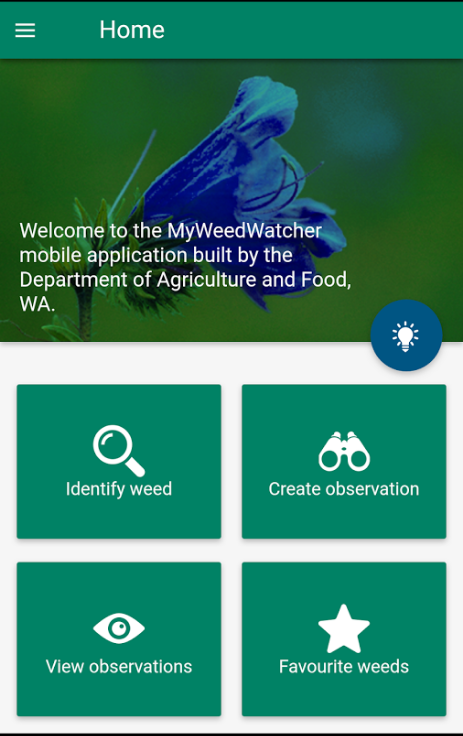


Figure 10 Home page of the MyWeedWatcher app

### MyWeedWatcher Web

[MyWeedWatcher Web](https://www.agric.wa.gov.au/myweedwatcher-web/search) is an interactive website. It provides an online database that allows the public to view maps of reported weeds, download spreadsheets of mapped weeds and report weeds online (Figure 11).

MyWeedWatcher Web makes weed reporting available to people without a mobile device. The web version of MyWeedWatcher makes it easy for users to access and use weed data. Users can generate customised data reports and view or export these as tables or maps. An advantage of the web version over the app is that users can access all MyWeedWatcher records and are not limited to viewing their own observations.

MyWeedWatcher Web provides a versatile online database for community and land managers to make informed decisions on weed management.

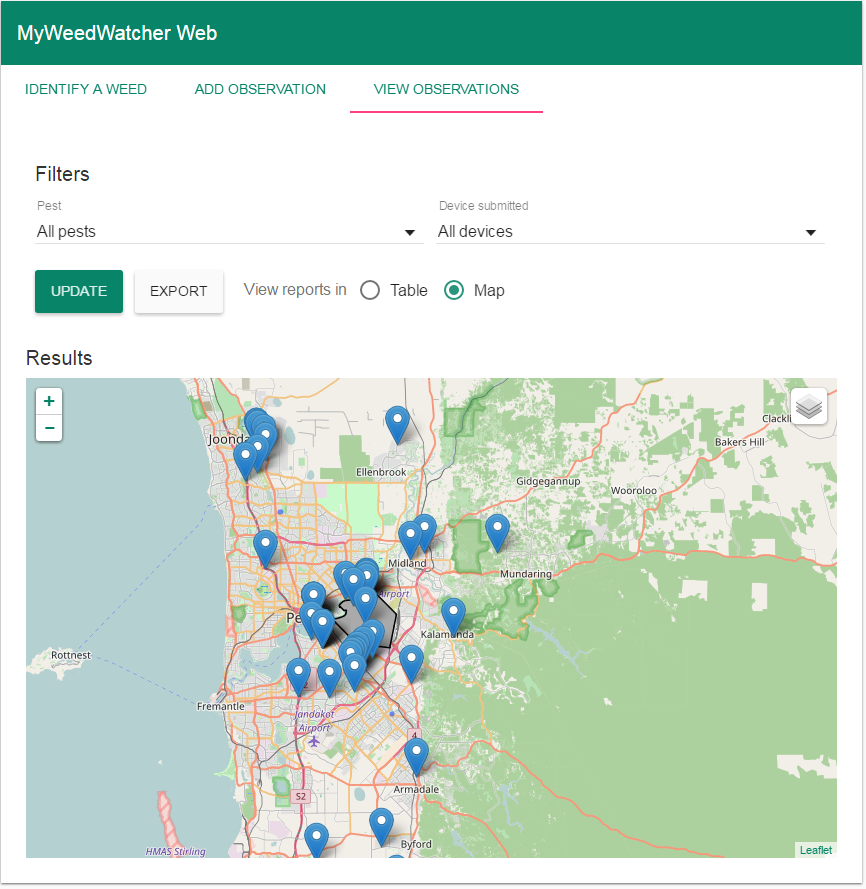


Figure 11 Sample page from MyWeedWatcher Web

### MyWeedWatcher evaluation

The MyWeedWatcher app has been installed 1561 times on smartphones or tablets since its release in April 2016. Of these, 1003 were from iTunes (for Apple devices) and 558 from Google Play (for Android devices).

Of the 1003 installations to Apple devices, 288 were to active devices[[8]](#footnote-8), meaning the app was used at least once. The app has been used (for at least 2 seconds) at least 967 times.

There have been 558 installs and 248 uninstalls on Android devices and there are currently 316 active installs on Android devices. Active installs are the number of devices that have been active in the last 30 days and on which the app is currently installed.

Between the release of MyWeedWatcher in April 2016 and January 2017, webpages relating to MyWeedWatcher received 7228 visits, including 430 webpage visits to MyWeedWatcher Web.

Over 10 months between 1 May 2016 and 20 March 2017, 211 observations were mapped on MyWeedWatcher by 60 unique users. Twenty-three (11%) records were made through the web application and 188 (89%) through the mobile app (Appendix 5).

They included:

* 1 record of a prohibited weed (C1) (0.47% of total)
* 3 records of weeds under eradication (C2) (1.42%)
* 84 records of declared weeds (C3 management) (39.81%)
* 26 records of declared weeds (no category) (12.32%)
* 95 records of permitted weeds (45.02%)
* 2 records of unknown weeds (0.95%).

Fifty-three records (25%) were of surveillance target weeds, including four (2%) high priority surveillance targets and 49 (23%) community surveillance targets. Twelve surveillance target weeds were reported using MyWeedWatcher (Figure 12). The most recorded target weeds were narrow leaf cotton bush (21 records), arum lily (10 records), two-leaf cape tulip (6 records) and one-leaf cape tulip (5 records: Appendix 5).

Most observations were of weeds that are known to be present in WA. One record was made of wheel cactus, which is under eradication. Given that the project’s primary goal is to increase early detection of weed incursions, this result is aligned with the project’s expectations.

MyWeedWatcher observations indicate that the community is aware of weeds and is searching for them. There are several records of weeds similar to surveillance targets. While there has been one observation of wheel cactus, other Opuntioid cacti have been mapped thirteen times. Although three-horned bedstraw[[9]](#footnote-9) has been mapped twice, there are 48 observations for cleavers, a related weed from the same genus (Appendix 5).

Figure 12 Observations of weed surveillance targets recorded using MyWeedWatcher

### MyWeedWatcher phase 2

Several opportunities for improvement were identified in Version 1 of the MyWeedWatcher app. These improvements will be incorporated into MyWeedWatcher phase 2.

DAFWA consulted industry groups, biosecurity groups, general public and DAFWA staff to determine the requirements for phase 2 of the MyWeedWatcher app. As part of this consultation, a survey was sent to the users’ email distribution list in August 2016, asking people how they use the app and what they would like to see changed. The nine respondents were identified as being from seven different stakeholder types.

The changes required have been described, and DAFWA developers are currently determining the best way to implement the changes.

The primary issue to be addressed is the difficulty of registration and logging into MyWeedWatcher. First-time users currently go through a two-step process to first register with DAFWA and then to create a profile on the app. Instructions on how to use MyWeedWatcher app and ‘quick tips’ are available on the DAFWA website and have been included in MyWeedWatcher Updates. Streamlining the registration process is identified as a high priority for phase 2 of MyWeedWatcher.

Registration and login improvements have been discussed with users, and a number of initiatives are currently being put in place to make these steps and submitting a weed report easier. These include:

* Phase 2 of MyWeedWatcher will provide an alternative to registration. Registration will be optional and people will be able to submit weed reports by email.
* Phase 2 will bypass the DAFWA website registration, as this is where most of the issues are occurring. A separate registration process will be developed.
* In the interim, the DAFWA website registration is being made easier and the wording of the email confirming registration has been rewritten and simplified.

Several stakeholders commented that they would like to see more or different weeds added to the app. Currently, the app would need to be redeveloped in order to add an extra weed; however, this will be modified in the second version so that DAFWA can add extra weeds without redeveloping the entire app. This will translate to significant time and cost savings. The project is currently collecting and collating background weed data to go into MyWeedWatcher.

Although the project’s aim is to develop survey and reporting abilities, phase 2 of MyWeedWatcher will enable users to add brief information on any control measures they have used on the weed. MyWeedWatcher already links to information on control recommendations, where these are available (see Appendix 2).

The project will continue to review and improve MyWeedWatcher.

### Increasing engagement with the MyWeedWatcher app

Many people installed the MyWeedWatcher app, but either did not use it or soon uninstalled it. Low retention rates are common for apps. Most people no longer use an app seven days after installing it and less than 25% of users return to an app the day after initially installing it (Appboy 2016). About 23% of users will only launch an app once (Localytics 2016).

The number of active users depends on several factors, including how many users sign up and actually try out the app (on-boarding) and how useful the app is over time (long-term retention). Retention also depends on the category of app; for example, mobile phone users spend most of their time using communication (42.2%) and social (19.5%) apps (Quettra 2015). The nature of the MyWeedWatcher app is that users are unlikely to use the app daily or, perhaps, even monthly, making it easy to forget about.

There are several strategies that could boost app retention and long-term engagement. Users need to be reminded about the app and find it useful. Periodic emails could be sent to MyWeedWatcher app users, preferably with personalised content.

Phase 2 of the MyWeedWatcher app is addressing the usefulness of the app by streamlining the onboarding process, adding more weed information and improving functionality.

Direct communications with app users could help remind users about the app and prompt them to use it more regularly. Given the rapid drop in app retention after installation, communications should target the first few days of usage, and in particular the first visit. Direct communication with MyWeedWatcher app users could include messages such as:

* weed of the month or weeds to look out for now
* a map of observations of a user’s favourite weed in their local area
* actions taken as a result of observations made
* directing users to WeedSpotter online training for the weed just saved as a favourite.

Personalising the app to align with a user’s needs and preferences makes it more likely that the user will continue to use the app. MyWeedWatcher already has a feature for favourite weeds which could be utilised to target messages to individual users.

Push notifications can extend MyWeedWatcher information to outside the app and encourage inactive users to engage with an app. Users who opt in to push messages can average three times more app launches than those who opted out, representing a 171% increase in app engagement (Localytics 2015).

However, because push notifications appear on a user's home screen, push notifications need to be used with caution. If messages are irrelevant or too frequent, they may be deemed annoying and negatively impact on engagement and retention.

As with WeedSpotter online training, the MyWeedWatcher app could reward users for reaching certain milestones; for example, 100 observations made, first high priority declared plant reported, observations made in five different local government areas, of an award to observing 20 different weed species.

# Progress against outcomes

The intended outcome of the AWS project is to increase stakeholder surveillance for significant agricultural declared plants, supporting pest management and market access. A summary of the progress against the project’s outcomes is provided in Appendix 6.

Surveillance requires awareness of the weed and how to look for it, and an ability to report observations. The AWS project has delivered on the outcome by determining priority surveillance targets for the South-West Land Division and publishing an agreed surveillance plan.

The project has also developed relevant information and resources in the form of declared pest information webpages, online weed identification training (WeedSpotter) and by linking the project’s resources to further information sources such as WAOL and webpages that provide weed control information.

A drone trial has shown opportunities for community involvement in weed surveillance using innovative methods and new technologies.

Output 1 of the AWS project is that groups are engaged in collecting surveillance data following an agreed surveillance plan. The original objective of Output 1 was that members of five to eight stakeholder groups would be engaged in collecting surveillance data following an agreed surveillance plan. To date, only one to three biosecurity groups are interested in managing priority weeds in the South-West Land Division and, of these, the Peel-Harvey Biosecurity Group is the most engaged. The project does not collect in-depth personal information on MyWeedWatcher and WeedSpotter users, which makes achievement of this objective difficult to measure. However, training enrolments and weed observations are being made by a large number of individuals belonging to several stakeholder groups, suggesting this objective has been met.

The project has established the means and avenues for engaging groups in surveillance. MyWeedWatcher has received social media attention from a variety of community groups and individuals, and print media and radio stations have been contributing to raising awareness of MyWeedWatcher and surveillance target weeds.

Surveillance is an activity that is difficult to measure and evaluate. The number of observations made and reported does not necessarily indicate whether people are aware of or searching for the weed. Most observations have been of weeds that are known to be present in WA, with few records reported to date of high priority surveillance targets for the South-West Land Division. Several of the high priority surveillance targets are not known to be present in WA, either with no previous records or having been eradicated when detected. This result supports the project’s primary goal of increasing early detection of weed incursions.

Figure 13 summarises the impact of effort expended by the project. It shows the level of communications for each weed and the extent to which resources and tools developed by the project (MyWeedWatcher, WeedSpotter and information webpages) are being used. It is clear from Figure 13 that, although there are some general trends, awareness of weeds and use of the project’s resources vary for most weeds, with a number of factors affecting results. Variables include media attention from outside the project, seasonality and visibility of the weeds, or whether a weed is of particular interest to a community group or industry program.

Generally, weeds of community interest receive high level of communications and engagement from community groups. This translates to better outcomes for these weeds, and results in higher webpage visitation, more enrolments and more observations. The project should maintain relationships with community groups, leveraging on their audiences and encouraging groups to spread messages to their members. The project should also focus its own communication efforts on the lesser-known, high priority surveillance targets.

Figure 13 Project outputs (communication effort) against project outcomes (MyWeedWatcher observations, WeedSpotter enrolments and webpage views) for 2016 and 2017

The project has achieved Output 2 by releasing the MyWeedWatcher online database, which is available through an app for smart devices and through a web browser. MyWeedWatcher has been available since April 2016 and is being continually evaluated and updated, with a major update (version 2) currently in development. Data from the retired WeedWatcher online database will be transferred to MyWeedWatcher to provide a single point of data management on declared agricultural weeds.

Communication and engagement have underpinned the delivery of the project. A wide range of media and communication channels have been used to promote MyWeedWatcher, highlight priority surveillance targets, and encourage the community to search for and report priority weeds. The project has been developed with - and continues to value input from - stakeholders such as biosecurity groups, industry groups, natural resource management groups, and state and local government. Consultation and engagement have resulted in the development of weed surveillance resources and tools that are relevant and useful to the community.

As the MyWeedWatcher app has only been available since April 2016, the data collected by the public is limited, but is already proving to be useful to DAFWA managers and community groups. DAFWA acts on Category 1 and Category 2 weed reports by contacting the relevant people to manage the weed. DAFWA managers are using observations of cacti to inform DAFWA programs and make decisions on how to raise awareness of cacti as priority weeds. DAFWA is also conducting online searches for sales of declared weeds and taking action by contacting the sellers or the relevant state/territory or federal officers. The Peel-Harvey Biosecurity Group has been interrogating MyWeedWatcher for baseline data on cotton bush, though more data is needed.

Early indications are that the community is using the resources and tools developed by this project. Metrics such as webpage views, observations made and online training enrolments are steadily increasing. Continual, strategic and responsive communications will help spread awareness of the project and MyWeedWatcher, resulting in increased usage.

The challenge for the project will be maintaining high levels of engagement in the long term, as MyWeedWatcher use is likely to fall if it is no longer promoted. A cost-effective and sustainable solution is for community groups to lead communication and engagement of weeds relevant to their location.

# Proposed future work

The project’s priorities are currently to redevelop the MyWeedWatcher app and to increase community uptake of the tools and resources developed by the project. Below is a summary of future work to be undertaken or considered by the AWS project.

## Project planning

* Review and update objectives and performance measures for the project, now that the tools and resources have been developed and are being used by the public.
* Review the project’s objectives to make them measurable and relate to available data.

## Project resources

* Develop and release Phase 2 of MyWeedWatcher.
* Provide information on more weeds.
* Update the surveillance plan to reflect developments since the start of the AWS project in December 2014.
* Evaluate WeedSpotter use after several months of availability.
* Analyse results of the drone trial, including comparing the cost of using a drone, helicopter or walking to survey the infested portion of the Serpentine River for water hyacinth.
* Extend MyWeedWatcher training to a wider audience beyond DAFWA.
* Transfer data from the retired WeedWatcher to MyWeedWatcher.

## Communication and engagement

* Focus project communications on weeds that are receiving less attention (that is, those with fewer webpage views and less media and engagement), and for which there are fewer records and training enrolments.
* Prioritise releasing communications on high priority surveillance targets for the South-West Land Division.
* Encourage community groups to lead communication on community surveillance targets.
* Release more communications during times when communication and engagement levels are low.
* Prioritise promoting MyWeedWatcher and raising awareness of high priority surveillance targets, while encouraging stakeholders to lead communications for community surveillance targets.
* For the lesser-known high priority surveillance targets, prioritise communications efforts using more traditional, information-rich formats such as media releases, direct emails, MyWeedWatcher Updates or radio interviews.
* Encourage higher levels of engagement via social media by leveraging on community interest in certain weeds. This can be done by including posts with images (particularly photos with people), mentioning the app while featuring a popular weed, and by sharing posts to wider audiences. Overall, this may be a low-effort way of promoting the app and providing an increased level of engagement.
* Extend communications to MyWeedWatcher app users directly, through channels such as push notifications, in-app messaging or emails, with a view to improving app retention and engagement.
* Maintain continual levels of social media communication, with more posting of shareable content, including images and a clear encouragement to use MyWeedWatcher.
* Consider extending the impact of the current level of social media engagement by consistently posting on both Facebook and Twitter.
* Capitalise on events by taking photos and posting to social media, as these posts are likely to attract high engagement.
* Continue monitoring and evaluation of communications and adapting the approach responsively.

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# Appendix 1: Priority agricultural weeds selected

The following agricultural weed species were selected as priority targets for surveillance in WA, using the [declared plant selection process](https://agric.wa.gov.au/n/3835). To simplify the list, species belonging to the same genus were counted as a single weed.

DAFWA selected the following 15 declared plants as high priority surveillance targets for the South-West Land Division (SWLD):

| Common name | Scientific name | Current status[[10]](#footnote-10) |
| --- | --- | --- |
| Bathurst burr | *Xanthium spinosum* | Declared pest; C2 and C3 |
| three-horned bedstraw | *Galium tricornutum* | Prohibited organism; C2 |
| branched broomrape | *Orobanche ramosa* | Prohibited organism; C1 |
| creeping knapweed | *Rhaponticum repens* | Prohibited organism; C1 |
| gorse | *Ulex europaeus* | Declared pest; C3 Albany, Cranbrook, Plantagenet; C2 rest of state |
| hoary cress | *Lepidium draba* | Prohibited organism; C2 |
| horsetail | *Equisetum hyemale* | Prohibited organism; C2 |
| karroo thorn acacia | *Vachellia karroo* | Prohibited organism; C1 |
| kochia | *Bassia scoparia* | Prohibited organism; C1 |
| nodding thistle | *Carduus nutans* | Prohibited organism; C1 |
| perennial thistle | *Cirsium arvense* | Prohibited organism; C1 |
| purple flower devil's claw | *Proboscidea louisianica* | Prohibited organism; C1 |
| ragwort | *Senecio jacobaea* | Prohibited organism; C1 and C2 |
| skeleton weed | *Chondrilla juncea* | Declared pest; C3 Yilgarn and Narembeen, C2 rest of state |
| wheel cactus | *Opuntia robusta* | Prohibited organism; C1 |

Community, industry, biosecurity groups and grower groups selected five targets:

| Common name | Scientific name | Current status |
| --- | --- | --- |
| narrow leaf cotton bush | *Gomphocarpus fruticosus* | Declared pest; C3 parts of the SWLD |
| arum lily | *Zantedeschia aethiopica* | Declared pest; C3 whole of state |
| Paterson’s curse | *Echium plantagineum* | Declared pest; C3 parts of the SWLD |
| Solanum species (silverleaf nightshade and apple of Sodom) | *Solanum elaeagnifolium* and *S. linnaeanum* | Declared pest; C3 |
| doublegee and lesser jack | *Emex australis* and *E. spinosa* | Declared pest; C3 |
| Two additional weeds were partially included in the project: | | |
| cape tulips | *Moraea flaccida* and *M. miniata* | Declared pest; C3 parts of the SWLD |
| early blackberry | *Rubus laudatus* | Declared pest; C1, C2 and C3 |

# Appendix 2: Information available for each surveillance target

| Common name | Scientific name | MyWeedWatcher app | MyWeedWatcher web | WeedSpotter course | Declared pest info webpage | Weed control webpage[[11]](#footnote-11) |
| --- | --- | --- | --- | --- | --- | --- |
| Bathurst burr | *Xanthium spinosum* | Yes | Yes | Yes | Yes | Yes |
| three-horned bedstraw | *Galium tricornutum* | Yes | Yes | Yes | Yes | Yes |
| branched broomrape | *Orobanche ramosa* | Yes | Yes | Yes | Yes | Yes |
| creeping knapweed | *Rhaponticum repens* | Yes | Yes | Yes | Yes | Yes |
| gorse | *Ulex europaeus* | Yes | Yes | Yes | Yes | Yes |
| hoary cress | *Lepidium draba* | Yes | Yes | Yes | Yes | Yes |
| horsetail | *Equisetum hyemale* | Yes | Yes | Yes | Yes | Yes |
| karroo thorn acacia | *Vachellia karroo* | Yes | Yes | Yes | Yes, weedy acacias in general | Yes, weedy acacias in general |
| kochia | *Bassia scoparia* | Yes | Yes | Yes | Yes | Yes |
| nodding thistle | *Carduus nutans* | Yes | Yes | Yes | Yes | Yes |
| perennial thistle | *Cirsium arvense* | Yes | Yes | Yes | Yes | Yes |
| purple flower devil's claw | *Proboscidea louisianica* | Yes | Yes | Yes | Yes | Yes |
| ragwort | *Senecio jacobaea* | Yes | Yes | Yes | Yes | Yes |
| skeleton weed | *Chondrilla juncea* | Yes | Yes | Yes | Yes | Yes |
| wheel cactus | *Opuntia robusta* | Yes | Yes | Yes | Yes, for wheel cactus and for Opuntioid cacti | Yes, for Opuntioid cacti in general |
| narrow leaf cotton bush | *Gomphocarpus fruticosus* | Yes | Yes | Yes | Yes | Yes |
| arum lily | *Zantedeschia aethiopica* | Yes | Yes | Yes | Yes | Yes |
| Paterson’s curse | *Echium plantagineum* | Yes | Yes | Yes | Yes | Yes |
| silverleaf nightshade and apple of Sodom | *Solanum elaeagnifolium* and *S. linnaeanum* | Yes, for each species | Yes, for each species | Yes, for each species | Yes, for each species | Yes, for apple of Sodom only[[12]](#footnote-12) |
| doublegee and  lesser jack | *Emex australis* and *E. spinosa* | Yes, for each species | Yes, for each species | Yes, for each species | Yes, for both | Yes, for both |
| Two additional weeds were partially included in the project: | | | | | | |
| cape tulips | *Moraea flaccida* and *M. miniata* | Yes, for each species | Yes, for each species | Yes, for each species | Yes, for both | Yes, for both |
| early blackberry | *Rubus laudatus* | Yes | Yes | Yes | Yes, for blackberry in general | Yes, for blackberry in general |
| Weeds not selected as surveillance targets | | | | | | |
| Other weed species | | Over 300 species listed | Over 300 species listed | No | For over 100 weeds | For over 100 weeds |

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# Appendix 3: Communications for MyWeedWatcher and each surveillance target undertaken by the AWS project

| Topic | Media release, date and topic | Social media | Radio |
| --- | --- | --- | --- |
| MyWeedWatcher or project in general | **8 Jun 2015**:*Community input sought on weed surveillance in South West*  **9 Jan 2015**: *Working together on weed surveillance* | Facebook:  **20 Apr 2016**, **3 May 2016**,  **6 May 2016**, **10 May 2016**,  **24 May 2016**  Twitter:  **1 May 2016**, **24 May 2016** (x2), **26 May 2016** (x2), **8 Jul 2016**, **15 Dec 2016**, **20 Dec 2016**, **14 Feb 2017** | **30 May 2016**: ABC Goldfields, Midwest, Wheatbelt |
| Bathurst burr | nil |  |  |
| bedstraw | **20 May 2016**: *Weed app protects profitability of WA’s agriculture sector* (mention) |  |  |
| branched broomrape | **16 Nov 2016**: MyWeedWatcher Update - weed of the month  **Nov 2016**: Backyard Buddies |  | **7 Nov 2016**: ABC South West, Great Southern (Albany and Wagin) |
| creeping knapweed | nil | Facebook:  **3 Dec 2017** |  |
| gorse | **20 May 2016**: *Weed app protects profitability of WA’s agriculture sector*  **26 May 2016**: *Look out for gorse and other weeds using MyWeedWatcher app* | Twitter:  **26 May 2016** |  |
| hoary cress | **12 Dec 2016**: *Report significant agricultural weed hoary cress*  **17 Oct 2016**: MyWeedWatcher Update - weed of the month  **Oct 2016**: Backyard Buddies | Facebook:  **5 Oct 2016**  Twitter:  **13 Dec 2016**, **17 Dec 2016**, **19 Dec 2016** | **15 Dec 2016**: ABC South West, Southern, Great Southern  **20 Dec 2016**: ABC Goldfields, Midwest and Wheatbelt |
| horsetail | **30 Mar 2017**: MyWeedWatcher Update - weed of the month  **May 2016**: Backyard Buddies | Facebook:  **15 Dec 2017** |  |
| African acacias | **10 Feb 2017**: MyWeedWatcher Update - weed of the month  MyWeedWatcher Update - mentions:  **17 Oct 2016**, **30** **Mar 2017**  **Jun 2016**: Backyard Buddies | Facebook:  **20 Nov 2016** |  |
| kochia | nil |  |  |
| nodding thistle | MyWeedWatcher Update - mentions:  **16 Nov 2016**, **10 Feb 2017** |  |  |
| perennial thistle | nil |  |  |
| purple flower devil's claw | **8 Feb 2017**: *Eyes up for pest weeds*  MyWeedWatcher Update - mentions:  **10 Feb 2017**, **30 Mar 2017**  **Mar 2016**: Backyard Buddies | Twitter:  **8 Feb 2017** |  |
| ragwort | nil | Facebook:  **30 Oct 2016** |  |
| skeleton weed | **20 May 2016**: *Weed app protects profitability of WA’s agriculture sector*  **26 Sep 2014**: *Skeleton weed program rewards industry* |  |  |
| wheel cactus / cacti | **20 May 2016**: *Weed app protects profitability of WA’s agriculture sector*  MyWeedWatcher Update - mentions:  **17 Oct 2016**, **16 Nov 2016**, **10 Feb 2017**, **30** **Mar 2017** | Facebook:  **1 May 2016**,  **23 Sep 2016**  Twitter:  **22 Apr 2015**, **5 May 2016**, **18 Nov 2016** | **29 Sep 2016**: ABC North West, Kimberley  **29 Sep 2016**: ABC Midwest, Wheatbelt  **2 Nov 2016**: ABC Midwest, Wheatbelt |
| narrow leaf cotton bush | **20 May 2016**: *Weed* *app protects profitability of WA’s agriculture sector*  **30** **Mar** 2017: MyWeedWatcher Update - mention |  |  |
| arum lily | nil |  |  |
| Paterson’s curse | MyWeedWatcher Update - mentions:  **17 Oct 2016**, **16 Nov 2016** |  |  |
| silverleaf nightshade  and apple of Sodom | MyWeedWatcher Update - mentions:  **17 Oct 2016**, **16 Nov 2016**, **10 Feb 2017**, **30** **Mar 2017** |  |  |
| doublegees | **4 Jul 2016**: *Report the prickly pest doublegee* | Twitter:  **6 Jul 2016**,  **7 Jul 2016** |  |
| cape tulips | **25 Aug 2016**: *Cape tulip targeted for community surveillance*  **17 Oct 2016**: MyWeedWatcher Update - mention | Facebook:  **13 Sep 2016**  Twitter:  **28 Aug 2016** |  |
| early blackberry | nil |  |  |

# Appendix 4: Workshops, conference presentations and radio interviews on AWS project activities

**Conference and workshop presentations**

North Stirlings Pallinup Natural Resources, Demonstration Field Walk on 23 February 2017.

MyWeedWatcher was promoted at a DAFWA compliance update in Bunbury on 25 November 2016 (14 attendees).

South West Celebration hosted by the South West Catchment Council and Cape to Cape Catchment Council, 10-11 November 2016, Margaret River. The *MyWeedWatcher* demonstration session was the most popular topic with around 50 participants (the two-day conference had over 120 participants in total).

Demonstration to a cactus awareness group in the Shire of Murray Works Depot on 7 November 2016 (16 attendees, mostly parks and garden staff).

Demonstration to the Town of Mosman Park on 3 November 2016 (2 attendees).

Peel-Harvey Catchment Council, MyWeedWatcher App/Bridal Creeper Workshop, 23 September 2016, Mandurah (10 attendees).

Twentieth Australasian Weeds Conference, 12-15 September 2016, Perth. *MyWeedWatcher: Mapping weeds* *in Western Australia*. Over 300 delegates attended.

Twentieth Australasian Weeds Conference, bus tour for 30 people around Peel-Harvey on 15 September 2016. A prize was given for the most uploads to the MyWeedWatcher app.

Display and MyWeedWatcher business cards sent to Dowerin GWN7 Machinery Field Days on 15 and 24 August 2016.

Presentation on MyWeedWatcher app to North Stirlings Pallinup Natural Resources at a field day in Gnowangerup on 11 August 2016 (19 attendees).

Three RHDV-K5 Rabbit Roadshow events at South West biosecurity forums in May 2016: Bridgetown (72 attendees), Waroona (22 attendees) and Bunbury (26 attendees).

Display at Perth Garden Festival, 28 April to 1 May 2016, attracted about 500 visitors.

Presentation at a Bridgetown/Greenbushes meeting, 10 June 2015.

Presentation at Biosecurity Forum to other Boosting Biosecurity Defences Royalties for Regions projects, 22 May 2015. Technology Park, Bentley.

Presentation at Invasive Species Forum to other Royalties for Regions projects, 14 May 2015. Muresk.

Focus group workshop 30 April 2015 to determine MyWeedWatcher app requirements. DAFWA, South Perth.

Workshop held to choose what system and tools would be developed, December 2014. DAFWA, South Perth.

**Radio interviews**

ABC Goldfields, ABC Midwest and ABC Wheatbelt stations discussing hoary cress and the MyWeedWatcher app, 20 December 2016

ABC South West WA (Bunbury), ABC Great Southern (Albany), ABC Great Southern (Wagin) stations discussing hoary cress and the MyWeedWatcher app, 15 December 2016

ABC South West WA (Bunbury), ABC Great Southern (Albany), ABC Great Southern (Wagin) stations discussing branched broomrape and the MyWeedWatcher app, 7 November 2016

ABC Midwest and Wheatbelt (Geraldton) stations discussing cactus species and the MyWeedWatcher app, 2 November 2016

ABC Midwest and Wheatbelt (Geraldton) stations discussing cactus species, 29 September 2016

ABC North West (Karratha) and ABC Kimberley (Broome) stations discussing cactus species, 29 September 2016

ABC Goldfields, ABC Midwest and Wheatbelt stations discussing MyWeedWatcher app, 30 May 2016.

# Appendix 5: Outcomes for each surveillance target

| Common name | Presence status | MyWeedWatcher app records | MyWeedWatcher webpage records | Info webpage views | WeedSpotter course enrolments | WeedSpotter quiz completions |
| --- | --- | --- | --- | --- | --- | --- |
| Bathurst burr | present in WA | 0 | 0 | 1827 | 1 | 0 |
| three-horned bedstraw | present in WA | 2 (48 for *Galium aparine*) | 0 | 2081 | 0 | 0 |
| branched broomrape | not present in WA | 0 (1 for lesser broomrape) | 0 (1 for lesser broomrape) | 3913 | 1 | 1 |
| creeping knapweed | not present in WA | 0 | 0 | 847 | 0 | 0 |
| gorse | present in WA | 0 | 0 | 1233 | 0 | 0 |
| hoary cress | present in WA | 0 | 0 | 1175 | 0 | 0 |
| horsetails | present in WA | 0 | 0 | 1348 (all horsetails) | 0 | 0 |
| acacias | present in WA | 10 (all acacias; 0 for *V. karroo*) | 2 (all acacias; 0 for *V. karroo*) | 4081 (all acacias) | 4 | 2 |
| kochia | eradicated from WA | 0 | 0 | 799 | 0 | 0 |
| nodding thistle | eradicated from WA | 0 | 0 | 320 | 0 | 0 |
| perennial thistle | eradicated from WA | 0 (1 for *Cirsium vulgare*) | 0 (2 for *Cirsium vulgare*) | 449 | 1 | 1 |
| purple flower devil's claw | present in WA | 0 | 0 | 2054 | 0 | 0 |
| ragwort | present in WA | 0 | 0 | 654 | 0 | 0 |
| skeleton weed | present in WA | 0 | 1 | 12 718 | 3 | 2 |
| wheel cactus | under eradication | 1 (6 for other *Opuntia* spp.) | 0 (6 for other *Opuntia* spp.) | 5836 | 2 | 1 |
| narrow leaf cotton bush | present in WA | 20 | 1 | 45 436 | 6 | 5 |
| arum lily | present in WA | 10 | 0 | 24 034 | 2 | 1 |
| Paterson’s curse | present in WA | 1 | 1 | 22 145 | 4 | 2 |
| silverleaf nightshade | present in WA | 0 | 0 | 727 | 0 | 0 |
| and apple of Sodom | 2 | 0 | 6709 | 5 | 2 |
| doublegee and lesser jack | present in WA | 0 | 1 | 12 859 | 2 | 2 |
| 1 | 0 |
| cape tulips | present in WA | 1 | 4 | 12 427 | 0 | 0 |
| 5 | 1 |
| early blackberry | present in WA | 1 (and 3 for blackberry) | 0 | 5414 | 2 | 2 |

# Appendix 6: Progress against project outcome, outputs and deliverables

|  | Objective | Performance measures | Progress achieved |
| --- | --- | --- | --- |
| **Project outcome** | **Increased producer and community surveillance for significant agricultural pests and diseases supporting disease or pest investigation, pest management or market access** | Amount of declared plant locational data collected by groups in line with the agreed plan on the presence or absence of high-risk declared weeds | 211 records made on MyWeedWatcher since release in April 2016, including 53 records of surveillance target weeds selected by this project. |
| Invasive species managers using data collected to make decisions | DAFWA managers are using MyWeedWatcher data to inform decisions. Usage of weed information pages, weed identification training and MyWeedWatcher indicates that external groups are also likely to be using information from the project*.* |
| Stakeholders participating in “WeedSpotter” training | 28 users enrolled since January 2017. |
| Output 1 | Members of 5-8 stakeholder groups engaged in collecting surveillance data following an agreed surveillance plan | Surveillance plan produced for 15 high priority declared plants and 5 stakeholder priority declared plants | Completed and published in August 2015. |
| Number of groups/people: trained to identify high-risk declared weeds through online “WAWeedSpotter”; and participating in collecting surveillance data | The community is using MyWeedWatcher and WeedSpotter, with participation growing over time. |
| 50% of people trained through WeedSpotter online training say they will use training to look for weeds on their property/in their area | Evaluation survey respondents were 84% confident in their identification skill and were 88% likely to use the app to report weeds. |
| Drone trial conducted | Drone and helicopter components of trial completed; analysis in progress. |
| Output 2 | Interactive customised tool/application/database accessible through the external website | System(s)/database(s) developed. Includes, online training and maps on presence and absence of declared plants | MyWeedWatcher developed and released; allows weeds to be mapped.  WeedSpotter training developed and released. |
| Number of stakeholders/groups: using systems developed to participate in weed surveillance | There were 19 unique users of WeedSpotter and 60 unique users of MyWeedWatcher. |
| “20% of people trained through WeedSpotter online training say they will use systems developed to record weed problems” | Only 15% of enrolled trainees evaluated a course. Users were on average 85% likely to use the app. |
| “5% of people trained online have entered data into the system developed” | Not achieved - None of the WeedSpotter users have used MyWeedWatcher to record observations. However, online training has only been available since January 2017 and has been used by 19 people to date. |
| Deliverable 1 | Establish project Declared Plant Reference Group | | Completed – reference group formed in November 2014 and being consulted throughout project. |
| Deliverable 2 | Review and collate existing AWS in the South West weed distribution data into a data management system. Identify gaps and priority target weeds and areas based on risk management criteria | | Partially achieved – Priority weed surveillance targets selected and information on priority weeds made available. Data from pre-existing database (WeedWatcher) to be migrated into new data management system (MyWeedWatcher). |
| Deliverable 3 | Develop standard survey methodology and test, including use of drone technology | | Partially achieved – Surveillance plan and related weed information pages released. Drone trial conducted in early 2017 – analysis under way. |
| Deliverable 4 | Interactive customised database accessible through the external website | | Achieved – see online database at [agric.wa.gov.au/myweedwatcher-web/search](https://www.agric.wa.gov.au/myweedwatcher-web/search) |
| Deliverable 5 | Survey rollout 1-3 reports written | | Four MyWeedWatcher Updates and this report have been published. |
| *Future deliverables (planned for after the release of this report)* | | | |
| Deliverable 6 | Survey rollout 4 report written | | To be completed |
| Deliverable 7 | Undertake survey program and recording data, providing information on high-risk species as gained | | To be completed |
| Deliverable 8 | Analysis, report and prioritisation of results with recommendation for future follow up surveillance | | To be completed |

1. Under the BAM Act, a Category 3 declared pest must be managed. [↑](#footnote-ref-1)
2. An **Industry Funding** **Scheme** is an industry-based scheme that uses funding arrangements authorised under the BAM Act, whereby agricultural producers can raise funds to tackle priority pests and diseases. [↑](#footnote-ref-2)
3. A **unique page view** represents the number of sessions during which a page was viewed one or more times. [↑](#footnote-ref-3)
4. A **unique user** is a user who did one or more courses. [↑](#footnote-ref-4)
5. Water hyacinth was short-listed for community selection of surveillance targets for this project, but was not included in this project because it received only 12% of the votes, and was ranked twelfth. [↑](#footnote-ref-5)
6. A **Recognised Biosecurity Group** is a formally-recognised group that operates under the BAM Act to control pests that impact at a landscape scale on public and private interests. [↑](#footnote-ref-6)
7. Privacy settings allowed only nine of the 18 shares to be viewed. Therefore, engagement levels are likely to be much higher. [↑](#footnote-ref-7)
8. Data on active devices is based on devices running iOS 8 or tvOS 9, or later, and is only available for app users who agree to share their data. [↑](#footnote-ref-8)
9. Three-horned bedstraw = *Galium tricornutum*; cleavers = *G. aparine*. [↑](#footnote-ref-9)
10. Under the BAM Act, declared pests are categorised as Category 1 (C1) Exclusion; Category 2 (C2) Eradication; or Category 3 (C3) – Management. A prohibited organism is a declared pest for the whole of Western Australia. [↑](#footnote-ref-10)
11. Control pages were developed prior to the AWS project and updates were not within the scope of the project; however, information webpages link to control pages where they are available. [↑](#footnote-ref-11)
12. The link for silverleaf nightshade leads to a New South Wales control page [↑](#footnote-ref-12)