The Victorian Weed Spotters: Recruitment and training of citizen scientists

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Summary The Weed Spotters program is a Victorian Government initiative delivered by Agriculture Victoria, aimed at engaging a passive surveillance network to identify and report Victoria's highest priority, State prohibited weeds (SPW). The program involves training volunteer Weed Spotters to identify and report target weeds, thereby allowing early detection and treatment with the ultimate aim of eradication. These citizen scientists are strategically recruited from various agencies identified as most likely to encounter, correctly identify and report the target weeds.

When compared to the general public, Weed Spotters have been found to be more likely to make accurate reports of SPWs. This is likely a result of strategic recruitment from key organisations, and importantly, due to the training they receive in the identification of target species. A total of 222 Weed Spotters were recruited and trained in the 2016/2017 and 2017/2018 financial years. These new recruits now form part of a network of over 2588 registered Weed Spotters.

A participatory approach was used to deliver the training, utilising live weed sample demonstrations and group discussions. An evaluation of the training was conducted which found that it was well received by participants, with some improvements to the training, such as increased time to examine live plant specimens, identified and incorporated for future training sessions.

Keywords Agriculture Victoria, early detection, citizen scientists, participatory training, State prohibited weeds, passive surveillance.

INTRODUCTION

A combination of prevention, early detection and intervention is an effective biosecurity approach for the management and eradication of high risk invasive species (Agriculture Victoria 2018), while engagement and training of citizen scientists is a proven effective biosecurity strategy (Laidlaw *et al.* 2015). Weed Spotters is a surveillance network of volunteers, first conceptualised back in 2001 (McInerney and Smith 2008) that combines both of these approaches.

Weed Spotters are volunteers who are trained to identify and report State prohibited weeds (SPWs). SPWs are the highest category of declared noxious weeds in Victoria and are managed with the aim of eradicating them from the State (*Catchment and Land Protection Act 1994* (Vic)). Weed Spotters are trained to focus on a small, target group of species, enabling them to confidently identify and report the highest priority weeds in Victoria. This provides a valuable surveillance tool in the management of SPWs (McInerney and Smith 2008), contributing to their prevention, early detection and ultimately, eradication. At the time of writing there are 2588 registered Weed Spotters in Victoria.

THE WEED SPOTTERS PROGRAM (2016/2017–2017/2018)

Recruitment Strategic Weed Spotter recruitment was first introduced in 2008, prior to which recruitment was undertaken on an ad-hoc basis, generally targeting people interested in weeds. The strategically adopted approach ensures that there is a competent surveillance network covering the State, with the necessary skills, opportunity and motivation to detect and report SPWs.

This process began with a systematic stakeholder analysis (Molony 2014) that identified potential key target agencies from which to recruit Weed Spotters. This considered ability to detect the weeds, interest, relationship with the Department, and the potential likelihood of encountering SPWs during daily operational activities. These key stakeholders were largely other government agencies whose staff spent substantial time undertaking outdoor work, in areas where these target species were most likely to be found. Target agencies included water management authorities, local governments, road managers, Catchment Management Authorities and Landcare groups. The analysis ensured that the most appropriate people were targeted for recruitment and training to maximise the number of accurate reports received.

Training Weed Spotter training consists of a two- to three-hour session featuring information about targeted

SPWs. The main objectives are to train participants to identify and report SPWs, distinguish them from similar species, identify common places to detect them and to increase understanding of weed related biosecurity principles and responsibilities.

Training sessions are delivered in spring and summer when most SPWs are actively growing and most easily identified. Groups of no more than 15 participants are preferred to ensure effective interaction and full engagement. An online version of the Weed Spotter training is currently being developed for those who are unable to attend a face-to-face session with the opportunity to participate.

Weed Spotter training sessions are free and each participant receives a package of weed identification resources including a Weed Spotter training manual, SPW calendar, SPW identification cards, SPW brochures and a Weed Spotter newsletter subscription. This is fully funded by Agriculture Victoria. The network is maintained at a size that can be adequately supported by Agriculture Victoria to ensure regular contact and support materials for all participants.

Training evaluation The 2016/2017–2017/2018 training was evaluated by means of a short survey. The purpose of the evaluation was to provide an indication of the effectiveness of the training and to identify areas for improvement for the delivery of future sessions. At the end of each training session, participants were asked to complete a questionnaire with seven closed-ended statements. A section for additional comments and observations was also included at the end of the statements.

RESULTS AND DISCUSSION

Recruitment During 2016/2017–2017/2018, 15 sessions were delivered across Victoria, training and recruiting 222 new Weed Spotters. State government organisations represented the largest number of recruits (37%), drawn from VicRoads, Department of Environment, Land, Water and Planning, Agriculture Victoria, and Parks Victoria (Figure 1). The next highest number of recruits was from rural city councils (28%). The remaining participants were from various agencies and groups including water management authorities, city councils, Catchment Management Authorities and Landcare groups.

Training The training that Weed Spotters receive has proven to be effective, resulting in a high number of accurate reports of target species. Approximately one third (34%) of all the SPW reports received (both negative and positive) in the 2016/2017 and 2017/2018 financial years were from registered Weed Spotters. Forty-eight percent of the confirmed accurate reports were also from Weed Spotters (Table 1). Only 21% of the inaccurate reports were from Weed Spotters, with the remaining 79% of the inaccurate reports from the general public (Table 2).

Training evaluation The response to the training evaluation survey was extremely high and overall positive. A total of 191 out of 222 (86%) training participants completed the survey. Nearly all respondents (>99%) reported that their knowledge of SPWs and the negative impact they can have on Victoria was increased as a result of the training. Only one

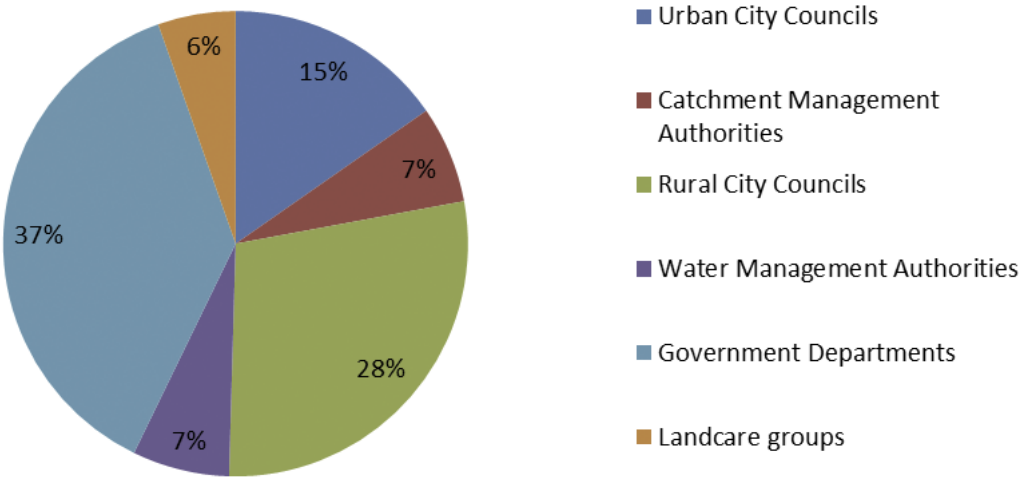

Figure 1. Agencies from which Weed Spotters were recruited and trained in 2016/2017 and 2017/2018.

Table 1. State prohibited weeds: Accurate reports in 2016/2017 and 2017/2018.

Year	Accurate reports	From registered Weed Spotters	From general public	% from Weed Spotters
2016/2017	21	9	12	43%
2017/2018	8	5	3	63%
Total	29	14	15	48%

Table 2. State prohibited weeds: Inaccurate reports in 2016/2017 and 2017/2018.

Year	Accurate reports	From registered Weed Spotters	From general public	% from Weed Spotters
2016/2017	16	2	14	13%
2017/2018	13	4	9	31%
Total	29	6	23	21%

participant (out of 191) responded negatively by strongly disagreeing with that statement. The opportunity to examine live weed samples was very popular across all participants. SPW identification cards and SPW calendars were the most popular hard copy resources provided, with many participants asking for additional copies to distribute to colleagues.

The strategic recruitment and training of 222 new Weed Spotters that have the ability, opportunity and motivation to detect and report SPWs has been a significant achievement. Having an extensive network increases the probability of detecting Victoria's highest risk weed species at an early stage of invasion, making control and management more effective and increasing the chance that infestations can be eradicated from Victoria.

There is constant fluctuation in the number of registered Weed Spotters, as people change employment, move to a new house or decide to discontinue their participation in the program. In addition to building capacity in the network to detect and report SPWs, training new participants also helps maintain the critical mass and distribution of the network.

Comparison of the accuracy of reports received from Weed Spotters and the general public show that trained, strategically recruited Weed Spotters are more likely to make accurate reports of target species than the general public. By recruiting from targeted groups and providing them with training and resources, the number of accurate reports increases, which decreases wasted staff time in following up on false reports. This increases the time available for managing new and existing infestations, rather than chasing false leads.

An example of the benefits of Weed Spotters is demonstrated by a recent report received of water hyacinth (*Eichorrnia crassipes* (Mart.) Solms), a SPW in Victoria. A registered Weed Spotter reported an advertisement for water hyacinth on a 'Buy, Sell and Swap' Facebook group in 2017. The newly trained Weed Spotter made the report just days after attending a Weed Spotter training session. Agriculture Victoria Authorised Officers responded to the report, leading to the seizure of 31 water hyacinth plants from a backyard pond on private property. The trace back investigations led to the discovery of an additional 21 water hyacinth plants that were removed from a suburban property. Both infestations were located near major waterways, posing a serious risk of the plants spreading. These two water hyacinth infestations would not have been detected without the contribution from the Weed Spotter who was a member of the private Facebook group where the plants were advertised.

The results of the training evaluation survey show that the training was very well received by participants and that the resources provided were of value. The results specifically highlighted the value the participants gained from the opportunity to examine live weed specimens. This feedback has been incorporated into the training delivery by ensuring that sufficient time is allowed for participants to closely examine the plants, making the training engaging and exciting for participants. Evaluation of future training sessions will continue in the interests of continual improvement.

Victoria is recognised nationally and internationally for leadership in prevention and preparedness of invasive species (Agriculture Victoria 2018). Early detection and rapid response are essential to successfully eradicate SPWs. The role of Weed Spotters in support of these government interventions cannot be overemphasised. They are trained to be the 'eyes and

ears' of the Department (Smith 2006) and provide a valuable contribution to preventing the establishment and spread of new high risk invasive plants. Over the past two years, Agriculture Victoria have strategically recruited over two hundred new Weed Spotters from targeted organisations, which are more likely to accurately report target species compared to the general public. By evaluating the Weed Spotter training, we have ensured that Weed Spotters are engaged and responsive to the training.

ACKNOWLEDGMENTS

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