

Weed management is not quite ‘Bush Regeneration’ – An opinion

Peter Harper¹ and Nimal Chandrasena²

¹ Bettersafe Pest and Weed Management, 33 Lagonda Drive, Ingleburn, New South Wales 2565, Australia

² GHD Pty Ltd, 20 Smith Street, Parramatta, New South Wales 2650, Australia
(peter@bettersafe.com.au)

Summary As long-term practitioners of managing weeds in varied circumstances, we notice the increasing trend towards bush-regeneration as a broad approach to weed management, particularly in New South Wales (NSW). Recent observations in the Sydney basin and other parts of NSW show that bush-regeneration has not achieved the desired weed control outcomes for major weed species that have plagued eastern Australia for decades. These include semi-terrestrial species – alligator weed (*Alternanthera philoxeroides* (Mart.) Griseb), primrose willow (*Ludwigia peruviana* (L.) Hara), long-leaf willow primrose (*Ludwigia longifolia* (DC.) Hara), and full-terrestrial species such as blackberry (*Rubus fruticosus* L. species aggregate), Chilean needle grass (*Nassella neesiana* (Trin. & Rupr.) Barkworth), Coolatai grass (*Hyparrhenia hirta* (L.) Stapf) and green cestrum (*Cestrum parqui* L'Hér.). Added to this are infestations of: interstate invaders such as golden wreath wattle (*Acacia saligna* (Labill.) H.L. Wendl.); fully aquatic invaders, such as egeria (*Egeria densa* (L.) Planch); and terrestrial invaders expanding their range southwards, such as groundsel bush (*Baccharis halimifolia* L.). Following an initial survey in 2009, we now observe these weeds greatly expanded invading new areas. We attribute inadequate local control primarily to the change in approach adopted by some agencies: i.e. a greater portion of funding used for bush-regeneration, instead of, as previously, weed management. We appreciate the noble goal of bush-regeneration, that is to assist regeneration of native bushlands from a diminished quality to a better condition. However, we lament the techniques used have limited value in controlling the large-scale infestations of highly invasive weeds. Indeed, the adoption of bush-regeneration as the primary paradigm for funding appears to be self-serving for some stakeholders. We suggest that well-coordinated, direct control, deployed on a regional-, catchment- and local-site-scale, is the only way to contain highly invasive weeds. We contend, that unless there is a change in weed management investment, these well-known invaders will soon become so entrenched that they will become widespread and likely to be given lower priority for management.

Keywords Bush-regeneration, willow primrose, alligator weed, egeria.

INTRODUCTION

Weeds are generally pioneering, opportunistic species, which are adapted to rapidly colonise, establish, and then thrive in disturbed environments, largely associated with human disturbances and habitation. Humans are primarily responsible for moving plants from one location to another, and across continents. As global trade and human habitations expand, more and more opportunities are created for this special group of plants (weeds) to thrive. These plants are not at fault. Plants we call ‘weeds’ are supremely well adapted to occupy vacant niches created by disturbances caused by humans, or by natural causes.

That weeds cause significant problems (negative impacts), goes without saying. Their management requires a holistic and integrated approach, incorporating various control methods, at both spatial (catchment to infested patch) and temporal scales (short, medium, or long-term control). Although the principles underlying the above approaches are well-established, often, weed management fails not because of lack of control options, but because control is reactive, poorly executed, and also poorly resourced. In this paper, we aim to highlight some aspects of the impact of the recent changes that have occurred within New South Wales (NSW), and how they are affecting weed management in the Sydney basin and elsewhere.

MATERIALS AND METHODS

Review of legislative changes To understand how jurisdictional responsibilities have changed since 1993, we undertook a brief review of legislative changes, particularly, as noted in Montaya (2012), NRC (2014a,b), Grain Growers (2014), and Local Land Services (LLS 2017, 2018). We also reviewed the frameworks around weed management in NSW (NSW DPI 2013, 2017, 2018a,b), the extent of on-ground knowledge of existing weed problems (often, the missing component in weed management), and the expectations of various responsible parties, apparent in these reports. Further, we obtained input from a wide network of land managers in agencies and local government clients.

Weed survey We conducted an extensive mapping of alligator weed infestations in the Sydney and Hunter regions, considered ‘core areas’ for this weed in 2007–2008, (Chandrasena 2008). This data were subsequently used in prioritising areas for alligator weed control in the Sydney basin (Sydney Weeds Committees 2010). During this extensive geographical survey, we were also able to opportunistically obtain information on the extent of infestations of many other weeds. Approximately 8–9 years later, during 2015–2017, we visually sampled many the same sites, including rivers, creek lines and semi-terrestrial sites, to assess the status of alligator weed infestations, as well as other species, which had been historically known to occur at these sites. We focused on some of the State’s most problematic weeds, and compared the current levels of infestations, including new infestations, with historically known and documented infestation levels.

RESULTS

Legislative changes In NSW, the responsibilities of managing problematic weeds primarily reside with State and Local governments, and with various agencies that own or manage large tracts of land (such as roads and rail authorities, Sydney Water, Water NSW, and the National Parks and Wildlife Service). Most weeds were declared in 1907–1931 ‘for the purposes of primary production’ (Johnson 2013) and in the areas of NSW that we surveyed, weeds used to be the domain of the former NSW Department of Agriculture, now the NSW Department of Primary Industries with various Catchment Management Authorities (CMAs).

The NSW Department of Primary Industries (NSW DPI 2018a) is currently the lead agency for invasive species policy in NSW. It also takes a lead role in managing new terrestrial and aquatic invasive species incursions and in managing established aquatic pests. Its other responsibilities include the administering of key legislation (the *Biosecurity Act 2015*) and leading programs, such as the NSW Weeds Action Program 2015–2020 (NSW DPI 2018a).

Local Land Services (LLS), a newly-formed arm of the NSW government, established in 2013 under the *Local Land Services Act 2013*, now has major responsibilities for coordinating the management of weeds (LLS 2017), previously performed by regional local government groups. LLS take a supervisory and advisory role for most of the on-ground actions implemented at a local level. The functions of the LLS’ are to be ‘the interface between landholders and Government across invasive species management’. LLS’ also provide operational assistance during invasive species incursions and surveillance, play a key role

capacity building and technical advice, and act as the lead regional organisation for implementing the NSW Weeds Action Program 2015–2020 (NSW DPI 2017).

In the past three decades, practitioners have been confused by not just various classes and categories of weeds, but also about required action necessary against individual weeds, some of which has changed over time. Anecdotally, on-ground evidence suggests that weed management in the Sydney basin, and in NSW more broadly, has changed significantly. We suggest that this is because allocated funding for weed management has dramatically declined, or has been aligned with other ‘asset management’ priorities by many stakeholders. Historically, there has not been much emphasis on monitoring the effectiveness of any weed management program. Reporting was mostly based on areas sprayed and not on outcomes. Today, there are tighter objective-based outcomes to be reported. However, results from our surveys find that there is much variation in the way many stakeholders perceive the reporting requirements, much to the detriment of previously gained successes over many individual weed species.

For at least two decades, weeds in NSW were managed under the *Noxious Weeds Act 1993*. The *Biosecurity Act 2015* has now replaced the *Noxious Weeds Act* and many other separate pieces of ‘biosecurity’ legislation, some of which dealt with plant diseases and pest animals. A key objective of the *Biosecurity Act 2015* is to streamline and simplify existing procedures and provide greater flexibility in managing biosecurity risks posed by diseases, weeds and pest animals. Overall, the aim is to identify ways to reduce the negative impact of weeds on the economy, environment and/or community. A ‘State Weeds Committee’ is established to oversee implementation of weed management. Eleven LLS-based Regional Weed Committees are expected to facilitate community participation in promoting a landscape-scale approach to managing prioritised weeds. Weed management is implied as everyone’s ‘General Biosecurity Duty’ (NSW DPI 2013) and a collaborative effort (NSW DPI 2018a). Although not explicitly stated, we assume that strict adherence to the Act will result in enforcement. Regional Strategic Weed Management Plans (RSWMPs) are the new mechanisms for articulating community and stakeholder expectations, and working together to identify, minimise, respond to and manage ‘high-risk’ weeds (LLS 2017, 2018). High risk weeds in NSW have been identified through the Weed Risk Management System (Johnson 2009, NSW DPI 2018b) and the lists are available from the LLS websites (LLS 2018).

Existing local control authorities have responsibilities for on-ground weed management within their jurisdictions. This includes high-risk weeds and those managed for 'asset protection' purposes. Those weeds to be controlled via a 'Biosecurity Duty' (as defined in the Act) are not always clear, particularly, if the latter group of species includes those that are not high-risk species. For an integrated and systematic weed management approach across a local control area ALL stakeholders need to be corralled, without any stragglers!

To implement the weed management across the State broadly, and the RSWMPs more specifically, the *NSW Weeds Action Program [WAP] 2015–20* (NSW DPI 2017) has been developed, which 'follows from the successful implementation of the *NSW Weeds Action Program 2010–2015*'. The WAP is an initiative to reduce the impact of weeds through implementation of the *NSW Biosecurity Strategy 2013–2021* (NSW DPI 2013) and the *NSW Invasive Species Plan 2016–23*. Our day-to-day experience is that the claim of success in implementing the WAP 2010–2015 is debatable, as evident in the proliferation of infestations of major weeds across the Sydney basin (see Table 1), and particularly because there has been no independent audit. Our observations concur with the view strongly expressed by the Natural Resources Commission (NRC) that limited stakeholder accountability and absence of a consistent audit of weed management programs in NSW is a major limitation for success on the ground (NRC 2014a).

Our weed and land management experiences, working with many clients and other contractors, is that there is quite a deal of confusion about the roles and expectations associated with the *Biosecurity Act 2015*. Some of the current workforce is also poorly trained in weed identification and control methods, as responsibilities have shifted, and most local government funding has been shifted towards Bushcare and Landcare initiatives, which make little impact on existing infestations of aggressive weeds.

Ground-truthing by the authors has revealed that during the past 6–8 years, many weeds that should have received some control treatment, have not been treated at all; or have only been treated sporadically, or, inadequately. We recognise a crisis looming regarding the overall weed management, at least in the Sydney basin, particularly in the Hawkesbury-Nepean River, Georges River, South Creek and areas affected by developments in western Sydney. We observe that the overall result of so many legislative and policy changes, particularly over the past 25 years, and changes in approaches with these, is that many of the State's worst weeds have expanded their territory (Table 1). In some

cases, there is evidence that these expansions have not gone unnoticed and that responsible individuals and agencies are managing these weeds, but that they receive inadequate attention and funding, primarily because the existing system does not require obligatory action, compliance and reporting.

Weed survey Results of the initial and most recent weed surveys are summarised in Table 1. Relevant observations and comments are summarised below:

Alligator weed There has been a vast expansion of alligator weed in the past 10 years, into new areas within 'core areas' of the infestation (some areas of Sydney and the Hunter). Historical infestations remain deeply entrenched at most sites, despite the availability of metsulfuron for control. We fear that the current failure to control this invader will most likely leave the State with no option but to accept that the weed has become too widespread and given lower priority for management in much the same way, as has been done with other widespread species, such as lantana (*Lantana camara* L.) and egeria (*Egeria densa* (L.) Planch).

Long-term practitioners have witnessed, how unsuccessful the management of alligator weed in the State has been. Despite spending millions of dollars over the past 25 years on biological control and other research, lessons learnt through research, which has been amply documented (and reviewed in Chandrasena 2008), are yet to be adopted. Fifteen years have passed since we contributed to the CRC alligator weed management guide (CRC 2003) on successful control with targeted programs. Despite this, in most areas of Sydney, alligator weed thrives, because on-ground implementation of effective control methods is poor. A much more hands-on coordination approach is required for alligator weed management, instead of leaving it to stakeholders alone.

Willow primroses To our knowledge, infestations of *Ludwigia peruviana* and *L. longifolia* have not been properly mapped or controlled in the Sydney basin. Many of the wetlands in the Sydney basin and the Hunter region continue to be at great risk of being invaded by these two species. Since the late-1980s, these species have been well researched, and reasonably well controlled (e.g. Chandrasena *et al.* 2002). Our recent experience is that agencies and their contractors have little appreciation of the risk these species pose, nor how to control them. One stark example is the continued use of the non-selective Roundup Biactive® to control primrose willows (which is ineffective), in contrast to the broad-leaf herbicide 2,4-D, to which

Table 1. Comparative weed survey results from the Sydney and Hunter regions of New South Wales. Surveys were conducted in 2009, and then again in the period 2015–2017. LGAs refer to Local Government Areas and Hwy to highways.

Weed species	Botanical name	Comparative weed survey observations
Alligator weed	<i>Alternanthera philoxeroides</i> (Mart.) Griesb.	Vastly expanded its territory since 2009: deeply entrenched, historical infestations in all of Botany Wetlands' ponds, Sydney Airport's Engine Ponds, Rouse Hill – Second Ponds Creek, Smalls Creek, and other smaller tributaries; the upper Nepean River, and the Hawkesbury River; new and spreading infestations within LGAs – Hills Shire, Penrith, Bankstown, Blacktown, Botany and Rockdale, Camden, Campbelltown, Liverpool, Sutherland; South Creek, Anzac Creek, Lane Cove River, Macquarie University, entrenched in low lying creeks and lagoons away from major tributaries; new infestations in Erskine Park; and Orchard Hills.
Willow primrose	<i>Ludwigia peruviana</i> (L.) Hara	Vastly expanded its territory since 2009: new regrowth in Botany Wetlands, Engine Ponds, Second Ponds Creek, Smalls Creek, and many locations along Nepean River and Hawkesbury River (Sackville Ferry) etc. Infested creeks include Darling Mills Creek, Toongabbie Creek, Parramatta River; other sites – Bankstown Airport, Camden, Campbelltown, Liverpool, Glenfield Creek, Georges River, and Warwick Farm Sewage Treatment Plant wetland.
Long-leaf willow primrose	<i>Ludwigia longifolia</i> (DC.) Hara	Significant infestations in Penrith Lakes and basins: Darling Mills Creek, Toongabbie Creek, Parramatta River, Kenthurst (Hills Shire), Penrith; and Port Macquarie (north of the Hunter region).
Blackberry	<i>Rubus fruticosus</i> L. spp. aggregate	Vastly expanded territory since 2009 last survey: major infestations in western Sydney, Wollondilly, Wingecarribee, Camden, Campbelltown, Liverpool, Fairfield, and Penrith LGAs.
Green cestrum	<i>Cestrum parqui</i> L'Hér.	Vastly expanded territory since 2009 last survey: major infestations in Parramatta, Liverpool and Fairfield LGAs.
Chilean needle grass	<i>Nassella neesiana</i> (Trin. & Rupr.) Barkworth	Major infestations in Campbelltown, Liverpool, and Fairfield LGAs.
Coolatai grass	<i>Hyparrhenia hirta</i> (L.) Stapf.	Major infestations in Sutherland and Wollondilly Shire LGAs, Picton Road, Cumberland Hwy, along the M4, M7 and other major roads.
Golden wreath wattle	<i>Acacia saligna</i> (Labill.) H.L. Wendl.	Major infestations along major arterial roads – Hume Hwy, from Picton to Liverpool, Picton Road, Pacific Hwy to Wollongong, etc.
Egeria	<i>Egeria densa</i> (L.) Planch	Vastly expanded territory since 2009: major infestations in Fairfield, Liverpool, Hills Shire, and Parramatta LGAs – Toongabbie and Pendle Hill Creeks, Georges River, Nepean River, Kangaroo River; new infestations in many creeks in the Shoalhaven areas (south of Sydney region).
Groundsel bush	<i>Baccharis halimifolia</i> L.	Significant infestations along the Pacific Hwy to Coffs Harbour; from Taree to the Queensland Border; Isolated infestations in the Sydney basin (i.e. Parramatta, Liverpool LGAs, and at Menangle).

both species are highly susceptible. Inadequate sharing of information on effective weed management solutions, and poor training of the workforce are two reasons for this failure.

DISCUSSION

In this paper, we express our sincere concern that all is not rosy in weed management in NSW, despite the efforts of responsible authorities, over several recent decades. The absence of proper audits and reporting, over decades, has led to complacency and a lack of accountability for tracking whether outcomes are being achieved with public funds spent on weed management. Many stakeholders and agencies appear to be rather 'out-of-touch' with on-ground realities and are indifferent to certain weeds and their management. However, instead of being pessimistic, we offer some practical suggestions, with the hope that these may be seriously considered by relevant authorities.

We agree with the view that weed management is a *shared responsibility* between the public and private including all government landowners. All parties are equally responsible for stopping the spread of weeds, and the proposed collaborative approach, if coordinated well, is likely to result in success. Conversely, failure by any single party regarding on-ground implementation will lead to an increased risk of weeds becoming a greater problem than they have to be.

We share the concerns expressed by Arcioni (2003), that is that the *Noxious Weeds Act 1993* was too broad in its scope, and that its expectations were not being fully met due to the prevailing policies, the interplay with other regimes, international politics, and practical issues, such as insufficient funding. We contend that after this analysis, the situation has changed very little, except that weed management, across the board has become even more diffuse and ineffective 'on the ground' in the ensuing period.

Inadequate priority and legislative positioning

How major changes in approaches affect outcomes is best illustrated again using the example of alligator weed. Before 2003, alligator weed was declared as a '**W1**' noxious weed throughout NSW under the *Noxious Weeds Act 1993*. As such, its presence needed to be notified to the Local Control Authority (usually the Local Government), and mandatory actions had to be taken to '*fully and continuously suppress and destroy*' the weed. Subsequent Act and declaration amendments resulted in the declaration of alligator weed as a '**Class 3**' noxious weed within 'core' infestation areas in NSW. For all intents and purposes the mandatory management actions did not change; i.e.

the plant was to be '*fully and continuously suppressed and destroyed*', where it was feasible.

That said, we question if the declaration amendment reflected the NSW DPI's view that infestations of alligator weed had reached unmanageable levels. We suggest that there was a lack of confidence in the likelihood of containment, and where relevant, eradication of alligator weed. However, in so far as managing a potential that was called a '*National threat*', the apparent demotion of alligator weed to a **Class 3** weed in 2005 was not in line with the invader's capacity to spread further, adversely impacting waterways, and potentially, Australia's national economy. The demotion led to several State agencies, water utilities and LGAs assigning much *less* priority to alligator weed in their asset management plans. The disbanding of the NSW DPI aquatic weed management task force (NSW DPI 2001), which existed until about 2006–2007, also contributed to an inadequate focus on the '*national threat*' posed by alligator weed, which has continued unabated to this date. Before this time, Australia had spent several million dollars funding projects, through the now extinct CRC for Weed Management, looking for suitable biocontrol agents for alligator weed, with no notable success. For example in the field, we occasionally observe that the flea-beetle *Agasicles hygrophila* Selman & Vogt, introduced in 1977, is still the only agent actively doing some damage, albeit sporadically, to alligator weed. Given that no other agent has thus far been successfully field-deployed, despite more than 25 years of alligator weed bio-control research, the public would be excused for doubting whether funds have been correctly spent!

Separate bush regeneration from weed management We attribute the inadequate local control of many major weeds primarily to the change in approach adopted by some agencies, which have allocated greater portions of annual funding for bush-regeneration, instead of straight forward weed management. We appreciate the noble goal of bush-regeneration, i.e. to assist regeneration of native bushlands from a diminished quality to a better condition, possibly, to a quality that might have existed before weed invasion. However, bush-regeneration methods have limited value in arresting the large-scale establishment of highly invasive weeds. Indeed, we contend that the primary motive for adoption of bush-regeneration as the primary paradigm for weed management funding appears only to be self-perpetuating.

We are aware of a growing realisation among some land managers that bush-regeneration contracts do not adequately address weeds within their assets. As to why this is the case, we offer the following,

relevant observations:

- actions on-the-ground to achieve bush-regeneration goals, even on principle, are very localised. These cannot be easily replicated across sub-catchments or broader regions. The scales of operation are often so small that of the most major weed infestations do not get adequately treated;
- the tools available, i.e. small-scale herbicide spot sprays, cut-and-paint applications, etc. leave large infestations behind, as bush-regenerators are overwhelmed by the scale of weed control required at most sites; and
- the self-perpetuating nature of the work, apparent only with some stakeholder agencies and contractors. Under bush regeneration contracts, some major weed infestations may go unreported for years, because the primary focus is on facilitation and slow recovery, and rehabilitation of targeted sites; yet, it creates more bush regeneration contracts!

Multiple stakeholder cooperation Models of multiple stakeholder engagement and cooperative approaches are well established in natural resource management. However, leadership is required to garner goodwill, invoke effective partnerships and obtain commitment from multiple stakeholders to reduce the national threats posed by weeds. Having the legislative requirements to support this cooperation is a must. The key to obtaining effective cooperation is obligatory compliance reporting, and penalties for non-compliance.

Inadequate resourcing Most weed managers agree that the current expansion of weeds in NSW is attributable to severe under-resourcing, both of funding, and human resources, committed to a sustained and coordinated management effort across the State. Even a cursory check would reveal that, in submitting applications for weed control funding in a given area, the tactic used by local managers is to ‘*not ask for much*’ for the fear of not getting any! Inadequate funding means insufficient effort to contain major weed infestations in many areas. Inadequate accountability with regard to tracking how weed funding has been used, against outcomes, continues largely unaddressed.

Our on-ground experiences reveal that local managers tend to use various defences for inadequate action. These include: a lack of clarity on boundaries; diffused responsibilities; and the insufficient priority given to specific weeds. We fear that this unsatisfactory State-wide problem will continue if the new LLS Regional Weed Committees, set up under the new

Biosecurity Act 2015 lack the legislative authority required to oversee the management efforts across jurisdictions. The authority established must be for independent verification and compliance reporting, particularly on the effectiveness and adequacy of weed control programs. To achieve this, it would be prudent to set up a special Weed Management Task force in NSW to manage all high-profile species that pose a ‘*national threat*’.

CONCLUSIONS

Our paper is not an exhaustive study of why weed management has largely been ineffective across the Sydney basin or other parts of NSW, although we sense such a review is timely. We argue that all stakeholders approach weed management within their jurisdictions, purely and simply, to achieve a minimal level of compliance only, and not because they have ‘*to do the right thing*’. Asset protection and compliance are strong drivers, which motivate stakeholders to allocate some level of funding to weed management.

A primary failure in weed management in the last two decades, during which so many legislative changes have occurred, is the inadequacy of compliance reporting. Further, the lack of will to enforce weed legislation is a political decision, but the price society pays is rampant growth of many species, and wastage of resources. If the approach evident in the most recent Greater Sydney Strategic Weed Management Plan (LLS 2017) is to be successful, establishing an accurate baseline of key weeds and their abundance would be a first step. In conclusion, we re-iterate that a review of on-ground weed management, actual actions, funding and performances of ALL stakeholders will reveal inadequacies, a need that has already been highlighted elsewhere (NRC 2014a,b).

REFERENCES

- Arcioni, E. (2003). Out damned weeds! Weed management in Australia – Keeping them at bay. *Australasian Journal of Natural Resources Law and Policy* 8, 2003, 75-122.
- Chandrasena, N. (2008). Assessment of risk of spread for strategic management of the core alligator weed infestations in Australia – ‘Taking stock’. Australian Government Department of Agriculture, Fisheries and Forestry, Canberra.
- Chandrasena N., Pinto L. and Sim R. (2002). Reclaiming Botany wetlands, Sydney through integrated management of *Ludwigia peruviana* and other weeds. Proceedings of the 13th Australian Weeds Conference, eds H. Spafford Jacob, J. Dodd and J.H. Moore, pp. 134-7. (Plant Protection Society of Western Australia, Perth).

- CRC, Cooperative Research Centre [for Australian Weed Management] (2003). Weeds of National Significance. Alligator weed – *Alternanthera philoxeroides*. Weed Management Guide.
- Grain Growers (2014). The economic cost of weeds in NSW. A Grain Growers research report, May 2014.
- Johnson, S.B. (2009). The New South Wales Weed Risk Management System. NSW Department of Primary Industries, Orange. 127 p.
- Johnson, S.B. (2013). Don't let the truth get in the way of a good story. The declaration of weeds that affect the environment started in 1907 in New South Wales. *Plant Protection Quarterly*, 28, 77-9.
- LLS, Local Land Services [New South Wales] (2017). Greater Sydney Regional Strategic Weed Management Plan 2017–2022. Greater Sydney Local Land Services. 80 p.
- LLS, Local Land Services (2018). NSW Weed Reforms <https://www.lls.nsw.gov.au/biosecurity/weed-control> (accessed 21 April 2018).
- Montoya, D. (2012). Noxious Weeds. Briefing Paper No. 02/2012, NSW Parliamentary Library Research Service, Sydney.
- NRC, Natural Resources Commission [of NSW] (2014a). Issues Paper: Review of Weed Management in NSW. Document: D13/4149.
- NRC Natural Resources Commission [of NSW] (2014b) Review of weed management in NSW. Document: D13/6066.
- NSW DPI, New South Wales Department of Primary Industries (2001). Strategic plan for the management of alligator weed in the Hawkesbury-Nepean catchment. Hawkesbury-Nepean Aquatic Weeds Task Force, NSW Department of Primary Industries, Sydney.
- NSW DPI New South Wales Department of Primary Industries (2013). NSW Biosecurity Strategy, 2013–2021.
- NSW DPI, New South Wales Department of Primary Industries (2017). NSW Weeds Action Program, 2015–2020 Guidelines.
- NSW DPI, New South Wales Department of Primary Industries (2018a). NSW Invasive Species Plan 2018–2021.
- NSW DPI, New South Wales Department of Primary Industries (2018b). NSW Weed Risk Management System. <https://www.dpi.nsw.gov.au/biosecurity/weeds/strategy/nsw-weed-risk-management-system> (accessed 21 April 2018).
- Sydney Weeds Committees (2010). Priorities for the control of Alligator Weed in the Sydney Region. Unpublished report.