

Strategic use of weed legislation to limit the spread of weeds in NSW

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Summary Although the NSW *Noxious Weeds Act 1993* outlines a list of noxious weed species, these listings have not been used strategically to manage weed species from a state-wide perspective (i.e. to contain their spread). Using the following weed species: (1) cats claw creeper, (2) bridal creeper, (3) African olive and (4) fireweed, we illustrate how the declaration process, being a combination of the declared control areas (DCAs) and Control Classes (CCs) for individual species, can be used strategically to establish state-wide containment zones. Firstly, we overlaid the current distribution pattern for each taxa with the current DCA listings to highlight the degree of mismatch. Then, for each taxa, we systematically assigned each of the 'unlisted' DCAs with one of three CCs, being (i) eradication; (ii) suppression (containment) and (iii) asset protection, or left them as 'unlisted' for DCAs that are unlikely to be invaded. The selection of the CC for each DCA was based on its proximity to the current infestation, with DCAs covering core infestations assigned an asset-protection class, suppression assigned to those DCAs along the edge of the taxa's distribution (i.e. with low density or scattered infestations), and eradication to all adjoining DCAs currently without the taxa or where it is scarce. The proposed approach will strategically limit the spread of listed weed species without the need for significant additional resources, simply by (i) raising awareness of the weed species with local stakeholders where it is absent or scarce, and (ii) ensuring that suppression and monitoring occurs in areas with low densities. Whilst the proposed change requires the support of local control authorities, we believe that a more comprehensive and strategic approach to containment of listed species will have direct benefits for all stakeholders. The underlying approach can also be applied to other jurisdictions.

Keywords Noxious weed, declared, strategic management, containment zones.

INTRODUCTION

The management of weeds can be split into four strategic activities, prevention, eradication, containment and asset-protection, with a significant emphasis on

prevention and/or early intervention as the most cost effective management approach. This emphasis also underpins many of the declared weed listings in Australia (i.e. under the state and territory noxious weed legislation). But how does the declaration of a weed species as noxious lead to enhanced weed management outcomes? Here we examined weed declarations under the New South Wales (NSW) *Noxious Weeds Act 1993* (NW Act) to illustrate how the Act and declarations could be used more strategically to deliver on the objectives of the Act as well as to limit their spread.

NOXIOUS WEED DECLARATIONS

The NW Act contains a list of 183 taxa declared as noxious, in one of five CCs. Control Classes 1 and 5 encompass the whole state, being essentially state-wide eradication targets and imposing restrictions on sale and movement, respectively. There are 27 taxa in CC1 and 29 in CC5. The remaining 137 weed taxa are listed in one or more of the three remaining CCs based on their status (i.e. density and impacts) in each of the 123 Local Control Authorities (LCAs) or declared control areas (DCAs) in NSW. These listings are derived from individual control authority nominations or collective weed committees encompassing a number of LCAs in a region. This localised approach has rarely resulted in the strategic management of noxious weeds on a state-wide basis (bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata* (DC.) Norl.) is the notable exception). For example, the listings and declarations have not been used to limit the spread of emerging species or establish containment zones for significance weeds (e.g. the Weeds of National Significance (WoNS)). Thus we propose the addition of strategic declarations for listed species to deliver state-wide as well as regional outcomes.

METHODS

We selected four noxious weed species: (1) cats claw creeper (*Macfadyena unguis-cati* (L.) A.H.Gentry); (2) bridal creeper (*Asparagus asparagoides* (L.) Druce); (3) African olive (*Olea europaea* subsp. *cuspidata* (Wall. ex G.Don) Cif.) and (4) fireweed (*Senecio*

madagascariensis Poir.) to illustrate the proposed approach.

For each weed species we examined each of the 123 LCAs/DACs (excluding Lord Howe Island) to determine their current declaration status (i.e. not listed or CC1 to 5 (I&I 2010a)), and the distribution of the weed based on records held in PlantNet (BGT 2010) and the authors' knowledge. We also made a qualitative assessment of their potential spread based on known invasion pathways and habitat preferences to determine those LCAs that might become invaded in the future. We then allocated each LCA/DCA with a proposed CC based around strategically controlling and containing the species, using the existing CCs, being: CC2 (prevention and eradication), CC3 (containment and suppression) and CC4 (asset protection). Areas that were unlikely to be invaded, and where the species was not present, were not allocated a CC [not listed].

RESULTS AND DISCUSSION

Establishing containment zones for declared weed species A large majority of the control declarations (i.e. DCA and CC) under the NW Act are not strategic from a state-wide perspective, based on the spatial assessments of the four weeds undertaken here (Figure 1). The NW Act could however, be used more strategically to contain the spread of listed weed species in NSW, through the establishment of state-wide containment zones based on the spatial aggregation of DCAs and the level of CC assigned. Whilst this process may not be applicable for all declared weed taxa in NSW (i.e. those weeds that are already widespread across the state), our results illustrate that this approach has significant benefits in helping to reduce the spread of many noxious weeds.

Declared taxa and strategic state-wide management under the NW Act The strategic use of the declarations (i.e. combination of DCAs and CCs) under the NW Act could also be used to enable delivery of other weed management priorities. Whilst this occurs to some extent with the listing of those taxa in CC1 (state-wide prevention and eradication), and to a lesser degree those in CC5 (i.e. state-wide restrictions on sale and movement), assessments have not been applied to taxa in the other CCs. To illustrate this point, there were a large number of listed weeds identified in several recent reports as posing an impact to threatened species in NSW (Coutts-Smith and Downey 2006, Downey *et al.* 2010), whose management could benefit from the approach outlined here (i.e. to limit spread). In addition, this approach could be modified to have direct benefits to the biodiversity at risk, es-

pecially if those DCAs (and surrounding ones) with the worst impacts were given 'higher' CC classes. Those weed species identified as posing an impact whose management would benefit from this approach include bridal creeper (Figure 1b), lantana (*Lantana camara* L.), Madeira vine (*Anredera cordifolia* (Ten.) Steenis, cat's claw creeper (Figure 1c), asparagus fern (*A. aethiopicus* L.), Scotch broom (*Cytisus scoparius* (L.) Link), Japanese honeysuckle (*Lonicera japonica* Thunb. ex Murray), the privet species (*Ligustrum lucidum* W.T.Aiton and *L. sinense* Lour.) and gorse (*Ulex europaeus* L.).

Despite these criticisms, strategic assessments have been undertaken, albeit not formally. For example declarations for the WoNS, specifically alligator weed (*Alternanthera philoxeroides* (Mart.) Griseb. and salvinia (*Salvinia molesta* D.S.Mitch.), both declared as CC2 and CC3 in different DCAs, and serrated tussock (*Nassella trichotoma* (Nees) Hack. ex Arechav.) as CC3 and CC4. Strategic declarations for non-WoNS include water hyacinth (*Eichhornia crassipes* (Mart.) Solms), declared as CC2, CC3 and CC4 and pampas grasses (*Cortaderia* spp.), as CC3 and CC4 in different DCAs.

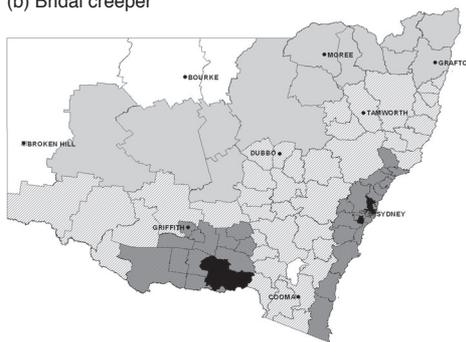
Current weed declarations and the weed's distribution The assessment process used in this study has highlighted a significant mismatch between the current declaration classes in each LCA/DCA relative to the distribution of each declared weed species and how this has limited strategic management. For example, cat's claw creeper is currently only listed in 12 out of 123 LCAs, only one of which contains cat's claw creeper (Figure 1a). In addition, the current listings illustrate how the process has been largely ad hoc from a weed management perspective (i.e. in terms of establishing strategic containment), despite being strategic from an individual LCA perspective. Thus weed declarations must be better aligned with the individual species in order to achieve more strategic management outcomes for the weed and the individual LCAs and the state.

Changes to current weed declarations In order to convert the proposed outputs of these strategic assessments (Figure 1) into a legislative outcome, each proposed new LCA/DCA declaration (i.e. CC listing) would need to be enacted. This would significantly increase the number of LCAs in which each weed could be potentially listed, as demonstrated with these four examples (see Table 1). As LCAs are primarily responsible for implementing the NW Act, Industry and Investment NSW (the agency responsible for the Act) will work closely with the 123 LCAs in order

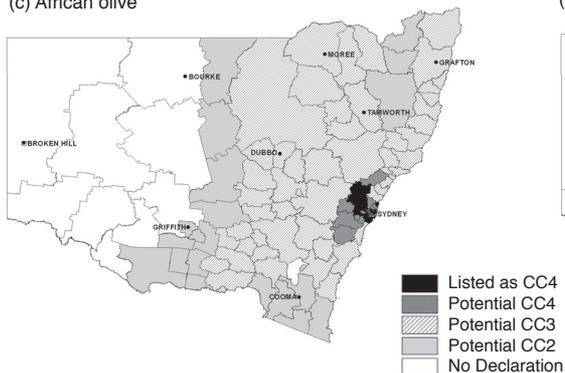
(a) Cats claw creeper



(b) Bridal creeper



(c) African olive



(d) Fireweed

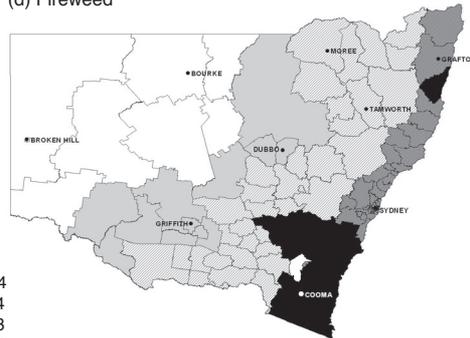


Figure 1. Current (listed) and proposed declarations of (a) cats claw creeper, (b) bridal creeper, (c) African olive and (d) fireweed under the *Noxious Weeds Act 1993* in New South Wales.

to gain their support for the proposed changes, in particular using the NSW Weed Risk Management system (Johnson and Charlton 2010). Operationally, the large number of proposed new declarations (see Table 1) will impose some extra responsibilities on many individual LCAs. Most of the proposed new declarations, however, would pose little or minimal changes to the current approach in that they are areas currently free of the weed species (i.e. if listed as CC2 – Figure 1). Whilst there are awareness raising costs associated with educating stakeholders in these LCAs and small monitoring costs, control costs would be non-existent or very low (i.e. once an infestation was detected). These costs would be offset by future savings, because any infestation should be detected and treated early; something that may not happen under the current approach. This is consistent with the current cost-effective basis of managing new weed incursions, and stopping spread. Where the cost will be incurred is in the DCAs/LCAs that adjoin core

infestations of declared weeds in which the weed is not currently declared, but are strategic for state-wide management. These DCAs would then be declared CC3 (containment and suppression). The number of LCAs affected is dependent on the weed species, its current declarations, current and potential distribution, and how manageable the weed is within each LCA. In some instances some core infestation areas without a current declaration would need to be listed as CC4, which would also incur management costs. However as all new CC4 listings require the development of a management plan, the costs of control can be clearly articulated.

The extra costs (control and awareness) involved may be accounted for by changes in government funding (I&I 2010b) which is strategically directed towards early detection and eradication, or containment in line with the NSW Invasive Species Plan 2008–2015 (NSW DPI 2008).

Table 1. Summary of the number of Local Control Authorities (LCAs) in which cats claw creeper, bridal creeper, African olive and fireweed are declared in NSW and the number of declarations proposed to deliver strategic management (see also Figure 1). Note: CC = Control Class, and Total number of LCAs is 123.

Weed	Number of LCAs with current declarations (all CC4)		Number of LCAs invaded by weed		Number of proposed declarations			
	No.	% of total	No.	% of total	CC2	CC3	CC4	% of total
					No.	No.	No.	
Cats claw creeper	12	10	10	8	24	39	7	57
Bridal creeper	10	8	66	54	13	42	56	90
African olive	7	6	47	38	20	55	33	88
Fireweed	14	11	68	55	12	35	54	82

Broader outcomes As part of the WoNS initiative, a series of nationally strategic containment zones has recently been proposed, some of which occur in NSW (Weeds Australia 2010). The NW Act has been used to support some these containment zones. For example, the NW Act supports strategic containment to (i) prevent the spread of lantana further south in coastal NSW, (ii) contain boneseed (*Chrysanthemoides monilifera* subsp. *monilifera* (L.) T.Norl.) in the Sydney basin and north, and (iii) reduce infestations of bitou bush from the Illawarra south of Sydney to the Victorian border. It also helps ensure the eradication and surveillance of incursions of hymenachne (*Hymenachne amplexicaulis* (Rudge) Nees) and parthenium weed (*Parthenium hysterophorus* L.) into NSW (both CC1 species), and alligator weed and salvinia from coastal NSW, while supporting the containment of serrated tussock and Chilean needle grass (*Nassella neesiana* (Trin. & Rupr.) Barkworth).

The approach outlined here will also help to avoid the mismatch between the currently listed LCAs/DCAs and the weed species distribution (as illustrated in Figure 1).

Future directions This study has highlighted the value in looking at noxious weeds legislation and the declaration process for individual taxa in a more strategic nature from a state-wide and legislative perspective. If adopted the proposed process will greatly strengthen our ability to manage key weed species and reduce the costs long-term, by helping to contain species and limit their spread in a strategic manner, as well as to detect and treat new outbreaks of such species. This has not occurred uniformly in the past with some weeds species invading large areas before detection or strategic management has been applied. Whilst this approach is significant for weed management in NSW, the same or a similar approach could be applied in other jurisdictions to achieve the same outcome.

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