PREDICTING AND PREVENTING THE WEST'S ENVIRONMENTAL WEEDS OF THE NEXT CENTURY

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Abstract Weeds were listed as interesting sidelines in the Nineteenth and early Twentieth Centuries by Botanists who were more inent on documenting the native flora. Most doubted they would have any major effects on the natural vegetation. At the end of the Twentieth century we know this was not an accurate assessment. With over 1155 naturalised species can we now predict the new major weeds of the Twenty First Century and prevent their spread. Based on observations in Gardens, Arboretea and Bushland a series of potentially serious weeds for Western Australia are listed that can be contolled at present to ensure they don't fulfill their promise by the end of the next century.

INTRODUCTION

Early Observations Weeds started to become introduced into southern Western Australia after European settlement in 1826 at Albany. It became a steady trickle when the Swan River Colony was formed in 1829. James Drummond, the Botanist and Gardener with the first fleet was provided with six boxes of plants and seeds from the Horticultural Society. These containing Fruit Trees (83 types of Apples, Cherries, Nectarines, Pears, Peaches, Plums, Quinces and Vines), Dahlias, Chrysanthemums, Roses, Currants, Gooseberries, Raspberries, Potatoes, Strawberries: Roots of Rhubarb, Horse Radish and Jerusalem Artichoke. Seeds of Vegetables (Asparagus, Beans, Beets, Cabbage, Capsicum, Celeriac, Celery, Cucumber, Endives, Gourds, Leeks, Lettuce, Melons, New Zealand Spinach, Parsnips, Peas, Sea Kale, Watermelon) and 60 kinds of flowers, including some now notorious weeds such as Mexican Poppy (in fact most of the plants that became weeds were garden plants).

However, most Free Settlers (including Drummond) also brought their own seeds and plants for their farms and gardens, as well as feed for animals, both of which contained weed seeds. This can be seen from a letter that James Drummond wrote to J. B. Hooker (Director of Kew) published in the Perth Gazette in June 1839:

" It is curious to observe the numbers of foreign plants that have established themselves on the Peninsula Farm and about all the old settlements, affording clear proof that man, when he emigrates carries the weeds that are most troublesome in cultivated ground, along with him.

Here the *Lolium tremulentum* and the several species of Wild Oats have taken exclusive possession of the lands broken up for wheat; the elegant *Briza minor* and the *Phalaris aquatica* are two of the commonest grasses on the farm; the *Centaurea solstitalis* is one of our chief pests; *Polygonum aviculare* is also very common but is much relished by the cattle. There are several foreign plants that became troublesome weeds here which are not known (at least as weeds) in England. I myself introduced the first Cape Gooseberry, (*Physalis peruviana*) and the first *Solanum capense* and in the short space of ten years they are perfectly naturalised; the *Solanum lunatum* we found on Garden Island when we arrived but it has since made its way to the mainlands and is plentiful around Perth.

The English Sowthistle (*Sonchus oleraceus*) which is now the most annoying weed we have all over the country even as far as the York district was quite unknown when we came here; the native Sowthistle {now established as *Sonchus hydrophilus*}a far finer plant growing 8'-10' high being at this time almost extinct about the settlements."

Despite early warnings, they were not considered a major problem for the bush by any of the early Botanists. This attitude can be best illustrated by referring to the German Ecologist Ludwig Diels during his wide ranging ecological studies earlier this century:

"Even the weeds which man has carelessly brought with him into the country have never seriously influenced the natural vegetation. We saw that almost everywhere the invaders appear as dependents, and most of them soon disappeared when man and his culture passed on. There is never a question of them pressing on the old vegetation and affecting it's existence."

Current Situation At the end of the twentieth Century with extensive disturbance and fragmentation of natural vegetation weeds are regarded as one of our most serious conservation problems. Currently there are over 1155 taxa of naturalised plants present in Western Australia and more are becoming naturalised every year. Currently policies are being implemented to limit the introduction of new potential weeds, rather than the previous policies which encouraged introduction. Weeds are being ranked for action at a State and national level. However, each conservation authority should also have a target list of potential weeds for eradication or contaiment as listed by Csurhes and Edwards (1998) for Australia. This paper attempts to provide a preliminary list for Western Australia.

METHODS

The author has been assembling data on the naturalised flora of Wetern Australia for many years, compiling local and State lists (Keighery, 1999), ranking these weeds (Environmental Weeds Strategy of Western Australia, 1999) and undertaking surveys of the extent and impact of these weeds. The current priority list is based on:

- surveys of bushland adjacent to the State Botanic Garden in Kings Park, where over 2,400 species (Selk, 1975) of plants from WA. Eastern Australia, South Afica, California and the Meditterrranean region were grown.
- surveys of CALM and local Arboreta containing approximately 400 tree species have been surveyed.
- surveys of Perth garden plants and their weedy tendencies (over 4,000 species) in wasteland has also been prepared (G. Keighery, unpub.).

RESULTS

Sedges

***Isolepis hystrix* (Thunb.) Nees** An annual weed of species rich vernal pools around Perth. This species forms dense monospecific stands in these habitats, and could be a major threat to these habitats throughout southern Western Australia.

Bulbous/Tuberous Weeds

***Asparagus declinatus* L. (syn: *A.crispus*)** Currently known from scattered populations at Perth, Bunbury and Albany (Keighery, 1995). This species is a serious weed on Kangaroo Island and may threaten high rainfall areas where Bridal Creeper (*Asparagus asparagoides* (L.) W.Wright) is largely absent.

***Lachenalia* species** The genus *Lachenalia* comprises currently 88 named species, and approximately 20 undescribed species, a total of over 110 species (Duncan,1988). Some species are already widely grown as attractive garden ornamentals. It is considered that the genus also has considerable future potential as a flowering pot plant, and seed of many species and horticultural variants are being imported into Australia to trial.

***Lachenalia aloides* (L.f.) Engl.** A variable, taxonomically complex species with 8 varieties recognised in the wild in Southern Africa (Duncan,1988). In Western Australia *L. aloides* var *aurea* (Lindl.) Engl. is naturalised in disturbed Tuart (*Eucalyptus gomphocephala*) woodland at Yanchep National Park, 50 km. north of Perth and sporadically in Banksia low woodland at Kings Park. *Lachenalia aloides* var *quadricolor* (Jacq.) Engl. is the common form of this species found in dense and scattered populations throughout Kings Park in mixed Tuart/Banksia woodland. Populations of this variant are also found on waste land, abandoned home sites, old refuse tips and road verges throughout the greater metropolitan region. This is also probably the variant established as a garden escape in Eastern Australia. *Lachenalia bulbifera* (Cyrillo) Engl. (often referred to as *L.pendula*), is established on vacant lots, road and rail verges throughout suburban Perth, in mixed Tuart/Banksia woodland at Kings Park, and in coastal dunes at City Beach. *Lachenalia* ? *mutabilis* Sweet, a large localised population of this species is found under Banksia woodland in Kings Park. *Lachenalia reflexa* Thunb. This is currently the most widespread and invasive species in Western Australia. It has been recorded in 6 conservation reserves (Mount Henry, Point Heathcote, Alfred Cove, Point Walter, Minim Cove and Chidley Point) along the entire Swan River Estuary in suburban Perth. Here the species has invaded Tuart Woodland, Banksia Woodland and Limestone Scrub and Heath. *L. reflexa* has also been recorded as abundant in Tuart woodland in Woodvale Nature Reserve (25 km north of Perth), and locally in Neerabup National Park (40 km north of Perth). The species has also been recorded in Sampson Park (Fremantle, 12 km SE of Perth) and Shenton Bushland (8 km west of Perth) in Jarrah Woodland, in Wandoo woodland near York (80 km east of Perth) and 400 km south-east of Perth in wasteland at Gnowangerup. This species has a great potential to spread far beyond the current limits of infestation, and posses a considerable threat to many areas of south Western Australia.

These species are currently the few that have been grown locally, yet all display weedy tendencies, perhaps it would be wise to ensure that the other 106 species do not get the chance to become weeds in Australia.

***Gladiolus caryophyllaceus* (Burman f.) Poiret** Currently explosively expanding north and south of Perth. New infestations should be eradicated to contain this species which otherwise will spread throughout southern Western Australia.

***Cyanella hyacinthoides* L.** Recorded for three localities within 100 km. of Perth, forming dense populations from seed and cormlets.

Grasses

***Andropogon distachyos* L., *Hyparrhena hirta* (L.) Stapf and *Tribolium uniolae* (L.f.)** Renvoize are all building populations and have the potential to become major weeds of heavy soil communities currently free from major weedy perenial grasses.

***Pennisetum polystachyion* (L.) Schultes** Could become a major weed in the Kimberley, as it has in the Northern Territory.

***Spinifex sericeus* R.Br. and *Thinopyron distichum* (Thunb.) A. Love** Are becomming major strand weeds, although they are still localised in distribution.

Herbs

***Succowia baleaerica* L.** This potentially serious weed has been discussed in Keighery (1996). It remains a serious threat to plant communities on the Swan Coastal Plain.

***Kochia scoparia* (L.) Schrad** This species was able naturalise in WA within 2 years of introduction (Dodd and Moore, 1993). The species was considered to be a serious threat to the semi-arid regions of southern Australia and is being eradicated.

***Pelargonium alchillemoides* L.** Currently present as a localised weed in the Hamelin Bay area. Considered by South African experts (van der Walt, pers. com.) to be potentially a very seious weed.

Shrubs

***Polygala myrtifolia* L.** Present as scattered populations through the higher rainfall areas of southern Western Australia from Perth to Albany. This weed is slowly building populations but still could be eradicated, it poses a major threat to coastal communities.

***Senecio glastifolius* L.** A major weed in New Zealand (Williams et al, 1998), this species is spreading explosively in the Albany region. Orginally a small population on Mount Adelaide the area of infestation has increased enormously since a fire in this area. The species could be major weed over much of the south coast of Western Australia and must be subject to an eradication program.

***Senna* species**

***Senna alata* (L.) Roxb. I**s present in WA as isolated infestations at Kunnnunurra and Koolan Island. The species is a major weed in the Northern Territory (Smith, 1995). This species should be eradicated and not cultivated in Western Australia.

***Retama raetam* (Forsskal) Webb.** Building populations around Perth, potentially a very serious weed of many areas, other Mediterranean species of broom are also weedy in Kings Park. Current populations should be eradicated.

Trees

***Acacia* species (especially *A.baileyana, A. dealbata, A. longifolia, A. melanoxylon* and *A. pycnantha*)** These species are widely established in Western Australia and have the potential to become major weeds of the forest regions, but could still be contained. Observations at Arboreta suggest that Eastern Australian *Acacia* species should all be treated with caution. As many populations as possible should be eradicated.

***Olea europaea* L.** A sleeper weed, although present in Western Australia without becoming a major weed the species is begining to spread rapidly from old plantings and is being plantedc as a major crop. Any escapes located in bushland should be destroyed.

***Pittosporum undulatum* Vent.** Present as scattered populations through the higher rainfall areas of southern Western Australia. This weed is slowly building populations and should be eradicated, it poses a major threat to forest communities.

***Rhamnus alaternus* L.** This species with bird disperesed fruit has been recorded from four diverse (Banksia woodland, offshore island, riverine and coastal sand dunes) sites around Perth. It appears able to invade relatively intact vegetation.

***Brachychiton populneus* (Schott & Endl.) R.Br.** This species with bird disperesed fruit has been recorded from Banksia woodland, mainly in Kings Park, around Perth. It appears able to invade relatively intact vegetation.

***Tamarix* species** Currently *Tamarix aphylla* (L.) Karsten is established in the Gascoyne River at Carnarvon, although it is currently being controlled (Steich, pers. com.). This population should be eradicated.

***Parietaria judaica* L.** Present at only one site on cliff vegetation at Fremantle. This species appears able to invade coastal limestone heaths and should be eradicated in Bushland.

DISCUSSION

Fourteen of the taxa listed herein (*Asparagus declinatus*, Three *Lachenalia* species, *Cyanella hyacinthoides*, *Succowia balaerica*, *Kochia scoparia*, *Pelargonium alchillemoides*, *Senecio glastifolius*, *Senna alata*, *Retama raetam*, *Pittosporum undulatum*, *Rhamnus alaternus* and *Brachychiton populneus*) could be targeted for eradication. The other 15 species should have new or outlying populations eradicated to lessen their threat potential.

Surveys of arboreta suggest that Eastern Australian Acacia and Eucalyptus species will become major environmental weeds in southern Western Australia, especially in the forest and urban reserves. Observations at Kings park suggest that tropical African Wattles could be equally weedy in the north. These species should not be grown in Western Australia and eradicated where planted near bushland. It would appear that Eastern Australian species should be treated in asimilar manner to exotic species as to their threat potential.

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