



Newsletter of the Weed Society of Victoria Inc.

volume 20 issue 4 2009

# Weedscene

## Habitat 141: from outback to ocean by Andrew Bradey, Habitat 141 Co-ordinator

Habitat 141 is a gutsy 50 year conservation initiative that unites Alliance partners in three states, with the drive, investment and expertise to safeguard our natural environment against climate change. It stretches from the coast at Portland inland to Broken Hill and from the Murray in the west to the Grampians in the east. The number '141' refers to the degrees of longitude of the border between Victoria and South Australia. The aim of Habitat 141 is to work with communities to conserve, restore and connect habitats for plants and wildlife on a landscape scale from outback to ocean.

The Habitat 141 Alliance is currently made up of the following organisations: Greening Australia, Parks Victoria, The Victoria Naturally Alliance, Glenelg Hopkins Catchment Management Authority (CMA), Southeast Natural Resource Management Board (NRM), South Australian Murray Darling Basin NRM, Wimmera CMA, Mallee CMA, Victorian Department of Sustainability & Environment, South Australian Department of Environment and Heritage, Trust for Nature, The Wilderness Society and the Victorian National Parks Association.

### A unique conservation project.

Over the past 200 years much of the landscape in eastern Australia has changed dramatically with the introduction of fences, roads, mines, dams, crops, pastures, powerlines, towns and cities, all of which have resulted in severe fragmentation.

Despite these changes the Habitat 141 region is one of the few places in Australia where wilderness areas form a series of stepping stones from the southernmost coastal regions through to the arid zone.

Identified as a high priority area by a number of scientific studies, Habitat 141 will improve the health of existing native vegetation, reconnect fragmented landscapes, protect both agricultural and natural systems, substantially add to work already started in the region, work consultatively with communities and landholders and break down the many administrative boundaries which currently hamper effective conservation work.

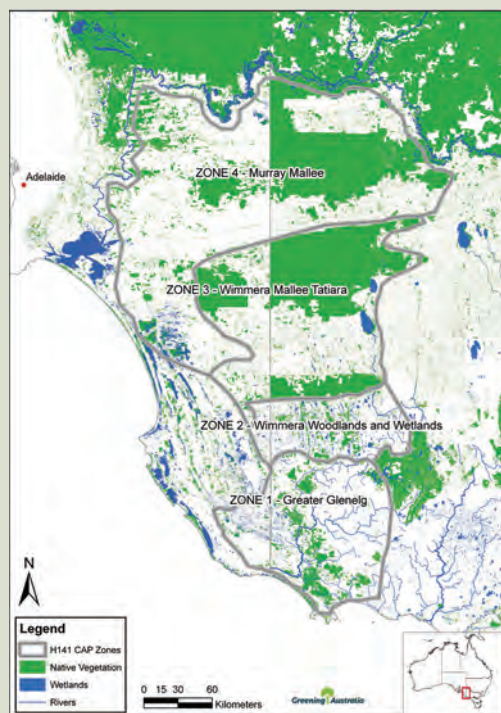
### A distinctive location

Considered a biodiversity hotspot, the region encompasses a number of iconic and diverse landscapes. These include extensive heathlands, mallee bushland of the Murray-Sunset and Billiat National Parks, Big Desert Wilderness, Wyperfeld and Ngarkat National Parks, Little Desert National Park, Red Gum country, threatened Buloke grassy woodlands, extensive wetland systems, limestone rich coastal plains and a number of areas of rich indigenous cultural heritage.

### Protecting agricultural and natural systems

The area of Habitat 141 is typical, in that areas set aside for reserves and

national parks tends to be those land types which are least valuable for agriculture; they are too infertile, or steep or rocky to be productive. Plant communities and their associated fauna which are adapted to these land types are quite well preserved, whereas those species adapted to agricultural land often extremely depleted. For this reason conservation which is carried out on farmland can produce enormous benefits for the vigour of the whole landscape.



The current extent of Habitat 141 showing the four active Conservation Action Plan zones

# WSV Directory

## Correspondence and enquiries

Weed Society of Victoria Inc.  
PO Box 987 Frankston Vic 3199  
Telephone (03) 9576 2949  
ACNA0011723W ABN 15 496 325 152

**Web Site** [www.wsvic.org.au](http://www.wsvic.org.au)

## Secretary

Ros Shepherd  
PO Box 987 Frankston Vic 3199  
Telephone/Fax (03) 9576 2949  
Email [secwssv@surf.net.au](mailto:secwssv@surf.net.au)

## Publications Officer and

### Weedscene Editor

Lisa Minchin  
26 Saint Street, Castlemaine Vic 3450  
Mobile 0437 233193  
Email [editor@wsvic.org.au](mailto:editor@wsvic.org.au)

## President and CAWS Rep

Michael Hansford  
[Michael.Hansford@dpi.vic.gov.au](mailto:Michael.Hansford@dpi.vic.gov.au)

## Vice President and CAWS Rep

Matthew Stephenson  
[M.Stephenson@basscoast.vic.gov.au](mailto:M.Stephenson@basscoast.vic.gov.au)

## Treasurer

Jackie Steel  
[Jackie.Steel@dpi.vic.gov.au](mailto:Jackie.Steel@dpi.vic.gov.au)

## Committee Members

John Burley  
[John.R.Burley@dpi.vic.gov.au](mailto:John.R.Burley@dpi.vic.gov.au)

Ian Faithfull  
[Ian.Faithfull@dpi.vic.gov.au](mailto:Ian.Faithfull@dpi.vic.gov.au)

David McLaren  
[David.McLaren@dpi.vic.gov.au](mailto:David.McLaren@dpi.vic.gov.au)

James O'Brien  
[James.O'Brien@landmark.com.au](mailto:James.O'Brien@landmark.com.au)

## Co-opted Members

Chris Knight  
[cknight@lmsonline.com.au](mailto:cknight@lmsonline.com.au)

Norm Stone  
[norm.stone@bayercropscience.com](mailto:norm.stone@bayercropscience.com)

Greg Wells  
[WELLS1@dow.com](mailto:WELLS1@dow.com)

## Country Representative

Les Mitchell  
[Les.Mitchell@agrisearch.com.au](mailto:Les.Mitchell@agrisearch.com.au)



## WSV Membership Rates 2009

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\* *Students and Pensioners*

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Copy deadline for next issue: Friday 22 January 2010

## Joining the Weed Society of Victoria

The benefits of membership to WSV include:

- Weedscene: quarterly newsletter packed full of information
- eWeedscene: regular electronic bulletin on weed news and events
- Discounts to WSV seminars, workshops, conferences and other events
- Opportunities to network with others.

To apply for membership, download and print the membership application form from the WSV website, [www.wsvic.org.au](http://www.wsvic.org.au), complete the details and mail to the WSV Secretary.

## Weedscene Newsletter of the Weed Society of Victoria Inc.

Contributions to Weedscene are welcomed. Please contact the editor for further information.

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The views expressed in Weedscene are those of the contributors and are not necessarily shared by the WSV Executive Committee.

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■ Quarter page	180 mm wide × 64 mm high	\$135.00
■ Half page	180 mm wide × 128 mm high	\$275.00
■ Whole page	180 mm wide × 257 mm high	\$450.00

**Editor** Lisa Minchin, [editor@wsvic.org.au](mailto:editor@wsvic.org.au), mobile 0437 233193

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By working with farmers and landholders, Habitat 141 will provide habitat continuity for plants and animals, explore and encourage sustainable farming practices, and incorporate wildlife conservation as a profitable farm enterprise across most properties.

### A co-ordinated and cost effective approach

Landscape connectivity is a proven strategy for re-establishing native vegetation in a cost effective way. Habitat 141 will build on current successful programs throughout the region that work with land-owners and farmers to restore the health of their land.

### Planning

Initially Habitat 141 activities will be guided through Conservation Action Plans. The plans are science based, co-ordination focused, landscape to regional scale and relevant to both natural and agricultural systems.

Conservation Action Plans are well advanced in four of the Habitat 141 zones: the Greater Glenelg, South-west Wimmera, West Wimmera and Tatiara and the Mallee. These zones are shown on the map. Eventually the project will increase to nine zones. These zones are based on native vegetation communities and ignore state and regional boundaries. Planning for each zone is carried out by Alliance partners as well as other interested community groups.

### Activities

Much of the physical work done as part of Habitat 141 will be on farm land. Patches of native vegetation, which currently are ignored and degraded will be managed for conservation. This will involve excluding livestock and re-introducing those species which have disappeared due to past agricultural activities such as fertilising, ploughing, grazing and spraying. Also these remnant patches may be enlarged or connected to other patches.

### Weeds

Carrying out these conservation activities in an agricultural landscape creates numerous challenges, one of which is weed management. For us the management of weeds falls into a number of categories.

Weed removal is important to the success of the re-establishment of native plants. Maintaining soil moisture for young seedlings through their first summer is critical, and so removal or avoidance of all other transpiring plants is essential.

For any rehabilitation work to be successful it is essential that native plants can grow, set seed and regenerate. One of the greatest impediments to regeneration is the presence of weeds, particularly those which are adapted to high levels of soil nutrients. Often patches of native vegetation on farms have been used as camps by livestock and so have even more extreme levels of nutrients in the soil.

Native species are adapted to very low levels of soil nutrient, particularly phosphate. They are very poor competitors in high nutrient soils. In the initial phases of rehabilitation competition by introduced pasture species is dealt with by the use of herbicides. In the long term, depletion of nutrients occurs due to leaching and through absorption by native vegetation.

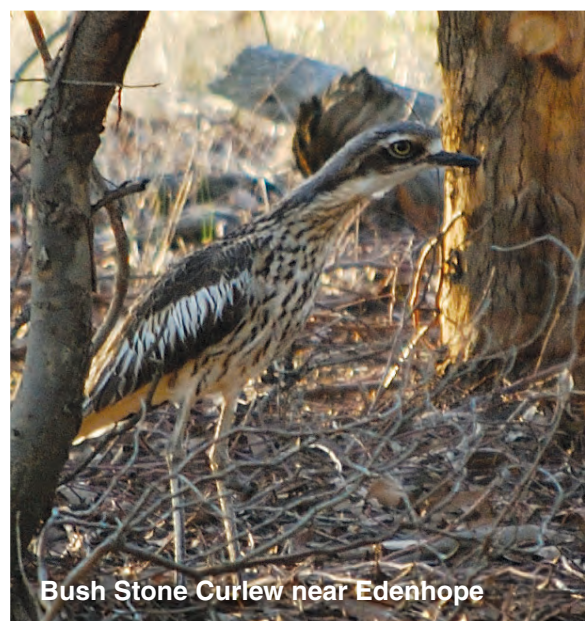
Another solution to high levels of nutrients is to remove the top 10 cm of soil. This process is called scalping and is sometimes used for establishment of native grassland species. Both weed seeds and nutrients are removed by scalping.

Environmental weeds are often escaped garden plants, but sometimes include agricultural and forestry species too. They tend to be species which can cope with lower nutrients and thrive with low grazing pressure. They are costly to remove and this is generally done manually or by spot spraying. Control of environmental weeds is likely to be an ongoing activity. Some of the weeds in this category include Bridal Creeper (*Smilax* spp.), Veldt Grass (*Ehrharta calycina*) and *Pinus radiata*.

Coping with weeds, particularly environmental weeds, involves control



Hattah Lakes National Park



Bush Stone Curlew near Edenhope

and then prevention of re-introduction.

The simplest strategy for the prevention of re-introduction is to minimise the amount of edge on a block of scrub. Reducing the 'edge effect' has many benefits for conservation work, including minimisation of weed invasion. To do this vegetation blocks are selected for size or shape. They are better if they are round or square rather than elongated. Bigger is better. And remnants which join other patches of vegetation, rather than stand in isolation are better again.

### Conclusion

At this early stage of development of Habitat 141 there are an enormous number of hurdles to overcome. Weed management is at present a major, but distant hurdle. When weeds become the number one issue to contend with, Habitat 141 will have truly arrived on the scene as one of Australia's major conservation projects.



# WSV News

## Fourth Victorian Weeds Conference, Geelong, 7–8 October 2009

Over 160 people attended the 4th Biennial Victorian Weeds Conference, our best ever attendance since the conferences were instituted in 2003. The program was packed with informative and fascinating presentations – there was so much good stuff that picking the highlights is difficult. Our speakers delivered some controversy and excitement, and a very interesting and entertaining couple of days.

As usual the attendance was dominated by Department of Primary Industries staff (41) and local government employees (30). There were approximately 25 from private industry including chemical companies, and contractors and consultants, many with a revegetation focus, 10 from Landcare/Friends groups and 10 from universities. A few people each from South Australia, Tasmania and New South Wales and two from the ACT attended, and our single overseas visitor, from New Zealand, was sponsored by the Society.

Day 1 commenced with keynote speaker, John Thorp, National Weeds Management Facilitator, who outlined the now hardened funding circumstances for weeds at the federal level, there being what he described as significant competition for resources at all levels of government, and the likelihood of a real struggle for funding in the next few years.

Geoff Carr, Ecology Australia, presented a controversial talk on environmental weeds, critical of government policy and practice. Since the concept was first muted back in 1978, the record has, he said, been ‘abysmal’. The Victorian flora now contains 1546

naturalised taxa, 46% of the total native and naturalised flora, and includes 896 environmental weeds. A list of about 180 of the most serious invasive environmental weeds was distributed. A breakdown of the family composition and origin of these weeds was provided, with Poaceae (118 spp.), Asteraceae (88 spp.), Fabaceae (59 spp.) and Iridaceae (45 taxa) being the largest families, the latter representing more than 10% of the South African Iridaceae. The weedy Myrtaceae (41 spp.) includes many non-Victorian Australian natives. The full list and an analysis of it are to be published in the forthcoming second edition of *Environmental Weed Invasions in Victoria: Conservation and Management Implications*, being compiled by Geoff, Jeff Yugovic, Val Stajsic and Steve Matthews. Some of the worst invaders mentioned included *Gazania* spp. (‘spectacularly recruiting’), *Sparaxis bulbilifera*, and the natives *Acacia sophorae* (‘one of Victoria’s top weeds’ with ‘high biodiversity impact’) and *A. longifolia* (‘thousands of hectares in the Grampians’). Particular criticism was directed at weed risk assessment and predictive modelling. It was argued that there is more expertise outside government agencies than inside them, and that this expertise has been grossly undervalued and underutilised.

John Burley, of the Victorian Department of Primary Industries, outlined the Victorian Government’s new Biosecurity Strategy, which subsumes the Victorian Pest Management Framework and is the major policy covering weeds. Biosecurity was defined as the protection of the economy, environment and human health from the negative impacts associated with pests, diseases and invasive species. The strategy has six themes: 1. developing partnerships across government, industry and the community; 2. strengthening coverage; 3. making sound decisions using a risk management framework; 4. building the skill base; 5. smarter surveillance; and 6. responding to incursions including emergency response.

Ian Mansergh of the Victorian Department of Sustainability and Environment presented a fascinating view of how Victoria will change in the future as a result of climate change, demographic transformation, shifts in land use and changing values, and what this may mean for weed management. Radical differences can be expected as a consequence of new ‘post agricultural’ and ‘multi-purpose’ landscapes’, major efforts to increase carbon sequestration in vegetation and soils, and intensified water and temperature constraints.

Possibly the most memorable presentation was provided by Peter Espie of the University of Otago, on the extremely sad New Zealand experience with *Hieracium* spp. (hawkweeds) and the implications for Australia. Warnings about these weeds from as long ago as the 1860s went unheeded and several species now occupy



Establishment from seed		
Site	No Seedlings / m <sup>2</sup>	
Flats	490 m	95
Hill	1100 m	46

Peter Espie, University of Otago, New Zealand

huge areas as almost complete monocultures. Hawkweeds are allelopathic and highly competitive and have so far proved resilient in the face of the biological control agents that have been released. To give just one of his numerous examples, what was a fescue tussock grassland without hawkweed at Tara Hills in 1970 was by 1997 45% hawkweed. Later on the second day Kerrie Howe of DPI Wodonga detailed the status of hawkweeds in Victoria and the programs underway to manage the alpine infestations, while Jenny Bear reported on her studies of *Hieracium* seed ecology.

Other memorable presentations included Andrew Warnock's impressive photos of townscapes in the Western District inundated with *Lachnagrostis filiformis* panicles and the difficulty of managing this lake bed weed, and Melissa Herpich's innovative studies on quantifying *Pinus radiata* invasions.

After lunch on day two, a session organised by Chris Knight and intended to provide a focus for workers in local government, examined the increasing difficulties confronting municipal weed managers, including funding arrangements and the problems of undertaking prosecutions for weed offences. In contrast to other sessions this included a forum in which open debate was encouraged.

The *Proceedings*, totalling 106 pages, were again produced by Rob and Fiona Richardson, and were provided to all attendees. Unfortunately several speakers failed to provide papers in time for incorporation.

The Mercure Hotel, in the south-west of Geelong city centre, proved to be a good venue. There was plenty of food, an excellent dinner and comfortable, quiet accommodation. The conference rooms had good acoustics and audio-visual facilities, and there was only one major problem when the projector broke down during the presentation of the first keynote speaker.

We are grateful to Land and Water Australia for funding the attendance of several interstate speakers, who all provided wider Australian perspectives on weed problems and numerous insights. Ros Shepherd once again provided the administrative foundation for the conference organisation – things would have been shambolic without her. Particular thanks are due to our generous sponsors Dow



The conference had a record attendance

AgroSciences and the Victorian Departments of Sustainability and Environment and Primary Industries.

The Committee welcomes ideas and more assistance to arrange the program and help organise future conferences. The Fifth Biennial Conference is scheduled for 2011, and in 2012 the Weed Society of Victoria will be hosting the 18th Australasian Weeds Conference in Melbourne. Please contact a member of the Executive Committee if you would like to be involved.

Ian Faithfull, WSV Executive Committee

## Weed Society of Victoria

### 4th Biennial Conference

*Plants behaving badly:  
in agriculture and the environment*

### CONFERENCE PROCEEDINGS

\$6 for a PDF on CD  
\$22 for paper  
(including postage)

Contact Ros Shepherd, Secretary  
Tel: 03 9576 2949, Email: secwssv@surf.net.au

## Weed Society of Victoria AGM Seminar

Thursday 15 April 2010

### WEED MANAGEMENT – WORTH THE INVESTMENT?

Presentations will cover topics such as:

- impacts measurement
- success stories
- cost:benefit analysis

**Venue** Department of Primary Industries, 475–485 Mickleham Road, Attwood Vic 3049

**Contact** Ros Shepherd, Secretary, Tel: 03 9576 2949, Email: secwssv@surf.net.au

# Weed profile



Flowering and vegetative parts



Flowering stem



Tubers and vegetative parts  
(Photos: David Venn, NRE)

## South African weed orchid (*Disa bracteata*)

### Common and scientific names

South African weed orchid, African weed orchid, South African orchid or brown finger orchid. *Disa bracteata* (Sw.) T.Durand & Schinz. Family Orchidaceae (orchids).

### Status

South African orchid is not a proclaimed species anywhere in Australia. The weed was identified as a New and Emerging weed in the Wimmera Weed Action Plan 2000–2005. The weed has potential to impact on native understorey flora, especially rare and endangered plants. There are five main infestation sites in Victoria; Black Range – Stawell, Lake Eppalock – Bendigo, Deans Marsh – Otways, Rowsley Valley – Bacchus Marsh and the Lower Glenelg National Park, which are currently under a control and monitoring program. The other known infestations throughout the state have been contained and have long term monitoring programs in place. The weed is likely to be introduced accidentally on vehicles and machinery due to poor hygiene practices, spread by seeds on clothing, shoes and camping equipment, and by wind dispersal.

### Background and distribution

Unlike our threatened native orchids, *D. bracteata* is self-pollinated and each plant produces tens of thousands of airborne seeds. In its native South Africa, it grows in the Cape Province – home to many of our weeds, from sea level to 2000 m. It was first noticed naturalised near Albany, Western Australia in 1944, where it now invades several thousand square kilometres. The 1990 records show it spreading as far north as Geraldton and east to the Israelite Bay.

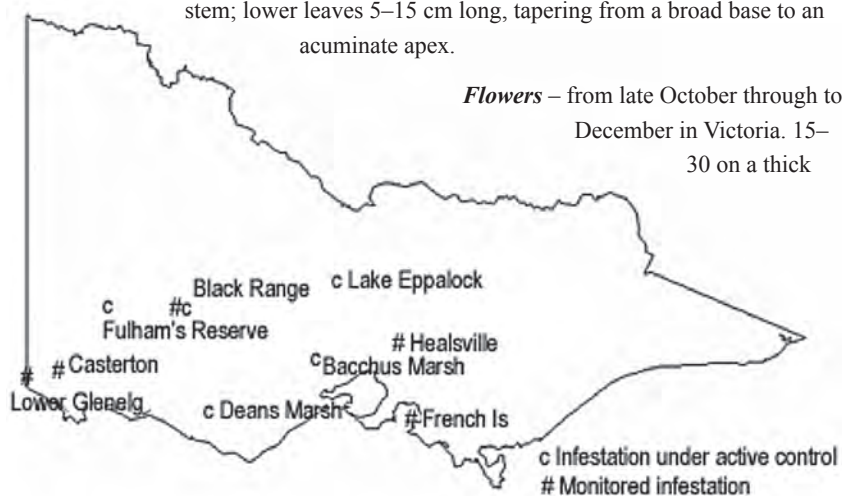
*D. bracteata* first appeared in South Australia in 1988, spreading rapidly in the 1990s. It is believed to have escaped from orchid enthusiasts, where it was cultivated as a curiosity. In South Australia, the problem has at least doubled annually and the local spread has averaged some 10 km/yr north and south. The first recorded infestation in Victoria was in the Rowsley Valley near Bacchus Marsh in 1991. Infestations in Victoria are also likely to be the result of garden escapes.

### Description

South African orchid is a deciduous perennial terrestrial orchid with underground tubers. Dormant for much of the year, it sprouts in early spring and takes a minimum of three years from seed to flowering stage. **Stems** – erect and fleshy usually 30–50 cm tall.

**Leaves** – numerous with parallel veins, decreasing in size progressively up the stem; lower leaves 5–15 cm long, tapering from a broad base to an acuminate apex.

**Flowers** – from late October through to December in Victoria. 15–30 on a thick



Infestation sites in Victoria

cylindrical spike 5–20 cm long, which resembles a greenish-brown asparagus spear. Flowers very dense, arranged in an indistinct spiral, mostly reddish-brown and yellow with a leafy bract.

**Seeds** – black, minute and dust-like, contained within the capsular fruit. The species is autogamous (self-pollinating) and thus produces a large amount of seed/plant. The seeds may be blown many km and can remain viable for seven years. Seed set and dispersal starts at the end of November. The seeds continue to mature in the capsule if the flower head is picked and the capsule shatters and disperses them when ripe.

**Tubers** – generally thought to have 1–3 tubers, similar shape to a garlic clove or bulbs, about 20 mm in size. The plant also has a mass of fleshy side roots and there is no main tap root.

If uncertain about the identification consult the keys to the Orchidaceae in the Flora of Victoria or submit specimens to the Herbarium of Victoria.

### Further information

This article is based on a Landcare Note produce by the Department of Primary Industries. For further information see: <http://www.dpi.vic.gov.au>. See also the Landcare Note *South African weed orchid – management*, for information relating to the control and management of this plant.

### References

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- Jessop, J.P. and Toelken, H.R. (1986). Flora of South Australia Part IV. Adelaide, South Australian Government Printer.
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- Walsh, N.G and Entwisle, T.J. (eds) (1994, 1999). Flora of Victoria, Volumes 2 and 4. Inkata Press, Melbourne.

# Gardening

## Monster mulch

Mulch is commonly used to manage garden weeds by smothering them and reducing their access to light. It has additional benefits of reducing the loss of soil moisture through evaporation and preventing run-off.

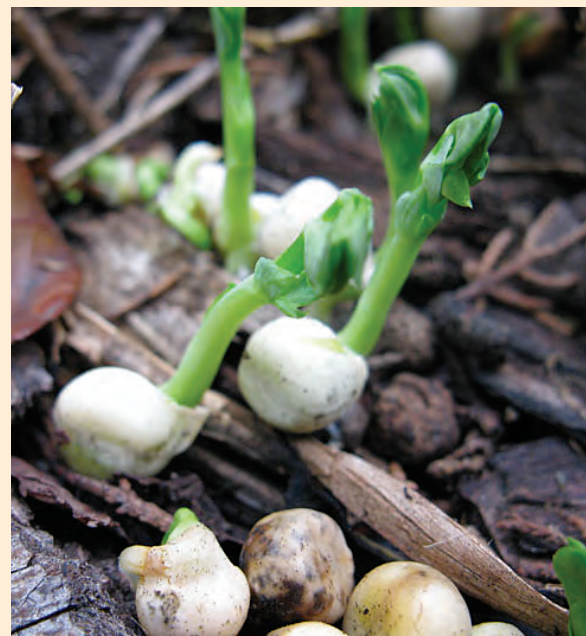
Recently a Malvern resident has reported being very disappointed with the outcome of her attempts to use mulch to prevent the spread of weeds when it began to take on a life of its own. The pea straw had been purchased from a garden supply store and was carefully spread over the entire garden. In a matter of a week or so it greened up and started developing shoots. Within two weeks it had managed to traverse the edges of the garden beds and was sprouting through the lawn. The tendrils lengthened and intertwined forming thick mats. Pigeons have been taking advantage of the peas and have become more prolific visitors in recent weeks.

When the garden supply store was contacted with a complaint about the virility of the pea straw, the advice was to dig it into the ground, however as it had been spread over all garden beds it would have taken considerable effort or expense on the part of the elderly resident. The resident was also concerned about digging too close to plants which the mulch had been put down to protect.

An examination of the pea straw revealed it to be *Pisum sativum*, probably the main plant baled to make pea straw in Victoria. As a source of food for animals it is the high protein content of the seeds that make it valuable, and for gardeners who are prepared to dig it in it is a reasonable source of nitrogen for the soil. It is problematic when used as a mulch because of the germination of the seed. According to ‘Weeds of the south-east: an identification guide for Australia’<sup>1</sup> *P. sativum* is ‘widely grown as a food plant and is occasionally a nuisance in crops and gardens’ (p. 268).



A patch of pea straw mulch in a Malvern garden (Photo: Ian Thompson)



Sprouting pea straw (Photo: Ian Thompson)

Suppliers should specify whether their straw is seed-free or not so that people buying it as a mulch are aware.

Lisa Minchin

<sup>1</sup> Richardson, F.J., Richardson, R.G. and Shepherd, R.C.H. (2006). Weeds of the south-east: an identification guide for Australia. R.G. and F.J. Richardson, Meredith, Victoria.

# Weed alert

## To be or not to be – Hawkweeds on the Bogong High Plains?

Dear Humans

What a strange species you are. You spread across the world, like a plague, destroying ecosystems in order to cultivate particular plants. And then you reserve islands of biodiversity as national parks.



Orange Hawkweed flowers. (Photo: Jenny Bear, School of Land and Environment, The University of Melbourne)



King Devil Hawkweed rosette at 8 weeks. (Photo: Jenny Bear, School of Land and Environment, The University of Melbourne)

You choose diverse plants – e.g. willows, lupins and daisies – for your gardens and are surprised when, being plants, we regenerate outside your gardens, where you don't want us. Then you call us weeds.

Long ago, your ancestors used the term 'weed' more generously, giving it to wild plants like hawkweeds. In the belief that hawks used its sap to sharpen their eyesight, ancient Greeks called a plant 'hieracion', meaning hawkweed, from 'hierax', a hawk. This is echoed in our generic name *Hieracium*. My specific name, *aurantiacum*, meaning orange-coloured, refers to my bright orange daisy flowers – daisies you humans like in your gardens. One of my common names is Orange Hawkweed.

Those of you who know my invasive and destructive capacities call me 'super weed' or 'dastardly daisy'. I travel far and smother, deter and outcompete nearby plants. Being daisies, we hawkweeds produce feather-light, wind-borne seeds. Barbs on our seeds allow us to hitch rides on your socks and livestock. Creeping stolons and rhizomes allow us to regenerate vegetatively and to survive even icy winters. And we use chemical warfare. Our roots secrete chemicals poisonous to other plants. In New Zealand, where your control attempts were too little too late, dense mats of our rosettes replace biodiversity.

My salutary story begins in the mind of a CSIRO ecologist, Dr Richard Groves. While undertaking sabbatical research on New Zealand tussock grasslands in 1981, Dr Groves was horrified by our widespread ecological devastation. Keenly aware of our invasive potential, Groves alerted Australian quarantine officers to the threat we would pose to Australian grasslands. *Hieracium* species were subsequently classed as 'Prohibited Plants', thereby banning our importation into Australia. Groves prepared the 1996 AQIS leaflet on hawkweeds and, at a weeds conference in 1999, mentioned my long-known invasion of Tasmania and recent discovery in Victoria. In January 1999 botanists had noticed me growing wild at Falls Creek on the Bogong High Plains.

The University of Melbourne's Botany School has a long association with the Bogong High Plains – beginning with Maisie Fawcett/Carr's grazing enclosures. Now, third-year 'Field Botany' students learn field skills on the High Plains – identifying flora and recording and mapping vegetation on the geologically and botanically-interesting area around Basalt Hill. University staff didn't need to be hawk-eyed to notice my bright orange daisies growing wild in Falls Creek early in 1999. But they were puzzled. There are no local indigenous orange daisies, and no orange daisies were known weeds in Victoria. But Dr Rick Willis remembered seeing weedy me while he was working as a park guide in Canada in the 1970s. Could the 'wild' orange daisy in Falls Creek be Orange Hawkweed? Field Botany student, Sarah Kimpton, prepared a specimen for the University Herbarium. Rick was right. At the Australian National Herbarium in Canberra, Sarah's specimen was identified as *Hieracium aurantiacum*. Having escaped my Falls Creek garden home some years earlier, I was at last noticed on mainland Australia.

A botanist at La Trobe University's Research Centre for Applied Alpine Ecology, Dr John Morgan, documented my first sighting on mainland Australia in *The Victorian Naturalist* and discussed me with Richard Groves. Groves was emphatic. I must be eradicated – immediately and at any cost.

But I had already spread beyond Falls Creek. In December 1999, DSE's prescribed fire fighter, Rudi Pleschutschnig, noticed my distinctive daisies beside the Heathy Spur walking track – my first sighting inside the Alpine National Park. Then the 2002-03 fires left nutrient-enriched bare soil open to my incursions. Parks Victoria commissioned Ecology Australia (Geoff Carr *et al.*) to investigate and report.

In January 2004, Weed Alert Rapid Response, Victoria, hosted a meeting at Falls Creek to discuss me. Days later, during their post-fire survey, Carr *et al.* found me flowering in cattle dung near Basalt Hill, and later, during a vegetation mapping exercise, Field Botany students also discovered me near there. Their lecturer, Nick Williams, discussed me with Park rangers and, with John Morgan, wondered about predicting where I was likely to invade in the future. Parks Victoria and resort management organised control efforts – surveying, mapping and spraying – while, with Parks Victoria Research Partners Program funding, Nick Williams, John Morgan and Amy Hahs constructed a dispersal model. To test it, Melbourne Field Botany and La Trobe Applied Ecology students combed the High Plains searching for my orange daisies. A 2006 Parks Victoria Technical Report carries the results.

Meanwhile, my cousin, King Devil Hawkweed, *Hieracium praealtum*, was discovered growing on the edge of the National Park – its first sighting in Australia. Rudi Pleschutschnig noticed thousands flowering near Rocky Valley Dam in December 2003. With its yellow daisy similar to local indigenous and weed daisies, it is much more difficult to detect on the High Plains than I. It may have remained unnoticed for years, perhaps having arrived on contaminated equipment brought from New Zealand to construct the Panorama ski lift. The site was quickly quarantined and my cousins sprayed. Satellite infestations have since been detected in the National Park.

I have also invaded Mt Buller and the NSW Alps, and weed lists and publications. I am on the Federal Government's *Alert List* of environmental weeds – weeds that threaten indigenous biodiversity – and in Kate Blood's *Environmental Weeds. A field guide for SE Australia*. I now grace the cover of the second edition of *Alps Invaders. Weeds of the Australian High Country*.

In Victoria, we *Hieracium* species are classed as 'State Prohibited Weeds' – weeds that must be targeted for eradication by the Department of Primary Industries (DPI). State Prohibited Weeds have the potential to cause huge ecological damage but, as long as we have a limited distribution, our eradication is possible. Originally championed by Kate Blood, project leader for the Weed Alert Rapid Response Plan, the Weed Spotter program was



University of Melbourne Field Botany students searching for Orange Hawkweed on the Bogong High Plains, January 2006. (Photo: Nicole Middleton, Collections Manager, University of Melbourne Herbarium)



Orange Hawkweed flowering on the lower slopes of Basalt Hill, Bogong High Plains. (Photo: Elaine Thomas, Parks Victoria)

established in association with DPI's Weed Alert Program. Weed Spotters report their sightings of Weed Alert target species – State Prohibited Weeds – to DPI.

The Victorian Government funds projects aimed at our eradication. One was organised by DPI Weed Alert Contact Officer (WACO), Greg Johnson, in January 2009. Volunteers, mostly Weed Spotters, worked in WACO-led groups. Often roped together, so that their GPS-recorded survey was as systematic as possible, these fluoro-jacketed hawkweed hunters were sometimes mistaken for searchers at a crime scene. Well they were – since I have made the High Plains an ecological crime scene. They found orange-red flags, each marking the site of a sprayed plant with its numbered metal identity tag, but no live plants in the National Park. But they did find me still growing at Falls Creek and elsewhere in the Alpine Resort.



Perhaps, with continuing vigilance by Park and Resort personnel, contractors and volunteers, and Dr

Nick Williams' *Hieracium* project at the University of Melbourne, my eradication from the Bogong High Plains is a possibility. Perhaps this collaborative effort will prevent us destroying ecosystems and biodiversity as we have in New Zealand.

But you humans must remain alert and alarmed. Think of my orange flowers as floral embers capable of flaring up into a devastating blaze. And you should seriously consider which exotic plants you let flower so close to your national parks.

Yours ever invasively  
Orange Hawkweed, *Hieracium aurantiacum*, via Linden Gillbank,  
lindenrg@unimelb.edu.au

### Further reading about me

- Anon. (2006). Alps Invaders. Weeds of the Australian High Country, 2nd edition. Australian Alps Liaison Committee.
- Blood, K. (2004). Weed update. *Victorian Landcare and Catchment Management* 30: 10-11.
- Carr, G.W., Roberts, N.R., Wearne, L.J. and McMahon, J.B. (2004). Alpine National Park post-fire mapping of orange hawkweed and other pest plants. Ecology Australia Pty Ltd, for Parks Victoria.
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# Research

## Protecting agricultural production and iconic Australian grasslands from herbicide resistant serrated tussock

Serrated tussock is a Weed of National Significance costing Australia more than \$50 million per annum and is a recognised threatening process to rare indigenous 'iconic' native basalt plains grasslands. There are limited herbicide options for serrated tussock management and flupropanate is widely regarded as the most effective and selective herbicide. Recent studies have confirmed that there are now three properties in Australia with serrated tussock resistant to flupropanate. The implications of this are the weed's potential for increased dominance, increased costs for land managers, more herbicide usage and higher environmental pollution and damage to 'iconic' rare indigenous grasslands as a consequence. The Department of Primary Industries together with the Victorian Serrated Tussock Working Party and the New England Weeds Authority are working on a project which aims to address this issue by undertaking wide-scale paddock/property surveys around the confirmed 'serrated tussock resistance properties' and working together with local Natural Resource Management/Landcare groups and individual farmers to develop a response. This project will determine whether it is still feasible to contain the resistance through active compliance or whether management should be through education. A proactive assessment and remedial action of this situation may potentially save flupropanate as a serrated tussock management tool for Australia.

### Research approach and methods

A serrated tussock paddock/roadside survey will be undertaken around the Diggers Rest (Victoria) and Armidale (NSW) properties that have been identified with resistant serrated tussock. The survey will be undertaken

in a 100 km grid around the properties concerned. At each sample point, 10 individual serrated tussock plants will be collected and labelled for later resistance assessment. For 16 km<sup>2</sup> on and around the affected property, every km<sup>2</sup> will be sampled (16 sites × 10 serrated tussock plants = 160 plants). For the remaining 84 km<sup>2</sup>, 42 sites will be selected using random numbers (42 sites × 10 serrated tussock plants = 420 plants).

In total, 580 serrated tussock plants will be collected from an area of 100 km<sup>2</sup> around each of the affected properties. Thirty serrated tussock plants will be collected from a known serrated tussock flupropanate susceptible site as a control. Collected serrated tussock plants will be grown in a glasshouse before being sprayed with the label recommended rate (2 L/ha) of flupropanate using a track sprayer. Serrated tussock will be assessed for flupropanate effects and evidence of resistance. The result will be a report which maps the extent of the resistance in the three areas.

The project will also produce and distribute 10,000 copies of a 'serrated tussock flupropanate resistance' awareness brochure to increase land managers knowledge of this serious issue. It will then conduct workshops with the local communities and Natural Resource Management Group's in the vicinity of the identified 'serrated tussock resistant' properties to formulate a plan to eradicate resistant plants with community support.

The results of this research will be posted on Weeds of National Significance serrated tussock web site. It is anticipated that the research project will be completed by January 2010. For further information contact David McLaren, Department of Primary Industries.

## Recent journal articles

A selection of recent scientific journal articles that may be of interest to members of the WSV. Compiled by Chris Timewell. In addition to selected articles below, volume 11 issue 5 of the journal *Biological Invasions* is devoted to articles from a symposium entitled 'Ecological and evolutionary consequences after invaders hybridize'.

- Beaumont, L.J. *et al.* (2009). Different climatic envelopes among invasive populations may lead to underestimations of current and future biological invasions. *Diversity and Distributions* 15(3): 409-20. [using *Hieracium* as the example]
- Benjamin, L.R. *et al.* (2009). Using stochastic dynamic programming to support weed management decisions over a rotation. *Weed Research* 49(2): 207-16.
- Botham, M.S. *et al.* (2009). Do urban areas act as foci for the spread of alien plant species? An assessment of temporal trends in the UK. *Diversity and Distributions* 15(2): 338-45.
- Cadotte, M.W. *et al.* (2009). Phylogenetic relatedness and plant invader success across two spatial scales. *Diversity and Distributions* 15(3): 481-8.
- Colautti, R.I. and Richardson, D.M. (2009). Subjectivity and flexibility in invasion terminology: too much of a good thing? *Biological Invasions* 11(6): 1225-9.
- Cornaglia, P.S. *et al.* (2009). Flooding and grazing promote germination and seedling establishment in the perennial grass *Paspalum dilatatum*. *Austral Ecology* 34(3): 343-50.
- Delye, C. *et al.* (2009). Variation in the gene encoding acetolactate-synthase in *Lolium* species and proactive detection of mutant, herbicide-resistant alleles. *Weed Research* 49(3): 326-36.
- Dowling, P.M. *et al.* (2009). Using plant development to determine optimum times for spraytopping, and assessing effect of grazing and double/repeat herbicide applications on regeneration of vulpia. *Plant Protection Quarterly* 24(1): 32-8.
- Ens, E.J. *et al.* (2009). Identification of volatile compounds released by roots of an invasive plant, bitou bush (*Chrysanthemoides monilifera* ssp. *rotundata*), and their inhibition of native seedling growth. *Biological Invasions* 11(2): 275-87.
- Foxcroft, F.C. *et al.* (2009). Patterns of alien plant distribution at multiple spatial scales in a large national park: implications for ecology, management and monitoring. *Diversity and Distributions* 15(3): 367-78. [a South African study]
- Freckleton, R.P. and Stephens, P.A. (2009). Predictive models of weed population dynamics. *Weed Research* 49(3): 225-32.
- Gardarin, A. *et al.* (2009). Which model species for weed seedbank and emergence studies? A review. *Weed Research* 49(2): 117-30.
- Gibbs, K.E. *et al.* (2009). Human land use, agriculture, pesticides and losses of imperiled species. *Diversity and Distributions*. 15(2): 242-53.
- Jarnevich, C.S. and Stohlgren, T.J. (2009). Near term climate projections for invasive species distributions. *Biological Invasions* 11(6):1373-9. [US-based study]
- Liu, J.G. *et al.* (2009). The importance of light quality in crop-weed competition. *Weed Research* 49(2): 217-24.
- Mallen-Cooper, J. and Pickering, C.M. (2008). Decline in species richness and cover of exotic plants with increasing altitude. *Victorian Naturalist* 125(3): 64-75.
- Peltzer, S.C. *et al.* (2009). Weed management in wide-row cropping systems: a review of current practices and risks for Australian farming systems. *Crop and Pasture Science* 60(5): 395-406
- Prober, S.M. and Lunt, I.D. (2009). Restoration of *Themeda australis* swards suppresses soil nitrate and enhances ecological resistance to invasion by exotic animals. *Biological Invasions*. 11(2): 171-81.
- Potter, K.J.B. *et al.* (2009). The current and future potential distribution of *Cytisus scoparius*: a weed of pastoral systems, natural ecosystems and plantation

# Letter from the Editor



This edition marks 20 years of Weedscape, a great achievement on the part of WSV, the executive committee, members and supporters.

Working on Weedscape has been very rewarding. Nothing like seeing a few ideas come together into the professional product we have, courtesy of contributing authors and Rob and Fiona Richardson's expertise. In recent times, people have been sending in articles unsolicited, which is a testament to its quality.

For those with a creative bent or who enjoy a laugh, Weedscape can accommodate all kinds of frivolity and informality alongside articles about research on weeds, the latest technology and more. I encourage anyone who is passionate about weeds to get involved in Weedscape by contacting Michael Hansford, President or Ros Shepherd, Secretary.

Due to a number of changes in my personal circumstances, this will be my final edition of Weedscape (for the moment). I retain my passion for weeds and look forward to seeing you at the next WSV event.

Lisa Minchin

forestry. *Weed Research* 49(3): 271-82.

Turner, P.J. and Virtue, J.G. (2009). Ten year post-fire response of a native ecosystem in the presence of high or low densities of the invasive weed, *Asparagus asparagoides*. *Plant Protection Quarterly* 24(1): 20-6.

van Evert, F.K. *et al.* (2009). Real-time vision-based detection of *Rumex obtusifolius* in grassland. *Weed Research* 49(2): 164-74.



# Web resources

## A predictive weed mapping tool

Internet-based geographic search tools have become increasingly common in the past couple of years. Aerial photography map systems, such as Google Earth, are probably the most well known. The Victorian Department of Sustainability and Environment has recently updated mapping tools that allow the user to look at native vegetation types, waterways, elevation, geology, planning overlays, regulatory boundaries and a range of other layers for any area within Victorian boundaries. Similarly, the ongoing Bird Australia Atlassing project is encouraging increased use of their internet-based mapping system for the entry and documentation of bird observations, rather than the paper-based technologies upon which the project was initially founded ten years ago.

The Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) – and their numerous previous incarnations – were early adopters of this technology. I have been using their Protected Matters Search Tool (PMST) for a few years now (<http://www.environment.gov.au/erin/ert/epbc/index.html>). The purpose of the PMST is to allow the user to search for matters of national environmental significance that are, or could be, relevant to a particular area. ‘Matters of national environmental significance’ are listed on the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*. For example, a person can define any sized or shaped area within Australian territorial boundaries, and the PMST will then generate a report identifying EPBC-listed threatened species and communities, Ramsar sites, migratory and marine species, World Heritage areas and National Heritage places that occur there or in the nearby area. For the listed species and communities, the PMST report will also identify where they could potentially occur, even if

there have been no documented records, based upon predictive maps of their theoretical distribution. This is useful in areas where there have not been previous comprehensive surveys, or where the species is cryptic and/or highly mobile. But PMST reports also tend to generate numerous unexpected predictions which require careful interpretation (e.g. a PMST report for the centre of the city of Melbourne predicts the presence of suitable habitat for the highly threatened and unlikely Regent Honeyeater, Spotted-tailed Quoll and Clover Glycine). Despite its idiosyncrasies, a search of the PMST is now a standard procedure for any flora and fauna assessment undertaken by a private consultancy or government agency.

I am unaware how long it has been operating, but I recently discovered that DEWHA also concurrently administers the Environmental Reporting Tool (or, the ERT – they love their acronyms). The purpose of the ERT is to provide ‘*information for decisions makers*’ and for any user to ‘*find out what’s in your backyard, town or region*’ (<http://www.environment.gov.au/erin/ert/index.html>). The ERT operates in a very similar manner to the PMST. The user defines a particular area from the on-screen maps, and then the ERT generates a report displaying the EPBC-listed threatened, migratory and marine species (and communities) that are known or could occur in the defined area. However, unlike the PMST, the generated ERT report also lists a selection of exotic plants and animals that could occur in your defined area. For plants, this includes all of the Weeds of National Significance that could occur, and also *other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity*.

A quick search of my home town of Castlemaine using the ERT revealed that

there was likely to be suitable habitat for two WoNS (Gorse, Blackberry), that there may be habitat suitable for a further five WoNS (Bridal Creeper, Bitou Bush/Boneseed, Chilean Needle-grass, Serrated Tussock, and a number of Willows) and another two ‘invasive’ species that may occur (Buffel Grass and African Boxthorn).

Through the generated ERT report, each of these species was supposedly hyper-linked to further information elsewhere on the internet, but the links currently all lead to blank dead ends. Comparing this ERT list against the list of ~300 exotic plants known to have established in the greater Castlemaine area, the list of WoNS looked reasonable for Castlemaine (particularly Gorse, which is a local menace), with all except the Serrated Tussock having being documented. I would’ve probably picked a few other species for the Castlemaine area as being ‘invasive’ before Buffel Grass and Boxthorn, as there have been no documented records of Buffel Grass, and relatively few Boxthorn in the area. (Gazania seems to be the most rapidly spreading local weed at present, particularly along roadsides, although it is proving difficult to convince our neighbours that its colorful flowers should not be seen as a welcome addition to the local flora. Cootamundra Wattle, Cotoneaster and Quaking Grass would follow as other local invasive menaces).

I consider the displaying of WoNS and invasive plants by the ERT as a welcome addition to the public education of the weed threat. Although this search tool is probably rarely used except by technical specialists and government agencies, it has the potential for broader use. The possibility of hyper-linking each weed species from the ERT report to further information is an opportunity currently unfulfilled, and will hopefully be addressed in the near future. If DSE or DPI were also to incorporate weeds into their state-based internet mapping search tools, allowing users to generate lists of all relevant weeds for an area (e.g., the potential occurrence of weeds listed under the CaLP Act), I suspect that it would be widely and regularly used.

Chris Timewell