



TASWEEDS



'WHY WEEDS WON'T WIN'

16–17 October 2008

Session One **6**

Session Two **15**

Session Three **25**

PROCEEDINGS OF THE 2ND TASMANIAN WEED CONFERENCE

Tramsheds, Inveresk Railyards
Launceston

Preventative Weed
Management

Community Weed
Management

Weeds of Tasmanian
Significance

FROM THE PRESIDENT



Elizabeth Schrammeyer

Why Weeds Won't Win!

The 2nd Tasmanian Weed Conference was held in Launceston on 16 and 17 October 2008. It was a fantastic showcase of local and Australian people and their projects, and of how they are winning against weeds.

More than 120 people attended, and fitting them and the fifteen or more poster presentations into the same room proved one of the bigger challenges in organising the conference, but the steadfast volunteer force of the Tasmanian Weed Society's Executive Committee prevailed...

Attendees enjoyed a varied and informative two days. It was kick-started by a keynote address from Tim Low on the relationship between climate change and weeds, in which we heard how we should use the political and social momentum of the climate change dialogue to increase public understanding, both of weeds and of the essential linkage of their management to climate change adaptation.

The program

Presentations on the first day covered Preventative Weed Management, Community Weed Management and Weeds of Tasmanian Significance, with some crossover between topics. They informed us about everything from the number of weed seeds found on a weed inspector's ute, to how Tasmania might improve its weed hygiene, to the astounding number of weeds volunteers can pull out if you give them spectacular scenery and feed them crayfish and abalone.

The second day of the conference allowed us to explore the three topics by practical example on a field trip to various sites.

The conference also featured a number of posters, which will be published in future editions of *Tasweeds*.

Please peruse the following pages to revisit the presentations and to learn more about the most pertinent weed issues in Tasmania today.

Acknowledgements

I would like to thank all those who helped make the conference possible, including the sponsors (see page four), the keynote speaker, Tim Low, and especially the Tasmanian Weed Society's Executive Committee members who worked so hard to organise the event: Matthew Baker and Peter McGlone for organising the program, David Lane for arranging the field trip, and Roy Skabo, Sue Hinton, Greg Taylor, Greg Stewart and Sandy Leighton for filling in the gaps and helping to produce the materials necessary.

I would also like to thank Matthew Baker and Timm Newlands for preparing this, the Proceedings of the 2nd Tasmanian Weed Conference.

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Joining TWS

The benefits of joining the Tasmanian Weed Society include:

- an information-packed quarterly newsletter – *Tasweeds*
- a forum to discuss weeds with people who actually understand
- regional field days and workshops on topics of interest
- an opportunity to meet and make valuable contacts

Membership is timed to coincide with the AGM and is therefore valid for a year from 1 March. Members who join in the three-month period prior to March are deemed to have joined on 1 March.

To join or renew membership, submit your details either online or using the form available at www.tasweeds.org.

Cost of Membership

Student	\$10.00
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About Tasweeds

This special edition of *Tasweeds* was edited by Matthew Baker, Timm Newlands and Elizabeth Schrammeyer

Design and layout: Timm Newlands

Readers are free to circulate and reproduce material published in *Tasweeds*. We ask that authors/sources of information are acknowledged.

Members of the weed community are encouraged to submit articles to *Tasweeds*.



Cover images

(by Matthew Baker):

- *Leucanthemum vulgare* (Ox-eye Daisy)
- *Cytisus scoparius* (Broom)

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Climate change weeds

A much weedier world can be anticipated under climate change. Environmental weeds should benefit from the following aspects of climate change.

More extreme events

Under a changing climate we can expect more floods, cyclones, fires and droughts (Intergovernmental Panel on Climate Change 2007). Extreme events benefit weeds by stressing or destroying competing native vegetation, and often by providing a pulse of nutrients. Flammable pasture grasses will benefit especially from more fire, and weedy vines from more violent storms.

Changing temperatures and rainfall

Climate change will leave many plants unsuited to new climates. The hope is that native plants will track climate change by dispersing southwards or upslope. But weeds are often more effective than native plants at dispersal, in part because they are often transported unintentionally by people (Sutherst *et al.* 2007). Many of the woody weeds invading Eucalypt forests have seeds dispersed by birds, and these species can disperse more rapidly than the Eucalypts, Sheoaks, Pea Bushes and most other native species occurring in Eucalypt forests.

References

- Bezemer and Jones (1998) 'Plant-Insect Herbivore Interactions in Elevated Atmospheric CO₂: Quantitative Analyses and Guild Effects'. *Oikos* 82(2): 212-222
- Coviella and Trumble (1999) 'Effects of elevated atmospheric carbon dioxide on insect-plant interactions'. *Conservation Biology* 13: 700-712
- CRC for Weed Management (2007) 'Make your garden waterwise – But don't plant weeds!' Press release, 15 March 2007, www.weeds.crc.org.au/documents/mr_waterwise_150307.pdf
- Intergovernmental Panel on Climate Change (2007) *Climate change 2007: Climate Change Impacts, Adaptation and Vulnerability. Summary for Policymakers*. IPCC Secretariat, Geneva
- Johns, Beaumont *et al.* (2003) 'Effects of CO₂ and temperature on development and consumption rates of *Octotoma championi* and *O. scabripennis* (Coleoptera: Chrysomelidae) feeding on *Lantana camara*'. *Entomologia Experimentalis et Applicata* 108: 169-178
- Poorter and Navas (2003) 'Plant growth and competition at elevated CO₂: on winners, losers and functional groups'. *New Phytologist* 157: 175-198
- Sutherst, Baker *et al.* (2007) 'Pests under global change – Meeting your future landlords?'. *Terrestrial Ecosystems in a Changing World*. Canadel, Pataki and Pitelka (eds). Berlin, Springer
- Ziska, Faulkner *et al.* (2004) 'Changes in biomass and root:shoot ratio of field-grown Canada thistle (*Cirsium arvense*), a noxious, invasive weed, with elevated CO₂: implications for control with glyphosate.' *Weed Science* 52: 584-588
- Ziska and Goins (2006) 'Elevated atmospheric carbon dioxide and weed populations in glyphosate treated soybean'. *Crop Science* 46: 1354-1359

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Nursery trends

As the climate changes, nurseries will introduce new stock better adapted to the new conditions (CRC for Weed Management 2007), thereby enlarging the pool of potential weeds, and ensuring that garden plants are well-matched for the prevailing climate.

Carbon dioxide fertilisation

Fast-growing plants tend to benefit more from carbon dioxide fertilisation than slow-growing plants (Poorter and Navas 2003). Weeds often grow faster than the native plants they replace.

Reduced effectiveness of biocontrol agents

Plants fertilised by carbon dioxide usually produce tougher leaves, with more toxins and lignin and a lower nitrogen content, rendering them less palatable to herbivores (Bezemer and Jones 1998; Coviella and Trumble 1999; Johns *et al.* 2003). Some, but not all, biocontrol agents will become less effective.

Reduced glyphosate effectiveness

Glyphosate, the main chemical used to control weeds in Australia, will lose some effectiveness, judging by recent experiments (Ziska *et al.* 2004; Ziska and Goins 2006).

Experimentation with biofuel crops

Many of the plants attracting interest as biofuel crops are serious weeds, for example Giant Reed (*Arundo donax*), Jatropha (*Jatropha curcas*), Chinese Tallow Tree (*Triadica sebifera*), Castor Oil Plant (*Ricinus communis*), Reed Canary Grass (*Phalaris arundinacea*) and Chinese Apple (*Zizyphus mauritanus*). Trials on Giant Reed have recently been undertaken in South Australia.

When Australians ask, 'What can I do about climate change?', part of the answer should be: 'Remove weedy plants from your garden and local bushland'.

These conclusions are adapted from a report Tim Low wrote for the Australian Department of Environment and Water Resources, after running a workshop in November 2006 on climate change and invasive species. At the time he was a member of the Biological Diversity Advisory Committee (which advises the Minister for the Environment and Water on conservation policy).

PREVENTATIVE WEED MANAGEMENT

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Weeds in the nursery industry

A national and international perspective

It used to be that a nursery person coming to a weeds conference was like Daniel going into the lion's den. I don't think this is the case anymore. The nursery industry has been working hard in recent times to minimise the effect invasive plants have on our environment. It has done this through a range of different activities and by working with key stakeholders. The partnerships and relationships that we have established and nurtured have been mutually beneficial. This work is going on nationally and in the states.

This paper will describe some of the successes of the nursery industry in this area and give some indications of where we are going in the future. The national Grow Me Instead program is an excellent example of how we can all work together, raise the awareness of the industry and gardeners, and engage a range of key stakeholders for a common good.

It is thought that about 10% of all plants that have been introduced into Australia have become invasive. As an industry, we have been responsible for inadvertently spreading some of these plants.

Abstract

The nursery industry has been working hard to minimise the effects that invasive plants have on our environment. It does this through a range of different activities and by working with key stakeholders. This presentation showcases some successes of the industry and indicates where it is going in the future.

The importance of invasive plants to the nursery industry

The industry now takes invasive plants very seriously. We understand that we have a responsibility as the major supplier of plants to reduce the impact of invasive plants. We have a history of selling invasive plants – though many of these were not considered 'weedy' at the time and still may not be by the general gardening public.

The Nursery and Garden Industry (NGIA) has now set up an 'Invasive plants/weeds committee' to help give them direction and to work through invasive plant issues. Invasive plants are

a major source of bad publicity for our industry and this is not desirable. We have become actively involved with governments (federal, state and local), regulators and other key stakeholder organisations – but we can't be everywhere.

A major market driver for the nursery industry – the environment

As an industry we are becoming more environmentally aware, reflecting the attitudes of the Australian community. Industry-funded research tells us that this is the case (Garden Market Monitor, Dec. 2007). We have become more aware and reactive to important environmental issues that might have a negative impact on our industry and on the communities in which we live. For example, these include:

- water use – through better management and increased use of water-wise plants
- using fewer chemicals
- creating less pollution
- using fewer resources; recycling more
- environmental weeds

This is a reflection of the wishes of the Australian community. The nursery industry either adapts and changes to meet these new drivers or will suffer in a variety of ways if it does not. The national body, the NGIA, and the various state bodies (NGI's) are leading the way, and the industry through its growers, retailers and allied traders are falling into line. Industry has a major role to play and is taking it seriously.

What is industry doing about invasive plants?

Industry has been proactive in its approach to invasive plants for some time. We are a major stakeholder in this area. The following are some recent initiatives we have been involved with:

- Grow Me Instead program
- national plant labelling guidelines – which are increasing in acceptance and use and contain a section on weeds and poisonous plants
- industry's own accreditation programs – upgrading and increasing content on invasive plants
- industry position paper on invasive plants – outlining the approach of the nursery industry to these plants (this gives the industry direction; the paper is available at www.ngia.com.au)
- industry publications – nursery papers, clippings, conferences
- involved in the National Weeds Advisory Group and a range of state and local committees
- appointment of a Development Officer with national responsibilities for invasive plants
- education and training programs
- promoting and supporting federal government programs



National Grow Me Instead (GMI) program

This is the flagship in recent times. It is a joint NGIA and Defeating the Weed Menace (DWM) funded (federal government) program. The funding of about \$600,000 in all builds on an original New South Wales version. Wide-ranging input has been gained from industry, governments and a variety of other stakeholders. The projected key outcomes of the program include:

- GMI Booklet for each state – shows weedy plants and non-invasive alternatives
- GMI educational program and workshops for industry and consumers
- consumer education material
- industry awareness increased
- less weedy plants grown and sold in industry
- community awareness increased
- fewer weedy plants sold to consumers
- fewer weedy plants in the environment

Invasive plant components of industry accreditation programs

The nursery industry has three widely accepted and promoted accreditation programs that set standards for the industry.

The *Australian Garden Centre Accreditation System (AGCAS)* is the industry scheme for garden centres and retail nurseries. We have recently included a significant new section about invasive plants.

The *Nursery Industry Accreditation Scheme, Australia (NIASA)* is the Best Management Practice program for production nurseries (growers) and media (potting mix) manufacturers. Within NIASA we have developed a new section on invasive plants that addresses the plants growers are selling.

ECOHORT is the Environmental Management System (EMS) for the nursery industry. It is relatively new and has increasing industry awareness and acceptance. ECOHORT has a major section on invasive plants.



Pistia stratiotes (Water Lettuce), freely traded in parts of North America but a serious aquatic weed in tropical and warm temperate regions of Australia

Weeds and nursery industries in America and Canada

Earlier this year I was lucky enough to be awarded a Churchill Fellowship that allowed me to travel to America and Canada to look at their nursery industries and how they cope – or don't cope – with invasive plants. The trip included forty-five days of visits to nurseries, industry bodies, weed researchers, governments and other regulators and key stakeholders. It gave me a reasonable understanding of what is going on in the two countries. It also allowed me to present a poster at the International Weed Science Conference in Vancouver, Canada.

Here is a brief summary of the key points from that trip:

- same issues, different country – the nursery industries in Australia and North America face many of the same issues in the area of invasive plants
- same people – more governments
- varies across the states – as it does here
- breeding – there are many active breeding programs in the nursery industry and in other places aimed at producing non-invasive forms of weedy plants
- our weeds aren't their weeds
- the cold climate (apparently) kills many weeds off
- varying climates up and down and across a big country
- industry varies as it does here – some members are good, some don't care
- Australian plants behaving badly – it's not their fault. No natural predators
- not just the nursery industry – others are responsible for weeds as well

Other invasive plant issues for the nursery industry

- declarations without industry consultation cause ill feeling in the industry
- so many lists – the value of 'mega-lists' is questionable
- declaration should be hard – plants are complex (not all varieties in a species are weedy)
- talk to us, a nursery industry body, if you need to
- the diversity of the horticultural media – all parts are not getting the message, so there is still work to be done here
- compliance and policing – done well, these are good things; done poorly, they bring resentment and trust is lost

In conclusion

The nursery industry is making a real difference in the area of invasive plants, as it is in other areas of the environment. We are working at many different levels on a range of programs, and the education of industry and consumers is working. The nursery and garden industry is not the only source of weeds, though you can't always tell this – we still get blamed for a lot. Hence there is still a lot to do.

The nursery industry and its relationship with invasive plants is the same in America and Canada as it is in Australia, and the Australian industry and other weed professionals are well-regarded in the US, Canada and by others. Selling weeds is in nobody's best interest and as an industry we need to continue to work with other stakeholders. The Australian Nursery Industry can be rightly proud of what it has achieved, but there is still work to do.

Further information, references and acknowledgements

Australian Garden Market Monitor (Summer 2007)

Kneebone (2001) *Nursery supply chain improvement program*. RETAILworks

Nursery and Garden Industry Australia – manuals of various accreditation schemes (AGCAS, NIASA, ECOHORT)

Thanks to the following people:

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- Matthew Baker and Elizabeth Schrammeyer from the Tasmanian Weed Society's organising committee
- Peter Bobbi and Gail Budge of Nursery and Garden Industry Tasmania for their ongoing work on behalf of the industry

Thanks also to the nursery businesses I consulted in preparing this presentation.

How clean is your gravel?

Quarry hygiene initiative for Circular Head

Background

A series of events in the Circular Head municipality triggered the development of a quarry inspection program in 2007. At the time the Woolnorth wind farm was under construction and a transmission line was being constructed to carry the power to Smithton, with gravel being carted in to provide road access to the transmission towers. Gorse (*Ulex europaeus*) has disjunct populations in the municipality; some areas have quite bad infestations and other areas are Gorse-free. So when Gorse seedlings were found growing in the new road, often in areas that had previously been Gorse-free, local farmers were alarmed. Complaints started to trickle into the Circular Head Council, and attempts were made to locate the offending quarry. Because the road had been made several years previously, quarry operators and truck drivers had only hazy memories of it. Even so, one quarry stood out as a suspect, and when its operator submitted a development application to the Circular Head Council to enlarge its operation, a local voluntary weed group opposed the application. This sensitive issue was ultimately resolved by the council, which wrote to all operators and instigated inspections of their quarries.

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Abstract

Circular Head Council has developed a program to check the weed status of gravel quarries, the aim being to identify clean quarries, and to develop control programs for quarries that contain declared weeds. More than half of the quarries have issues with declared weeds, and many are used as dumping areas for waste. The results indicate that changes to management practices are required.

Methods

Sue Jennings (Forestry Tasmania) kindly helped to set up the Circular Head Council quarry inspections based on a surveillance program developed by Forestry Tasmania. The primary focus for Forestry Tasmania was testing for the presence of the root rot fungus *Phytophthora cinnamomi*, but inspections also incorporated weeds. Each quarry is inspected for:

- drainage – water/mud carrying seed into the active quarry area
- overburden – if not scalped back this can lead to weed contamination of gravel
- weeds – presence of declared weeds and reminding operators of their responsibility under the *Weed Management Act*
- *P. cinnamomi* – are there indicators of its presence? This assessment was made to provide information and interpretation to the operators

After procuring a list of registered quarry leases from Mineral Resources Tasmania, a letter was sent to all operators informing them of their responsibilities under the *Weed Management Act 1999*, and of the decision by the Council to inspect all quarries. Preferably inspections were carried out with the quarry operator present; although at first operators were wary and resisted the program, they came to accept the inspections over time.

A written report with photos was produced for each quarry, and recommendations were made to improve performance. Confidentiality was carefully observed, with a copy of the report being forwarded to the operator and the council.

Results

The results were a disappointing eye-opener. Drainage was often poor; frequently the overburden (topsoil) had contaminated the quarry material; and out of 29 quarries in the municipality, 22 contained some or all of the following declared weeds:

- Broom (*Genista monspessulana*)
- Blackberry (*Rubus fruticosus* agg.)
- Boxthorn (*Lycium ferocissimum*)
- Gorse (*Ulex europaeus*)
- Pampas (*Cortaderia* spp.)
- Spanish heath (*Erica lusitanica*)
- thistles (various species)



Gorse, an unwanted component of quarries in Tasmania's north-western region



The dumping of garden waste, topsoil and other material introduces weeds, which are in turn spread further afield by the distribution of infected gravel

Thirteen quarries were found to have Gorse in their active areas. In addition, many agricultural and environmental weeds were located, including New Zealand Cabbage Tree (*Cordyline australis*), Capeweed (*Arctotheca calendula*), Cumbungi (*Typha latifolia*), Foxglove (*Digitalis purpurea*), Fat Hen (*Chenopodium album*), Hemlock (*Conium maculatum*), Macrocarpa Pine (*Cupressus macrocarpa*), Nightshade (*Solanum* spp.), Blue Butterflybush (*Psoralea pinnata*), Pussy Willow (*Salix x reichardtii*), Radiata Pine (*Pinus radiata*), Wild Radish (*Raphanus raphanistrum*), Yucca (*Yucca* sp.) and New Zealand Flax (*Phormium tenax*).

The presence of environmental weeds was the biggest surprise, and the first few inspections revealed something we had not realised: that quarries are seen as very good dumping grounds for unwanted garden material, topsoil and roadside waste. In fact, operators were infecting their own operations by importing or allowing the importation of weeds. And in nearly every case they were not making the connection between allowing the dumping of waste and the spread of weeds. Yet dumping contributes to quarries being sources of weeds which are spread over the whole district, rather than being the suppliers of clean weed-free material. In total, twelve quarries contained imported dumped

topsoil. Only six quarries did not have weed issues, and sadly this was due to the location of the quarry rather than good management. These quarries were situated in remote areas surrounded by vegetation devoid of weeds.

We believe that our initial inspections have alerted quarry operators to the need to change the way they operate, something that can be done inexpensively and with a little forethought, awareness and planning. Land managers everywhere are being challenged to improve management practices, and this program brings quarry operators right into the arena.

It is interesting to note that both the *Cradle Coast Regional Weed Management Strategy* (2005) and the *Circular Head Weed Action Plan* (2006) flagged the need for quarries to be inspected for the presence of declared weeds.

The quarry inspection program was funded by Cradle Coast NRM through the Local Government Incentive Scheme, with in-kind support from Forestry Tasmania.

WeedStop

Helping to prevent the movement of weeds in Victoria

Weed Movement, Machinery Inspection and Cleaning workshops (WeedStop training) have been delivered in Victoria since May 2005. They were developed to help land managers at risk of spreading weeds to meet their requirements under the *Catchment and Land Protection Act 1994* (CaLP). The workshops are intended to increase participants' awareness of weeds and of their obligations under the CaLP Act, and to provide some practical measures that can be implemented to reduce weed spread, including machinery inspection and cleaning. The workshop has been developed by the Victorian Departments of Primary Industries (DPI) and Sustainability and Environment (DSE) with assistance from the University of Melbourne's Longerenong College, and it meets the requirements of national competencies for RTD2312A *Inspect machinery for plant, animal and soil material* and RTD2313A *Clean machinery of plant, animal and soil material* (Lardner et al. 2005).

Abstract

The Victorian Department of Primary Industries has been conducting Weed Movement, Machinery Inspection and Cleaning workshops (WeedStop training) for the last three years – with significant results. Recent surveys of participants have identified that real changes in their awareness of noxious weeds and knowledge of responsibilities have been achieved. Smaller changes have also been made in on-ground work practices. Some of the reasons for slower on-ground workplace changes are also discussed.

into their business include Rail Maintenance, Australian Contractors Association, Australian Fodder Industry Association, Quarry Industry and some major infrastructure projects including the Sugarloaf Pipe Line Alliance (the installation of a pipeline from the Goulburn River to Sugarloaf Reservoir to help secure Melbourne's water supply).

During the practical session of the WeedStop workshops, participants are required to demonstrate competencies in cleaning equipment and machinery, and in collecting material for analysis. This material has formed the basis of an ongoing study on the types of apparently viable plant propagules that have been found on machinery in different locations. Samples have been visually assessed for plant propagules and subsamples grown on in a glasshouse for up to six months to identify any additional plant species present.

Up to September 2008, 300 items of equipment, vehicles and machinery had been assessed, with almost 1,400 samples analysed. A total of 153 passenger vehicles have been sampled, including 118 utilities, 29 wagons and six sedans, 57% of these being Government vehicles. One hundred and forty-seven items of plant and equipment have been assessed, including 31 tractors, 19 slashers, 22 out-front mowers, 16 backhoes and loaders, 12 trucks, 11 balers and eight graders, along with numerous sundry items.

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Although the workshops focus on weeds and weed-spread prevention, they have also been delivered to participants with *Phytophthora cinnamoni*, potato cyst nematode and *Phylloxera* as target organisms.

Workshops are generally conducted over one day and include components on weeds, their identification, biology and methods of spread; planning jobs to minimise weed movement; recording and reporting of weed infestations and hygiene measures; legislative requirements; and a practical component on the inspection and cleaning of machinery.

Eighty-nine workshops have been delivered in Victoria by DPI, 17 by Longerenong College and 16 in New South Wales and Australian Capital Territory by a number of presenters. Over 1,700 participants have attended and 1,633 have demonstrated competencies in inspection and cleaning.

WeedStop training has been delivered to 23 Victorian rural and provincial local governments, and state government organisations in New South Wales, Australian Capital Territory, South Australia and Victoria. In Victoria, these have included DPI (Landscape Protection, Sustainable Landscapes, Plant Standards), DSE (fire), Parks Victoria and VicRoads. DPI Landscape Protection has used WeedStop training as the basis for a minimum hygiene standard they have adopted for all their staff. Other industries to undertake training and incorporate WeedStop principles



Chilean Needle Grass seeds seek refuge on a vehicle's sump guard

Sample analysis has identified almost 400 taxa of plants as well as a variety of snails, live insects, mosses and fungi being carried on vehicles and equipment. Of the 400 plant taxa, 36 are declared Victorian Noxious Weeds; a number of other significant environmental weeds have been observed, including *Agapanthus* (*Agapanthus praecox*), Texas Needle Grass (*Nassella leucotricha*), Sweet Pittosporum (*Pittosporum undulatum*) and Olive (*Olea europaea*).

The results suggest that almost half of all passenger vehicles and 30% of plant and equipment carry at least one noxious weed. The maximum number of taxa observed on vehicles is 70 (including seven noxious weeds) and the median number is 20. A total of 33 noxious species have been observed on or in passenger vehicles, with 16 species observed in the cabin and radiator, 14 in the tray, nine in the guards, eight in the engine bay, five in the chassis and four in each of the spare tyre and attachments (including bull bar and spray rigs). Only two noxious species have been observed in samples from the wheels and wheel arches. Government-plated vehicles have a higher species burden than private-plated vehicles.

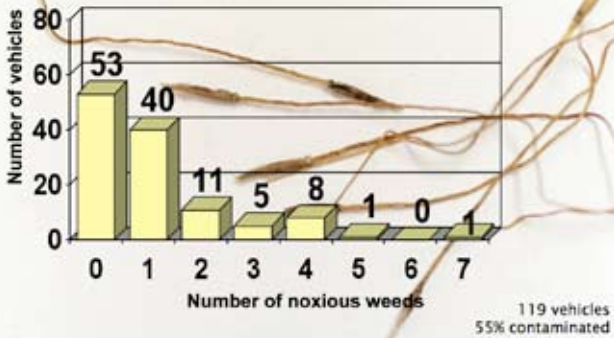
Heavy plant and equipment appear to have fewer species than passenger vehicles, with 12 noxious weeds being found on tractors, eight on slashers, seven on four-wheel bikes, six on backhoes and five on graders.

There appears to be a higher risk of spreading weeds on passenger vehicles than plant and equipment, although both carry a considerable burden.

An evaluation of the effectiveness of the WeedStop training was undertaken in 2007 through a survey of participants from local government and DPI training events which were conducted at least three months prior to the survey (King 2007). This was to allow the organisations and participants time to incorporate some of the learning outcomes from the workshops into their business practices. One hundred and sixty-four surveys were sent to local government and 90 to DPI participants, and a response rate of 33% and 25% respectively was achieved.

The key findings indicated significant impact in nearly all areas measured, including in awareness of the relevant legislation (CaLP), ability to identify weeds, planning jobs to minimise weed movement, inspection and the cleaning of work passenger vehicles, plant and equipment. There was a significant increase in the proportion of respondents who felt they now inspected and cleaned vehicles often enough since training to minimise weed spread (from 28% to 70% in councils and 29% to 71% in DPI). Almost all respondents (96%) indicated that attending WeedStop training had had at least some impact on the way they carried out their work in respect to minimising weed spread, and 28% of council respondents and 18% of DPI respondents said the training had had a substantial impact.

Number of noxious weeds on utes



Alarming results: 55% of sampled utes carried one or more noxious weeds (one ute carried seven noxious weeds alone)



Likely and actual hiding places for weed seeds on an average ute



A bevy of seeds taken from the engine bay of a vehical

group have attended WeedStop training and up to 90% in some regions. The implementation of this policy has achieved varying degrees of success across the state with the most successful implementation occurring in the North East where one staff member has undertaken to do monthly checks of vehicles and logbooks, and to follow-up with staff if they haven't been applying the policy (Alaistair Campbell pers. com 2008).

WeedStop training and the process of preventing weed spread through machinery inspection, cleaning and risk management are not unique. Other organisations such as Powercor (Powercor 2002) and the Agricultural Contractors Association of Tasmania (Doug French pers. com 2008) have developed their own packages to manage the risks associated with weed movement, and they have been implemented with varying degrees of success. Even so, every measure helps to raise awareness of weed spread, of the identification of weeds and of processes to minimise spread through inspection, cleaning and documentation. WeedStop training and the removal and assessment of material during inspections and cleaning has allowed us to further qualify the risks and extent of weed spread by quantifying the species present on vehicles and machinery.

A number of reasons were cited as to why WeedStop practices were not fully implemented by both councils and DPI, including:

- insufficient time and equipment
- not supported, monitored or enforced by management
- water restrictions (councils only)
- not required as vehicles were seldom driven off-road (councils only)

Since the survey, DPI has trained over 200 staff internally and adopted a Minimum Hygiene policy within Landscape Protection to address the risk and prevent the spread of weeds. Over 75% of all staff in this

References

- King (2007) *WeedStop training evaluation report – March 2007*. DPI
- Lardner, Moerkkerk, Jochinke and Wachsmann (2008) *Weed Movement, Machinery Inspection and Cleaning Workshop*. Participant workbook. DPI
- Moerkkerk (2006) 'Risks of weed movement through vehicles, plant and equipment: Results from a Victorian study'. *Proceedings of the 15th Australian Weeds Conference* Preston, Watts and Crossman (Eds) pp. 458-461
- Powercor (2002) *Powercor Australia Environmental Weed Guide*. DNRE

PREVENTATIVE WEED MANAGEMENT

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Cradle Coast Weed Hygiene Action Plan – 2008

This plan has been written to help the Cradle Coast community prevent the introduction of new weeds, and to minimise the spread of existing weeds. It details 39 actions to be implemented at the regional level, with a minimum of 30 of these to be initiated by the Cradle Coast Weed Management Committee by the end of 2013.

Recent research shows that:

- weeds cost \$4 billion in control methods, lost agricultural production and lost economic surplus in Australia
- the annual cost of weeds to Tasmanian pastures and field crops is estimated at \$58 million
- every dollar invested in pests, including weed prevention, results in benefits of \$25–\$38

In addition to the costs to agriculture, very significant (though presently unquantified) resources are spent controlling weeds in a range of other situations, including parks, reserves, roadsides, orchards and forests.

Weeds are also an important social and environmental issue. The spread of weeds from one property to another can be a source of community angst and conflict. Environmentally, weeds are one of the greatest threats to Australia's biodiversity.

Development of a Weed Hygiene Action Plan (WHAP) for the Cradle Coast region is a weed management action of high priority. By identifying actions that can realistically be achieved within the Cradle Coast region, the WHAP aims to:

- build awareness of the importance of weed hygiene for the Cradle Coast region
- reduce opportunities for new weeds to enter the region
- minimise or help prevent the spread of existing weed occurrence

The recommended actions for the WHAP are grouped as seven main goals:

1. Motivate government, business and industry to implement their weed hygiene practices
2. Provide support, training and education on weed spread prevention
3. Maintain a strong legal foundation for weed spread prevention
4. Develop and implement weed management plans for priority weed corridors, and reduce the threat of other weed vectors
5. Establish new weed hygiene facilities
6. Provide support to bolster state border quarantine procedures
7. Review, monitor and evaluate actions to achieve continuous improvement

The WHAP details 39 strategic actions, with a minimum of 30 to be initiated by the Cradle Coast Regional Weed Management Committee by the end of 2013. The committee will lead, coordinate and monitor actions to implement the WHAP over the next five years.

The full Weed Hygiene Action Plan document can be downloaded from www.nrmtas.org/home.shtml

For hard copies please contact:

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Development of a weed hygiene action plan was a high priority for the Cradle Coast region

Developing a weed surveillance, early detection and rapid response program for Tasmania

After implementing measures to prevent the introduction of weeds at Tasmania's entry points, preventing and minimising the establishment of new weeds is the state's highest weed management priority. Many strategies – the Australian Weeds Strategy, the Department of Primary Industries and Water (DPIW) Corporate Plan 2007 – 2009, Weed Plan (Tasmania's Weed Management Strategy 2005), the Tasmanian BioSecurity Strategy 2006, the three Natural Resource Management (NRM) regional weed management strategies, and various municipal weed strategies – have similar goals for preventing the establishment of new weeds.

It is well-documented that preventing weed establishment is much more cost effective than managing existing weed problems. In order to achieve such prevention, Tasmania needs to be prepared for new weed threats, and must have the capacity to detect and respond to them. The earlier an incursion is detected, the greater the chance there is of eradicating it.

COMMUNITY WEED MANAGEMENT

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Abstract

An effective surveillance and weed incursion response program is seen as critical in preventing the establishment of new weed species in Tasmania. This paper provides an overview of how such a program can work and raises a number of questions around planning a 'Weed Alert' program in Tasmania. What programs have been implemented in the past and what are we currently doing in this state? What happens at the national level? Using models from Victoria and Queensland, some of the key elements of a weed alert program are discussed. How can government, industry and the community work together to develop and implement a successful and sustainable program for Tasmania?

The original target for membership was 100 people selected on the basis of botanical skills and time spent in the field. They included professional land managers from agricultural and environmental agencies and businesses, and members of both the community and specific groups such as garden societies. Time was allocated to targeting certain organisations, conducting radio interviews and writing articles to encourage those with an interest in weed management to become involved. In 2001, the membership consisted of 84 people.

The focus of the WAN was to target species not present in the state or species present in a very limited distribution and with potential to have a significant impact on the state's agricultural productivity and natural values. The aim was to provide identification information to WAN members through the weed alert bulletins. Members were encouraged to be on the lookout for twelve species (see inset).

Ideally, weed surveillance includes early detection and rapid response, which usually lead to the implementation of some kind of 'Weed Alert' or 'Weed Spotter' program. These terms are commonly used in weed management and people can easily relate to them. 'Weed alert' in particular is used to badge numerous weed activities, news articles and brochures at all levels of weed management. The aim of a weed alert (or spotter) program or network is to utilise, through coordinated and effective communication, the people already 'out there', thereby maximising surveillance, detection and response activities.

A coordinated program that results in better-trained, -informed and -supported weed inspectors, NRM facilitators, land managers and community members will increase the state's capacity to detect and respond to new weed incursions.

Background

The Tasmanian Weed Alert Network (WAN) was an initiative of Weed Plan (First edition 1996). The initial ground-work was undertaken by the then new Weed Management Section and the Weed Alert Working Group. In 1999 a Weed Education Officer, funded through the Natural Heritage Trust (NHT) was appointed to:

- initiate contact with potential members
- develop a field kit (twelve weed alert bulletins and an explanatory booklet)
- coordinate member induction/training sessions
- produce a tri-annual newsletter – *Spotter*

Weeds targeted by Tasmania's WAN

Alligator Weed (*Alternanthera philoxeroides*)
Tumbleweed (*Amaranthus albus*)
Needle Burr (*Amaranthus spinosus*)
Espartillo (*Amelichloa brachychaeta*)
Kochia (*Bassia scoparia*)
Dodder (*Cuscuta* spp.)
Nut Grass (*Cyperus rotundus* & *C. esculentus*)
Common Heliotrope (*Heliotropium europaeum*)
Lagarosiphon (*Lagarosiphon major*)
Chilean Needle Grass (*Nassella neesiana*)
Creeping Yellowcress (*Rorippa sylvestris*)
Cut Leaf Nightshade (*Solanum triflorum*)

In early 2002, the Weed Education Officer position ceased to be. To continue disseminating new incursion information, *Spotter* was incorporated into *Tasweeds*, the newsletter of the Tasmanian Weed Society.



Although in Tasmania today there is no coordinated weed alert program as such, there are weed alert and response activities. Since 1999, a number of new incursions have been reported to DPIW, including incursions of *Solanum triflorum*, *Hieracium pilosella*, *Rorippa sylvestris* and *Onopordum acaulon*. Responses to these reports followed the formal process outlined in the State Response Plan for New Weed Incursions, which sets out the procedure and reporting structure that apply when a new weed is reported in the state.

Other ongoing activities include the provision of new weed incursion information to relevant stakeholders and the general community, via news articles, media releases, newsletters and training sessions, by DPIW's Weed Section. Regional weed strategy and local municipal weed management programs also provide Weed Alert updates and information.

What happens at a national level?

The Weeds Australia web site (www.weeds.org.au), an initiative of the Australian Weed Committee (AWC), enables users to 'Report an Alert Weed'. The information is received by the National Weed Management Facilitator's office, which passes it on to the relevant state weed management department. A telephone hotline (1800 084 881) is also available, and its callers are transferred to the relevant state weed contact person.

In 2000 the Australian Government and the CRC for Australian Weed Management identified a list of significant environmental weeds, known as the National Environmental Alert List. The weeds were selected because they had limited distribution within Australia at present, and high potential for successful eradication or containment. They were prioritised according to the severity of the threat they posed to the environment (high or serious).

Of the 28 species on this list, three are known to be present in Tasmania:

- Orange Hawkweed (*Hieracium aurantiacum*), an attractive herbaceous plant found in the Mt Wellington area and currently under a Hobart City Council control program
- Horsetails (*Equisetum* spp.), occasionally recorded in the ornamental trade in Tasmania
- Heather (*Calluna vulgaris*), a major weed of New Zealand; current populations on Bruny Island and mainland Kingborough Municipality are under a management program

Five of the 28 species are declared weeds under Tasmania's *Weed Management Act 1999* and are not known to be present in the state:

- Senegal Tea Plant (*Gymnocoronis spilanthoides*)
- Kochia (*Bassia scoparia*)
- Holly-leaved Senecio (*Senecio glastifolius*)
- Lagarosiphon (*Lagrosiphon major*)
- False Yellow Head (*Dittrichia viscosa*)

The above-mentioned species are known to be present on mainland Australia and pose a threat to Tasmania's natural values. These weeds (and potentially others on the current and future alert lists) are important to consider in the implementation of a state weed alert program.



A Weed Alert (top) and manual prepared by the Weeds CRC as part of its National Weed Detection Project

Weed alert models from other states

The Victorian Weed Spotters Network was based upon Tasmania's original WAN. It employs a State Weed Alert Coordinator and 13 Weed Alert Contact Officers (WACOs) who cover the ten Catchment Management Areas in Victoria. Anyone is encouraged to join the network. Application forms are available on the website, along with extensive information, including updates from the regional WACOs, newsletters, fact sheets, a training event calendar and training materials to assist participants.

As in the original Tasmanian model, members are asked to report 'Weed Alert Species'. These include species that are proclaimed under the *Catchment and Land Protection Act 1994* as State

Prohibited and the Victorian Alert Weeds (currently 12 priority species). Weed Spotters provide distribution data to the WACOs and decisions are made as to the type of response required for each incursion.

Victorian Alert Weed Fact Sheets have been developed for Weed Alert Species. Two examples of interest to Tasmania include *Echium candicans* (Pride of Madeira), an ornamental found in many gardens in the Hobart area and a potential sleeper weed for Tasmania, and *Heracleum mantegazzianum* (Giant Hogweed), a declared weed in Tasmania, not known to be present in the state.

The Queensland Weed Spotters Program is part of the National Weed Detection Project, funded through the CRC for Australian Weed Management and NHT. In this pilot project, a State Weed Spotter Coordinator liaises with Regional Coordinators and state authorities. They also provide support, training, information and materials for the weed spotters.

Weed spotters are specifically recruited from existing weed management and botanical networks and are trained in collection techniques and weed recognition. Specimens are collected, pressed and submitted to the regional coordinators. In contrast to the original Tasmanian WAN and the Victorian model, weed spotters are not provided with information regarding specific target weeds to report. They are encouraged to submit 'something unusual in their patch.'

Regional coordinators filter specimens against a criteria checklist and submit them to the state herbarium, which provides a taxonomic verification of the sample. The response to the incursion depends on whether the plant is new to Australia, the state or region, or whether it is listed on a priority alert list. The Australian Weed Committee and the state department responsible for weed legislation are included in the process as required. Feedback is provided to the spotters and all records are retained in regional databases. This program has resulted in an increase in records for a number of species.

Along with various training materials and weed spotter kits, a Weed Spotters Guide has been developed. This details the components and processes involved in setting up and running a weed spotter program, including establishing a network of spotters and the criteria and a checklist for filtering specimens. A Queensland weed spotter newsletter is also produced.

More information and training resources can be found at www.dpi.vic.gov.au and www.weedsrc.org.au/projects.

A future Weed Alert Program for Tasmania

There are a number of questions to be asked about a future weed alert program in Tasmania. What type of model is best for Tasmania? Do we target specific priority species or open it up to broader collection like the Queensland model? What resources are required for a successful program? What must the communication strategy include? The program must have the capacity to disseminate information effectively and quickly. What will be the limitations of the program? The system will need to be able to manage data and respond adequately to new weed incursions, and to incorporate responses from different levels of government, regional NRM organisations, the state herbarium and other stakeholders.

Who are the stakeholders? Communication with and participation of a large number of stakeholders is critical to the success of a weed alert program. Key organisations will need to drive the project, and partnerships may be required. Who would be part of the network – the weed spotters? Would people with skills out in the field be targeted or would the program put a call out for interested members of the community to become involved? And what are the training needs?

It is important that these questions and issues are given consideration in the planning and development of a future surveillance program in Tasmania. Much must be done to ensure that resources are utilised effectively and that the program achieves the desired long-term outcomes.

Conclusion

Having a weed alert network in place is recommended as best practice for early weed detection and it also supports principles of community involvement and cooperative weed management. The DPIW's Weed Management Section is to undertake a review of the weed alert framework in Tasmania, taking into particular consideration the current regional weed strategy framework. Through liaison with stakeholders, recommendations will be made as to the most suitable model of a surveillance and response program for Tasmania.

References

- Community Leaders Group (2001) *Tasmania Together*. Tasmania Together, Hobart
- Department of Primary Industries and Water (2007) *Corporate Plan 2007- 2009*. DPIW, Tasmania
- Department of Primary Industries and Water (2005) *Preparedness and Response Plan for New Weeds* (Internal draft working document). DPIW, Tasmania
- Hanson and Boersma (1999) *Weed Alert Network – A strategy to increase post barrier detection*. DPIW, Tasmania
- Natural Resource Management Ministerial Council (2006) *Australian Weeds strategy – A national strategy for weed management in Australia*. Australian Government Department of the Environment and Water Resources, ACT
- Tasmanian Biosecurity Committee (2006) *Tasmanian Biosecurity Strategy*. DPIW, Tasmania
- Tasmanian Weed Management Committee (2005) *WeedPlan: The Tasmanian Weed Management Strategy* (Revised Edition). TWMC, Hobart

COMMUNITY WEED MANAGEMENT

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Anni McGinniss

STEWARTS BAY
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Abstract

In a small council, the challenge of developing a long-term sustainable weed control program is a big one. Short-term funding opportunities offer short-term results but make little impact in the long-term. This presentation sheds light on how a clear focus, hard work and a quietly tenacious approach can release bushland from the clutches of seemingly well-established weeds.

Growing a weed control program

Working towards practical weed control in a small council

The passion and efforts of a dedicated few cannot be expected to play the role of implementing weed management across a municipality. How, then, do small councils make weed control core business for all land owners and managers? A cross-tenure control program successfully trialled in the Glamorgan Spring Bay municipality might help to answer this question. Small and regularly funded programs like this one (bolstered by occasional injections of project funds) promise to make long-term weed control more 'do-able'.

In the first part of this presentation, a council employee faced with the challenge of developing a weed management strategy shares some of her experiences of weed control programs, and the conclusions she draws from them.

To date, some of the most effective work on weeds has been done by members of Coastcare and Landcare groups, who carry out all-important (and often neglected) monitoring and follow-up work. In part two of this presentation, the founder of one such group reflects on the reality of keeping weeds at bay.

Developing a long-term sustainable weed control program

Mel Fazackerley – Tasman Council

About three-and-half-years ago I started work at Tasman Council as a Natural Resource Management Facilitator. I was doing one-day-a-week for the Council, and one-day-a-week for the Tasman Landcare Group, as project officer for a three-year National Landcare Program project. I had already been visiting the area regularly for many years and had been a resident for about two years, and had established quite close relations with a number of the community groups working in the Tasman through my role as a Coastcare Facilitator. I had limited experience in the farming area, but I had a basic understanding of some of the challenges of sustainable land management.

In terms of weeds, there were some pretty clear issues that needed addressing. The two most obvious being a need to improve some of the roadside works practices, and a need to raise awareness in the general community. My first decision was not to go in with all guns blazing, but to check things out, get to know people, look at how things are done and why they are done; to meet the landholders, get to know the works crews and contractors, work with the community groups and talk to the locals.

I have spent quite a lot of time becoming familiar with the people, the issues and the weeds because I believe that long-term sustainable change happens slowly. I now feel ready to develop a Tasman Weed Management Strategy.

Here are the things I think are important:

The people

Weeds get where they are by a number of means, but the common vector is people. It is our actions, activities and movement that help weeds get around, help them get established and hopefully help keep them in check. Weeds don't know our land tenure boundaries so it is important that as many people as possible are engaged in weed management. That means talking to people and encouraging them to become involved.

Weeds are one of the Natural Resource Management issues that most members of the public can relate to. They have them in the garden, around their home or at their shack. I find the articles I write in the local *Tasman Gazette* and the *Eastern Shore Sun* invaluable. For each article I write I get either a new weed location or another person interested in knowing if the plant next door is the weed I wrote about and, if so, how it can be controlled.

One of my other priorities is to try and make it as easy as possible for people with weeds on their property to do the right thing and control them. If someone has a big hard-to-get-to infestation of a weed on their property, I aim to get a contractor in to get it down to a size that they can realistically cope with. Or I might engage a contractor to do the more precarious work, or get them to talk with the landholders about control methods. Recently the Tasman Landcare Group and Tasman Council ran a herbicide training course in Nubeena. For landholders undertaking weed control works, attendance was subsidised – another obstacle overcome.

The information

What is a weed? This depends on the area or the circumstances. It is important that we all know what is considered a weed in our particular area. Information sessions, articles, field days, mail-outs, site visits and ringing up and having a chat are all ways of getting information out to people.

Where are the weeds? Once you start looking and asking there are always more weeds in more locations than you think. Through the South East Coastal Management project supported by NRM South and the Australian Government, North Barker have just done some roadside weed mapping and so we have the start of a database for our GIS system. New records can be added to the database so that we continue to gather information on where the weeds are, when and how they have been treated and what is needed for follow-up control. This information is already guiding on-ground works.



African Boxthorn – one of the species that hopefully can be eradicated from the Tasman region

The priorities

Weed control – where does the universe end? In order to keep up morale and to be effective with the small funds available to a small council with a reasonably large geographic area (by Tasmanian or European standards, anyway), it is important to set priorities. Unfortunately, I just can't see us eradicating all the weeds in the Tasman, so we need to focus our action. Our weed priorities are therefore being set by a number of criteria:

- potential for eradication
- national significance and hence potential for external funding
- follow-up from previous control works
- potential impacts to significant area/s
- community support and interest
- keeping weed-free areas weed-free

The action

Prevention is better than cure. A lot of the weed problems in the Tasman have been exacerbated by slashing. Weed hygiene is the most economical way to deal with weeds. But changing the culture is a real challenge, and it won't happen overnight without some big-stick support! As part of the South East Coastal Management project, a series of workshops have been held across Tasman, Glamorgan Spring Bay, Clarence and Sorell informing works crews and contractors about machine hygiene. A training DVD was also produced to ensure training is ongoing. In Tasman we have identified potential wash-down areas, and through the NRM South weed infrastructure project we are constructing a portable wash-down station. It's a long slow process.

Our focus is on the primary control of five weeds:

- Gorse and Boneseed – Weeds of National Significance (WoNS)
- African Boxthorn – a particularly nasty and hard-to-control weed
- Pampas Grass – community support is available
- Asparagus Fern – a WoNS; the one known infestation is spreading and poses a big threat

These weeds can be eradicated and all (except Asparagus Fern) have been subjected to control programs.

In addition to this, we plan to:

- Continue supporting control of Serrated Tussock – the priority is containment with possibility of eradication, WoNS, previous works, hard-to-prevent seed dispersal from Sorell
- Prevent establishment of Sea Spurge, which is a big threat. Sea Spurge has been found at White Beach in the past but does not appear to have become established. It was recently found by the Tasman Green Corps team at Eaglehawk Neck. The local Coastcare group were quick to remove the plants.
- Support community groups doing weed control works. Eaglehawk Neck Coastcare has been tackling a variety of weeds, including Watsonia, Boneseed and Canary Broom. Stewarts Bay Coastcare and White Beach Landcare are dealing with pines and Boneseed, Shelly Beach

Coastcare with pines and Blackberry, Sommers Bay Coastcare with Pampas and Spanish Heath, Little Norfolk Bay Coastcare with the three Bs (Broom, Blackberry and Blue Butterfly Bush) to name just a few, Friends of Judd Park with pines and Broom, Saltwater River Coastcare with African Boxthorn, Carnavon Bay with a variety of weeds arising from garden-waste dumping, and Roaring Beach Landcare with Marram (which, thanks to good vibes, is disappearing from the shores).



Community weeding in the region was bolstered with the donation of this fully equipped trailer

A new model

Community groups and some landowners are doing the most regular and consistent weed control works in the Tasman. They cannot tackle it alone. In Glamorgan Spring Bay they have tried a new model known as the 'Murdo Model'. Murdo is a resident at Glamorgan and has been doing volunteer work for the council for quite a while. Through the South East coastal project, Mel Kelly used funds to actually employ Murdo to do cross-tenure weed control on small bits of crown land and reserve managed by Parks and/or the council. Murdo has achieved an incredible amount by being able to go and tackle all the bits and pieces that get missed out by land manager works programs. The model has been a great success and it is hoped it will continue. In partnership with NRM South we hope to implement a similar cross tenure weed program in the Tasman, employing a part-time weed control officer to work with landholders, community groups and works crews to help them understand and control their weeds and to pick up all the fiddly bits and pieces around the municipality. The officer will also help collect more mapping data and monitor previous control sites. This position will be funded by the Australian Government, but I sincerely hope that funding for the position will be picked up by the council, as I feel that such a position is a key element of a successful ongoing weed program. I'm hoping that a resounding thumbs-up from the community will encourage the council to consider funding it.

The follow-up

Project funds are great and are very useful for getting a bit of a start on a weed or an area. However, more often than not the funding runs out, the project officers change, the information collected gets stored somewhere inaccessible and the result is there is no follow-up. In some cases you may as well have not started in the beginning. Positions like my own are essential to engage landholders, coordinate works, set priorities and tap into funding sources, but they don't achieve much if there is no action on the ground and no follow-up on previous works.

I feel that there is a real need for long-term assistance for weed control. Small amounts of money on an ongoing basis would, I think, achieve a lot more than project funds working to artificial deadlines. Timing of weed control projects is critical if they are to be effective. In my experience, funding timelines never coincide with the ideal weed control conditions. It's very frustrating seeing money spent too late or in a rush because it came late or it needs to be acquitted.

Councils should, I believe, be putting a regular amount aside for strategic weed control, and these funds could help attract an ongoing commitment from other funding sources.

I know ongoing funding doesn't fit in well with politics, but it would save taxpayers and ratepayers a lot of money and give them a lot more bang for their buck when it comes to weed control.

In the Tasman we have just had a great Green Corps team. Apart from their main program, they were able to go out and tackle new infestations and in some cases discover their extent. It takes quite a lot of effort to apply for a Green Corps team. It takes almost three months for the members to settle in, and by the end of the six-month term they have only just acquired the skills they need to do the work. Ideally, these programs would be longer, thereby giving the team members a chance to consolidate their skills and gain confidence – then they would really be able to achieve great outcomes.

The test of a sustainable weed control program is how it survives the changing of the guard and the shifting of the goal posts. To be effective, a weed control program needs to be resilient. It must be able to survive changes of landowners, weed officers, works crews, contractors, council staff, funding bodies, NRM support staff, community groups, community support, councillors and legislation. It's a pretty big task. The key elements are people and passion; the driver, the network, and the people on the ground.

I hope that when it is finally finished the Tasman Weed Management Strategy will help to build a sustainable weed control program. It would be great to look at the Tasman in ten years and know that all infestations of Gorse, African Boxthorn, Boneseed, Pampas Grass, Serrated Tussock and Asparagus Fern have been controlled, that there is an annual monitoring and follow-up program in place, that there is no Sea Spurge, that the community is at long last seeing a Spanish Heath control program being implemented, and last but not most hopefully that weed hygiene is a matter of regular practice and weeds are no longer being spread to new areas by slashing, excavation works and open trailers!

I would like to think it is possible, but only time will tell!

Action, inspiration and tenacity on the ground

Anni McGinniss – Stewarts Bay Coastcare Project

My interest in Coastcare at Stewarts Bay began in about 1999. A few years prior to this, the Council in its wisdom had diverted Alberry Creek from its natural course for a short distance, and instead of following the contours of the land had put a channel through a higher level of ground. They then decided to turn the encompassing bit of bushland into a 'park' and pretty-up the area. Most of the trees around the creek were felled right to the creek edge. A bridge was constructed across the diverted stream. The land in question was part of the Stewarts Bay Coastal Reserve managed by the Parks and Wildlife Service (PWS), but was in fact a very neglected area, having been farmed in previous years, and having been taken over by regrowth bush with an understory of various introduced weeds, in particular Blackberry and Montpellier Broom. Council made a non-formal agreement with the PWS so that they would manage the area that was to be 'upgraded into a park', and the works were part of a RED Scheme for unemployed people.

A couple of years of flooding, which happens after heavy rain, saw much of the steep banks of the diversion washed away, and the rocks placed along the banks as a retaining wall dislodged. It became a disaster area and not much to look at. I began to ask questions as to what could be done to slow the erosion. A couple of people from Rivercare stressed the importance of riparian restoration and care. Graeme Raphael, from the then Department of Primary Industries, Water and Environment, came and looked over the site and gave me lots of advice and encouragement. By this time I had also become aware of the dreadful weed problem, with one area of the creek so overgrown with Blackberry that you could not get through it. The problem of funding came up and Coastcare was suggested. When I said that the creek was not actually on the coast, I was told, 'My dear, Oatlands can be considered

Coastal.' Well, Alberry Creek does flow into Stewarts Bay, so it was decided to adopt the whole area, about four hectares, as it was felt that a healthy creek would benefit the bay in the long run, and that the land and sea are interconnected. It was a steep learning curve for me. And so Stewarts Bay Coastcare Group was formed. We have never been a very big group – I found that the local community, which is quite diverse and sparsely populated, was on the whole not much interested. In fact, there have even been hostile actions taken against what is seen as a 'Greenie scheme'. Most of the people who helped did not live in the area.

And so began the process of an application for funding to the Heritage Commission. A never-to-be-repeated operation for me. Fortunately we were successful. Early on in the project Green Corps came for a couple of days and their initial attack on the blackberries along the creek was such a boost. Since then we have managed to keep the creek relatively free of Blackberry on our side – I try not to look at what is growing on the privately owned side of the creek. Also, the Port Arthur Management Authority were helpful in supplying protector bags and stakes as well as conducting the initial overall spraying of Blackberry through the bushland. Green Corps have been involved three times since then and their efforts have always been appreciated. A big team can achieve so much in the short term and it gives encouragement for the few to go in and finish the job. We have had Green Corps teams help with weed management, replanting of an area that had previously been cleared and was not maintained by the PWS, and this year they helped clear a small infestation of feral oysters which had appeared at the mouth of the creek. With a bit of luck we shall get on top of this infestation.

Seven years on, the riparian plantings are coming along well and it is pleasing to see them growing. The weeds remain an ongoing problem.

The Blackberry I consider under reasonable control. I have found that by cutting back the bushes to almost ground level, then leaving the stumps until new growth occurs in the spring/summer, you can then spray with Blackberry

killer. This way you can minimise spray drift and hit only those plants you need to. Anything close to the creek banks I cut and paint by hand. Occasionally we come across Boneseed plants and Spanish Heath, both of which are rampant on the boundaries of the reserve area. We have been able to control these by hand-pulling, although I always dig out Spanish Heath or cut and paint the stumps if the plant is large. Montpellier Broom is a different matter. It is well-established throughout the Peninsula as is Spanish Heath – along the roadways and through the adjacent bushlands. Left to its own devices, it will eventually swamp an area and inhibit the growth of our native species. Each plant produces masses of seeds. It flowers in its first year of growth and will re-flower in the same season if just the tops are cut off. The plant has to be completely removed from the ground, as it will just keep branching and regrowing if slashed, so mowing of young growth is useless.

In the Stewarts Bay Reserve area we have managed to have no plants set seed in the past seven years; however, the sprouting of new growth each year has to be seen to be believed, and each spring I feel very depressed. I have been told that seed can remain viable in the ground for up to seventy years and I am beginning to believe this. So it is a matter of spray, spray, spray. I use glyphosate herbicide and spot spray rogue plants that occur throughout the bush. Anything above knee-height gets hand-pulled. There used to be a fair bit of Montpellier Broom along the foreshore of the beach, but persistent pulling on my regular walks keeps it under control. Continual vigilance is a necessity.

In one particular area, the Broom had been a tall thicket; we slashed it all down and heavily mulched the area. That was six years ago. Seedlings come up through the mulch quite happily, so I believe that mulching is a waste of time when it comes to suppressing this particular weed. However, mulching is good for the soil and is never a useless exercise. And young plantings always benefit from a mulching.

'If I die tomorrow, then in a year or two it will have taken over again' – this thought is my prod to keep at it.

COMMUNITY WEED MANAGEMENT

Sandy Leighton

SOUTHERN TASMANIAN
COUNCILS AUTHORITY

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NRM NORTH

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CRADLE COAST NRM

Nationally strategic control of outlying Boneseed infestations across Tasmania

Boneseed, a South African shrub, was introduced into Australia as a garden plant in the late 1800s (Brougham 2006). It was first recorded in Tasmania in August 1931 at Ulverstone, followed by Sandy Bay in September 1943 and Huonville in January 1947 (Matthew Baker pers. comm 2008). Since then Boneseed has naturalised in many coastal and estuarine areas of the state. However, according to its potential distribution, significantly more coastal and inland areas are currently at risk of invasion. Boneseed is a Weed of National Significance and is a declared weed in Tasmania under the *Weed Management Act 1999*.

At the national level both Tasmania and Western Australia are currently in the unique position of being able to control outlier populations and prevent further invasions. Accordingly, it is considered critical that Tasmania develops a coordinated and ongoing Boneseed control program in order to protect vast areas of coastline, priority vegetation communities and threatened species from the threat of future invasion. This paper focuses on our current statewide program, funded by the Australian Government Defeating the Weed Menace (DWM) initiative, which aims to achieve nationally strategic outcomes by controlling all outlier populations. NRM South was the project proponent, with NRM North, Cradle Coast NRM and the Southern Tasmanian Weed Strategy overseeing delivery within each NRM region.

The aims of the project were to define and prioritise sites across Tasmania; survey and map outlier infestations; prevent spread through strategic on-ground control; reduce Boneseed distribution to core infestations; develop management agreements with stakeholders and private land managers to ensure follow-up for at least three years; establish containment lines and eradication areas; ensure all stakeholders are committed to long-term Boneseed control; foster commitment from all three NRM regions; and increase community and stakeholder capacity for long-term control and containment.

Methods

The Tasmanian Boneseed Steering Committee was formed in February 2007 to develop and oversee the project. Members included the Southern Tasmanian Councils Authority, NRM South, NRM North, Cradle Coast NRM, Threatened Species Network, Parks and Wildlife Service, Department of Primary Industries and Water (DPIW) and the National Boneseed and Bitou Bush Coordinator.

NRM South acted as proponent and provided administrative support for the 12-month project, in partnership with the Southern Tasmanian Weed Strategy, NRM North and Cradle Coast NRM. Each region tailored their approach according to available funding, current Boneseed distribution levels and potential support from community groups and landholders. It needs to be remembered that Boneseed has been controlled in some local areas by various community

Abstract

Strategic control of outlying infestations of Boneseed in Tasmania is of national importance. Boneseed currently infests only a small proportion of the potential area that could be invaded, as well as having the potential to become more abundant within its current range. Australian Government Defeating the Weed Menace funding was received by NRM South to identify and control all isolated infestations across Tasmania. The project was delivered under a partnership between NRM South, Southern Tasmanian Councils Authority, Cradle Coast NRM and NRM North.

Significant progress has been made to identify, survey, map and control all outlying infestations, with national eradication areas and containment lines now established. In addition, many of the affected private landholders have signed three-year management agreements. On coastal areas and reserves, where community groups have been active in controlling infestations, Boneseed Blitz activities were organised (during Weedbuster Week in 2007 and 2008) for the ongoing monitoring and maintenance of these sites. In the Cradle Coast region, contractors controlled all known infestations. In the NRM North region, community groups, work crews and contractors controlled all coastal infestations, including those within the Tamar Valley. In the southern region, where Boneseed is the most widespread, the majority of outlying infestations have been identified and controlled by contractors or in partnership with community groups. Additionally, in areas where community groups are undertaking control of strategic infestations, contractors were sent in to assist these groups by controlling hazardous sites (e.g. cliff lines).

Under this statewide program, Tasmania's northern, eastern and southern coastlines and critical habitats are now being protected from the spread of Boneseed.

groups for at least ten years, and the actions of these groups has helped to significantly reduce the extent and threat of Boneseed in Tasmania.

Priority areas were determined with the assistance of the DPIW regional weed management officers using maps generated from the DPIW statewide Boneseed database housed on the Natural Values Atlas. All three NRM Weeds staff then more precisely identified priority areas and oversaw delivery of project funds within their region. Core infestations were identified in the Launceston and Bicheno areas and in other places: Huonville, Cygnet, Snug, Kingston, Hobart, Glenorchy, New Norfolk, the Clarence council area, and the Lewisham – Dodges Ferry area, and were not included in the current project.

Target areas

Cradle Coast NRM had the least number of infestations and is controlling all sites. Boneseed infestations occur on King Island (around Currie) and in coastal areas between Smithton and Port Sorell, with the areas of heaviest infestation found between Heybridge and Penguin; NRM North targeted all sites outside of the Launceston area including Falmouth, Scamander, St Helens, Bridport, Weymouth, Beechford, Lulworth and several sites throughout the Tamar Valley including Greens Beach, George Town, Beauty Point, Exeter, Hillwood and Legana; whilst the Southern Tasmanian Weed Strategy focused on outlying infestations on the east coast south of Bicheno, on the Tasman Peninsula, in the Dunalley – Connelley's Marsh – Primrose Sands area, south of Huonville, Bruny Island and the Channel (south of Snug Creek to Garden Island Sands) as high priority areas. All infestations were controlled by hand-pulling and/or cut-and-paint using glyphosate herbicide.

Regional programs

Cradle Coast NRM

Cradle Coast NRM first developed a regional approach to coordinated management in 2006, and its regional program still continues. Broadly, the program has taken the following directions:

- 2006/07 – Identification of Boneseed sites, in cooperation with regional stakeholders. Outlying infestations (i.e. those outside the core area between Heybridge and Penguin) were controlled in 2006, funded through CCNRM weed program. (Approx. \$25,000 expended)
- 2007/08 – Participation in a statewide DWM program, control of the core infestation, and support to ensure follow-up control of areas treated in 2006/07. (Approx. \$46,000 of DWM funds expended)
- 2008 – The 2008 program has been again funded through the CCNRM weeds budget, and is nearing completion, with follow-up actions on all known Boneseed areas, and control of some newly identified areas. (Approx. \$23,000 expended). Occasional new small sites have been discovered and controlled. A handful of small sites are still to be controlled, with actions planned to achieve control. These sites are either technically difficult (on steep rocky cliffs) or there has been difficulty identifying and contacting landowners.

NRM North

The NRM North Weeds Coordinator worked with municipal NRM Facilitators and Tamar NRM to identify sites for treatment and to obtain authorisations from landholders to undertake control works. Landowners were also provided with advice on identification and control of Boneseed plants. Contractors and community groups were then engaged to map and control infestations at the various sites. Due to the vast number of properties involved, NRM North will utilise the services of Work for the Dole teams, community groups and contractors to provide follow-up. (Approx. \$77,000 expended during 2007/08.)

Southern Tasmanian Weed Strategy (STWS)/NRM South

The Project Manager STWS worked with councils and community groups to identify exact locations for control sites, contacted land managers and directed contractors to survey, map, and treat identified priority sites on public and private land. With the assistance of councils and community groups, additional sites were also controlled in coastal reserves and in private gardens. For sites controlled on private land, management agreements were negotiated with and signed by the landholder to ensure follow-up for at least the next three years. (Approx. \$77,000 expended during 2007/08.)

Results

Cradle Coast NRM

The Cradle Coast NRM region is a Boneseed eradication zone. Overall, the CCNRM region is on track to achieve eradication of Boneseed, with all known Boneseed sites brought under control by the end of 2008. It is possible that new Boneseed sites will be identified in future, but it is considered that very little uncontrolled Boneseed remains in the Cradle Coast region. However, ongoing vigilance, follow-up actions and support to landowners will be required for some years to come in order to consolidate the gains that have been made to date. A key area of concern for the future is follow-up control of lands managed by the State Government, which has been generally unwilling to commit to this.

NRM North

The Northern NRM region outside of the Launceston area is deemed to be an eradication zone. Control measures were undertaken at nearly all of the targeted sites within the region. All treated areas were mapped so as to enable targeted follow-up. Due to the high number of properties, some of which are owned by absentee landholders, it was not possible to treat every site. Any remaining sites will be treated during future activities to control Boneseed.

Southern NRM Region

The Southern NRM region achieved control at the majority of identified priority sites. Due to the time taken to contact absentee landholders, there are still sites on private land on Bruny Island that need to be treated. The majority of priority areas were controlled and are now under annual monitoring programs. Southern NRM region containment lines are now established at Dysart (northern line), Primrose Sands (eastern line), south of the Huon River at Huonville (southern line)

and New Norfolk (western line), with the majority of areas being monitored and controlled by community groups and council NRM Officers.

Land managers and community groups were instructed in identification, survey and control techniques to ensure they had the skills and knowledge to monitor and control sites into the future. In addition, Weedbuster Week activities were organised during 2007 and 2008 to raise awareness and improve on-ground control of priority sites across Tasmania.

Each region developed a database according to the national core attributes for weed mapping (McNaught *et al.* 2006). Data was then transferred to the Tasmanian Natural Values Atlas database, where it is managed by DPIW. This comprehensive database will provide an excellent source for future monitoring and evaluation of the Tasmanian Boneseed project.

Future program

All three NRM regions are committed to the delivery of an ongoing Boneseed program; however, this will depend on available funding and staff. Currently, Cradle Coast NRM has Australian Government funding for the next 12 months to consolidate its program, whilst the Southern Tasmanian Weed Strategy has applied for Australian Government Caring for our Country funding to consolidate and expand its program. NRM North has a signed partnership agreement with the Work for the Dole service provider regarding follow-up control and will also engage contractors and support volunteers as needed. The annual Boneseed Blitz activities will also provide for continued work to eliminate Boneseed from the state.

References

Brougham, Cherry and Downey (2006) *Boneseed management manual: current management and control options for Boneseed (Chrysanthemoides monilifera spp. monilifera) in Australia*. Department of Environment and Conservation NSW, Sydney

McNaught, Thackway, Brown and Parson (2006) *A field manual for surveying and mapping nationally significant weeds*. Bureau of Rural Sciences, Canberra

Acknowledgements

We would like to sincerely thank all of our dedicated community groups throughout Tasmania. These tireless, passionate and willing workers spend hundreds of hours each year protecting coastal and estuarine areas from the impacts of Boneseed. We would also like to thank our Tasmanian Boneseed steering committee members for their guidance and support throughout the project.

Developing willow management priorities from the local to national level: the Tasmanian perspective

Although a familiar and often well-loved icon of the Australian landscape, willows (*Salix* spp.) are a Weed of National Significance and among the most serious river bank and wetland weeds in temperate Australia. At least 32 naturalised and around 100 cultivated willow taxa (species, varieties and hybrids) are present in Australia.

With around 132 different willow taxa spread across Australia's states and territories (except the Northern Territory) it is unrealistic to expect that all willows can and should be controlled. There is a need to target priority areas or priority species; in order to do so, the distribution, invasiveness and impacts of willows must be better understood. Based on the premise that 'you can't manage what you don't know', the National Willows Taskforce successfully gained funding to determine willow management priorities.

The project was sponsored by the Australian Government

Department of Environment, Water, Heritage and the Arts and the Department of Agriculture, Fisheries and Forestry (through the Defeating the Weed Menace program) and was administered by the Victorian Department of Primary Industries on behalf of the National Willows Taskforce.

WEEDS OF TASMANIAN SIGNIFICANCE

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Abstract

From 2006 to 2008 the National Willows Taskforce mapped the distribution of willows across Australia and conducted a weed risk assessment of thirty-five willow taxa. As a result, a toolkit is now available to enable willow managers at all scales to set priorities for on-ground management that provide the greatest environmental and economic benefits. The toolkit also provides a means of altering legislation to more effectively manage conflicting views and uses of willows and the willow problem.

Australia, the Australian Capital Territory, Western Australia and Queensland between September 2006 and March 2007.

All the data collected during these phases of the project was collated, digitised and added to a GIS database. This data formed the basis for our current knowledge of willow distribution across Australia and provided input for the weed risk assessment.

Weed risk assessment

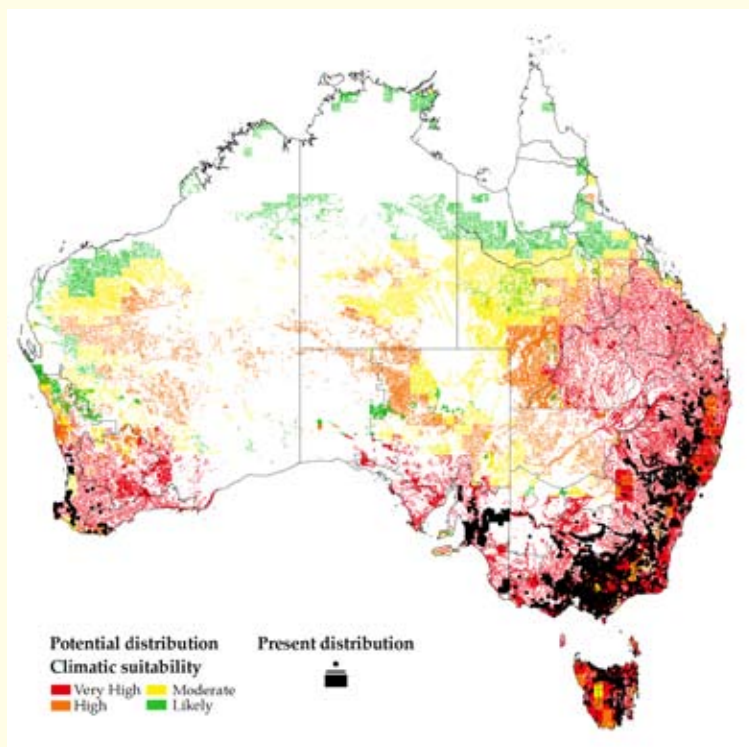
The weed risk assessment of willows was conducted in order to objectively rank the weediness of willow species more specifically than ever before. Thirty-five willow taxa, including the three major groups of willows, the subgenera *Salix* (tree willows), *Vetrix* (shrub willows) and *Chamaetia* (alpine/mountain willows) were assessed, based on three major components:

- invasiveness, or potential rate of spread
- current and potential distribution
- the current and potential impacts of the plant on land use and ecosystems

How willow management priorities were developed

Determining the extent of willows across Australia

Comprehensive surveys and a series of workshops were conducted around Australia to determine the extent of willows across the country. Twenty-nine willow workshops, attended by a total of 576 people, were held in 29 regions in Victoria, New South Wales, Tasmania, South



Current knowledge on willow extent and potential distribution across Australia

Willow management priorities across Australia

Which are Australia's worst willows?

The results of the weed risk assessment can be seen in the table on the left. The total score reflects willow risk; the higher the score the higher the risk, and the higher the risk the 'worse the willow'. The total score was taken by weighting scores for invasiveness (12%), impacts (56%) and distribution (32%).

National ranking of willows based on total assessment score

Of particular interest and perhaps surprise is that the three weeping willows (shown in bold) came out as high risk. This was not expected at the beginning of the project, and has led to recommendations being made to manage these willows. This scientific process enables us to confidently make management and legislative decisions that focus on willows with the greatest or lowest risk.

Case study – Managing Tasmania's worst willows

This case study provides an example of how to use the results and data provided in the toolkit from this project to determine willow management priorities in Tasmania.

Where are Tasmania's willows?

This project added value to the existing data in Tasmania. The data was collected through the Strategic Planning for Willow Management in Tasmania project conducted in 2003, and through the current Tasmanian Seeding Willow Eradication project run by Tasmanian Land and Water Professionals. According to this data, Tasmania currently has 15 naturalised willow taxa, which are infesting 354 hectares of riparian and wetland areas. *Salix cinerea* was the most commonly recorded willow, while there are only two records of *S. babylonica* (Weeping Willow) in Tasmania. Two other weeping willows were also recorded in the state: *S. x sepulcralis* (Kemp Willow/Weeping Willow) and *S. x pendulina* (Wisconsin Weeping Willow).

According to the data, the far north-west and far south-west are currently free of willows. However, due to their very high suitability for willow establishment and the presence of willows nearby, these areas are at high risk of willow invasion.

WILLOW	TOTAL SCORE
<i>S. triandra</i>	0.83
<i>S. nigra</i>	0.80
<i>S. daphnoides</i>	0.79
<i>S. glauca</i>	0.79
<i>S. exigua</i>	0.77
<i>S. purpurea</i>	0.76
<i>S. x rubens</i>	0.76
<i>S. cinerea</i>	0.75
<i>S. viminalis</i>	0.75
<i>S. alba</i>	0.74
<i>S. babylonica</i>	0.73
<i>S. x pendulina</i>	0.72
<i>S. x sepulcralis</i>	0.71
<i>S. fragilis</i>	0.70
<i>S. caprea</i>	0.68
<i>S. alba x matsudana</i>	0.67
<i>S. gracilistyla</i>	0.67
<i>S. pentandra</i>	0.66
<i>S. x mollissima</i>	0.64
<i>S. x reichardtii</i>	0.63
<i>S. x sericans</i>	0.62
<i>S. eriocephala</i>	0.62
<i>S. x calodendron</i>	0.61
<i>S. myricoides</i>	0.61
<i>S. aegyptiaca</i>	0.58
<i>S. elaeagnos</i>	0.56
<i>S. myrsinifolia</i>	0.55
<i>S. matsudana</i>	0.53
<i>S. chilensis 'Fastigiata'</i>	0.33
<i>S. integra 'Hakuro-nishiki'</i>	0.33
<i>S. alba var. caerulea</i>	0.30
<i>S. x 'Boydii'</i>	0.04

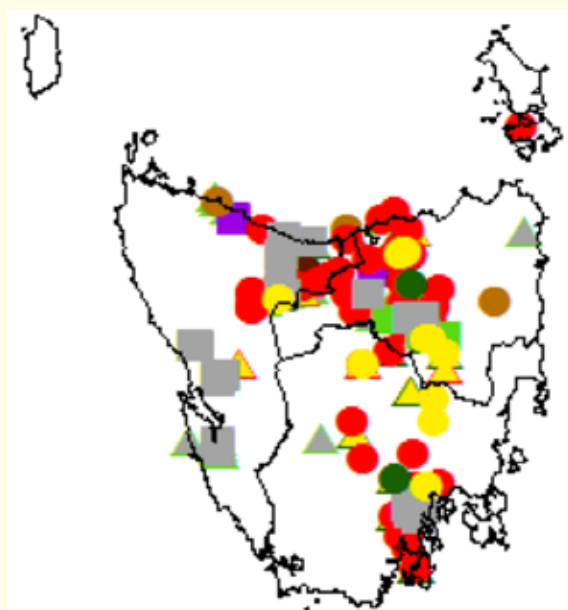
National ranking of willows based on total assessment score

Which are Tasmania's worst willows?

Every region in Australia now has a matrix prioritising its worst willow taxa for management based on risk and feasibility of control. Using NRM North's prioritisation matrix as an example and following the information in the explanation matrix, the following recommendations can be made in order to effectively prioritise for willow management in this region.

<i>S. alba</i>		<i>S. viminalis</i>	
<i>S. babylonica</i>		NZ hybrid	
<i>S. cinerea</i>		<i>S. X calodendron</i>	
<i>S. caprea</i>		<i>S. X pendulina</i>	
<i>S. fragilis</i>		<i>S. X reichardtii</i>	
<i>S. matsudana</i>		<i>S. X rubens</i>	
<i>S. nigra</i>		<i>S. X sepulcralis</i>	
<i>S. purpurea</i>		<i>Salix spp.</i>	

Distribution of willow taxa across Tasmania



Very High Priority (highest risk willow taxa – red box)

It is of national importance that the following willow taxa do not become established in Tasmania:

- *Salix glauca* – this willow’s potential distribution is confined to Tasmania and should be monitored in those areas that have suitable areas for its establishment
- *S. exigua* has a potential distribution confined to an area around Launceston
- *S. daphnoides* and *S. triandra* have areas of very high suitability

If found, these taxa should be monitored and eradicated as a very high priority. Using the potential distribution maps provided in the toolkit, monitoring efforts should focus firstly on taxa in areas of very high climatic suitability (marked red on maps) and sequentially on other taxa in areas of high, moderate or likely suitability.

Since some of these taxa are relatively unknown, land managers need help to identify them. A recommendation made to the National Willows Program suggests that suitable information be developed.

Tasmania North Prioritisation matrix (scientific names)

(See the next page for an explanation of this matrix)

		INVASIVENESS AND IMPACT SCORE		
DIST. SCORE	H	M	L	
H	<i>S. nigra</i> * <i>S. triandra</i> * <i>S. babylonica</i> <i>S. viminalis</i> * <i>S. glauca</i> *	<i>S. x calodendron</i> * <i>S. pentandra</i> * <i>S. x sericans</i> * <i>S. aegyptiaca</i> * <i>S. myrsinifolia</i> *		
M	<i>S. x rubens</i> <i>S. cinerea</i> <i>S. alba</i> <i>S. purpurea</i> <i>S. x sepulcralis</i> <i>S. daphnoides</i> * <i>S. fragilis</i> <i>S. exigua</i> * <i>S. x pendulina</i>	<i>S. alba x matsudana</i> <i>S. gracilistyla</i> * <i>S. caprea</i> <i>S. x reichardtii</i> <i>S. x mollissima</i> * <i>S. eriocephala</i> * <i>S. myricoides</i> * <i>S. matsudana</i> <i>S. elaeagnos</i> *	<i>S. chilensis</i> ‘Fastigiata’ <i>S. alba</i> var. <i>caerulea</i>	
L			<i>S. integra</i> ‘Hakuro-nishiki’^ <i>S. x</i> ‘Boydii’^	

* Not known to be naturalised in this NRM/CMA

^ No potential distribution in this NRM/CMA

Mapping of *Salix babylonica*

Whilst the mapping database shows two *Salix babylonica* records for Tasmania, this is almost certainly an under-representation of the species in the state. Because it is highly invasive and damaging, this species should be mapped more accurately before its management priority and other options are determined. Also, *S. babylonica* is often a valued part of the landscape, which means there may be opposition to its removal, so other management approaches may be required.

High Priority (high risk willow taxa – orange box)

The following willow taxa should be targeted for eradication in Tasmania: *Salix cinerea*, *S. alba*, *S. purpurea* and the rarely eradicable and difficult to distinguish *S. fragilis* and *S. x rubens*. In this instance, there is already an eradication program for seeding willows such as *S. cinerea* in Tasmania; these results therefore suggest that the program should continue.

Two weeping willows, *Salix x pendulina* and *S. x sepulcralis*, also appear to be eradicable, but, again, this may be an underestimation of their distribution, due to the common perception that weeping willows are not a weed.

Prevent establishment

Salix nigra and *S. viminalis* appear to be absent from the naturalised records in Tasmania. Large parts of the state are suitable for their establishment, so all efforts should be made to ensure they do not spread.

In the toolkit this information is accompanied by a series of maps with current and potential distribution of willow taxa (or a GIS package). These maps are scalable to the local level and developed to determine which areas management should focus on. The toolkit and prioritisation matrices also provide a means of altering legislation to more effectively manage conflicting views and uses of willows and the willow problem.

Explanation of the matrix

		INVASIVENESS AND IMPACT SCORE		
DIST. SCORE		H	M	L
H	<p>VERY HIGH PRIORITY High invasiveness and impact risk. Either not yet naturalised in the region, OR likely to be able to be eradicated.</p>	<p>MODERATE PRIORITY Medium invasiveness and impact risk. Either a high potential for spread in the region, OR able to be eradicated.</p>	<p>LOW PRIORITY Considered a low priority for management because they have a low potential for invasiveness and impacts, and either have already spread across a large part of their potential range, OR are unlikely to establish in the region due to unsuitable climate.</p>	
M	<p>HIGH PRIORITY High invasiveness and impact risk. High potential for spread in the region.</p>			
L	<p>LOW PRIORITY Considered a low priority for management because they have already spread across a large part of their potential range, OR unlikely to establish in the region due to unsuitable climate.</p>			

The way forward

This project applies a more objective, scientific process to willow management than was previously possible. Its evidence-based approach will help build credibility in future decision-making and management activities at the local through to the national level. Although through this project we have significantly improved our knowledge of the extent and potential impacts of willows, there are clearly still knowledge gaps. We must continue to improve this knowledge and to adapt our priorities as we do so.

From the results and evidence derived from this project, a number of recommendations have been made for both on-ground management and legislation in all states. These are outlined in the toolkit itself and are accessible at www.weeds.org.au/WoNS/willows/.

If you have any questions about this project or wish to obtain the toolkit – Developing willow management priorities toolkit (CD) and/or the Current and potential distribution of willows GIS package (DVD) – please contact Kelly Snell, the National Willows Coordinator.

Predicting seed persistence of two invasive weeds – Boneseed and Bitou Bush

Seed persistence in the soil seedbank has a major influence on the success of weed control and eradication programs. Field burial trials under a range of environments are the most accurate way to establish seed persistence. However, this method is expensive, labour-intensive and can take a decade or longer to achieve results.

The inherent life span (longevity) of seeds, which is an important component of persistence, can be measured in a laboratory much more quickly. Temperature and humidity are raised to provide accelerated ageing conditions that test the inherent biochemical resilience of seeds to temperature and moisture stress. The controlled ageing test (CAT) has been developed by the Millennium Seedbank at the Royal Botanic Gardens, Kew in the UK as a standard accelerated ageing method with

which to compare seed longevity for species collected worldwide. Long *et al.* (2008)

recently found that seed longevity measured using the CAT was useful for placing species into broad categories of transient (<1 year), short-lived (1 to 3 years) and long-lived (>3 years) field persistence.

Large variation in the longevity of seed lots from the same species, and even from the same plant, has been found during accelerated ageing studies. The level of physiological maturity, environmental conditions during development and mechanical damage influence the resilience of seeds to temperature and moisture stress, which can cause significant variation in predictions of seed longevity (Hay & Probert 1995; Cheplick & Sung 1998; Smith *et al.* 2003; Hay *et al.* 2006).

Abstract

Controlled ageing tests on seed have been shown to correlate with weed seed persistence in soil. Experiments that apply these tests to Boneseed and Bitou Bush are currently in progress, and this presentation outlines the results so far.

This research project aimed to use the CAT to measure comparative longevity and use this to predict field persistence categories of two subspecies of *Chrysanthemoides monilifera* (Asteraceae), subsp. *monilifera* (L.) T.Norl. (Boneseed) and subsp. *rotundata* (DC.) T.Norl. (Bitou Bush). A field trial was also set up to see whether the CAT prediction is correct and to provide further information on the relationship between how long seeds survive in the CAT versus how long they survive in the soil. The field trial will also determine the persistence of Boneseed and Bitou Bush seeds under natural conditions and give insight into seed population dynamics.

Methods

Controlled ageing test

Seeds were collected from Victoria, Tasmania, South Australia and Western Australia (Boneseed) and New South Wales (Boneseed and Bitou Bush) and sent to the University of Queensland by mail. Collections were highly variable in quality and maturity (Fig. 1). Differences in viability between different populations were measured using tetrazolium (TZ) and a series of germination tests were run to establish the optimal germination conditions. The bony endocarp was removed from seeds prior to all tests.

Five populations of Boneseed and two of Bitou Bush were aged in a sealed box at 60% relative humidity (RH) in an oven set at 45°C following the methods of Long *et al.* (2008). Seeds were periodically retrieved and germinated at 25/15°C on agar with gibberellic acid (GA3). Percentage germination was plotted against time in days for each population to produce a seed survival curve. The survival curves allow the calculation of the time in days for a 50% decline in viability (P50).

WEEDS OF TASMANIAN SIGNIFICANCE

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Field seed burial trials

Boneseed seeds were collected from You Yangs Regional Park in Victoria in December 2007. Bitou Bush seeds were collected from Wyong and Jervis Bay in New South Wales in June 2008 (these two collections were combined). Bitou Bush seeds that were visibly impacted by the biological control agent *Mesoclanis polana* (Bitou Seed Fly) were discarded. Seeds were stored in a cool, moist environment until planting. Two thousand seeds from each collection were subjected to the CAT. One thousand seeds of each weed were germinated in a glasshouse at Wollongong to determine baseline germinability.

Seeds of each subspecies were buried in soil near the southern and northern areas of their current distribution. Bitou Bush seeds were buried in Brisbane and in Wollongong, while Boneseed was buried in Wollongong and near the You Yangs in Victoria. At each site, seeds were buried in free-draining, 60 L plastic tubs filled with either dune sand (Bitou Bush) or low nutrient, sandy soil (Boneseed). The tubs were buried in the ground (up to the top edge) and exposed to natural elements. Wire mesh was placed over tubs to prevent predation or disturbance. Seeds were buried in the tubs in stapled mesh bags at 2–5 cm and at 15 cm deep. Separate tubs were used for each depth treatment, with each tub containing twelve samples consisting of four replicate bags each containing 200 seeds.

For the first two years, four bags will be retrieved at random from each depth treatment every 6 months; for the following eight years, four bags will be retrieved at random annually from each depth treatment. Retrieved seeds will be set to germinate in a glasshouse for five months in seedling trays. At the end of this period, any ungerminated seeds will be collected and tested for viability with tetrazolium. Results from the field burial tests will be available from November 2008.

Results

The thick, bony material (endocarp) covering Boneseed and Bitou Bush seeds created a mechanical barrier to germination and had to be removed using a nut cracker. Neither sub-species showed a temperature preference in the range of 15–30°C (Fig. 2). The addition of GA improved Boneseed germination (suggesting some physiological dormancy), but had no effect on Bitou Bush germination. The TZ test produced an acceptable estimation of seed viability when compared to germination.

The CAT produced different survival curves for different populations of Boneseed and Bitou Bush ($P < 0.001$). Seeds were placed into a seed persistence category based on their P50 value (Table 1). Boneseed populations were placed in both the short-lived (three populations) and long-lived (two populations) seed persistence categories. Bitou Bush seeds were shorter-lived than any of the Boneseed populations.

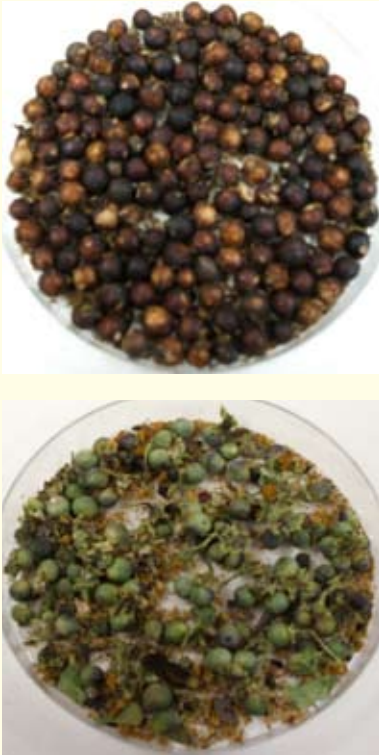


Figure 1: Mature and healthy (top) and immature (bottom) Boneseed seeds

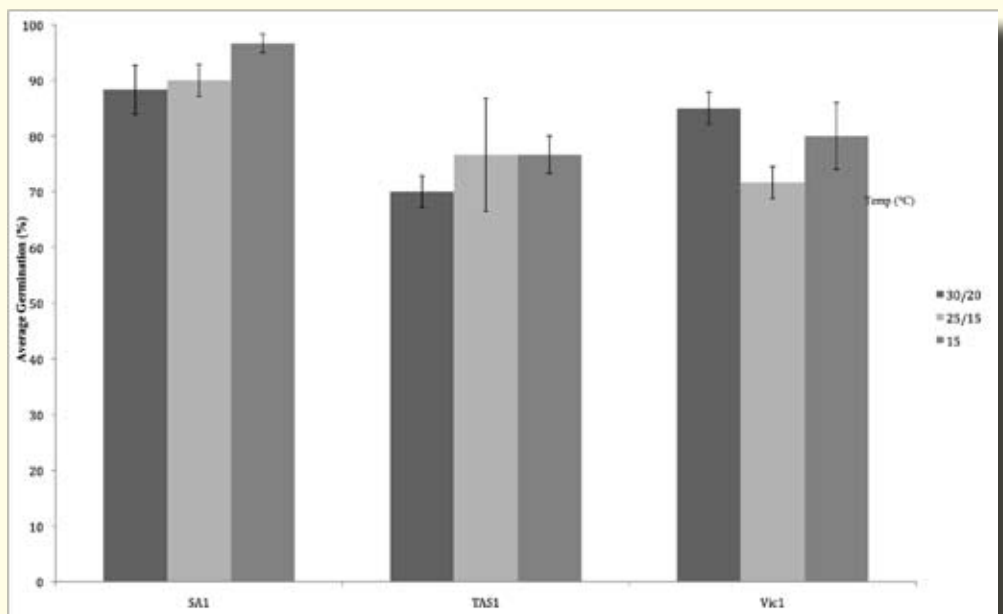


Figure 2: Average germination (%) of three Boneseed populations at three different temperatures with GA and thick bony coat removed

Discussion

Controlled ageing test

This study has shown that seed collections of variable seed quality and maturity do not decline in viability at the same rate under controlled ageing. Seeds that are collected before the point of natural dispersal have less desiccation tolerance, making them less resilient to the temperature and moisture stress in the CAT. The WA1 population, which was the shortest-lived Boneseed population, was a mixture of mature and immature seeds. SA1 and Vic5 (which were long-lived) were collected one month later than WA1, so they may have had longer to develop on the mother plant. An exception to this trend was the Vic7 population which was collected within one day and about three kilometres away from Vic5 in the You Yangs National Park – similar results would be expected for these two populations in the CAT, but they were placed in different categories (short-lived and long-lived). It is possible that Vic7 contained less advanced seeds due to plant-to-plant variation in seed maturity, even though the seeds had a mature appearance. Additional sources of differences in seed longevity may have been the environment of the parent plant and mechanical damage. Ultimately, it may be possible that populations responded differently due to genetic differences, but other reasons should be excluded first.

Based on the probability that seed longevity has been underestimated for some immature seed collections, it is most likely that Boneseed will be long-lived and persist for more than three years in the field. In contrast, two populations of Bitou Bush were both likely to be transient in the seedbank based on their CAT results. Longevity is only one component of persistence, giving an indication of the extent to which seeds may be expected to persist in the soil if they do not germinate. However, considering that little is known about seed longevity at the outset of most weed management programs, the CAT may be a valuable tool for a rapid estimation of seed persistence. The results of this study will be compared to the field seed burial trial, set up earlier this year, which should clarify the accuracy of these predictions. The field trial will also provide further information on the persistence of the seed when the bony endocarp is retained and when the seeds are subject to a range of environmental variables. Seed persistence information is essential for developing long-term management and eradication strategies for widespread weeds such as Bitou Bush and Boneseed.

POPULATION	P50 (DAYS)	SEED PERSISTENCE CATEGORY
SA1 – Boneseed	61.2	>3 yrs (long-lived)
Vic5 – Boneseed	56.8	>3 yrs (long-lived)
Tas1 – Boneseed	42.8	1-3 yrs (short-lived)
Vic7 – Boneseed	40.4	1-3 yrs (short-lived)
WA1 – Boneseed	35.6	1-3 yrs (short-lived)
BBNSW5 – Bitou Bush	15.8	<1yr (transient)
BBNSW8 – Bitou Bush	17.0	<1yr (transient)

Table 1: P50 values and associated seed persistence category based on Long et al. (2008) for populations of Boneseed and Bitou Bush, listed from longest- to shortest-lived

References

- Bekker, Bakker, Ozinga and Thompson (2003) 'Seed traits: essential for understanding seed longevity'. *Aspects of Applied Biology*, 1–9
- Cheplick and Sung (1998) 'Effects of Maternal Nutrient Environment and Maturation Position on Seed Heteromorphism, Germination, and Seedling Growth in *Triplasis purpurea* (Poaceae)'. *International Journal of Plant Sciences* 159, 338–350
- Hay, Klin and Probert (2006) 'Can a post-harvest ripening treatment extend the longevity of *Rhododendron L. seeds*?' *Scientia Horticulturae* 111, 80–83
- Hay and Probert (1995) 'Seed Maturity and the Effects of Different Drying Conditions on Desiccation Tolerance and Seed Longevity in Foxglove (*Digitalis purpurea L.*)'. *Annals of Botany* 76, 639–647
- Long, Panetta, Steadman, Probert, Bekker, Brooks and Adkins (2008) 'Seed Persistence in the Field May Be Predicted by Laboratory-Controlled Aging'. *Weed Science* 56, 523–528
- Smith, Dickie, Linington, Pritchard and Probert (2003) *Seed Conservation: Turning Science into Practice*. Royal Botanic Gardens, Kew

WEEDS OF TASMANIAN SIGNIFICANCE

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Abstract

In fifteen years, *Amsinckia* has gone from being an occasional plant in a few areas, to one with a fairly wide distribution on farms and roadsides in the Derwent Valley. *Amsinckia* can be a competitive weed, and it poses particular challenges to weed managers. These are discussed in this paper.

Impacts

Amsinckia is a weed of grain and other crops, pastures and roadsides. It has also been identified in urban areas. The weed competes strongly with cereals, and heavy infestations can result in yield losses. It can taint and discolour flour. Over the years, I have seen this weed in poppy crops and essential oil crops too. It has the potential to taint essential oil crops that are steam-distilled. The bristly calyx can become an impurity in wool. It has the potential to be toxic to livestock, causing liver damage.

In the last fifteen years, populations of *Amsinckia* have been increasing. Years ago, I did not often see it in crops; now, however, populations have increased in the Derwent Valley, and it has become a roadside weed around Hamilton. My experiences are of *Amsinckia* in poppies, essential oil crops (like peppermint and fennel), and in grains and pastures.

A hard weed to manage

What makes *Amsinckia* so difficult to manage? Its bristles lessen the effectiveness of some chemical control methods, while the progressive germination of the seed in autumn and winter makes it hard to schedule control strategies, as seed is present on the plant in various stages of maturity. To make matters worse, *Amsinckia* is a prolific seed-producer (up to 1,600 seeds per plant).

Yellow Burrweed (*Amsinckia* spp.)

An agronomist's reflections

Amsinckia is in the same family (Boraginaceae) as Paterson's Curse. Its various species contain harmful alkaloids, but no cases of poisoning have been reported in Australia. In Tasmania, *Amsinckia* is a declared species and is subject to a Statutory Weed Management Plan. Localised infestations have been recorded in the Brighton, Central Highlands, Clarence, Derwent Valley, and Northern and Southern Midlands municipalities. Isolated occurrences have been recorded in Hobart, Sorell and Flinders.

In Australia, the species are erect annual herbs that grow between 20 and 100 cm high. They are found in all states and territories, and in large areas in New South Wales, South Australia and Victoria. Four species are recorded in Australia. In Tasmania, recordings are mostly of *Amsinckia calycina*.

Structure and life cycle

Stems are covered with stiff hairs or bristles. The leaves are also covered with these hairs. Seedlings have a distinctive Y-shaped cotyledon. Young plants form a rosette. The flowers are bright yellow to orange and grouped along a cyme at the end of branches.

Life cycle

Amsinckia germinates with the first autumn rains and continues through autumn and winter. A flowering stem emerges from the rosette in late winter or early spring. Seed is set in late spring or summer, and then the plant dies. On each curved flower spike (cyme) the flowers are produced progressively from the base. This results in progressive seed production, which makes it difficult to manage this weed.

Means of dispersal

Amsinckia is spread mainly through human activities. The seed can be moved on farm equipment, or in contaminated seed, grain or fodder. The bristly calyx may lodge in the coats of feral animals and livestock and facilitate movement. The seed can also be transported in the digestive tracts of birds and stock.



Amsinckia calycina – an increasing weed problem in Tasmania



Progressive flowering and seed production along the individual flowering stems of Amsinckia make it difficult to schedule control strategies

Methods of control

An integrated approach is likely to produce the best results. Farm hygiene is important to reduce the potential spread of *Amsinckia*. Aim to reduce the risk of carrying the seed in produce (grain, fodder and stock). It is important to adhere to the requirements of the Statutory Weed Management Plan for *Amsinckia* (see www.dpiw.tas.gov.au for details).

Some methods of control include: mechanical (that is, cultivation and mowing/slashing before the seed sets); chemical (registered products are available for use in certain situations); and pasture management (spray/graze techniques; legume competition also stunts the growth of *Amsinckia*). As always, good farm hygiene is important.

The Derwent NRM and Central Highlands Council have been working on controlling this weed. A number of companies including GlaxoSmithKline and Essential Oils of Tasmania are also developing strategies aimed at managing this weed in their crops. *Amsinckia* has the potential to become a weed in many cropping situations.

Summary

Amsinckia has the potential to greatly reduce the productivity of grains, crops and pastures. Unfortunately, it is a difficult weed to manage, but by working together we stand a better chance of controlling the infestations we have, and of preventing them from spreading any further.

WEEDS OF TASMANIAN SIGNIFICANCE

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Abstract

While south-west Tasmania is notable for the integrity of its natural ecosystems and its low incidence of exotic species, invasions by Sea Spurge and Marram Grass are of concern. This presentation will describe the work being done by Sea Spurge Remote Area Teams (SPRATS) in an effort to control and remove these weeds.

SPRATS: Sea Spurge and Marram Grass eradication in south-west Tasmania

The SPRATS (Sea Spurge Remote Area Teams) volunteer group aims to eradicate two environmental weeds – Sea Spurge (*Euphorbia paralias*) and Marram Grass (*Ammophila arenaria*) – from the south-west coast of Tasmania.

Following preliminary work in the summer of 2006/07, SPRATS was fully operational using funding from the Federal Government’s Envirofund in the 2007/08 field season. An estimated 270,000 Sea Spurge plants were weeded over approximately 265 kilometres of wilderness coastline. Weeded sites had on average a more than 35% reduction in the number of Sea Spurge plants the following season, with a consequent average 40% reduction in weeding time required per site. A trial application of neat glyphosate to treat Marram Grass had a 94% kill rate, which is encouraging for remote area weeding where other herbicides may be impractical.

SPRATS is working to a ten-year plan to ensure adequate follow-up and monitoring of weeds on the south-west coast. The project contributes to all four goals identified in the Tasmanian Beach Weed Strategy (Rudman 2003):

- to contain the distribution of beach weeds in Tasmania
- to minimise adverse impacts on biodiversity and geodiversity
- to educate, coordinate and maintain commitment
- to develop improved control techniques for beach weeds

The first goal specifically identifies the south-west coast as an eradication zone for Marram Grass and Sea Spurge.

The success to date of the SPRATS project is attributed to committed volunteers, thorough planning and the support of the Tasmanian Parks and Wildlife Service (PWS).

The problem

Sea Spurge is a highly invasive coastal weed originating from the Mediterranean and now naturalised in many parts of southern Australia. Severe infestations occur in parts of coastal northern Tasmania, including north of Macquarie Harbour on the west coast. It grows on bare sand and also amongst cobbles

on stony beaches. Marram Grass is an invasive sand dune coloniser originating from Europe and introduced to Tasmania to stabilise sand dunes, where it has since spread to dominate most of the sandy coastline.

Both of these weeds threaten the integrity of the largely weed-free south-west wilderness by displacing native coastal vegetation, invading shorebird nesting sites and changing the geomorphology of sandy coastlines (e.g. dune steepening).

Sea Spurge has been known from a few sites on the south-west coast since the late 1980s; however, the relatively high number of sites with small populations observed

in 2007/08 (fig. 1) suggests that this weed has potential for major expansion in the coming years, considering that there is more than 260 kilometres of coastline suitable for Sea Spurge. Major weed infestations occur throughout the area, mostly on the west coast (north of Port Davey), with fewer sites on the south coast (fig. 2).

The south-west coast presents a number of challenges to SPRATS: limited access, few tracks, very thick scrub, a rugged rocky coast, unpredictable weather and remoteness. The only feasible way of locating and treating coastal weeds is to walk the entire coastline, and this requires experienced bushwalkers capable of multi-day off-track walking.

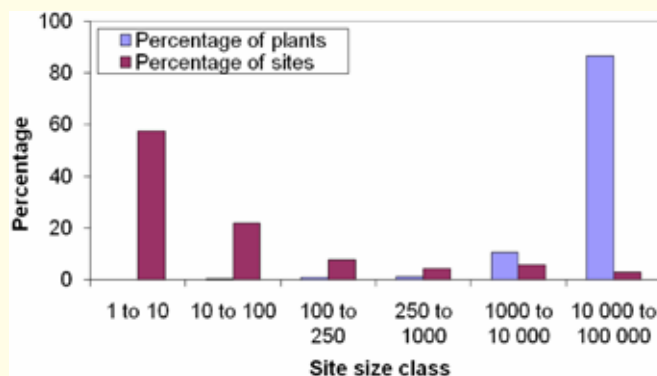


Figure 1: Sea Spurge populations were classified into six size classes. Most of the plants occurred in a small number of sites with large populations (over 1,000 plants),

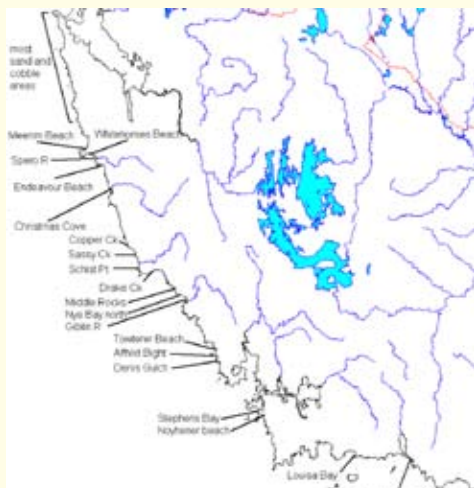


Figure 2: Locations of major weed infestations on the south-west coast



Before (top) and after: SPRATS clear Sea Spurge from a beach at Pennerowne Point

herbicide-treated at 49 sites. The Parks and Wildlife Service conducted herbicide spraying of sites which could not feasibly be weeded by hand (Marram Grass at Endeavour Bay and large Sea Spurge infestations north of Pennerowne Point).

There was an average reduction in weeding time per site of around 40% compared to the previous season (fig. 3). Over 300 kilometres of coastline were covered by SPRATS. More than 95% of the coastline classified moderately and highly susceptible to Sea Spurge invasion was surveyed and 79% was weeded. Almost all the areas not weeded were sites north of Pennerowne Point which were beyond the capacity of SPRATS at the time.

Documentation

Group leaders for each sector keep detailed records of site locations (using a GPS), time spent weeding, estimates of numbers and extent of weeds (juvenile/mature), site descriptions, walking times and campsites. This information is invaluable for assessing the effectiveness of eradication efforts and for planning future on-ground work (e.g. estimates of how many hours are required to weed each site, and how many people are needed for each sector).

SPRATS project model

The SPRATS group was formed in 2007 and is based on the highly successful Willows out of Wollemi group from New South Wales. SPRATS is a Wildcare Group and works closely to integrate its work with PWS. An Envirofund grant covers expenses which are largely transportation costs (aeroplane, helicopter and boat).

Extensive knowledge of access points to the remote south-west coast, walking times, campsites, and weed infestations is incorporated into project planning. It took around 65 days of volunteer work to plan and prepare for the 2007/08 field season.

A volunteer logistics person based in Strahan during the field-work season received reports from the weeding groups by satellite phone. Field volunteers provide their own food and camping equipment, with SPRATS providing transport and weeding equipment (herbicide, applicators, gloves etc.). Detailed maps showing all known weed sites, major campsites and walking routes are provided to the weeding crews.

Before SPRATS

The Parks and Wildlife Service has conducted herbicide spraying of Sea Spurge and Marram Grass on the south-west coast since 2000. Some hand-weeding was undertaken during a preliminary on-ground survey of the coastline in 2002/03. Another survey was undertaken in 2006/07 when volunteers conducted a trial eradication program at known sites and surveyed additional parts of the coast.

SPRATS 2007/08 season

Between December 2007 and February 2008, 27 volunteers were deployed to seven sectors by boat, plane or helicopter (each for a period between seven and twelve days long). Sea Spurge was weeded at 160 sites, with a total of approximately 270,000 plants removed. Around 290 clumps of Marram Grass were dug out or

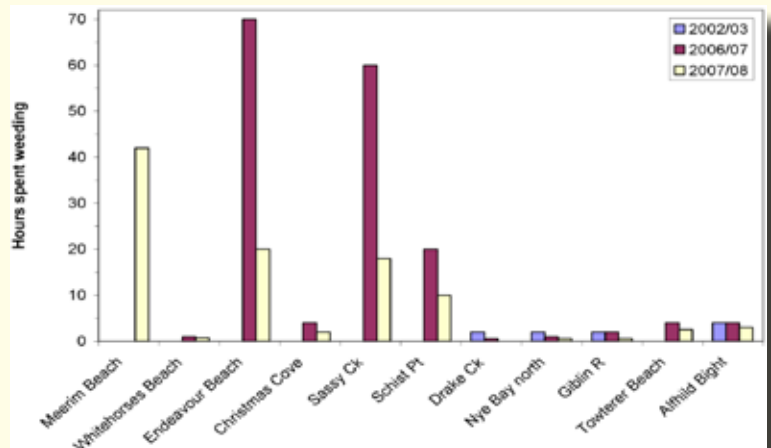


Figure 3: Time taken to weed selected sites on the south-west coast over three field seasons

Sea Spurge treatment

Seedling and sub-adult plants are relatively easily pulled out by hand. This method is very effective, resulting in almost 100% mortality. On sandy substrates hundreds or thousands of plants can be removed per person per hour. Hand weeding is somewhat slower on cobble beaches because stones often need to be moved to reach the stem base ensuring that the whole plant including roots can be pulled.

Mature plants can also be pulled out with similar success as long as the thick taproot is removed. Plants broken off at the base of the stem are able to resprout from the taproot or the remaining base of the shoot.

Although hand-pulling proved effective for the vast majority of Sea Spurge plants encountered, very large plants or those with roots firmly buried under rocks were treated by cut-and-paint application of glyphosate. This method also delivers a near 100% kill rate.

Plants with flowers or fruits were disposed of by being placed underneath or on top of the ubiquitous dense coastal scrub (Sea Spurge is unable to germinate and grow under a thick canopy).

Herbicide treatment of large Sea Spurge infestations using a handheld sprayer was trialed but was less effective than the other methods, with a kill rate varying from 20 to 80%. Furthermore, conditions on the south-west coast are often too windy or wet for spraying, and a local supply of fresh water is needed. Nevertheless, this method is suitable for initial knockdown of large infestations.

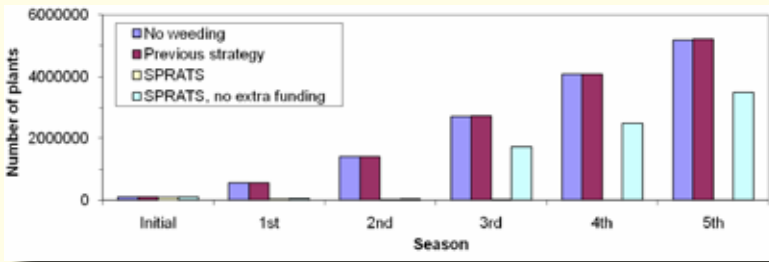


Figure 4 (top): Predicted Sea Spurge populations on the south-west coast under four scenarios

Figure 5 (bottom): Predicted weeding effort on the south-west coast under four scenarios

December through to late January appears to be the best time to control Sea Spurge because it comes after seedling recruitment (spring germination) and before seed production.

Marram Grass treatment

Hand-digging of Marram is labour-intensive, with one to three person hours required to dig out a clump measuring one square metre. The rhizomes spread extensively under the sand and are very difficult to remove entirely, so resprouting is possible.

Two herbicide treatments were trialed (see table at right).

Leaves swiped with concentrated Verdict (using a wick)

- very slow
- requires a relatively large quantity of Verdict
- precautions for handling and transporting Verdict make it unsuitable for unsupported remote area use

Leaves swiped with concentrated Roundup (using a modified glove)

- messy
- uses a moderate quantity of herbicide
- effective (trial achieved a 94% kill rate)

Sea Spurge modelling

Preliminary modelling of predicted Sea Spurge populations in south-west Tasmania suggests that without the intervention of SPRATS this weed would soon be too extensive to feasibly be controlled by hand-weeding (fig. 4 and fig. 5). Modelling is based on shoreline substrate, seed production and germination, density of plants, speed of weeding and probability of invasion.

References

Rudman (2003) 'Tasmanian Beach Weed Strategy for Marram Grass, Sea Spurge, Sea Wheatgrass, Pyp Grass and Beach Daisy'. *Nature Conservation Report 03/2*. Nature Conservation Branch, DPIWE

South-west coast weeding – the future

SPRATS has funding to support the project during the 2008/09 weeding season, and has around 45 volunteers engaged. The Parks and Wildlife Service will treat major infestations using quad bike-mounted spray units. More volunteers will be deployed to the northern part of the project area this season to follow-up after the spraying and to treat smaller, less accessible sites.

The aim in the 2008/09 season is to establish an eradication zone from Cape Sorell to Cockle Creek by removing or poisoning all Sea Spurge and Marram Grass on this coastline. Future work will involve regular surveying of the coastline and follow-up control to deplete seed banks and treat new infestations before they become established.