A Good Weed

Newsletter of the Weed Society of New South Wales Inc. ISSN 2203 0360

Winter / Spring 2019 **Issue # 85**

Blandfordia Grandiflora **Image: Anna Calvert**

INSIDE THIS ISSUE

In this issue

Committee Meeting Dates

Committee meetings will be held in February, April, June, August, October & December 2020.

The Annual General Meeting will be held in November 2020.

Contact Details

The Weed Society of NSW
PO Box 215
BOOLAROO NSW 2284

Secretary: secretary@nswweedsoc.org.au
Treasurer: treasurer@nswweedsoc.org.au
Editor: editor@nswweedsoc.org.au
Website: www.nswweedsoc.org.au

Office Bearers for 2020

President
Kim Hignell (Lake Macquarie)

Vice President
Birgitte Verbeek (Albury)

Secretary and Public Officer
Maria Edmonds (Cessnock)

Treasurer
Doug Campbell (Scone)

Newsletter Editor
Kim Hignell (Lake Macquarie)

Assistant Newsletter Editor
Terry Bignell (Maitland)

Other Committee Members
Hanwen Wu (Wagga Wagga)
Andrew McConnachie (Orange)
Hillary Cherry (Hurstville)
Michael Walsh (Narrabri)
Paul Marynissen (Wyong)
Terry Bignell (Maitland)
Wendy Gibney (Mullumbimby)
Megan Wyllie (Yass)

'A Good Weed' & 'Just a Little Weed' are produced by The Weed Society of New South Wales Inc.

From the President

I would like to wish everyone a Merry Christmas and a Happy New Year. Please take care over the holiday season.

Thank you all for being part of the Weed Society of NSW. Lets all look forward to a great 2020 for each and everyone of us.

Happy Weeding
Kim Hignell

Welcome to our New Members

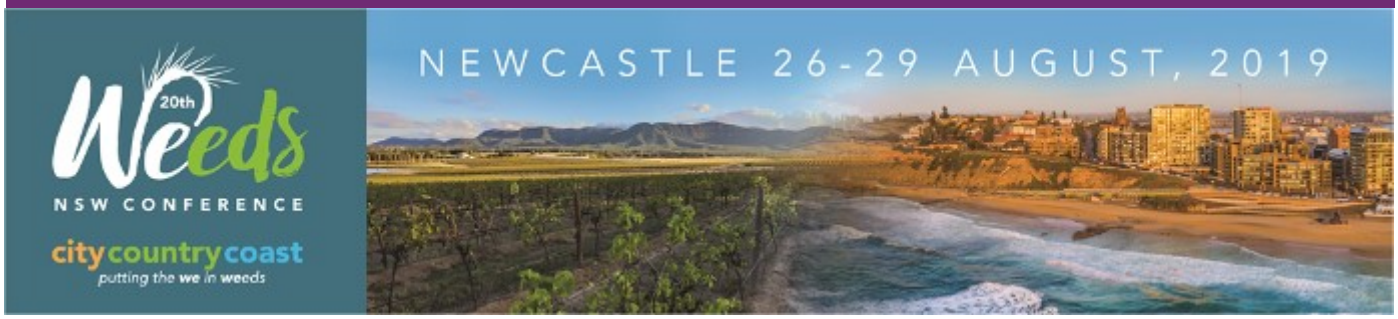
Our new members for this edition are

Glenn Neyland	Bland Shire Council
Grahame McCubbin	Bland Shire Council
Karen Raymond	Bland Shire Council
Mitchell Townsend	Cabonne Council
Todd Saxelby	Cabonne Council
Neil Boyd	Cabonne Council
Dr Louise Morin	CSIRO
Gary Leeson	OCP
Melissa Gunn	Cobar Council
Kerrie Guppy	Ausecosolutions
Julia Rayment	UoW
Kathy Ashton	Camden Council
Trish Kidd	Blue Mountains CC
Dave Whiteman	Blue Mountains CC
Matt Sheehan	Wildmatters
Shauna Potter	Wildmatters
Cain Waterman	Worimi,
Samuel Chaffey	Worimi,
Brett Chambers	Worimi,
Aaron Crotty	Litoriaers
Cheryl Crotty	Litoriaers
Mel Hall	NPWS
Paul Crack	Bayer Australia
Imtiaz Faruk Chowdhury	CSU

New members receive all the benefits of Society membership including:

- opportunity to network with others interested in weed management;
- discounted registration for Society seminars and workshops;
- opportunity to apply for Society Travel Awards;
- the Society newsletter, *A Good Weed*, delivered quarterly and the electronic newsletter, the *Just a Little Weed;*
- discounted registrations to attend the Australasian Weeds Conference and the NSW Biennial Weeds Conference, and additional financial prizes for the winners of the Buerckner Award, Stephenson Award & NSW Weed Industry Award.

20th NSW Biennal Weeds Conference August 2019



The 20th NSW Biennial Weeds Conference was held at Newcastle Exhibition and Convention Centre (NEX), Newcastle NSW from 26 – 29 August 2019.

The Conference was attended by 326 delegates, sponsors, speakers and exhibitors. The conference was held over 3 days which included 3 concurrent sessions, 6 keynote and plenary speakers, 52 concurrent session presentations and a DNA Diagnostics – LAMP presentation.

There were 4 social functions consisting of:

- Welcome Reception – held on Monday 26 August – an inclusive function held within the trade exhibition
- Pub Night – held on Tuesday 27 August at Honeysuckle Hotel, an inclusive function where delegates were provided with a meal and two drink vouchers
- Conference Dinner – held on Wednesday 28 August at NEX and an inclusive function
- Conference Breakfast – held at The Station on 29 August and an inclusive function

There were four half day field trips offered on Wednesday 28. The conference theme of city, country, coast was the inspiration for the tours which also provided the opportunity for delegates to experience the broader region during their stay in Newcastle.

Opening Session of the conference

20th NSW Biennal Weeds Conference Newcastle – August 2019

Official Opening by Michael Johnson MP Parliamentary Secretary of Agriculture

Welcome from the City of Newcastle Deputy Lord Mayor, Cr Declan Clausen

Brett Miners (session Chair) presenting keynote speaker Dr Kris French

Welcome Reception

Pub Night

Breakfast BBQ

Conference Dinner

20th NSW Biennal Weeds Conference August 2019

The 20th NSW Biennal Conference Organising Committee - Ian Turnbull, Brad Shultz, Leigh Ernest, Kim Hignell, Dean Semit (Chair), Eric Pasnow, Maria Edmonds, Doug Campbell and Terry Bignell.

Conference Dinner on Wednesday night

20th NSW Biennal Weeds Conference

20th NSW Biennal Weeds Conference

Conference Sponsors

Thank you to all our conference sponsors who are working with us to improve weeds management across NSW.

NSW Local Land Services	The Weed Society of New South Wales	MACSPRED AUSTRALIA	CORTEVA agriscience
Gold Partner	**Silver Partner**	**Silver Partner**	**Silver Partner**
QUIKSPRAY	KLEINFELDER Bright People. Right Solutions.	Tocal COLLEGE	Weedtechnics
Silver Partner	**Bronze Partner**	**Bronze Partner**	**Bronze Partner**
OCP	NSW Department of Primary Industries	NSW Weeds Officers Association	Hunter Precision Agriculture Pty Ltd
Bronze Partner	**Conference Dinner Partner**	**Welcome Reception Partner**	**Breakfast BBQ Partner**
DRAYTON'S FAMILY WINES	CESSNOCK CITY COUNCIL	PORT STEPHENS COUNCIL	ACFEC Australian Centre for Financial and Environmental Compliance RTO:88151
Presenters Gift Partner	**Field Trip Partner**	**Field Trip Partner**	**Exhibitor**
rapidmap 4Dglobal	Rapid Spray	CROP culture	CHARTIS TECHNOLOGY
Exhibitor	**Exhibitor**	**Exhibitor**	**Exhibitor**
ADAMA	Granular Products	QUIKSPRAY	Hunter Precision Agriculture Pty Ltd
Exhibitor	**Exhibitor**	**Exhibitor**	**Exhibitor**
NUTURF SPECIALISTS PROVIDING SOLUTIONS	BHA BioHerbicides Australia	NSW Local Land Services	OCP
Exhibitor	**Exhibitor**	**Exhibitor**	**Exhibitor**
nsw weed biocontrol TASKFORCE	Weedtechnics	contact organics	KLEINFELDER Bright People. Right Solutions.
Exhibitor	**Exhibitor**	**Exhibitor**	**Exhibitor**
ROTOWIPER The genuine weedwiper	DRAYTON'S FAMILY WINES	HUNTER REGIONAL weeds	City of Newcastle
Exhibitor	**Exhibitor**	**Organising Committee**	**Our Proud Host City**

2019 Conference Award Winners

Buerckner Award Winner - Andrea Fletcher from Castlereagh Macquarie County Council with the late Mal Buerckner's family, wife Debbie and his son Jack Buerckner. Congratulations Andrea.

Stephenson Award Winner—David Pomery from Illawarra District Weeds Authority with the late Ian Stephenson's wife Ingrid. David is a member of the Society and won $500 to go towards assistance to attend a weeds conference in the next two years. Congratulations David.

2019 Conference Award Winners

Our **NSW Weed Industry Award** Winner - Mel Hall with our Vice President Hillary Cherry. Mel is a member of the Society and also won $500 to go towards assistance to attend a weeds conference in the next two years. Congratulations Mel.

Our three winners: from the left Mel Hall, David Pomery and Andrea Fletcher. Congratulations again to all our Award winners.

2019 Photo Competition Winners

WINNER—Weed Identification

Boneseed by Paul Marynissen

2019 Photo Competition Winners

WINNER — Weed Management

Cactoblastis in common pear
by Robert Burr

The WMSSA invites submission of abstracts for oral papers and poster presentations for the 22nd Australasian Weeds Conference

Topics to be discussed range from cutting edge weed science and research, to local and national innovative policy, new operational practices and tools, best practice on-ground management, chemical innovations, alternative weed control, and on-ground case studies, all helping to protect our agricultural and environmental landscapes from weed threats.

If you have a weed story, we want to hear and see you at the 22nd Australasian Weeds Conference!

Abstract submissions close Friday 14 February 2020

The conference subthemes are:

Subtheme 1: Community engagement and behaviour change

- Building capacity – from awareness to behaviour change
- Increasing engagement
- Behavioural science
- Social licence
- Understanding stakeholder motivation
- Communications
- Social media and marketing

Subtheme 2: Prevention of weeds

- New and emerging weed threats
- Weed ecology and invasiveness
- Climate change and other issues causing weed distribution changes
- Garden plants as weeds
- Weeds of National Significance
- Practical preventative weed management and general surveillance
- Using the new 'National Biosecurity Statement' – creating linkages across environment and industry
- Weed Risk Assessment
- Hygiene
- Prep/post border biosecurity for weeds, including islands

Subtheme 3: Using new enabling tools and technologies for weed management

- Surveillance – pathways, tools, people
- Mapping
- Precision weed control
- Using data for weed management, modelling, identification
- Machine learning
- Robotics
- Genetic approaches to weed control

Subtheme 4: Integrated Landscape Weed Management

- Policy from a global, national and local level – using evidence and implementation for effective weed management
- Success with integrated weed control
- Biological control
- Non-chemical weed control
- Research impacts and case studies on the broader society, environment and economy

Subtheme 5: Weeds in the environment

- Functional ecology and ecosystem services – environmental impact of weeds
- Economic impact of weeds in the environment
- Healthy people and communities – socioeconomic and medical impacts, mental health
- Chemical innovations for use in natural ecosystems
- Weed management techniques for sensitive sites

Subtheme 6: Crop and pasture weed management

- Economic impact of weeds on plant production systems
- Functional ecology and ecosystem services in plant production systems – the impact of weeds on the production systems
- Integrated Weed Management (IWM) strategies, including non-chemical tactics
- Herbicide resistance – extent and management approach
- Chemical innovations for plant production systems

Department of Primary Industries

nsw weed biocontrol TASKFORCE

Spring News 2019

Welcome to the spring news from the NSW Weed Biocontrol Taskforce. The Taskforce is a voluntary collaboration of members from a number of like-minded agencies responsible for managing weeds in NSW. This Newsletter is designed to summarise key information from Taskforce biannual meetings. Our meetings are designed to build an environment for sharing information and facilitating collaboration on current and future biocontrol programs. We hope you enjoy this spring issue.

Biocontrol of weeds and drought

Some weed species are adapted to low rainfall conditions and thrive under drought conditions. During these times, you may notice the resurgence of weeds in your area that are under current management by biocontrol agents.

Paterson's curse is an example of a weed, that has been more prolific this year. The current drought conditions may provide a competitive edge over less drought-tolerant species, particularly in heavily grazed pastures with limited groundcover and pasture regrowth.

But don't stress! Even though this toxic weed appears to be having a resurgence take a closer look. Two of the most damaging agents - the flea beetle and crown weevil - are still there doing their job. They just need a little time to catch up to continue controlling the population.

Remember that biocontrol will not eradicate a weed, but is used to reduce populations to levels that are manageable and, ideally below an economic/damage threshold.

Tallangetta 1980's prebiocontrol

Six biocontrol agents including

- the leaf-mining moth, *Dialectica scalariella*
- crown weevil, *Mogulones larvatus*
- root weevil, *Mogulones geographicus*
- flea beetle, *Longitarsus echii*
- stem beetle, *Phytoecia coerulescens*
- pollen beetle, *Meligethes planisculus*

were released against Paterson's curse and have established and spread well in the landscape. These agents act synergistically against Paterson's curse with plants often dying before they flower. The agents reduce seed production, seed banks, plant density and plant vigour which has led to a significant reduction in the impact of Paterson's curse. Those 'seas of purple' landscapes will hopefully be a scene of the past.

Tallangetta 2018

Photos

Top: Paterson's curse before the release of the first biocontrol agents in the late 1980s (photo of Tallangatta, North East Victoria by M. Moerkerk).

Bottom: Successful biocontrol of Paterson's curse (photo R. Kwong).

nsw weed biocontrol TASKFORCE

continued... Biocontrol of weeds and drought

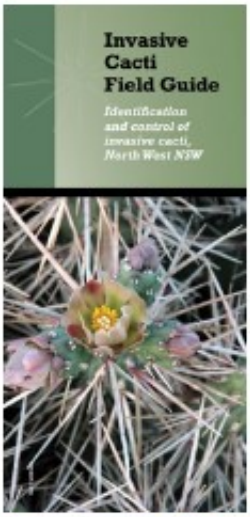
As all effective biocontrol agents for Paterson's curse are widespread, there is no need for redistribution. Paterson's curse fluctuates seasonally, so agents are not abundant during the winter period. Substantial agent populations can take a while to build up during spring and summer, which are then able to do a robust job attacking the weed.

Photos clockwise from right: Crown weevil adult; A sea of Paterson's curse before biocontrol; Crown and root damage on Paterson's curse by the crown weevil (wide larvae) and flea beetle (thin larvae); Flea beetle adults and the shot hole damage they inflict.

Invasive Cacti Field Guide

The new 'Invasive Cacti Field Guide – Identification and control of invasive cacti, North West NSW' is now available. This publication is a deliverable under the NSW DPI / NW LLS "Releasing the Hounds project" and has been a great collaboration between all players.

The guide is availble online at:
https://northwest.lls.nsw.gov.au/__data/assets/pdf_file/0004/1192396/5537_Cacti-Booklet_VeryFINAL_WEB.pdf



North West Cactus Quarterly Newsletter

If you would like to subscribe to this newsletter go to:
https://northernslopeslandcare.us19.list-manage.com/subscribe?u=ab70d19b26e4b0f2b776f9b1f&id=407bd299c8

The Weed Society of New South Wales

The Weeds Society of New South Wales Inc.
Promoting the awareness, understanding & control of weeds.
For more information: http://www.nswweedsoc.org.au/

nsw weed biocontrol TASKFORCE

Bridal Creeper smashed by the leafhopper in an ecologically endangered saltmarsh community at Lake Macquarie

Saltmarshes are listed as endangered ecological communities in NSW, and threatened globally. Weed invasion, damage by domestic and feral animals, human disturbances, altered fire regimes, climate change and the wide-spread invasion of saltmarshes in southeast Australia by mangroves has reduced the habitat availability for a diverse array of flora and fauna. Saltmarshes provide protective habitat for a variety of species like migratory shore birds. They support commercial and recreational fishing and provide a buffer against storm surges.

Released in 2007 by CSIRO, the bridal creeper leafhopper is now having a significant impact against bridal creeper in the saltmarsh community at Toronto Lions Park situated in the Lake Macquarie Local Government Area. *"I've never seen a saltmarsh so prolific with bridal creeper",* quoted Dennis Gannaway (National Bridal Creeper WoNS Co-ordinator, 2009) a few years after the release of the leafhopper. We knew this agent would take a while to have an impact on the weed, however, the observed benefits as demonstrated through native species recovery are superb (see images below). There are only two columns of bridal creeper growth left over the entire saltmarsh area!

Both nymphs and adults feed on cell contents, from the underside of leaves, with their piercing and sucking mouthparts. Damage initially appears as small, white/yellowish flecks on leaf tops and develops into merged zigzag patterns causing discolouration and whiteness. Feeding reduces the growth and production of seed and continual damage exhausts tuber production, leading to the decline in bridal creepers competitive ability.

Over the years, this site alone has produced enough leafhopper numbers for adequate redistribution around NSW. This demonstrates the importance of recording release site information and observations in the Australian Biocontrol Hub (https://biocollect.ala.org.au/biocontrolhub). Recorded dispersal is around 10 km from the release site. Our little 2.5mm friend is still 'on the hop', assisting with the management of bridal creeper in surrounding areas.

Further redistribution around the state today is unnecessary and only recommended at specific sites with heavy infestations, or sites that may have year round above ground bridal creeper foliage. Your local weed or biosecurity officer can assist you with these decisions.

We are incredibly happy with the great achievement of our little leafhopper friend!

Top left: First release of the ridal creeper leafhopper at Toronto Lions Park. , Lake Macquarie (NSW).
Top light: Saltmarsh infested with bridal creeper (pre-2007) at Toronto Lions Park
Bottom left: Close up of the bridal creeper leafhopper *Zygina spp.* on bridal creeper.
Bottom right: Damage inflicted by the leafhopper causing white flecks on leaves leading to complete discolouration.

nsw weed biocontrol TASKFORCE

The Australian Biocontrol Hub: an important home for information on agent redistribution

Don't forget to upload your agent release site information and observations to the Australian Biocontrol Hub. You can use your smartphone, or alternatively enter information at your desktop. This platform is integral for finding information on where agents have been released to assist others with collection for redistribution. Please add photos as well. https://biocollect.ala.org.au/biocontrolhub

The Australian Biocontrol Hub was funded by the Commonwealth Government's Rural Research and Development for Profit program, conducted in collaboration with Meat and Livestock Australia and Agriculture Victoria.

nsw weed biocontrol TASKFORCE

Workshops: strong interest in biocontrol in the central tablelands

The Central Tablelands LLS, Landcare, DPI and the NSW Weed Biocontrol Taskforce partnered to deliver an introduction to biocontrol course in the central tablelands in late September 2019. There was strong interest in the day with over 70 people in attendance from a range of backgrounds (state and local government, cropping and grazing enterprises as well as hobby farmers).

Dr Andrew McConnachie was the presenter for the day giving the participants information on what weed bio-control agents were available locally, along with explanations of how they work. Information was also given on how best to spread these biocontrol agents locally, with NPWS and Forestry staff bringing in samples of broom gall mite that participants were able to take home and introduce to their local broom populations. Evaluations on the day showed that the day not only increased participant's knowledge and understanding of local weed biocontrol options, but also clearly showed that participants were more confident to make decisions about weed biocontrol.

Four weeds were identified as most serious for the Central Tablelands area through survey responses – these being blackberry, serrated tussock, St John's Wort and blue heliotrope. The biocontrol options for St John's Wort and blue heliotrope were addressed on the day, along with updates on research into biocontrol agents suitable to use on blackberry and serrated tussock. More workshops and field days on biocontrol and weed identification were identified as activities that were needed in the region into the future. Central Tablelands LLS is currently working with Dr Andrew McConnachie to design a series of smaller follow-on workshops that would include field visits to survey for local weed biocontrol agents.

More workshops across the state will be running in the New Year. Stay tuned for registration details.

Dr Andrew McConnachie addressing the participants at the Bathurst Weed Biocontrol day.

Facebook

To join the **NSW Weed Biocontrol Taskforce** facebook page simply search for 'NSW Weed Biocontrol Taskforce'. This page is a great outlet for sharing information, including the latest developments in weed and biocontrol research.

nsw weed biocontrol TASKFORCE

NSW Weed Conference

The NSW Weeds Conference this year had a great turn-out with 284 delegates, 25 sponsors and exhibitors, and 60 speakers across nine themes, showcasing new research and ideas for controlling and eradicating weeds. The theme for the conference was to put the 'we' in WEEEEEDS.

Our keynote speaker Professor Kristine French highlighted the importance of working together, reporting metrics, and in particular, the need for highlighting our good news stories so the public receives the right information. Following on from this, Taskforce representative Dr Andrew McConnachie gave a smashing plenary, demonstrating how we are building capacity across the state and internationally in weed biocontrol. Mr Troy Brown provided a talk on how the Taskforce collaborates with land managers and community to maintain a functional biocontrol agent delivery pipeline.

The Taskforce had a strong presence and our stall was a great hit. We do not have the resources to do things on our own, so this collaborative effort was very valuable. Our presence and the many talks on weed biocontrol strongly demonstrated that the partnerships we are building across the state and in working with the community are integral for building a sustainable future.

Thank you to all Taskforce members for facilitating engagement at our stall - well done!

Top: Andrew McConnachie's plenary, putting the 'We' in Weed Biocontrol

Bottom: The NSW Weed Biocontrol Taskforce stall

nsw weed biocontrol TASKFORCE

Want to be involved in Biocontrol Research?

The initial stages of biocontrol research are often done by scientists overseas or behind closed doors within quarantine facilities. But there are ways in which weed officers can be involved and make a valuable contribution to science! Are you interested? Then read on….

1 Collection of weed samples for genetic testing.

The genetic diversity of weed populations can influence the effectiveness of biocontrol agents. If we can determine how many different genetic populations occur in Australia and compare these to populations overseas where the weed is native, we can focus our search for natural enemies on weed genotypes of the closest match.

2 Collection of weed propagules for ecological studies.

Why do introduced plants become invasive? One possibility, known as the Enemy Release Hypothesis, is that introduced plants lack natural enemies and therefore, can put their resources into growing bigger, stronger and more reproductive. Scientists wishing to study the mechanisms behind weed invasion often set up "common garden experiments", where populations of the weed from native and invaded ranges are grown side by side and various plant traits compared. Such studies are often linked to the population genetic studies mentioned above, to see if there is an underlying genetic basis for the weedy traits of some introduced plants.

Both studies often require plant samples to be collected from multiple sites and multiple locations across the weed's invaded and native range. For genetic studies, the samples require preservation in silica gel. For ecological studies, viable propagules such as seeds or tubers are required.

Requests for plant samples are listed below. Please contact the relevant scientists to express your willingness to help and to obtain further information on the collection technique.

Weed: Nodding thistle, *Carduus nutans*

Purpose: PhD student wanting to grow nodding thistle from the UK, NZ and Aus in a common garden experiment in the UK.

Contact person: Quentin Paynter Manaaki Whenua – Landcare Research New Zealand PaynterQ@landcareresearch.co.nz

Weed: Serrated tussock, *Nassella trichotoma*

Purpose: Population genetic study to determine the genetic diversity of invasive Australian and New Zealand populations, compared to native populations in Argentina

Contact person: Raelene Kwong Agriculture Victoria Rae.kwong@agriculture.vic.gov.au

Weed: Sagittaria, *Sagittaria platyphylla*

Purpose: Common garden experiment to be conducted in the USA (native range), comparing native populations with those from Australia and South Africa.

Contact person: Raelene Kwong Agriculture Victoria Rae.kwong@agriculture.vic.gov.au

nsw weed biocontrol TASKFORCE

New Taskforce Priorities

Looking forward, new priorities for the Taskforce include the biocontrol of African lovegrass, African boxthorn, silverleaf nightshade, privets, Harrisia cactus, Cape and Scotch broom, gorse, broadleaved pepper tree, blue heliotrope, sagittaria and wandering trad.

Become a Taskforce member and register with NSW DPI's Weeds Extranet to find out more information on biocontrol agent availability and Taskforce priorities (see Table 1).

Table 1. Current agents available for redistribution in NSW

Weed	Weed scientific name	Agent common name	Agent scientific name
Alligator weed	*Alternanthera philoxeroides*	Flea beetle	*Agasicles hygrophila*
Cat's Claw Creeper	*Dolichandra unguis-cati*	Jewel Beetle Tingid bug	*Hylaeogena* jureceki *Carvalhotingis visenda*
Crofton Weed	*Ageratina adenophora*	Crofton weed rust fungus	*Baeodromus eupatorii*
Cylindropuntia spp. and *Opuntia* spp.	A range of species (and in some cases various lineages) are available for cactus biocontrol. *See the weeds extranet for more details*	Cochineal Moth	*Dactylopius* spp. and their lineages *Cactoblastis cactorum.*
Madeira vine	*Anredera cordifolia*	Madeira beetle	*Plectonycha correntina*
Salvinia	*Salvinia molesta*	Salvinia weevil	*Cyrtobagous salviniae*
Wandering trad	*Tradescantia flumenensis*	Smut fungus	*Kordyana brasiliensis*
Water hyacinth	*Eichhornia crassipes*	Water hyinth weevils (temperate) (sub-tropical)	*Neochetina bruchi* *Neochetina eichhorniae*
Water lettuce	*Pistia strateoites*	Water lettuce weevil	*Neohydronomous affinis*
Weedy Sporobolus grasses	*Sporobolus pyrimidalis, S.fertilis, S.africanus*	Crown rot	*Nigrospora oryzae*

See the Weeds Extranet for more details: https://extranet.dpi.nsw.gov.au/weeds

Many thanks for your support this season
Steering Committee: NSW Weed Biocontrol Taskforce

For further information about the Taskforce please contact Executive Officer
Troy Brown 02 6640 1649 or weed.biocontrol@dpi.nsw.gov.au

No Space for Weeeeeeeeeeeeeeeds

2019 Annual General Meeting

President's Annual Report

I would like to extend a welcome to everyone who has been able to attend this meeting and thank you for being here today. The tireless input from our members who volunteer their time helps this Society to succeed and grow in strength, and attending meetings is a vital part in delivering benefits to our members and a necessity to ensure that we strive to meet expectations. I thank you for your time and effort.

Our membership increased this year by 44 new members, so thank you for joining and welcome to our family. On a sad note, we lost a few of our members as well especially long term members Richard Carter and Don MacKenzie. Our sympathy goes to all the families for their loss.

We also were the beneficiary of $600 from the wonderful family of Kelvin Green one of our original members and past president of the Society. Thank you to the family for this wonderful donation.These funds will be used over the next 5 years to help support the undergraduate prizes with the names of these prizes to be The Weed Society of NSW Kelvin Green Student Prize in honour of Kelvin.

This year was another important year for the Society with the very successful 20th NSW Biennial Weeds Conference, which was held at Newcastle in August. The conference committee from the Hunter region worked tirelessly for the past two years to coordinate a very successful conference with the attendance of over 300 delegates, one of the largest NSW conferences for many a year. Thank you to each of our members for the work that you have done behind the scenes. What a great bunch of people. In addition, a big thanks to Nerida Worboys from Abercombie Management, for being a great PCO for this conference. I know that everyone at the conference had a great time.

The conference produced some deserving winners of the Weed Society sponsored Awards. The winners were Andrea Fletcher for the Buerckner Award, David Pomery for the Stephenson Award and Mel Hall for the NSW Weed Industry Award. Both David and Mel are members of our Society and both received a bonus of $500 to go towards attending a weeds conference of their choice over the next 2 years.

The Society has continued to support undergraduate studies in weed science through academic prizes with a number of tertiary institutes. Encouraging future weed scientists or weed management practitioners is important if we are to continue to develop and maintain successful weed management programs. Congratulations to our prize-winner for this year: Chris Curtis from Charles Sturt University.

Our wonderful sponsorship has increased this year to 8 sponsors so I would like to thank each of you for supporting the Society during 2019, Corteva Agriscience, Macspred, ChemCert Australia, Scotts, Bayer, Australian Catchment Management, Truxor Australia and Hunter Central Coast Weeds. Thank you so much.

As I wrap up this review of the last twelve months, I would like to thank all my executive committee for their tireless participation and service to the society in the various roles that they have played. Having such an active executive committee helps ensure the society collectively gets the best outcomes for all members.

Kim Hignell

2019 Annual General Meeting

THE WEED SOCIETY OF NSW, INC.
A.B.N. 87 562 970 261
FINANCIAL REPORT FOR THE YEAR ENDED
30 SEPTEMBER 2019

STATEMENT BY MEMBERS OF THE COMMITTEE
The Committee has determined that the society is not a reporting entity and that this special purpose financial report should be prepared in accordance with the accounting policies outlined in Note 1 to the financial statements.

The Committee declares that:
1. The financial statements and notes present fairly the financial position of the Weed Society of NSW, Inc as at 30 September 2019 and its performance for the year ended on that date in accordance with the accounting policies described in Note 1 to the financial statements; and

2. In the committee's opinion there are reasonable grounds to believe that the Weed Society of NSW, Inc. will be able to pay its debts as and when they become due and payable.

This statement is made in accordance with a resolution of the Committee and is signed for and on behalf of the Committee by:

President: Kim Hignell
Treasurer: Doug Campbell
Dated: 29nd November 2019

BALANCE S H E E T
AS AT 30 SEPTEMBER 2019
THE WEED SOCIETY OF NSW, INC
A.B.N. 87 562 970 261

ASSETS

Current assets		
Cash on Hand/Cash Equivalents.	**2019**	**2018**
Bendigo Bank - Cheque Account	-	$16,249.98
Commonwealth Working Account	$55,838.49	
Commonwealth Card Account	$495.00	
Bendigo Term Deposit - 2506	$21,054.23	$21,054.23
Bendigo Term Deposit - 2507	$20,957.93	$20,957.93
Total Cash on Hand	**$98,345.65**	**$58,262.14**
Total Current Assets	**$98,345.65**	**$58,262.14**
Other Assets		
Seed funding to 21AWC PCO	-	$25,000.00
LIABILITIES		
Loan from CAWS	-	($15,000.00)
Loan from Conference Future Fund	-	($10,000.00)
NET ASSETS	**$98,345.65**	**$58,262.14**

2019 Annual General Meeting

THE WEED SOCIETY OF NSW, INC
A.B.N. 87 562 970 261
PROFIT AND LOSS STATEMENT
FOR THE YEAR ENDED 30 SEPTEMBER 2019

INCOME	**2019**	**2018**
Member Subscriptions	$8,575.00	$6,100.00
Profit share from 21AWC	$38,851.80	
Sponsorship - General	$2,400.00	$2,100.00
Miscellaneous Income	$600.00	$49.41
TOTAL INCOME	**$50,426.80**	**$8,249.41**
EXPENSES		
Merchant Fees	$200.29	$191.66
AGM/Annual Dinner	$397.50	$61.73
CAWS - subscriptions	$200.00	$200.00
Insurance - Public Liability	$816.42	$816.42
Buerckner/Stephenson Award	$1,000.00	$60.00
Dept. Fair Trading	$46.00	$45.00
Postage - General	$58.00	$11.35
Postage – Subscription Notices	$288.36	$24.63
PO Box Expenses	$63.50	$65.00
Travel Grant	$2,979.00	
Student prize	$250.00	$250.00
Medal for Excellence	$46.60	$109.30
NSW Conference - sponsorship	$5,500.00	-
NSW Conference - misc	$344.80	-
Committee - teleconference	$597.42	$750.17
21AWC Teleconferences	$1,189.77	
Printing General	$229.90	
Website	$462.00	$385.00
Miscellaneous Expenses	$72.40	$66.07
TOTAL EXPENSES	**$10,343.29**	**$7,435.00**
OPERATING PROFIT	**$40,083.51**	**$814.41**
OTHER INCOME		
Interest Income	$899.12	
TOTAL OTHER INCOME	$0.00	$899.12
NET PROFIT (LOSS)	**$40,083.51**	**$1,713.53**

SUCCESSES AND PITFALLS – A REVIEW OF FOUR HISTORICAL WEED INCURSIONS IN NSW

Philip Blackmore
State Priority Weeds Coordinator - Woody Weeds and Cactus
NSW Department of Primary Industries, Armidale
philip.blackmore@dpi.nsw.gov.au

INTRODUCTION

This paper reviews four historical weed incursions to New South Wales (NSW), the short and long term responses to those incursions and the outcomes from those responses. The weeds are:

Fireweed (*Senecio madagascariensis*) Poir.

Serrated Tussock (*Nassella trichotoma*) (Nees) Hack. ex Arechav.

Parthenium weed (*Parthenium hysterophorus*) L., and

Water hyacinth (*Eichhornia crassipes*) (Mart.) Solms in the Gingham Watercourse.

The attitude to the incursion of each of these four weed species, by both landholders and officials, has been quite varied. The potential impact of each species, the identification of control methods relevant to the mechanism of weed spread and an understanding of the need for control of the incursion at an early stage have in most cases been wanting. The review will attempt to establish the reasons behind the successes and failures of responses to these incursions and to identify any commonalities between the approaches from which lessons can be learned.

FIREWEED

Fireweed (*Senecio madagascariensis*) Poir., a wind-spread, short-lived perennial herb, was first collected in NSW in 1918, from Raymond Terrace in the lower Hunter Valley (Australasian Virtual Herbarium, 2019a). It is thought to have been introduced in ship ballast, discharged from vessels that had earlier docked in South Africa and were waiting to load in Newcastle (Sindel, 1986). For many years fireweed was thought to be an invasive form of the native plant known as "variable groundsel" (*Senecio pinnatifolius* syn. *S. lautus*) (Whittet, 1958; Martin and Coleman, 1977; Sindel, 1986). It was not until 1980 that fireweed was confirmed as an exotic invader (Michael, 1981). Following introduction, fireweed spread throughout the lower Hunter Valley. It was introduced to the north coast of NSW in about 1940 in crop seed (Green, 1953). Spread of fireweed continued largely unchecked and it was introduced to the south coast of NSW during the 1979-1983 drought, probably in hay from the Hunter valley (I. Borrowdale, pers. comm.).

Although fireweed was declared a noxious weed in 1946, there were no effective herbicides available to treat infestations. Green (1954) reported that intensive pasture and grazing management could destroy fireweed infestations and prevent reinvasion from neighbouring populations. Work in the late 1970's investigated control using combinations of herbicides, fertilizers and grazing strategies (Martin and Coleman, 1977). Launders (1979) identified bromoxynil as the most effective herbicide for fireweed control. However, no significant ecological studies of fireweed were completed until ten years later (Sindel, 1989).

Community concern about the spread and increase in density of fireweed on the NSW south coast during the Millennium drought (1997-2009) caused the Minister for Primary Industries to request advice on fireweed management from the Noxious Weeds Advisory Committee (NWAC, 2008). The response of NSW Department of Primary Industries to this review was to employ a project officer for two years to demonstrate the effectiveness of a range of herbicide treatments to landholders and producers.

Fireweed is now endemic to coastal NSW. It has spread onto coastal highland areas such as the Dorrigo plateau and Kangaroo Valley and is spreading onto the eastern edges of the northern and southern tablelands. As a Weed of National Significance, fireweed plants are prohibited from sale under the Biosecurity Regulation 2017. Fireweed is not listed as a priority weed in any coastal area under the Regional Strategic Weed Management Plans, although the General Biosecurity Duty applies to all landholders in relation to fireweed. The eradication of fireweed is required

for land in the Central Tablelands, Central West, Riverina regions and the southern tablelands area of the South East region.

SERRATED TUSSOCK

Serrated tussock (*Nassella trichotoma*) (Nees) Hack. ex Arechav., a wind spread tussock forming perennial grass, is believed to have been introduced to Australia in the early 1900's (Parsons and Cuthbertson, 2001). It is not known whether serrated tussock was introduced directly from South America or indirectly from South Africa, possibly as stuffing in military saddles brought back to Australia after the Boer War (M. Michelmore, pers. comm.). It became established in the Yass River valley (Land, 1937b) and was commonly known as Yass River Tussock (Cross, 1937), although it was originally known locally as "Thompson's Curse" (Yass Tribune-Courier, 1936).

A sample of serrated tussock was submitted to the NSW Herbarium in 1935, which took more than two years to identify (Cross, 1937), in part, because the botanists had never seen a grass from the Nassella genus and because the sample did not include flowers or seeds. By 1937 more than eighty landholders in the Yass district were so alarmed by the spread and impact of serrated tussock that they presented a petition to the Goodradigbee Shire Council (the shire surrounding Yass) calling for the species to be declared noxious (Farmer and Settler, 1937). It was declared later that year (Land, 1937a) after the NSW Herbarium had formally identified the species (Cross, 1937).

In 1937, local and state officials agreed about the area of land in the Yass valley heavily infested with serrated tussock but disagreed about the area and potential impact of scattered infestations (Sydney Morning Herald, 1937; Land, 1937b), which may have occupied more than 20 000ha (Yass Tribune-Courier, 1936). The NSW Department of Agriculture (Land, 1937b) was aware of another infestation at Rockley, south of Bathurst, of about 40ha.

In the 1930s the only controls for serrated tussock were hand chipping scattered plants or to spray larger infestations with a sodium chlorate, a knockdown herbicide that was largely ineffective (Healy, 1945). Carn (Land, 1937b) was of the opinion that serrated tussock invaded overgrazed pastures and recommended cultivation of arable lands infested with serrated tussock, followed by the sowing of improved grass and legume pastures to suppress the growth of serrated tussock seedlings.

The manpower shortage on farms during World War 2 reduced the amount of serrated tussock control that could be carried out by hand chipping. Drought affected NSW during most of the war years (BoM, 1999). After the war better seasons prevailed from 1947 into the 1950's and during this period many new infestations of serrated tussock were reported on the southern and central tablelands of NSW (Australasian Virtual Herbarium, 2019b) where it has become widely established. Serrated tussock was introduced to the northern tablelands near Rockvale, north east of Armidale before 1955 (Australasian Virtual Herbarium, 2019b) and later, south of Armidale in hay brought from the southern tablelands during the 1965 drought (B. Tombs, pers. comm.).

Commencing in 1958, M.H. Campbell, a research officer from the NSW Department of Agriculture, produced a series of papers over the following 30 years on the distribution, ecology and control of serrated tussock (Campbell and Vere, 1995). The introduction of fluproponate (tetrapion, Frenock®), a selective herbicide for the control of perennial grasses in 1978 was a leap forward in the control of serrated tussock, especially when integrated with improved pasture establishment (Campbell *et al*., 1979).

The declaration of serrated tussock as a noxious weed does not appear to have been an effective tool in containing the spread of this species. However, it has been reasonably effective at achieving the suppression of scattered populations of serrated tussock on the northern tablelands.

As a Weed of National Significance, serrated tussock plants are prohibited from sale under the Biosecurity Regulation 2017. Although serrated tussock is listed as a priority weed in all tablelands areas under Regional Strategic Weed Management Plans, the control requirement is no higher than "protect priority sites" except for the western edges of those areas, where high level suppression is required.

PARTHENIUM WEED

Parthenium weed (*Parthenium hysterophorus*) L., was introduced into Queensland as a contaminant of pasture seed in 1958 (Everist, 1976). It became naturalised in the central highlands region of that state, where spread was aided by land clearing operations during the Brigalow Development Scheme (Holman, 1981). The impact of Parthenium weed

was not appreciated until a series of favourable seasons commencing in 1973 promoted an alarming increase in its spread and density (Haseler, 1976). It is now endemic throughout the central highlands area and regular isolated outbreaks occur in all surrounding areas.

The NSW Department of Agriculture became aware of the threat posed by Parthenium weed in 1976 (Mears, 1976). Work to develop a strategic response to Parthenium weed incursion commenced in 1978 (Brown, 1978), four years before the first discovery of an infestation in NSW. The response identified potential invasion pathways and methods to intercept those pathways using existing resources.

Parthenium weed was first discovered in NSW in 1982 (Blackmore, 1997). Almost 800 infestations have been discovered in NSW between 1982 and 2019, the greater majority being in Moree Plains Shire (Blackmore and Johnson, 2010; Blackmore, unpublished data). The number of new incursions peaked in 1989. Most infestations have occurred on roadsides and have consisted of less than 10 plants with the greatest proportion of roadside infestations occurring along the Newell Highway between Goondiwindi and Narrabri. All infestations have been eradicated or fully suppressed. Many of these infestations have been linked to deliveries of Queensland oilseeds, contaminated with Parthenium weed seed, to oilseed extraction works in Moree and Narrabri (Brown, 1986). The Narrabri works now only processes locally sourced cotton seed and the Moree works (Gwydir Valley Oilseeds) was closed in 2001. Since then, roadside infestations in Moree Plains and Narrabri Shires have fallen almost to zero (Blackmore and Johnson, 2010; Blackmore, unpublished data). Numerous incursions have been discovered on other roads entering NSW from Queensland.

A much smaller number of incursions have occurred on private property, with 67 infestations recorded between 1983 and 2019 (Blackmore, unpublished data). Most infestations have occurred in the north of the state, to the west of the Great Dividing Range but infestations have also occurred in the central western plains and the Riverina. All of these incursions have been linked to human activity and in particular, the movement of grain harvesting machinery (headers) from Queensland into NSW and the operation of that machinery in NSW.

Approximately 500 headers enter NSW from Queensland each year but this can vary between 100 and 850 depending on the size of the Queensland wheat crop. Unregulated movement of harvesting machinery entering NSW from Queensland caused several outbreaks on farming land before legislation was introduced in 1984 imposing hygiene standards for entry to NSW (Brown, 1986). Inspection of harvesting machinery was carried out by existing stock inspectors at the cattle tick inspection stations already in place. Three clean-down sites at the main border crossing points of Goondiwindi, Mungindi and Hebel have been established by NSW Department of Primary Industries, to encourage the cleaning of headers at three known locations, rather than at many unknown locations in southern Queensland.

Amendments to existing legislation covering the movement of harvesting machinery into NSW from Queensland were introduced in 1997 and new legislation was introduced in 2017 with the Biosecurity Act 2015. The inspection procedures were upgraded in accordance with each set of new statutory requirements. Since 1997, the number of new outbreaks of Parthenium weed linked to grain harvesters has declined significantly (Blackmore and Johnson, 2010). In turn, this has meant a decline in all outbreaks on private properties.

The natural mechanism for spread of Parthenium weed seed is along waterways in flood flows. As the core areas of Parthenium weed infestation in Queensland in the late 1970's were outside the Murray-Darling Basin (Haseler, 1976), there was limited threat of spread by natural forces into NSW. However, Parthenium weed is now established in the Maranoa River upstream from St George and is slowly spreading south towards NSW (C. Hunter, pers. comm.).

Other invasion pathways for Parthenium weed have been assessed, including; cotton harvesting machinery, hay and silage making machinery, earthmoving machinery, mining and mineral exploration machinery, livestock and livestock transports, cars and caravans, and hay, grain and seed (Blackmore and Johnson, 2010). Of these pathways, only mineral exploration machinery has been considered sufficiently high risk to be more actively regulated, despite no infestations being linked to that machinery to date.

Commencing in 1996, the NSW Parthenium Weed Taskforce became the coordinating group for the NSW Parthenium Weed Strategy, replacing an earlier committee. The Taskforce has enjoyed the continuity of a single convenor

during its life. The goal of the Strategy since its inception has been to prevent the establishment of Parthenium weed in NSW. To date this has been achieved. There continues to be no self-sustaining populations of Parthenium weed in NSW. The NSW Government has remained committed to the Strategy from its inception and this support has been critical to its success. Parthenium weed is listed as Prohibited Matter under the *Biosecurity Act 2015*.

WATER HYACINTH – GINGHAM WATERCOURSE

Water hyacinth (*Eichhornia crassipes*) (Mart.) Solms, is an emergent free floating perennial aquatic plant. Water hyacinth was first found in the Gingham Watercourse (the Watercourse), an ephemeral flood channel north west of Moree, in 1955. It had probably escaped from a garden pond during a flood (Strang *et al.*, 1972). By 1976, 7000ha of the Watercourse were infested (Smith *et al*., 1984). Strang *et al.* (1972) considered that water hyacinth from this infestation could have easily escaped into the Murray-Darling River system.

Flooding in the Watercourse caused by upstream rain events produced localised verdancy in stark contrast to the surrounding dry countryside. Land was selected for agriculture in the Watercourse because it was subject to regular inundation (Curran, 1969). Two significant floods in the Gwydir valley in 1956 assisted the establishment of the infestation (Strang *et al*., 1972), which had become apparent by 1958. In 1964 the NSW Department of Agriculture and the Water Conservation and Irrigation Commission urged Boomi Shire Council to enforce control of the emerging infestation in the Watercourse while it was still at a manageable level. However Boomi Shire Council took no action, even when drought in the following year offered a perfect opportunity (BLWA 1965; Strang *et al*., 1972). By 1970 the size of the infestation started to cause local concern (Moree Champion, 1970). Yet Boomi Shire Council continued to take no action and finally, when the situation had become critical, baulked at the huge potential cost of control works, seeing this as a responsibility for state and national governments (Northern Daily Leader, 1972).

Unpublished letters and meeting minutes held at the NSW Department of Primary Industries Armidale Office have revealed the following information: in 1972, a meeting between the NSW Department of Agriculture and Boomi Shire Council established that Boomi Shire had never served notices on landholders in the Watercourse for water hyacinth and according to the Shire Clerk, the shire was unlikely to do so.

In 1972 the Premier of South Australia was becoming concerned about the threat of the Gingham infestation to the whole of the Murray-Darling River system, which was considered to be imminent. By the end of the year the Australian Weeds Committee had formed a tristate working panel to consider approaches to control the infestation. The working panel (AAC84/SCA90/26) recommended that:

- herbicides should not be regarded as the sole answer to the problem and that a combination of drainage and local use of herbicides offered the best prospects for control,
- any drainage scheme should cause minimal disturbance to flooding patterns,
- the water hyacinth be contained by spraying the western fringe of the infestation,
- Boomi Shire appoint a competent weeds officer,
- the limits of the existing infestation be determined and that regular downstream surveillance take place, and
- the state government make a special allocation of funds to support the control work on private property.

The control program commenced soon after the creation of the inter-departmental project team in 1976 (Smith *et al*., 1984). The program was funded by equal grants from NSW, Victoria, South Australia and the Commonwealth and the total contributions were $550 000 (Smith *et al*., 1984). The program was carried out in accordance with the recommendations of the working panel and was conducted in three phases.

The first phase was to destroy the existing infestation. This was implemented by:

- building earth dams at the Gwydir Pool to prevent inflow into the Watercourse during times of normal flow in the Gwydir,
- clearing the main channel with a specialised bulldozer to drain the larger swamps,
- aerially spraying selected channels with herbicide,

- land based treatment of water hyacinth with herbicides initially from a specialised amphibious vehicle (the Tortoise) and later from four wheel drive trucks (SPCC, 1978),
- containing westward movement of floating water hyacinth plants by constructing a netting fence was at a narrow point above the Gingham Bridge.

The second phase of the program was to exhaust the seed bank by promoting the recruitment of seedlings and destroying those seedlings prior to flowering (Smith *et al*., 1984). This was attempted in 1980 and 1981 by a program of local flooding in the watercourse but was only partially successful due to limited water flows in the prevailing drought conditions and was finally abandoned in the severe drought of 1982 (Smith *et al*., 1984). The third phase of the program was to trial biological control. This was not successful.

The ecology of water hyacinth in a warm temperate environment was not well known at the time. The University of New England under the leadership of Dr John Duggin from the School of Rural Science and Natural Resources was commissioned to study aspects of the water hyacinth seedbank, including the longevity of seed in the seedbank and methods of reducing viability of that seed (Smith *et al*., 1984).

In 1983, the tristate project was concluded. Responsibility for implementing the project passed to the newly formed Moree Plains Shire Council. Water hyacinth in the Watercourse appears to have remained under control for the next 13 years. Irrigated cropping developed in the Gwydir valley in the 1980's after the completion of Copeton Dam, with the demand for water by the expanding cotton industry reducing flows into the Watercourse. During the series of dry years from 1978-1983, the Gingham Watercourse Association lobbied successfully for the construction of a stock and domestic water supply channel through the Watercourse and a stock and domestic water allocation (S. Murphy, pers. comm.).

Flooding in the Gwydir valley in late 1995 and early 1996 re-established water hyacinth in the Watercourse from the existing seedbank. More floods during the remainder of the 1998 and the first half of the 2000's expanded the infestation (Albertson, 2008). Apart from periods of flooding, a combination of natural flows through the Watercourse and allocated flows for stock and domestic purposes and for environmental benefit assisted in maintaining the water hyacinth population (J. Duggin, pers. comm., Albertson, 2008). Although responsibility for control of water hyacinth in the Watercourse rests with individual landholders, the logistics of controlling plants in inundated country are challenging and not practicable for most landholders.

The following year, Moree Plains Shire Council convened a workshop that developed a new management plan for the Watercourse. The plan failed, for the want of a disinterested leader, with several interested parties making conflicting demands on the size and timing of water flows through the Watercourse.

Ad hoc control of water hyacinth continued until 2005 when it became apparent that water hyacinth was spreading westward along the stock and domestic channel and had spread beyond the limits of the 1970's infestation. Water hyacinth was spreading downstream at about one kilometre per annum and by 2009 was 15km further west than in 1996. Established populations of water hyacinth were less than 45km from the Barwon River which greatly increased the probability that water hyacinth may escape into the Murray-Darling System during a significant flood event (Albertson, 2008). A flood in 1998 had passed through the full length of the Watercourse and reached the Barwon River.

The problem was ultimately relieved by two water supply projects unassociated with water hyacinth control. The first was a project to decommission the existing free flowing artesian bores and to sink new capped bores supplying piped stock water to troughs. The second project was to install ground water bores to each homestead. Together, these projects eliminated the need for stock and domestic flows through the Watercourse. The stock and domestic channel was now redundant and was blocked at a number of points (Albertson, 2008). Moree Plains Shire Council has successfully controlled with herbicides all infestations of water hyacinth downstream from the Gingham Waterhole.

As a Weed of National Significance, water hyacinth plants are prohibited from sale under the Biosecurity Regulation 2017. All land west of the Great Dividing Range is subject to a Biosecurity Zone under the *Biosecurity Act 2015*, with the exception of Moree Plains Shire Council. However, water hyacinth is a containment target for the North West Regional Strategic Weed Management Plan, except for the core area of infestation in the Watercourse.

DISCUSSION

The incursions of fireweed and serrated tussock seem to have generated no sense of urgency by state or local government officials until these species had become so widespread that containment was impossible. The spread of water hyacinth in the Watercourse was due solely to the inaction of Boomi Shire Council, over which the NSW Department of Agriculture had no authority. There seemed to be reluctance at a local level to declare weeds "noxious" until they were well established. A "wait and see" attitude appeared to prevail.

Prior to the 1960's, the lack of effective controls for many weed species, beyond chipping by hand, required early detection and rapid response to new incursions to be paramount. This did not happen in the case of these three species. Poor or delayed identification was an issue with fireweed and serrated tussock. There also appears to be a lack of understanding of strategic weed management at a local level, with a strong focus on the core infestations (Sydney Morning Herald, 1937) at the expense of outliers. Cross (1937), urged immediate action to contain and eradicate new incursions of serrated tussock but this did not appear to have been implemented and was hampered by the manpower shortages of the Second World War. In all three cases, there appears to have been a "this plant won't grow here" attitude, a belief that particular areas were outside the optimal range for these species, particularly, serrated tussock on the northern tablelands (M. Duncan, pers. comm.), fireweed on the south coast (W. Johnston, pers. comm.) and water hyacinth west of the Great Dividing Range (Strang *et al*., 1972).

The lack of response to fireweed, serrated tussock and water hyacinth may be contrasted with the response to Parthenium weed, albeit with the benefit of foreknowledge and in dealing with a weed that was spread by long distance human dispersal rather than by natural forces. Plans to deal with this species were in place before the first incursion was discovered, a major invasion pathway was intercepted at early stage and the response to incursions was immediate and effective. The large number of incursions on the Newell Highway might have been prevented if the powers to deal with carriers, enacted by the *Biosecurity Act 2015*, had been available in 1985.

From the above examples, it is apparent that the essence of successful official programs to deal with incursions of new weed invaders will be:

- Active and passive inspection programs to ensure early detection of new invaders and to establish the extent of any new incursion,
- Rapid and correct identification of new invaders,
- Knowledge of the invaders ecology, including mechanisms for spread,
- Rapid response to the incursion in a planned and strategic approach, controlling outliers as a priority,
- Availability of effective and economic control methods,
- Identification of invasion pathways and interception of those pathways where possible,
- Willingness to fully implement the biosecurity legislation and to lead and coordinate the program, and
- Commitment to implementing and resourcing the program.

Panetta and Scanlan (1995) considered early detection to be the key factor.

REFERENCES

Albertson, D. (2008). Wetland flooding and environmental flows. Unpublished report. NSW Department of Conservation and Climate Change. 3 pp

Australasian Virtual Herbarium (2019a). Senecio madagascariensis – oldest record for Australia. https://avh.ala.org.au/occurrences/e8b4c888-e652-4878-8953-805fa9f4cf9a Accessed 7 July 2019.

Australasian Virtual Herbarium (2019b). Nassella trichotoma https://avh.ala.org.au/occurrences/search?taxa=Nassella%20trichotoma#tab_mapView Accessed 7 July 2019.

BoM (1999). The World War II droughts 1937-45 *Climate Education*. Australian Bureau of Meteorology. http://pandora.nla.gov.au/pan/96122/200903171643/www.bom.gov.au/lam/climate/levelthree/c20thc/drought3.html Accessed 7 July 2019.

Big Leather Watercourse Association Members (BLWA) (1965). Report of Watercourse Survey. Unpublished Report. Big Leather Watercourse Association. Moree. 3pp

Blackmore, P.J. (1997). Parthenium Weed Update. Proceedings of the 9th Biennial Noxious Weeds Conference. pp. 18-23. NSW Department of Agriculture, Dubbo.

Blackmore, P.J. and Johnson, S.B. (2010). Continuing successful eradication of Parthenium weed (*Parthenium hysterophorus*) from New South Wales, Australia. Proceedings of the 17th Australasian Weeds Conference, Christchurch, New Zealand. Ed. S.M. Zydenbos. New Zealand Plant Protection Society. Christchurch, New Zealand. pp 382-5

Brown, D. (1978). Parthenium weed survey, Goondiwindi May 1978. Unpublished report. NSW Dept. of Agriculture. Tamworth NSW. 3 pp.

Brown, D. (1986). Parthenium weed in NSW – An overview. Unpublished report. NSW Dept. of Agriculture. Tamworth NSW. 6 pp.

Campbell, M.H, Gilmour, A.R. and Vere, D.T. (1979). Effect of time and rate of application of herbicides on serrated tussock (*Nassella trichotoma*) and improved pastures species. 2. Flupropanate. *Australian Journal of Experimental Agriculture and Animal Husbandry.* 19, 476-80.

Campbell, M.H and Vere, D.T. (1995). Nassella trichotoma (Nees) Arech. In 'Biology of Australian Weeds, Volume 1'. pp. 189-202. R.G and F.J. Richardson, Melbourne.

Cross, D.O. (1937). Yass River Tussock – A troublesome new introduction. *The Agricultural Gazette of New South Wales.* 48, 546-8.

Curran, J.D. (1969). The Raft on the Gwydir River. Unpublished Report. Water Conservation and Irrigation Commission of NSW. 5pp plus maps and photographs.

Everist, S.L. (1976). Parthenium weed. *Queensland Agricultural Journal.* 102: 2.

Farmer and Settler (1937). Ban Sought for Yass River Tussock. *Farmer and Settler* Thursday 20 May 1937. Page 8. https://trove.nla.gov.au Accessed 7 July 2019.

Green, K.R. (1953). Fireweed. *The Agricultural Gazette of New South Wales.* 64, 527.

Green, K.R. (1954). Pasture Management Kills Fireweed. *Dungog Chronicle : Durham and Gloucester Advertiser. Wednesday 15 December 1954 p.1.* https://trove.nla.gov.au

Haseler, W.H. (1976). Parthenium hysterophorus L. in Australia. *PANS* 22 (4): 515-7.

Healy, A.J. (1945). Nassella Tussock. Field studies their agricultural significance. Department of Scientific and Industrial Research New Zealand. Bulletin No. 91. Cited in Campbell, M.H and Vere, D.T. (1995) Nassella trichotoma (Nees) Arech. In 'Biology of Australian Weeds, Volume 1'. pp. 189-202. R.G and F.J. Richardson, Melbourne.

Land (1937b). Pastures Will Check Yass River Tussock. The *Land* newspaper. Friday 10 December 1937, page 7. https://trove.nla.gov.au Accessed 7 July 2019.

Land (1937a). Yass River Tussock Declared Noxious. The *Land* newspaper. Friday 15 October 1937. https://trove.nla.gov.au Accessed 7 July 2019.

Launders, T.E. (1979). Can fireweed (*Senecio lautus*) be extinguished? *Australian Weeds Research Newsletter* 27, 26-7.

Martin, R.J. and Coleman, R.L. (1977). The effect of fertilizers, herbicides and grazing intensity on the Incidence of fireweed (*Senecio lautus*) in sub-tropical pastures. *Australian Journal of Experimental Agriculture and Animal Husbandry.* 17, 296 -300.

Mears, A.D. (1976). Parthenium weed – will it cross the border? *Agnote* Unpublished report. NSW Department of Agriculture. Sydney. 2 pp.

Michael, P.W. (1981). Alien plants. In Australian Vegetation, ed. R.H. Groves, pp 44-64 (Cambridge University Press, Cambridge). Cited in Sindel, B.M., Radford, I.J., Holtkamp, R.H., Michael, P.W. (1998) *Senecio madagascariensis* Poir. In *The Biology of Australian Weeds, Volume 2.* Eds. F.D. Pannetta, R.H. Groves and R.C.H. Shepherd. R.G. and F.J. Richardson, Melbourne. pp. 247-67.

Moree Champion (1970). Hyacinth spread causes concern. *Moree Champion*. 20th August.

Parsons, W.T. and Cuthbertson, E.G. (2001). Parthenium Weed in 'Noxious Weeds of Australia, Second Edition' pp. 292-6. CSIRO Publishing, Melbourne, Australia.

NWAC (2008). Advice to the Minister for Primary Industries on fireweed management in NSW. Noxious Weeds Advisory Committee of NSW. Kidd, R. (Chair), Rudd, R. and Blackmore, P.J. 32 pp.

Panetta, F.D. and Scanlan, J.C. (1995). Human involvement in the spread of noxious weeds: what plants should be declared and when should control be enforced? *Plant Protection Quarterly,* **10(2):** 69-74.

Sindel, B.M. (1986). The ecology and control of fireweed (*Senecio madacascariensis* Poir.). *Plant Protection Quarterly*. 1(4) 163-71.

Sindel, B.M. (1989). The ecology and control of fireweed (*Senecio madacascariensis* Poir.). PhD Thesis, University of Sydney, 283 pp.

Smith, L.W., Williams, R.E., Shaw, M., Green, K.R. (1984). A water hyacinth eradication campaign in New South Wales. Proceedings of the international conference on water hyacinth. pp 925-35

State Pollution Control Commission of NSW (SPCC) (1978). Water Hyacinth Environmental Study – Background Review.

Strang, J., Baldwin, G.B., Borbidge, R.T., Sainty, G.R., Shaw, M.J., Sands, J.R. (1972). Report of the Water Hyacinth Working Panel. *Proceedings of the Standing Committee on Agriculture*. 90: Agenda Item 26

Sydney Morning Herald (1937). Yass River Tussock. *Sydney Morning Herald.* Thursday 18 February 1937, page 7. https://trove.nla.gov.au Accessed 7 July 2019.

Whittet, J.N. (1958). Weeds. NSW Department of Agriculture, Sydney. Yass Courier-Tribune (1936). Letters to the Editor - Yass River Tussock. *Yass Courier-Tribune* Monday 20 July 1936, page 3. https://trove.nla.gov.au Accessed 7 July 2019

Proud Sponsors of 'A Good Weed'