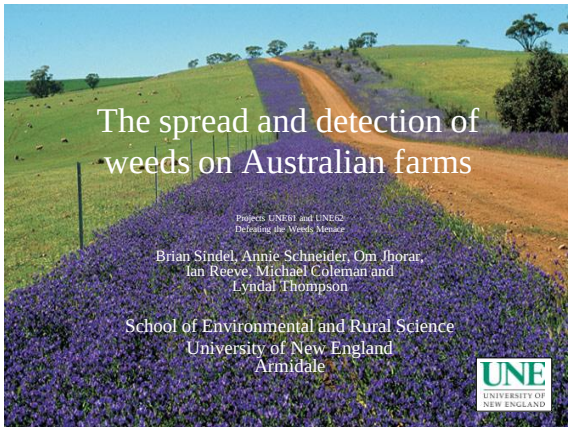


Background


L. Tanner

- One potential way to manage weeds is to stop their ***spread***.
- Pathways risk assessment has been advocated as a means of reducing weed spread into and within Australia.

Background

- ***Detection*** is first step in weed control.
- No national knowledge of weed surveillance practices amongst landholders or weeds inspectors.
- 80% of graziers check for weeds; 10% record or mark them.
- Information on current detection practices is needed before developing and extending better methods for surveying and managing emerging weeds.

Aims

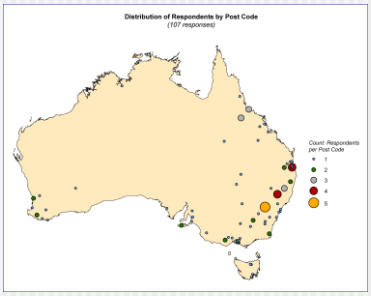
The purpose of this research was to:

- assess the relative risks of sources and pathways of weed spread within Australia;
- identify ways to reduce these risks;
- assess current weed surveillance levels and practices amongst landholders and weeds inspectors; and
- identify ways to improve weed detection by these groups on-ground.

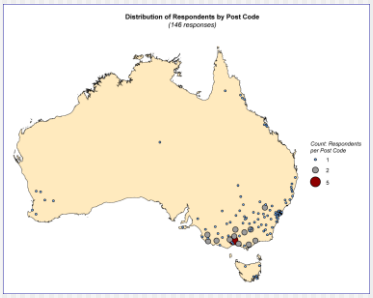
Methods

- Review of literature on weed spread and detection.
- Landholder and weed inspector focus groups scoping the issues surrounding weed detection strategies on-farm.
- 3 national surveys
  - 107 weed experts
  - 600 landholders
  - 146 weed inspectors

Weed experts



Weed inspectors



Farmers

Type of property	Proportion of respondents in State or Territory (%)							
	Qld	NSW	Vic	Tas	SA	WA	NT	Total
Mainly commercial grazing	43.2	**37.3**	55.6	45.5	28.6	26.7	100.0	**41.4**
Commercial mixed cropping and livestock	27.2	**37.3**	27.1	36.4	49.2	61.7	0.0	**36.3**
Mainly commercial cropping	19.2	**11.2**	2.3	0.0	11.1	6.7	0.0	**9.9**
Hobby farm or rural retreat	5.6	**4.3**	11.3	13.6	6.3	3.3	0.0	**6.7**
Mainly commercial horticulture	4.8	**9.9**	3.8	4.5	4.8	1.7	0.0	**5.6**

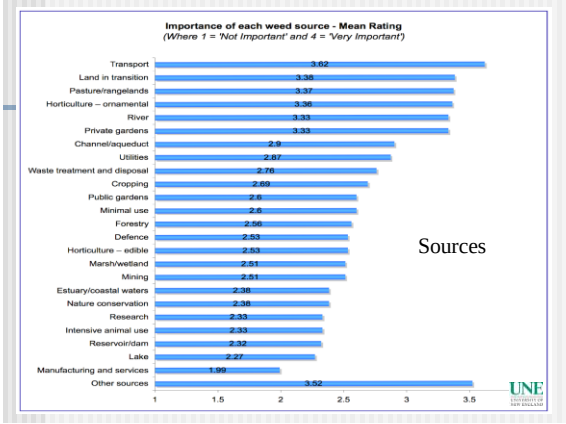
n = 568, chisq = 103.394, d.f. = 24, p < 0.0005.

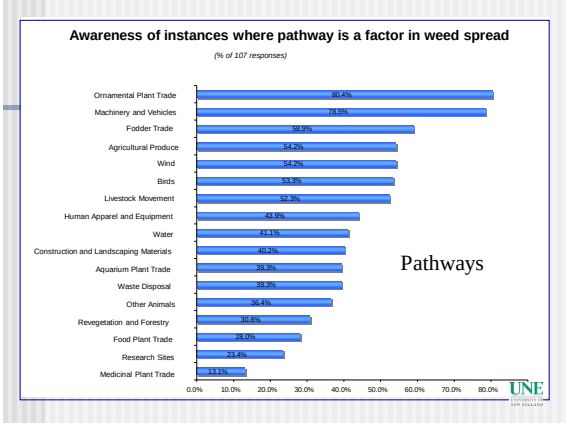
How do weeds spread in Australia?

- Seventeen ***pathways*** (the means by which weed propagules are moved): deliberate spread by humans, accidental spread by humans, and natural spread.
- The number and wide diversity of potential sources and pathways demonstrates the difficulty of the task of preventing weed spread
altogether.

Weed status by industry sector of exotic plant species introduced to Australia (source: Virtue *et al.* 2004)

Industry sector	No. species introduced (*I*)	No. naturalised	Naturalised (% of *I*)
Food crops	221	85	38
Pasture	1,086	349	32
Forestry	633	149	24
Gardening	25,360	1,831	7
Accidental	207	186	90





Likelihood of weed spread – weed inspectors

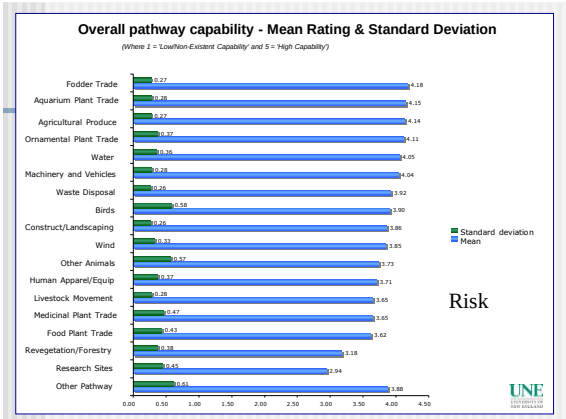
	Victoria	*NSW*	*National*
Birds	1.4	1.3	1.4
Machinery	1.3	1.6	1.4
Wind	1.6	1.4	1.5
Water	1.5	1.5	1.5
Fodder trade	**1.3**	**1.8**	1.7
Other animals	1.8	1.7	1.7
Construction/landscaping	1.7	1.8	1.7
Livestock movement	**1.7**	**2.1**	1.8
Ornamental plant trade	1.8	2.2	2.1
Waste disposal	2.0	2.0	2.1
Aquarium plant trade	2.0	2.3	2.2

UNE

Likelihood of weed spread – farmers (%)

	Victoria	*NSW*	*National*
Birds	34.1	23.6	28.2
Wind	34.1	31.5	27.5
Water	**18.2**	**40.0**	27.5
Vehicles	**8.0**	**22.5**	21.0
Livestock movement	**12.5**	**27.0**	19.2
Fodder movement	**20.5**	**12.4**	15.7
Machinery	**6.8**	**19.1**	14.8
Wildlife/vermin	15.9	14.6	13.6

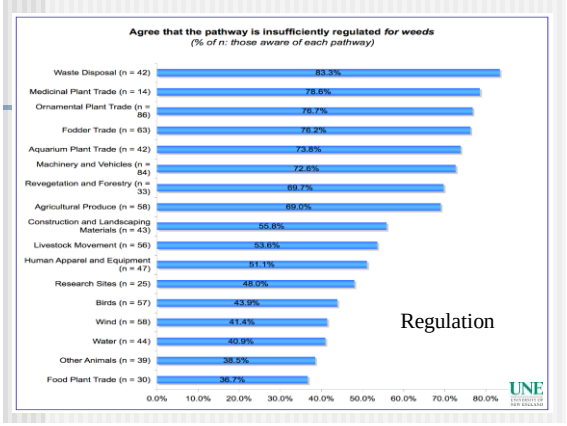
UNE



Changing risks

- Most pathways will remain stable or increase in importance.
- Water - climatic variability (dry times followed by floods), conduciveness for weeds, and declining number of herbicides available for waterways.
- Fodder trade and Agricultural produce - increasing droughts and need to grow hardy fodder crops and transport more fodder.
- Machinery and vehicles - increasing traffic movements, use of contractors and fragmentation of landscapes.
- Ornamental plant trade – growing industry, peri-urban sprawl taking ornamental plants into rural areas, and public demanding drought adapted species for dry gardening.

UNE



Risk management

- ***Regulatory*** and ***management*** strategies likely to impact on pathways involving deliberate or accidental spread.
- Natural pathways generally difficult to regulate or manage.
- Education, extension and publicity was the most common positive approach for improving regulatory effectiveness and management for many of the pathways covered by the survey.

Farmer surveillance for new weeds

- The great majority of interviewees overall (84.3%) check for weeds on a regular basis.
- When checking for weeds: the majority (65.3%) combine weed checking with other on-farm tasks, while a further 23.8 % adopt the combined approach *as well as* undertaking specific weed inspection activity.

Farmer surveillance for new weeds

- 61.3% of interviewees nationally believe that declaration of weeds makes no difference to their checking for weeds (compared with 53.8% of inspectors).
- Only 4.9% of respondents indicated that the impending visit of an inspector makes them change their weed checking activity (compared with 76.9% of inspectors).
- Focus of weed authorities should be on provision of information for landholders (43.4%) vs encouraging reporting of new weeds (16.1%). 28.5% said both.

Weeds of most concern to farmers (%)

	Victoria	*NSW*	*National*
Perennial broadleafs	15.9	**33.7**	29.0
Annual broadleafs	21.6	**37.1**	24.6
Thistles	**36.4**	**23.6**	23.1
Paterson's curse	**37.5**	16.9	18.7
Perennial grasses	14.8	20.2	18.3
Woody weeds	4.5	21.3	18.1
Bathurst burr	13.6	**34.8**	14.4
Blackberry	**38.6**	6.7	12.9
Annual grasses	3.5	14.6	9.5
Capeweed	21.6	4.5	9.0
Ragwort	12.5	0	4.8

Weed distribution information

- Overall, 65.3% believe weed distribution information on private property should be made publicly available.
- NSW interviewees less likely to agree with this than their counterparts, especially those in Queensland (inspectors 45.8% in favour).
- 'Popular' reasons for making the information available included that it made landholders better informed and was in the community interest, while a relatively high proportion suggested that it was an invasion of privacy.

Areas of outbreaks

- The majority of interviewees (67%) believe there are particular areas of the property on which new weeds are regularly found.
- Commonly indicated areas included water courses (41.3% nationally but only 10.3% in SA), traffic areas (18.1%) and boundaries (16.1%) (inspectors included livestock feeding areas).

Surveillance level

- 80.2% of interviewees check for weeds on average every three months or less.
- Overall, 90.9% of a property is said to be checked for weeds (inspectors 62.8%).
- Just over half believe their strategy is 'mostly effective' while nearly 48% said it was 'very effective' (inspectors also reasonably satisfied with their strategies).
- The highest proportion of interviewees overall check when weeds are growing rapidly, particularly after rain.

Surveillance timing

Month when regularly check for weeds	Proportion of respondents in State or Territory (%)							
	Qld	NSW	Vic	Tas	SA	WA	NT	Total
January	60.9	**65.6**	31.7	31.9	34.3	22.9	52.4	46.0
November	56.5	**65.6**	31.7	38.3	32.9	27.1	42.9	45.7
October	50.0	54.1	**38.1**	46.8	35.7	44.3	19.0	45.4
September	39.1	45.9	**41.3**	55.3	47.1	55.7	9.5	44.9
December	54.3	**63.9**	30.2	38.3	35.7	20.0	66.7	44.1
February	56.5	**62.3**	23.8	31.9	25.7	22.9	61.9	41.3
May	21.7	26.2	33.3	21.3	45.7	68.6	19.0	34.7
March	45.7	41.0	25.4	23.4	22.9	18.6	66.7	32.4
April	23.9	29.5	**38.1**	27.7	31.4	31.4	38.1	31.1
June	21.7	16.4	20.6	12.8	37.1	58.6	9.5	26.1
August	23.9	18.0	17.5	29.8	30.0	54.3	9.5	25.1
July	21.7	16.4	12.7	10.6	25.7	54.3	9.5	21.9

n = 378

Weed identification/reporting

- 74.8% ask a local professional for identification advice and 26.6% look the weed up in a book. Sending the weed away for ID is unusual behaviour.
- All of these (+ internet) are regarded highly by inspectors (most common impediment – experience).
- Primary motivation for having weed identified is curiosity (41.9%).
- Factors making landholders reluctant to report weeds – cost of eradication, fear of legal action and worry what neighbours will think.

Landholder commitment

Landholder types less likely to check	Proportion of respondents in property type (%)					
	Grazing	Mixed cropping and livestock	Cropping	Hort	Hobby farm or rural retreat	Total
Hobby farmers/rural retreaters	41.0	31.9	15.6	37.6	**56.0**	**35.9**
Absentee owners	24.0	24.0	21.7	36.4	23.5	24.4
Graziers	17.4	16.5	**34.9**	0.0	8.5	17.4
Landholders with large properties	7.3	10.6	8.6	8.7	7.7	8.8
Lazy/uncommitted landholders	6.6	8.8	20.0	0.0	5.8	8.3
New/inexperienced farmers	7.6	3.1	3.4	0.0	7.7	5.1
Government owners	5.1	4.0	7.1	3.4	6.8	4.9
Croppers	4.7	5.4	4.4	0.0	0.0	4.4
Other	21.6	23.0	21.6	59.2	32.0	24.7

n = 406

Government commitment

Level of commitment of government agencies to detecting and controlling new weed outbreaks	Proportion of respondents in State or Territory (%)							
	Qld	NSW	Vic	Tas	SA	WA	NT	Total
Low	45.6	**49.1**	**72.4**	68.2	41.9	50.8	66.7	54.0
Medium	37.6	**40.5**	**19.4**	22.7	30.6	33.9	33.3	32.4
High	8.8	**9.2**	**6.0**	4.5	17.7	11.9	0.0	9.3
Unsure	8.0	**1.2**	**2.2**	4.5	9.7	3.4	0.0	4.2

n = 568, chisq = 46.795, d.f. = 18, p < 0.0005.

Incentives and improvements for on-ground detection

- Factors mentioned by interviewees included subsidising costs e.g. spray (17.1%), awareness and advertising (16.4 %) and research and publicity into weed cost and impact (14.8%).
- The relatively high proportion indicating education and awareness campaigns and improved communication between weeds authorities and landholders suggests that many farmers feel inadequately informed with regard to weed control.
- Updated local information, particularly amongst non-croppers (inspectors said increased resources, personnel, community education, and time devoted to in-field detection).

Conclusions

- Weeds are *spread* within Australia by a large number of pathways and most have relatively high risks associated with them and most will increase in importance in the future, particularly water, fodder and ornamental plant trade, and machinery and vehicles.
- Not all are readily amenable to management or regulation and in these cases *sources* of weed spread need to be targeted.
- The most important *sources* are transport sites, land in transition, pasture, gardens and rivers.

Conclusions

- People have an important role in mediating dispersal, even by natural agents; extension and education are critical.
- Farmers are generally a committed group of weed detectors; they require encouragement in this role.
- The legally sanctioned surveillance of weeds by inspectors complements the voluntary approach.
- Results on detection and reporting varied between states and landholder types. Research and extension needs to target specific groups appropriately.

Conclusions

- Weeds are only ever rarely eradicated from an area. Those weeds that have been eradicated have been detected early in their spread.
- EARLY detection is vital!

Acknowledgements

- LWA on behalf of the Australian Government Department of Agriculture, Fisheries and Forestry and the Department of the Environment and Water Resources.
- Thankyou to all the organisations and individuals who provided information resulting from their own work and who participated in the surveys.

Further information

- Full reports and *Weed Detection on Farms: A Guide for Landholders* available at www.ruralfutures.une.edu.au