

Assessing weed spread in Australia using pathway risk analysis



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1. Goals

- Assess the relative risks of the different sources and pathways of weed ingress within Australia.
- Identify ways to reduce these risks.

2. Methods

- Identify relevant or potentially relevant pathways.
- Assess the risks associated with each pathway.
- Evaluate ease of pathway management.

The project progressed in two stages:

- a literature review; and
- a survey of Australian experts working in weed science, government and extension.

3. Results

The literature review identified:

- 24 sources of weeds (sites or areas of land from which new weed invasions may emerge); and
- 17 deliberate, accidental and natural pathways of weed spread (means of plant/propagule dispersal).

All weed sources and pathways were included in the survey. Over 100 survey responses were received.

3.1 Important weed sources

- Transport sites.
- Land in transition (degraded, abandoned or unused).
- Pastures/rangelands (grazing land).
- Ornamental horticulture (flowers, plants, bulbs, seeds).
- Private gardens.
- Arable/cropping land (dryland and irrigated).



Pastures and rangelands are considered amongst the most important weed sources in Australia (*Senecio madagascariensis*, Gloucester NSW)

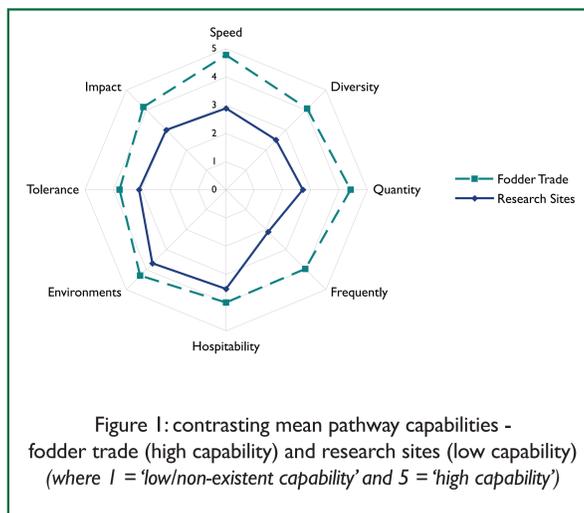
3.2 Important weed spread pathways

- Ornamental plant trade.
- Machinery and vehicles.
- Fodder trade.
- Agricultural produce.
- Livestock movement.
- Wind.
- Birds.

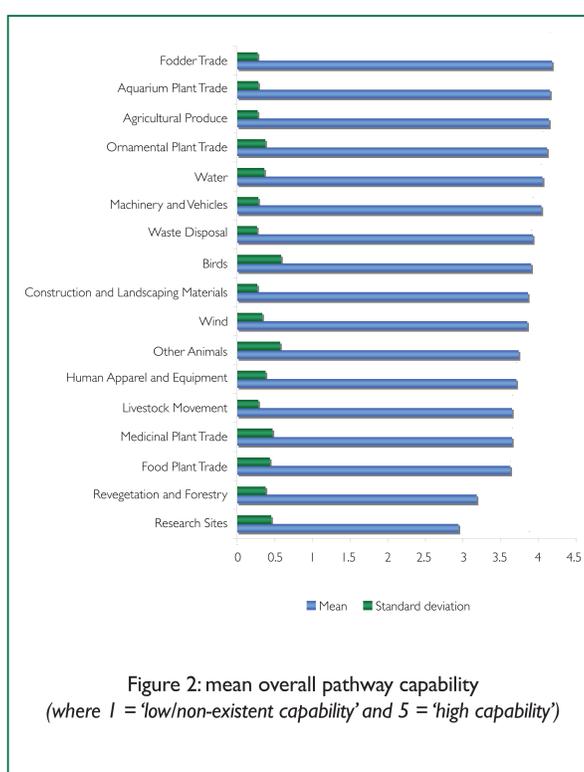
3.3 High-risk pathways

Risk was evaluated according to eight pathway capabilities. The higher the score, the higher the risk (Figure 1).

- **Speed:** transport propagules quickly >1km.
- **Diversity:** transport a high diversity of species.
- **Quantity:** transport large numbers of propagules in a single event.
- **Frequently:** a regular/ongoing rather than occasional event.
- **Hospitability:** deliver viable plants/propagules.
- **Environments:** introduce into suitable environments.
- **Tolerance:** overcome or avoid preventative strategies.
- **Impact:** transport weeds into sensitive areas.



Unweighted mean capability scores were also produced to illustrate overall risk (Figure 2).



Ornamental plant trade and **machinery and vehicles** stood out as the most significant weed spread pathways.

- **Prevalence:** the highest proportion of respondents were aware of these pathways being a factor in weed spread.
- These were considered amongst the *highest risk* pathways.
- Related *weed sources* were amongst the most important - ornamental horticulture, private gardens, transport sites, pastures/rangelands, arable/cropping land.



The ornamental plant trade and machinery and vehicles pathways (ornamental plants photo J. Moss; vehicle photo L. Tanner)

3.4 Increasing future pathway risk

- Fodder trade: more frequent/severe droughts.
- Water: variable climate, reduced herbicide availability.
- Machinery and vehicles: greater traffic movement.
- Ornamental plant trade: semi-rural population growth, popularity of gardening, drought-tolerant species.



The water (*Egeria densa*, Yarrowonga VIC) and fodder/fodder plant trade pathways may pose a greater risk in the future due to climate variation

3.5 Improving pathway management

Insufficient management may be due to gaps in regulation, insufficient knowledge, or inadequate implementation.

A specific management/regulation approach is required for each pathway. However, a general strategy includes a mixture of:

- 'negative' regulation: enforcement and fines;
- 'positive' management: education, labelling, codes of practice; and
- more research to assess pathway management options.

Acknowledgements

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Further information is available at www.ruralfutures.une.edu.au

4. Outcome

Pathway risk assessment makes it possible to target scarce weed control resources by identifying those pathways (e.g. ornamental plant trade, machinery and vehicles) that have the greatest potential to spread weeds.