Pathway risk analysis for weed spread within Australia (UNE61)

Appendix 2 – Respondent comments

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UNE
THE UNIVERSITY
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INSTITUTE FOR Rural Futures

Contents

1 Weed Sources

1.1 Are there any other comments you would like to make with regard to weed sources in Australia?

Are there any other comments you would like to make with regard to weed sources in Australia?
According to my view, the biggest source for weeds in Australia is pastures, which act as sources of weeds dispersed into cropping areas and become weeds of economic significance.
Assumes a level of management by land use.
Deliberate plantings by aquatic plant traders remain a major vector for aquatic weeds, probably much larger than aquarium escapes into waterways. Fish tanks are indoors, and escapes into waterways are not as high a risk as deliberate plantings. Pond plants do pose a high risk, as gardens are outdoors and fragments can be spread by floods. Pond plants also tend to be planted in dams, which is a very high risk.
Despite the efforts and awareness, weeds are still on the increase.
Different managers will naturally determine the degree of influence on weed spread, depending on their perception of their responsibility and effect on the purpose for the land/ water under their control.
Garden escapes are the worst source of new weeds.
Internet purchasing – interstate and international importations. Very important horticultural and other plant sales at unregulated markets, supermarkets, garden clubs, and other sources that make regulation difficult.
It all depends on the dispersal mechanism.
Livestock movement and the movement of soil and gravel, earth-moving machinery, etc, provide a very important vector for the movement of weeds.
Mainland wheat growing areas are the outstanding source of new weed incursions to Tasmania, particularly during this time of drought.
Most of my experience has been in urban bushland areas, and in areas on the fringes of Sydney/ the Central Coast, NSW. In these areas, most of the weeds have originally come onto the public and private land from adjoining private land, e.g. privet hedges. This original invasion has often started to occur in excess of thirty years previously. The weeds have then become established and these newly infested areas have in turn become sources of weeds.
My comments regarding the contribution of research relates to historical responsibility for the many invasive (mainly) pasture species, some of which were never released commercially, but nonetheless escaped from abandoned or mismanaged plots (e.g. Pennisetum polystachion), and also for the Andropogon guyanus, which escaped from mismanaged plantings at the Berrimah Research Farm, and the Coastal Plains Research Station near Darwin.
No.
No comments with regard to weed sources. But in regard to this question, I'm sure you'll get extremely different answers depending on one's background / experience / knowledge. For instance, I'm more interested in environmental weeds than agricultural weeds. I'm sure you'd find completely different answers from an agricultural person. But I'm sure you've considered this and factored it in! This did make it hard for me to answer the question however, because I was aware that I wasn't / couldn't be completely subjective!

2 Weed Pathways

2.1 Q3(a) If the pathway is regulated for weeds in any way, how?

How is the pathway regulated for weeds? Pathway 1: Ornamental plant trade	
ACT	ACT Pest Plants and Animals Act.
ACT	Permitted seeds lists, ad-hoc expert monitoring of sales on EBay, 'grow me instead' program.
ACT	Prohibited sale and transport of some species.
NSW	AQUIS, Nursery Industry, seem to be aware of it, and have some brochures such as Grow What Where. Recent Jumping the Fence by CSIRO and WWF also have highlighted these issues too.
NSW	Got better over recent years with education.
NSW	It is understood that there is a Nursery Association Code of Practice, which guides association members. Local control authorities have a clear role to play in implementing legislation to ensure that the industry conforms to requirements.
NSW	Legislation does provide for penalties for spread of declared weeds, however, policing and identification of offenders is difficult and costly.
NSW	Noxious or declared plant legislation at federal and state levels. The enactment of the legislation is done by various federal, state, or local government personnel.
NSW	Noxious weed laws in some cases.
NSW	Noxious weed listings, inadequate.
NSW	Noxious Weeds Act, 1993, but only applicable to listed weeds. Commitment of some nurseries to not selling invasive plants (e.g. bush-friendly nurseries).
NSW	Nursery industry self-regulation, lobbying of nursery industry by others, noxious weed legislation.
NSW	Nursery inspections, education programs, but still a lot of weeds are escaping under the radar.
NSW	Only for declared noxious species.
NSW	Regulated in terms of bans from sale.
NSW	Restricted sale of some plants.
NSW	Sales of particular species are prohibited under the Noxious Weeds Act. Inspection of nurseries should detect prohibited plants. Inspection of agricultural land under the Noxious Weeds Act may detect garden escapes.
NSW	Some state/territory legislation, also non-mandatory schemes that encourage use of native plants.
NSW	State regulation for noxious weeds. Nursery inspections, liaison, awareness, etc.
NSW	Voluntary code of practice in the nursery industry. Currently the subject of an education program by the Council of Australasian Weed Societies (CAWS), and the Grow Me Instead Campaign. Very limited impact to date.
NSW	Voluntary efforts of NGIA.

NSW (2)	Noxious Weeds Act. (Two responses).
NT	Declared species legislation.
NT	Movement of some spp. restricted by legislation.
NT	Nursery and Garden Industry Assoc., and others, are working with state and AG to develop a permitted list approach, with some providing warnings on plant labels and catalogues.
QLD	Awareness?
QLD	Cannot sell declared weeds legally.
QLD	Control of declared pests under legislation.
QLD	Declared plant list, and monitoring of nursery sales by land protection officers.
QLD	Increasing use of 'banned from sale' categories by states.
QLD	Land Protection Act, 2002, self-regulation, and social regulation.
QLD	Lands Protection Pest and Stock Rought Management Act, 2002.
QLD	Legislation to ban the sale of declared weeds, and control the import of identified high-risk species.
QLD	Monitoring of plants sold at nurseries.
QLD	Only as Declared Plants.
QLD	Only in Mackay, our nearest city.
QLD	Restrictions on new plant introductions.
QLD	Restrictions on sales and some voluntary codes.
QLD	Some agreements exist with industry, and government legislation provides a deterrent for some species.
QLD	Some formerly sold ornamentals are now declared plants, and hence, sale is prohibited.
QLD	Supply of declared weeds.
QLD	The Act prevents selling of class 3 weeds.
QLD	Through voluntary self-regulation of sale of known weeds.
QLD	Under pathway 2 it is regulated. However, there are differences in the classification between the states with regards to some species: e.g. Ornamental Honey Locust, which can be sold in NSW, but QLD is trying to eradicate this species.
QLD, NSW, SA	Noxious weed legislation. (Three responses).
SA	In SA, by prohibition of sale of declared species, under section 177 of the NRM Act.
SA	Legislation and industry codes of practice.
SA	Plant declarations in different jurisdictions throughout Australia - for some major weeds.
SA	Regulated for declared plants, some self-regulation for non-declared plants.
SA	Some education through brochures, and regular calls to observe plants by compliance officers.

SA	State and federal legislation, and voluntary industry protocols.
SA	Through legislation relating to declared plants, and through voluntary agreements.
SA	Via legislation and education.
TAS	Nurseries are restricted in the range of pants they can sell by import restrictions to Tasmania, Weed Management Act, 1999, and voluntary standards/codes. In Tasmania, sale of declared weeds is legally proscribed.
TAS	Quarantine, nursery inspections, and application of relevant state legislation; voluntary compliance from some sectors of the nursery industry is very high.
TAS	Some species are restricted from sale, but the level of surveillance of the trade for compliance is inappropriate in most cases. You can find restricted plants for sale at outlets, and often the species is incorrectly identified as one that is not considered weedy (e.g. Lippia - Phyla canescens labelled as Phyla nodiflora).
VIC	Declared weeds updates, extension activity, ongoing negotiation.
VIC	DPI Does do some inspections of nurseries, but often they find out after the fact, and weeds have already been spread. Many of the potential weeds are still legally available also.
VIC	Education by DPI, AND nursery association.
VIC	In Victoria, regular nursery inspections in recent years, some prosecutions; similar DPI enforcement activity with shows and other markets; prohibitions on sale exist only for declared noxious species.
VIC	Mainly voluntary avoidance of having stock of weed known species.
VIC	New weed stop and SGA programs to help change the industry, also the new weed review will help.
VIC	Regulations, but not policed enough.
VIC	Voluntary code.
WA	Declared plants.
WA	Legislation in Western Australia for the movement of declared plants.
WA	Nursery association policy on not growing known high impact weeds. Some nurseries offer alternative plants instead of weedy varieties.
WA	Only some plants are restricted or declared in WA and not allowed to be sold, but there are a huge variety that are weeds, or potential weeds, that are sold through nurseries, etc, without restriction.
WA	Prohibited/declared weeds list.
WA	Relevant state legislation to prohibit movement of some species.
WA	Some plants are banned from sale or trade. Plant species vary from state to state, though some are restricted nationally.
WA	State permitted and prohibited lists, and declared species lists.
WA	Through contact with nurseries, and making them aware of what are weed species.
WA	WA has a quarantine system that regulates or prohibits the importation of many plant species.

How is the pathway regulated for weeds? Pathway 2: Aquarium plant trade	
ACT	As for previous pathway, but regulation more ad-hoc I think.
NSW	Declared species as per weed acts.
NSW	My answers apply mainly to the aquarium trade, where known serious aquatic weeds are listed to minimise risk of spread, though the potential for this pathway to operate has caused enormous problems to sensitive, natural and artificial, economically important waterways. My answers also apply to wetland systems, where gardens can be the source, as is likely in the case of Mimosa pigra in the Northern Territory.
NSW	Noxious species only.
NSW	Only regulation in place is inspections of waterways. This is inadequate, as it is always after the fact that the plants have been dumped in the rivers, etc. There needs to be more regulation in the shops.
NSW	Restrictions on sale of known weeds.
NSW	See Pathway 1, Q 3.
NSW	Through the Noxious Weeds Act, 1993.
NSW	Weeds authorities.
NSW	WONS coordinator. State regulation.
NSW, ACT	Legislation. (Two responses).
NSW, WA	Noxious Weeds Act. (Two responses).
QLD	Certain aquarium plants are declared, but many others are not.
QLD	Control of declared pests through legislation.
QLD	Government legislation for declared plants.
QLD	Legislation to ban the sale of declared weeds and control the import of identified high-risk species.
QLD	Many aquarium weeds are declared.
QLD	Monitoring of waterways. Some weeds are under bio-control. I'm not that familiar with this area.
QLD	Some are declared weeds.
QLD	There is legislation and quarantine on the importation and sale of plants, including aquatic plants. We have a considerable problem with water lettuce in the Warrego river, which is believed to have been introduced from a fish tank. The problem is that the general public is usually unaware of some of the weeds and their impact, and some people are selling plants at stalls, etc, that are restricted.
QLD, SA, NT	Noxious weeds legislation. (Three responses).
SA	As above, although not sure about voluntary industry codes.
SA	In SA, by prohibition of sale of declared species under section 177 of the NRM Act.
SA	Legislation and codes of practice.
SA	On the spot checks to nurseries, etc.

SA	Through legislation and voluntary agreements.
SA	Via legislation and education.
TAS	Legislation, quarantine inspection, nursery/aquarium inspection.
TAS	Some species are listed as noxious under various legislation (water hyacinth, alligator weed for example).
VIC	I have heard that DPI has plants listed as restricted, regionally controlled, and so forth, but do not know what action they take with members of the aquarium industry.
WA	Declared plants.
WA	Declared species for state.
WA	Declared weeds lists.
WA	For declared plants.
WA	Information to nurseries and self-regulation.
WA	Sale of declared plants is prohibited in WA.
WA	See previous question's answer.

How is the pathway regulated for weeds? Pathway 3: Medicinal plant trade	
ACT	Biosecurity Australia weed risk assessments of new plants?
NSW	Only if species are listed as noxious (declared). Because of the huge conflicts of interest, industry speculation in some cases, and the small size of the trade in other cases, little is done about this group of species.
NT	Legislation.
QLD	Government legislation for declared plants, and AQIS legislation for post border restriction.
QLD	Only for declared plants.
SA	Noxious weeds legislation, quarantine regulations.
TAS	Legislation, quarantine inspection, nursery inspection.
VIC	It is regulated, but only with a token voice to try and appease the public. Recently, my shire (the Golden Plains Shire) employed contractors to remove vegetation along my roadside, and other roadsides in the area. I have never seen such a blatant, deliberate, and appalling spread of weeds by these contractors, and endorsed by the shire. I had to contact the shire and refuse to let these contractors anywhere near my roadside due to such poor practices employed by them. They mulched gorse, and got the mud and debris all over their tracks and on the machinery, and then transported this from one end of the road to the other. They started work in the most infested areas and spread it to non-infested areas, and the shire, when I complained, did nothing, and the second in charge said we don't cross contaminate weeds here, showing that he did not even understand the issue. We will be paying for this mess for decades to come.
WA	Declared plants.
WA	Declared weeds lists, and searches of internet sites selling medicinal plants.
WA	While this trade should be regulated the same as the nursery trade, it manages to combine a significant underground element in its trade in plant materials, as many

members of the herbal trade do not consider the bans on many species to apply to them, as they need them for medicinal purposes. In fact, there is at times some pride amongst herbalists that they have, or have access to, quarantine species that they know are illegal to own and import.

How is the pathway regulated for weeds? Pathway 4: Food plant trade	
ACT	Biosecurity Australia conducts weed risk assessments for import requests of new crops.
NSW	But only where the species is declared, and because of the conflicts of interest, and interest in diversification to help farmers, this is really difficult to achieve.
NSW	There is less likelihood of transportation of live weed plants with food plants for human consumption.
NT	Legislation.
NT	WA legislation is very tight with respect to bringing any plant into WA. Australian quarantine is improving all the time. There have also been initiatives, such as replacing alligator weed with more suitable species amongst Sri Lankan groups in Melbourne.
QLD	Noxious weeds legislation.
SA	Border inspections and legislation to stop and inspect vehicles with loads of produce.
SA	Covering loads and hygiene, both of these are frequently neglected or inadequate.
SA	Legislation and education.
SA	Noxious weeds legislation, quarantine regulations.
SA	Test samples of cereals are assessed for weed seed presence/ contamination when presented at silos.
TAS	Weed Management Act, 1999, which establishes alligator weed as a declared weed.
WA	Declared weed spread.
WA	Risk assessment.
WA	Some state regulation of species/varieties of new plants.
WA	WA Quarantine System.

How is the pathway regulated for weeds? Pathway 5: Fodder trade	
ACT	Act legislation.
ACT	Biosecurity Australia conducts weed risk assessments as for pathway 4.
NSW	Notifiable weeds are regulated from sale under Noxious Weeds Act.
NSW	Noxious weeds listings.
NSW	Noxious Weeds Act. QA programs, e.g. there is a nil tolerance for coriander seed in wheat; this limits the area where coriander is grown for the spice and seed industries

	due to contamination from volunteer plants in subsequent years - real cases near Tarlee in SA in late 1970s. There is a capacity to sue under civil law for weed spread - point source pollution.
NSW	Only by Noxious Weeds Act.
NSW	Only in general ways, and not each specific instance.
NSW	Random inspection of farms and trucks. It is a huge task, and much of the industry is self-regulated.
NSW	Sorry, I am unsure about fodder regulations in NSW.
NSW	Through legislation, but this is ignored.
NSW	Through the application of the Noxious Weeds Act.
NSW	Various legislation and self-regulation by farmers, especially if weed is damaging to stock.
NT	Most state and territory Weed Acts prohibit transport and trade for their declared weeds that fall into this category. However, trade still occurs amongst farmers and others, especially for horse feed and garden mulch.
NT	Theoretically, the transport of some invasive species is limited by weeds legislation, but this is seldom enforced.
NT	There is legislation against spread, but there is nothing that makes sellers declare that products are free of specified weeds to my knowledge. Hay is a major pathway for the spread of weeds.
QLD	Legislation to ban the sale of declared weeds and control the import of identified high-risk species.
QLD	Noxious weeds legislation.
QLD	Supply declared pests.
QLD	The Act regulates the transport and introduction of weeds.
QLD	Various vendor declaration policies.
QLD	Vendor declarations.
QLD	Voluntary vendor declaration system.
QLD	Weed declaration forms in contaminated areas.
QLD (2)	Through legislation. (Two responses).
SA	Legislation and codes of practise.
SA	Legislation and regular inspections of vehicles and quarantine areas.
SA	Noxious weeds legislation, quarantine regulations.
SA	Some areas employ a stock fodder declaration with any movements of feed. However, this is primarily a voluntary action.
SA	Some former pasture introductions are now on noxious weeds lists, and there are some voluntary agreements.
SA	South Australian NRM Act.
SA	Via education (only).
TAS	Some surveillance and inspections are undertaken (e.g. importing fodder into Tasmania).
VIC	Again, DPI has information and fliers about it, but does not do anything about it. Buyer beware is their answer.

VIC	Catchment and Land Protection Act (Victoria) prohibits the movement of declared noxious species in fodder. However, DPI regulation of the trade has been practically non-existent for many years. It's a buyer beware market.
VIC	DSE controlled programs, but no action or monitoring.
VIC	Not adequate. Many species are not identified, and locations of final point of delivery are not known.
WA	Declared weeds list for noxious species only, otherwise buyer beware.
WA	Only through noxious weeds legislation that prevents movement of declared species, which may be contaminants of fodder, rather than fodder species themselves.
WA	Some regulations are in place for declared or non-permitted plants. Also some regulations are in place in regard to plant species that can be planted on pastoral lease land.
WA	Through our Agriculture and related Protection Act of 1976.
WA	WA Quarantine System.

How is the pathway regulated for weeds? Pathway 6: Revegetation and forestry	
ACT	Control orders for declared weeds would dictate that weeds are controlled on forestry land - assume regular importation/permitted seed list regulations pertain to potential weeds that may emerge from forestry species.
ACT	Legislation and management.
NSW	Governments now restrict the use of known weed species for soil conservation purposes, e.g. Bitou bush, Rhodes grass.
NSW	Legislation.
NSW	Regular inspection by staff of government agencies and the public.
NSW	Vehicle hygiene standards are becoming a big factor.
QLD, NSW	Noxious weeds legislation. (Two responses).
SA	Noxious weeds legislation, quarantine regulations.
SA	Some inspection and quarantine areas.
SA	South Australian NRM Act.
VIC	Partly by state legislation.
WA	WA Quarantine.

How is the pathway regulated for weeds? Pathway 7: Human apparel and equipment	
ACT	Legislation and standard operating procedures for field staff.
NSW	Border checks.
NSW	Only minimally. More public awareness is needed.
QLD	A bit covered by spread prevention policies.
QLD	Lands Protection Pest and Stock Rought Management Act, 2002.
QLD	Particularly in the machinery side of things, some farmers, but not all, take a lot of care to clean their equipment and avoid the spread of weeds. I do not know of any regulations requiring farmers, etc, to clean equipment, and bush walking and weed dispersal is not regulated.
QLD	Wash down and weed declaration.
SA	In SA, it theoretically comes under the prohibition of movement of declared species, under section 175 of the NRM Act.
SA	Some legislation makes it an offence to transport propagules of noxious weeds, but in practice, this is almost impossible to police. In any case, only a small proportion of potential weeds are on noxious weeds lists.
SA	Some regulation of the movement of weeds and weed seed.
SA	South Australian NRM Act.
SA	Via legislation and education.
WA	Messages at airports, shipping lines, etc, public awareness campaigns.
WA	Some legislation. However, this is very difficult to enforce.
WA	WA Quarantine.

How is the pathway regulated for weeds? Pathway 8: Machinery and vehicles	
ACT	In areas where weeds that can be spread by this means are present, sanitation is required and access may be restricted (e.g. serrated tussock and African lovegrass in SE Australia).
ACT	Legislation and standard operating procedures.
NSW	Border crossing; only for Parthenium weed, not for other weeds.
NSW	Class 1 weeds have restrictions on them, but lesser classes do not.
NSW	DPI control of headers, etc.
NSW	Header cleaning at NSW/Qld border.
NSW	Limited regulation, such as Parthenium weed inspection at borders.
NSW	Movement of agricultural machinery into NSW from Qld, Noxious Weeds Act.
NSW	Noxious weeds legislation.
NSW	Noxious Weeds Act.
NSW	Noxious Weeds Act. This is hard to police at ground level.
NSW	NSW Noxious Weeds Act (Class 1, 2 & 5 weeds).
NSW	Only at specific sites.
NSW	Provision of roadside signs about transporting weeds, division of shire into weed sectors, which machinery should be washed between. I doubt this is enforced though, and most people would not understand the signs.
NSW	Qld to NSW regulations for wash down of vehicles for Parthenium.
NSW	Quarantine barrier at the Qld/NSW border for grain harvesting equipment.
NSW	Spread can occur between infested and uninfested water bodies by boats harbouring fragments of weeds in sheltered conditions. This occurred in the case of the introduction of Salvinia from the Chobe swamps into the Okavango swamps in Botswana. It could occur by the same means in Australia, and may have done so in the introduction of Salvinia into wetlands near Jabiru in the Northern Territory. Regulation by notices adjacent to boat slipways have been effective, but need constant ongoing vigilance. Other forms of publicity have been employed and should continue, even though it is difficult to judge effectiveness.
NSW	Through provisions of the Noxious Weeds Act, 1993, and regulations.
NSW	Vehicle wash down bays.
NSW	Vehicle wash down bays provided in areas with noxious weeds they are trying to contain, i.e. wash down bays in Qld for Parthenium weed.
NSW	Wash down stations.
NT	Good hygiene practices are only optional, and only if the operator is aware and can be bothered. Often they only kick off the obvious large clods of dirt. Also, poor awareness and practice of working from weed free areas into weed areas, and need to wash down at the infestation instead of returning to the depot.
NT	Kakadu NP requires all earth moving equipment to be cleaned and inspected before entering the park. Similar agreements also exist for some NT islands. There are also programs in place to work with roadside slashers, railway line workers, etc, to limit weed spread.
QLD	Act prevents transport/introduction; wash downs available.

QLD	Land Protection Act, 2002.
QLD	LPP & SRM Act, 2002.
QLD	Requirement for vehicle hygiene to reduce weed seed spread.
QLD	Some voluntary vendor declarations, but ad hoc adoptions.
QLD	State and local government legislation on vehicle/machinery movement and cleaning.
QLD	There are wash down facilities across Queensland for specific weeds.
QLD	Under pathway 12 (livestock), it would come under the use of the Weed Hygiene Declaration form. But again, unless it is for a class one weed area, section 45 (2) of the Land Protection (Pests and Stock Route Management) Act, 2002, it is only voluntary for the person to use them.
QLD (2)	Vendor declarations. (Two responses).
QLD	Wash down.
QLD	Wash down facilities.
QLD	Wash down facilities at various points; protocols for company vehicles.
QLD	Weed seed spread provisions of Act.
SA	Declarations of certain species making it illegal to transport their propagules.
SA	In SA, it theoretically comes under the prohibition of movement of declared species, under section 175 of the NRM Act.
SA	Similar to fodder transportation. However, typically inspections are limited to agricultural machinery, rather than incorporating machinery which has been in operation in agricultural environments, i.e. utes, motorbikes, etc.
SA	Some legislation makes it an offence to transport propagules of noxious weeds, but in practice this is almost impossible to police. In any case, only a small proportion of potential weeds are on noxious weeds lists.
SA	South Australian NRM Act.
SA	There are some voluntary industry codes, and state legislation does cover this, but monitoring and enforcement are weak.
SA	Vehicle wash down requirements in certain areas.
SA	Via legislation and education.
TAS	Legislation (relating to declared weeds only), voluntary codes of practice, hygiene requirements in contracts.
TAS	Machinery wash down - Parthenium weed and harvesting equipment coming into NSW for example.
TAS	Weed Management Act, 1999 (Tasmanian weed legislation). However, hygiene of slashers is not policed.
TAS	Weed Management Act, 1999, which proscribes the transporting of any material (which includes machinery) contaminated with declared weeds.
VIC	Catchment and Land Protection Act (Vic), Section 71, prohibits movement of machinery and vehicles contaminated with noxious weeds. Some industry/company/local government codes of practice.
VIC	Contract management, regulations, Catchment Act, etc.
WA	Inspection of machinery at border pathways in WA and TAS. For eastern states, it is a very leaky border.
WA	Quarantine protocols for machinery transportation between zones, and biosecurity protocols within zones.

WA	Some legislation. However, this is very difficult to enforce.
WA	WA has interstate border quarantine protocols to prevent interstate movement in this way, but intrastate movement is not regulated due to the volume of movement.
WA	WA Quarantine.

How is the pathway regulated for weeds? Pathway 9: Construction and landscaping materials	
ACT	Australian standards for landscaping products require pasteurisation, but this is not enforced - relies on consumer awareness/acceptance of product.
ACT	Legislation.
NSW	AQIS.
NSW	Industry standards.
NSW	Inspection of gravel pits. Council maintaining good husbandry.
NSW	Noxious Weeds Act - notifiable weeds.
NSW	The Noxious Weeds Act regulates the sale of notifiable weed material, but not other classes of weeds (3,4).
NSW	Road management plans.
QLD	DMR Regulations.
QLD	LPP & SRM Act, 2002.
QLD	Use/movement of declared weeds restricted by the Qld Land Protection Act & others.
QLD	Weed declaration forms.
SA	In SA, it comes under the prohibition of movement of declared species, under section 175 of the NRM Act, and the sale of contaminated produce, under section 177. Soil, gravel pits, quarries, etc, which are contaminated with a declared weed, can also get a control order under the Act.
SA	Legislation through NRM Act, 2004.
SA	South Australian NRM Act.
SA	Some legislation makes it an offence to transport propagules of noxious weeds, but in practice, this is almost impossible to police. In any case, only a small proportion of potential weeds are on noxious weeds lists.
TAS	Weed Management Act, 1999, proscribes the transportation of any material contaminated with declared weeds.
VIC	By shire and DPI. Shires are the worst offenders with road making practices.
WA	Manjimup Shire has policy to scrape back topsoil before digging for gravel, to avoid weed spread to new areas.
WA	Soil is a prohibited import, but movement within the state is effectively unregulated despite these issues of seed movement.

How is the pathway regulated for weeds? Pathway 10: Agricultural produce	
ACT	Treatment and testing of stored grain, for example, needs to meet trade standards.
ACT, QLD	Legislation. (Two responses).
NSW	Grain testing at silos.
NSW	Limited fodder programs, mostly based on complaint, driven when feeding out fodder.
NSW	Notifiable weeds are regulated and able to be prevented from sale.
NSW	Noxious Weeds Act - notifiable weeds.
NSW	Noxious Weeds Act and other similar legislation.
NSW	Only by pure seed regulations, and transport of noxious weed seeds, through the Noxious Weeds Act. There are no regulations for the restriction of movement of weed species that are not declared. Droughts have always been a cause of increased risk through the movement of stock fodder from interstate and even overseas.
NSW	Self-regulation.
NSW	Sorry, answered this question for fodder.
NSW	The Noxious Weeds Act does contain some provisions relating to the sale and distribution of weeds.
NSW	Weed seed assessment in grain delivered to silos.
NT	State government legislation on what level acceptable contamination is.
QLD	Land Protection Act, 2002.
QLD	Seed purity standards, vendor declarations on hay, etc.
QLD	Some voluntary vendor declarations, but ad hoc adoption.
QLD	Under pathway 12.
QLD	Voluntary declaration.
QLD	Weed declarations.
QLD (3)	Vendor declarations. (Three responses).
SA	In SA, it comes under the prohibition of movement of goods contaminated with declared species, under section 175 of the NRM Act, and the prohibition of sale of contaminated produce, under section 177.
SA	NRM Act, 2004, and quarantine of areas.
SA	Quarantine regulations.
SA	Seed legislation exists, but stuff happens.
SA	South Australian NRM Act.
SA	State and federal legislation, and voluntary industry codes.
SA	Via legislation, education, and market/industry requirements.

TAS	Legislation (Seeds Act), quarantine inspection, changes to feed grain certification process.
TAS	Weed Management Act, 1999, (Tasmanian weed legislation).
TAS	The Weed Management Act, 1999, proscribes the transport of any material contaminated with a declared weed. Quarantine inspections/restrictions also operate concerning importation from the mainland of grain and hay contaminated with weed seeds.
WA	Grain and produce are required to have a list of weed species in the grain.
WA	In the instance of grain, there is (sometimes) a set of protocols that must be followed. In the instance of hay, it appears deregulated.
WA	Legislation around seed sales.
WA	Through imposing dockages.
WA	WA Quarantine.

How is the pathway regulated for weeds? Pathway 11: Research sites	
ACT	Quarantine measures enforced by AQIS/OGTR.
ACT	Some states have prohibited weeds lists that prevent certain species to be grown, even for research purposes, unless a license is obtained.
NSW	Effective management of weeds during research.
NT	Imports are now currently restricted by good quarantine laws. Previously, this was not so.
QLD	Ethical standards of individual researchers, and compliance with state legislation on movement of propagules of known weeds between states.
SA	Quarantine regulations, biosafety regulations.
VIC	The Catchment and Land Protection Act requires permits to propagate and carry noxious weeds, and for the control of infestations on public land.
WA	But not as highly as it should be, with many researchers not fully aware of the implications of the work they are conducting with such species.
WA	Noxious weeds lists, and regulations for scientific introductions.

How is the pathway regulated for weeds? Pathway 12: Livestock movement	
ACT, QLD	Legislation. (Two responses).
NSW	Noxious Weeds Act.
NSW	Noxious Weeds Act, only for declared weeds.
NSW	On some weeds there is a quarantine period between the animal leaving the source of the infestation, and being introduced to clean country. It stops the introduction of seed that has been ingested, but does nothing for propagules on the animal's coat, or in their hooves, etc. This comes out of the best practice manuals, rather than the legalised restrictions.
NSW	Road signs / communication with Rural Lands Protection Boards. Self-regulation.
NT	Inter state regulations, especially into WA. Inspections and wash down facilities.
NT	Withholding periods for stock that go with vendor declaration forms, but people can lie.
QLD	I really know very little about this area.
QLD	Legislation - knowingly spreading declared weeds on stock routes, etc.
QLD	LPP & SRM Act, 2002.
QLD	Quarantining of new stock to an area.
QLD	There is a system (Weed Hygiene Declaration forms), although it is rarely used, but most stock coming from areas of a particular class (1) has to be penned or confined on delivery. There has been movement of a particular cactus species within the Paroo shire, which could have only been moved by way of stock transport. Mesquite is also present in the shire, which came from the Quilpie shire. Mesquite seed can be carried by stock and deposited by faeces.
QLD	Vendor declarations.
SA	In SA, it comes under the prohibition of movement of goods contaminated with declared species, under section 175 of the NRM Act, and the prohibition of sale of contaminated produce, under section 177.
SA	NRM Act, 2004, regular inspections and quarantine.
SA	Quarantine regulations.
SA	Some legislation makes it an offence for weed propagules to be transported with stock, but many potential weeds are not declared noxious, and the legislation is almost impossible to police.
SA	South Australian NRM Act.
SA	State and federal legislation for both weeds and stock movement, and voluntary industry codes.
TAS	Some quarantine inspections are made, but generally inadequate (I recently heard of Noorgoora burr being introduced into Tasmania, attached to the tails of cattle).
VIC	DPI has awareness brochures, but does nothing about it.
WA	Interstate quarantine laws.
WA	Interstate regulations apply, but minimal intrastate regulation is applied due to resourcing issues and volume of movement.
WA	It is difficult to deal with internal weed seeds that would require several days to pass through a digestive tract. Adequate quarantine periods for stock, after movement to new areas, to allow the seeds to move through, would make a huge difference but it is not always required.

WA	Livestock movements are subject to strict protocols, especially when moving from a recognised quarantine area.
WA	Some legislation to check for weed seeds on animals entering WA.

How is the pathway regulated for weeds? Pathway 13: Waste disposal	
ACT	Laws against illegal dumping; have heard of people/organizations being charged.
ACT	Legislation.
NSW	Fines if you get caught, but hardly anyone does.
NSW	Littering laws.
NSW	Local council regulation of illegal dumping.
NSW	Local government inspections.
NSW	Regulations relating to waste and unauthorised dumping.
NSW	Relevant state and local government legislation.
QLD	By signage, and patrols by Council Officers and maybe Police.
QLD	Dumping is usually illegal - but enforcement is lacking.
QLD	Legislation to stop the spread of declared weeds.
QLD	Local laws.
SA	Dumping of garden waste is usually an offence, but almost impossible to police.
SA	South Australian NRM Act.
TAS	Weed Management Act, 1999 (Tasmanian weed legislation) - for Declared Weeds only.
TAS	Weed Management Act, 1999, proscribes the transport of any material contaminated with a declared weed. Council regulations also prohibit the dumping of garden waste in certain locations.
VIC	Anti-dumping signage, but not regulated effectively.
VIC	It is illegal to dump rubbish, but people still do it.
VIC	Usually via litter strategies, or law enforcement of local government. Not specifically addressing regulation of designated weed species.
WA	Shire council has dumping laws, but this is not followed up regularly.

How is the pathway regulated for weeds? Pathway 14: Birds	
ACT	Indirectly through legislation.
QLD	It is difficult, but it has been done a bit by manipulating the species present in areas where dispersers frequent.

How is the pathway regulated for weeds? Pathway 15: Other animals	
ACT	Only indirectly.
ACT	Please see answers for previous pathway.
NSW	AQUIS in an agricultural stock animal context. However, not so much for an urban animal context.
NSW	Minimally through control of feral animals, possibly locally, as well through fencing.
NSW	Vermin control.
QLD	To a very limited extent, through feral animal control programs.

How is the pathway regulated for weeds? Pathway 16: Wind	
ACT	Indirectly through primary control.
ACT	Must be a very difficult pathway to regulate. To my knowledge, it is an important pathway for all Asteraceae species, and for serrated tussock.
NSW	Noxious Weeds Act.
NSW	Only for noxious plants.
NSW	Relevant state Noxious Weeds Act (for Noxious weeds only).
QLD	All to many wind born weeds are not declared.
WA	Prevention of seed set.

How is the pathway regulated for weeds? Pathway 17: Water	
ACT	Indirectly.
ACT	My answers as for previous pathway.
NSW	Local government.
NSW	Notification and control of alien weeds, such as Salvinia and water hyacinth, which have infested the Hawkesbury-Nepean system for example.
NSW	Noxious weeds legislation.
NSW	Noxious Weeds Act.
NSW	Relevant legislation for noxious weeds, Local Government Plans of Management.
QLD	Through legislation.

2.2 Q5(a) Do you have any suggestions for improving the effectiveness of regulation for this pathway?

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 1: Ornamental plant trade	
ACT	Aligning state declaration status (noxious/not permitted, etc) with 'weed lists', e.g. WONS, alert listed, sleeper weeds, etc, and improved enforcement of this regulation.
NSW	Ban plants with proven weediness, or high potential, from sale.
NSW	Closer liaison with the nursery industry, etc, re: potential weed spread.
NSW	Garden escapes dominate the new weeds, and more control is needed.
NSW	Greater resources are needed to educate and train garden people as to the extent of the damage that is caused by weeds, and as to what plants are actually weeds or future weeds.
NSW	Improve resourcing at federal and state levels, to ensure more inspection is carried out. Improve resourcing at federal and state levels, to weed risk assess known potential weeds before they are introduced. Since the federal government must comply with international guidelines, and not inhibit movement into Australia of weeds already here, a second line of defence at a state level is needed to do this. In reference to the questions below - information is generally not limiting (in rarer cases it is, e.g. where states like WA use a prohibited list, and new species are introduced). Management is easy enough - ban on sale.
NSW	Increase participation from garden industry - mandatory labelling schemes.
NSW	Increased publicity, and spot-checking of vendors.
NSW	Involve NGIA in development of enforceable regulations - perhaps an 'Environmental Weeds Act'.
NSW	More education is probably the answer, including TAFE courses.
NSW	More regular inspections of nurseries, national protocols for internet trade.
NSW	National prohibition of the sale of weeds that cost more than they benefit (economically, socially, environmentally), nationally (maybe 300-400 species?).
NSW	Need a national approach to avoid cross-border issues.
NSW	Plans in place.
NSW	Stricter control of imports/propagation/itinerant markets.
NSW	The bona fide nursery industry probably does have lines of communication to inform members. Perhaps this could be upgraded to help the industry to be more responsive to changes in declarations. The non-affiliated nurseries and local plant propagators who sell locally need to be contacted by local control authorities, or by media extension exercises.
NSW	Very hard to police deliberate plantings in waterways. The banning of aquatic plants with high risk is the best alternative.
NT	Ongoing weed risk assessment tied into state, and Australian, government legislation processes.
NT	Uniform legislation between states.
QLD	Compulsory labelling of weeds, compulsory region of origin labelling, so that consumers can make informed choices.
QLD	Education programs for weed control would help.

QLD	Enforcement of legislation preventing sale of declared pests. Regulation is required to prevent the sale and transport of environmental/non-declared weeds.
QLD	Greater awareness and disincentives to those intentionally spreading weeds.
QLD	Greater reference to e.g. Global Weeds Compendium, and other sources of information regarding the invasibility of potential garden escapes.
QLD	Having worked in a small Plant Nursery for a number of years, it was very clear where a number of problems were in the industry. 1) The majority of small nurseries are an addition to another retail outlet, like hardware stores, rural stores, etc. The owners have no training, knowledge, or desire to be held accountable. The industry itself is its own worst enemy, because it has no standard regulations against these types of operations especially. 2) Doing weed education at the coalface of the nursery is seen by many as a negative thing, and not a positive step in being proactive. Very few nurseries I have visited have any displays about weeds or the responsibility of gardeners, especially if they live in an area of high conservation value. 3) The rapid growth in the peri-urban spread is seeing this as a major area that needs to be addressed. I run workshops called 'Gardening with Care for Nature' for this very target group here on the range. This is critically important, because these new 'settlers' are arriving, and even before their boxes are unpacked, they are planting all the same things that they did in the suburban gardens.
QLD	I am not sure that regulation is the key. Many non-regulated environmental weeds are still highly sought after by the public. There needs to be a cultural change in the use of many garden plants. I have started to give talks to landscape architect students, plant the seed, so to speak, on the use of non-invasive plants and indigenous species, instead of the usual species that are used by everyone. The nursery industry will only supply plants to the public that they know will sell. If the demand is there, there will be someone there to sell it.
QLD	Make nurseries informed and then accountable. Provide alternative plant species.
QLD	More education and information for the public and the nursery trade.
QLD	More vigorous, self-regulated, weed risk assessments.
QLD	Need for more known weeds to be banned from sale.
QLD	Perhaps introduce a code of practise for the industry and training programs, and increased communication through the industry associations.
QLD	Regulate the industry.
QLD	Some regulation of internet garden suppliers would help.
QLD	Uniform declaration of species across Australia.
SA	Education of staff, and brochures with the plants sold like an msds.
SA	Inspectorial compliance on a regular ongoing basis.
SA	National declarations of species prohibited for sale, rather than jurisdictional. National weed risk assessments for new species/cultivars to cultivation. Increase the number of environmental weeds that are declared for sale.
SA	Regulation of currently non-declared, but threatening, weeds.
SA	The weed risk assessment process, which regulates plants entering the country, needs to be extended through legislation to cover plants already in the country. This process would be expensive, but so is the impact of nursery and garden escapes.
TAS	Regulation of pathway at nurseries is adequately regulated. Regulation of garden escapes, particularly by illegal dumping, is nearly unregulated. Improving the regulation of garden waste dumping could be effective, but is not generally practical to enforce.
TAS	Surveillance and inspections of the industry.
VIC	DPI do not have enough staff to manage all nurseries, weekend markets, garden clubs and the like, inadequately get their messages across, and really don't have this issue as a priority.

VIC	Hefty fines might help for second and subsequent transgressions.
VIC	Improving national legislation.
VIC	Need more enforcement of enviro-weeds, and to stop people who always sell illegal plants.
VIC	No.
VIC	Noxious declarations need to include more species. The status of cultivars (e.g. broom spp.) needs to be clarified in terms of the declarations and the material for sale. Voluntary codes are not sufficient.
VIC	Weed ratings on non-listed species must be displayed. Non-sale in sensitive areas.
WA	Does not include non-declared weeds.
WA	Labelling plants. Education of the public to make better choices, and therefore remove the market for weedy plants. Better consistency between weed lists, so that the nursery industry knows what are weeds. Better use of current Latin names of species.
WA	More random inspection of nurseries needed.
WA	Not allowing known weed plants for sale (this may differ from area to area). Labelling potential weed plants with information on how they spread (wind, seed, cuttings, etc) so that people buying plants have information, and can choose whether they purchase the plant or not, and know how to manage propagules. More public information on weed potential plants.
WA	State governments need to raise awareness of what plants are likely to be weedy and really important – e.g. star rating of species.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 2: Aquarium plant trade	
ACT	Difficulty in regulating the use and dissemination of aquatic plants - banning sale of weedy aquatic plants may be unrealistic - options for enforcement need to be explored.
ACT	More rangers doing spot checks of shops, and education campaigns.
NSW	Aquatic plant importers flout AQIS regulations by sending imports to the right address, but to the wrong person at that address. If AQIS chases it up, the resident says, 'Well there is no-one here by that name,' and the plant is confiscated. If they do not chase it up, then the plant gets grown by the person (company) it was sent to. Inspectors need to consider this pathway of introduction. A number of aquarium plants are intentionally planted into coastal waterways in NSW by the broccoli box man. This guy then goes and harvests these at a later date as he hitchhikes up and down the highway. One prime example is that of Hygrophila polysperma, which has been found deliberately planted near bridges in four rivers in Nth NSW and SE Qld. Licensing of all traders of aquatic plants (who do not plant waterways for their own benefit) may be one way to address this. For some of these plants, there is insufficient info to risk assess them properly (or even to ID them).
NSW	Faster identification of potentially weedy species (AQIS). Faster reaction time when new, or potential, infestations are found in the field (this will need proactive funding). Authority for local weed management authorities to act quickly on newly identified incursions.
NSW	Maybe regulation is there, but not enforced.
NSW	Needs to be a national regulation to avoid cross-border issues.
NSW	No consistency across states and territories re: prohibition status, etc, creating confusion amongst dealers, etc.
NSW	No policing of what is actually sold in pet shops, etc.
NSW	Nurseries (wholesale and retail) still continue to sell known weeds.

NSW	Provide extension material for distribution at aquatic plant distributors, highlighting the penalties that can be imposed for distributing plant material.
NSW	Removal from sale of aquarium species that pose a high weed risk.
NSW	Untiring, consistent vigilance.
NT	Uniform legislation between states.
QLD	As above for 1.
QLD	Cover more species, and the ability to identify declared weeds.
QLD	It is very difficult to enforce compliance with the legislation in terms of dumping weeds in waterways. However, further regulation of aquatic weed sales in pet shops is required.
QLD	Make aquarium stores informed and then accountable.
QLD	More comprehensive risk assessment for plants commonly sold.
QLD	No.
QLD	Regulate the nursery and aquatic plant industry.
SA	Education and fact sheets.
TAS	More weed officers to inspect and undertake surveillance.
TAS	The current weed risk assessment of aquatic plants (a joint Australia/NZ project) should lead to important recommendations for changes in state legislation. Generally, little seems to be known about aquatic weeds and their impacts.
VIC	More DPI resources, and the setting up of an inspections program. A public awareness campaign that will also include visiting private households to identify and remove weeds.
VIC	Quick risk assessment process.
WA	Increased resources for inspections/education; trade should be regulated, i.e. all premises should be registered to sell living organisms/seeds, etc.
WA	Needs to be for all weeds, not just declared weeds.
WA	Not really, other than education to prevent backyard pond and aquarium owners from having these plants and giving them on to others.
WA	Paid inspectors to make regular checks.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 3: Medicinal plant trade	
ACT	I am not familiar enough with this pathway to comment.
NSW	Investigate the organisational structure of the industry, and target them with information about the weedy characteristics of plants.
NSW	Stop all plants at the federal border and then risk assess. If not, then risk assess before they enter each state (and definitely before speculators get a hold of them). There is sometimes a lack of info on the weediness of these species (despite the fact that there is a huge amount of herbal and agronomic [anecdotal] info on them - all in the grey literature of course, like on the internet).

QLD	No.
QLD	There are a lot of declared and undeclared plants with possible health benefits.
TAS	There is no requirement that plants being trialled for medicinal properties are automatically risk assessed. There have been instances where one arm of government has promoted the development of a plant industry, when the plant in question is a known weed.
VIC	The people regulating it are the worst offenders. Only lip service is paid to this issue.
WA	Need full-time person at a national level searching the net for weed sellers, and reporting to states on sites that pose a risk to Australia or the states.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 4: Food plant trade	
NSW	Little is known about the weed potential of food plants.
NSW	No.
NSW	Stop all plants at the federal border and then risk assess. If not, then risk assess before they enter each state (and definitely before speculators get a hold of them). There is sometimes a lack of info on the weediness of these species (despite the fact that there is a huge amount of food potential and agronomic [anecdotal] info on them - often in the grey literature of course, like on the internet).
NT	Uniform legislation between states.
QLD	The responsibility for control/prevention of escape/spread of these species needs to be put on the growers.
TAS	The number of weeds that originated from the herb industry is significant.
VIC	Land owner responsibility for implementing preventative measures of spread, especially into adjoining land. Crop owner onus.
WA	Crops that are known to become weeds could be regulated to have a weed management system in place. For example: olive orchards/plantations are on the increase in WA, and seeds can be spread by birds over large areas. Shires/Ag departments need to be more aware of these crops' weed potential, and regulation set up for weed management as part of the approval process.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 5: Fodder trade	
ACT	More resources for spot checks.
ACT	To my knowledge, more information is required about the sources and sinks that facilitate the transport of weed seeds in fodder.
NSW	Ban importation of stock feed plants, concentrate on developing best local species, and fostering low input agricultural practices.
NSW	But regulation is unlikely to work, management and education are more important, given the quantities involved.
NSW	Class 3 and 4 weeds cannot be prevented from sale, as they are not notifiable. All noxious weeds need to be banned from sale.
NSW	Compulsory assessment of the weedy characteristics of the species prior to distribution.
NSW	Develop a system where producers list contents of produce (hay, grain, etc), similar to pasture and crop seed producers.

NSW	Limited opportunities for weeds officers to find cases, except for complaints, or stumble across. Only applies for weeds determined to be noxious. QA programs are typically developed to manage for critical issues or for squeaky wheel issues, not for general purpose spread of weeds. Farmers Associations must lead the way to tell people how to take civil action against other farmers that introduce any plant that becomes a weed.
NSW	More policing required.
NSW	National mapping program with results readily and easily available to producers, so that they can cross check the areas they are buying fodder from, to determine if specific weeds may be coming in the fodder they may have purchased.
NSW	Prevent use of listed weeds as fodder species; promote native fodder species.
NT	As above.
NT	The NT government in particular is not prepared to list any useful pasture spp. as weeds, despite strong evidence that some spp. are causing massive environmental damage and spreading out of pastoral properties.
NT	Vendor declaration certificates, so that if I buy some weed infested barley straw, for example, I can firstly go back to the vendor, and if unresponsive, then report it to the state department. Farmers KNOW when they harvest what the quality is, and often keep the best for themselves and sell the rest for cash.
QLD	Draft National Weed Seed Spread Strategy developed - what has happened to this? There is no action on delivering this on the ground to date.
QLD	Education directed at the grower of the fodder/mulch.
QLD	Increase number of weeds that have to be listed/identified.
QLD	My understanding is that despite legislation that prohibits the movement or distribution of declared plants and their reproductive materials, a conflicting piece of legislation allows seed supplies to contain a certain percentage of declared grass seed - this is likely to confound most weed movement efforts.
QLD	No.
QLD	Ongoing onus placed on industry for quality assurance awareness schemes.
QLD	The issue is that some people see certain plants as a benefit; while in other areas they are weeds. Thorough risk assessments are needed, and plants to be declared, if they are considered a high risk. They would then also be prevented from further sale. An example is gamba grass.
SA	Enforced fodder declarations, not simply to prevent fodder from being transported, but more for the purchaser to be more aware of the potential species of contamination.
SA	If the people who plant or promote a species were made financially responsible for containing it to the area planted, and held financially responsible for the cost of any escapes, then the use of invasive fodder species would cease overnight (i.e. implementing the same conditions that apply to virtually every other industry that must control its own waste stream, such as power stations and pulp mills, etc). The only introduced species used would be those in which the increase in productivity outweighed the cost of containment and control of escapes (i.e. those where there was a net benefit to the nation). Under present arrangements, profits are privatised to a small group of privileged individuals, and the far greater costs are socialised, and borne by the rest of us.
SA	More resources to better monitor and enforce regulation.
TAS	The provider of fodder for sale needs to provide certification of the weediness of their product.
VIC	Make it mandatory that farmers/landholders have to declare all known noxious/declared weeds present on the property, and make it an offence not to declare if it is in the hay, and put fines in the order of $10,000 for not declaring this to be so.
VIC	Need to identify high infection areas, and fine landowners and carters who have the weeds in a saleable form.
VIC	Numerous bad agricultural weeds, which are frequent fodder contaminants, are not declared noxious - e.g. Rumex spp., Romulea, various exotic grasses. These could be listed as Restricted Weeds under the Act, prohibiting their sale, including as contaminants of fodder.

VIC	Restrict sales to an area unless approved product, i.e. no known weeds on site of production.
WA	Certificate of weed status for the buyer, from the producer, as a mandatory requirement before sale.
WA	More staff to check on breeches of contaminated material being transported.
WA	Proposals for voluntary codes of practice may work for some, but are unlikely to have a major impact if there is no public pressure to take caution with what species are grown where, and how they are transported. Identification of higher weed risk species to be avoided in particular regions may inform decision making more appropriately. The suggestion also of polluter pays type legislation is unlikely to get approval, but it there are consequences for inappropriate management of species, then growers will be more likely to manage the plants better. In most cases, if the species can't set seed/produce viable propagules, then the species won't become a problem. Many leading farmers manage their pastures very well, and these should be made an example of, so others can learn.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 6: Revegetation and forestry	
NSW	Compulsory assessment of species proposed for soil conservation use by the DPI.
NSW	Make growers of timber crops, especially pines, financially responsible for dealing with the resulting wildings, or find a way to sterilise planted pines. Do not give government funding to soil conservation projects that involve planting non-local species, or non-local provenance plants.
NSW	Many volunteers are not well educated about weeds; others are too conservative in other ways that limit choices for land management.
NSW	Prevent use of weeds for salinity and re-veg projects, esp. for state/federally funded projects; more research into native spp. that can be used in these situations.
NSW	Require managers to control invasions spreading from plantations.
QLD	Increase the requirements for funded rehab work to include LONG-TERM weed management if funded through NHT etc., and increase eduction around corridor plantings for natives, providing conduits for weed spread too.
QLD	My comments deal with the conservation section, with respect to Landcare Tree Plants. These are all to often lost to invasive weeds due to lack of resources, and given that most are done in sensitive high conservation areas, it sets the train in motion of destroying an area that was previously healthy.
SA	Education of transport companies and primary producers.
SA	Forestry and revegetation industries need to be made financially accountable for containing non-indigenous plants to the sites planted, and for controlling off-site spread.
SA	Greater resources to monitor and enforce.
VIC	Restriction of usage of known problem weeds into these areas.
WA	Lack of cleaning equipment in forestry areas ensures contractor spread of weeds between forestry areas.
WA	Need for Weed Management Systems to be written into planning and implemented. Plantations need to have adequate weed control before planting out, as spraying after planting generally isn't carried out due to young/small plants being susceptible to herbicides. This leads to further problems after harvesting, when sleeper weeds are activated.
WA	Requirement for plantation owners to control seedlings escaping from their properties.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 7: Human apparel and equipment	
NSW	Education.
NSW	Education and awareness.
NSW	General weeds extension work for the public would help create improved awareness of weeds, and of the risks of moving them.
NSW	Not really – too difficult to regulate for.
NT	Increase awareness of this pathway of spread, esp. amongst bushwalkers.
QLD	More education for all residents and visitors in the shire.
QLD	No – very difficult to achieve.
QLD	Provide facilities and make people informed.
QLD	This is a difficult one, general public AWARENESS tailored to high conservation areas.
SA	Lack of awareness by members of the public of weed spread methods.
VIC	Enforcement and fines for non-compliance to regs.
VIC	Improving public education.
WA	Public education.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 8: Machinery and vehicles	
ACT	Infestation areas identified, and regional quarantine/sanitation measures enforced.
NSW	Compulsory reporting of all cross border movements, and at least 3 movements internally thereafter.
NSW	Enforce wash down requirements on earthmoving contractors and public utilities.
NSW	Mandatory hygiene and wash down at high-risk sites.
NSW	Mandatory wash down of vehicles between property visits for councils, energy suppliers, Telstra, etc.
NSW	More regulation over slasher design (seed shedding covers) to prevent movement of weeds along roads.
NSW	More vehicle inspection where there is movement between areas with high infestation levels of specific weeds to areas where that weed/s is/are absent or isolated (similar to border inspections for Parthenium weed).
NSW	Needs to include more than just the current list of local noxious weeds.
NSW	Noxious Weeds Act has no weeds prescribed by regulations limiting movement. Only prohibited to move notifiable weeds (i.e. Class 1, 2 and 5). Publicise successful prosecutions for transport of weed seeds, etc.
NSW	The common law. Landholders who have weeds spread to their land by machinery should sue.
NSW, QLD	Education. (Two responses).
NT	Operator awareness training and certification for drivers.

QLD	Compulsory wash downs and weed free declarations.
QLD	In the ACT, all offences have a defence, which makes it very hard to prosecute.
QLD	Informing stakeholders of their duty to be aware of what they are carrying. This may mean the big stick approach rather than voluntary.
QLD	Not really, this is a very difficult one to regulate, but education and awareness may help.
QLD	The legislation is not enforced.
QLD	There is ample 'best practice' guidelines laid out in state and local council regulations, but the problem is that they are simply ignored. The following information deals specifically with DMR Dept of MAIN ROADS – Qld and local councils on the Sunshine Coast.
SA	Monitoring and enforcement need to be done seriously.
SA	More resources for monitoring and enforcement, better hygiene practises in industry.
SA	Regulation focuses on particular species, as opposed to more general regulation, requiring vehicles/machinery to maintain adequate hygiene (akin to covering a trailer load or littering).
SA	There need to be many more purpose-built wash down points for machinery, and mandatory cleaning before moving between districts.
TAS	Enforcement of the Weed Management Act, 1999.
TAS	Increased capacity to enforce existing legislation.
VIC	Better contract management by councils and road authorities, enforcement and fines for non-compliance to regs.
VIC	Inspections by regulatory authority (DPI) appear to have been completely lacking in recent years, i.e. there is no enforcement of the Act.
VIC	There is no regulation of this, and even DPI staff enter properties and get weed seeds caught in grills, mudguards, etc., of cars and no action is taken. I generally don't allow foreign vehicles on my property, including DPI, as I see them as one of the worst offenders.
WA	Introduce a code of practice for machinery/earthmoving operators.
WA	My main concern is grader drivers moving infestations of weeds, as they move their blades along roadsides.
WA	Not practical to regulate effectively due to volume of traffic, number of interstate entry points for some states, intrastate movement issues, etc.
WA	Road verge management vehicles/equipment (slashers, etc.) need to have policies introduced for better practices on weed spread.
WA	There should be a statutory requirement that municipal bodies maintain an acceptable biosecurity plan that should be producible on demand.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 9: Construction and landscaping materials	
ACT	Increased public education of Australian standards assist landscape media providers to comply – education, promote best practice.
ACT	Insufficient resources.
NSW	Change the regulation (Noxious Weeds Act) to prevent the sale of all noxious weeds.
NSW	The example that forms the basis of my comments is the introduction and spread of Alternanthera philoxeroides (alligator weed) on sods of lawn grass in the vicinity of Newcastle.

NSW	The main issue I have seen is the use of weed-contaminated fill – it is difficult to control the movement of this.
NT	More wash down bays for cleaning up machinery between infected and clean areas.
QLD	Again I offer information dealing with DMR specifically. Current practice of DMR is to just dump soil, gravel, green waste, etc., usually contaminated with a highly invasive weed (e.g. morning glory) on the side of a road wherever they may be working. These sites are not kept clean, nor are they monitored for any invasive material, this comes back to the fact that staff are not trained. Material from these sites is then moved around the landscape for fill and road repair/edge repairs. On the range, 5 of these sites have created massive weed infestations into areas of high conservation value. The damage that has been done is yet to be fully appreciated. I know of 4 major road repair works where contaminated fill was used in private properties beside the road repairs, and all now have out of control infestations of morning glory.
QLD	Enforcement of regulations.
QLD	Informing stakeholders of their duty to be aware of what they are carrying. This may mean the big stick approach rather than voluntary.
SA	More resources for monitoring and enforcement.
SA	Sources of sand, gravel, mulch, etc. need to have a mandatory certification of weed-free status.
TAS	Enforce Weed Management Act.
VIC	Education of people moving soil/plant material.
VIC	Local councils should be involved.
VIC	Take regulation away from DPI and shire, and give it to an independent organization that has the teeth to enforce proper procedures and practices to stop weed spread.
WA	Better education of those involved
WA	Code of practice.
WA	Quality assurance schemes for soil traded or being sold could be implemented. For waste soils however, it's difficult to see how it could be managed at all.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 10: Agricultural produce	
ACT	Insufficient resources.
NSW	All produce to have a certificate of purity or stated weed content.
NSW	Certification of fodder produced for sale.
NSW	Education and more regulations on the movements of these commodities.
NSW	Improving regulation of sale of all classes of weeds.
NSW	Inspection of saleable products or inspection of fodder crops.
NSW	It will continue to be a problem because of the scale.
NSW	Nil tolerance of weed seeds in grain being sold.
NSW	Registration of producers, and a requirement that content of produce (grain, hay, etc.) is listed, as it is for pasture and crop seed producers.
NSW	The Noxious Weeds Act provides adequate control for serious weeds, but there are very few opportunities for inspections, collection of evidence, and actual regulation. A far better technique, which is counter to typical landholder behaviour, is to sue for losses. This allows for better regulation of plants not determined to be noxious, and links

	regulation to market forces.
NSW	Vendor declarations.
NSW	Weed declarations for fodder.
NT	Should be zero weed tolerance on weed species.
QLD	Compulsory weed declarations.
QLD	Need regulations to apply to more weed species.
QLD	Regulation is not enforced.
SA	Again it is the surveillance, monitoring, and enforcement aspects that are deficient.
SA	Lack of resources for monitoring and enforcement.
TAS	A stock feed register (to track stock feed movements) established.
TAS	In drought situations it is inevitable that the imminent risk of stock loss will be considered more important than the medium/long-term impact of weed invasion, despite the fact that this is likely to be more costly. Therefore, regulatory provisions will be relaxed in times of emergency.
TAS	Persistent weed invasion through this pathway suggests that regulation of the pathway is insufficient.
VIC	It is not ACCIDENTAL. I cannot believe no one knows these days. Enforce it with money and people.
WA	Need to stop transported material leaving vehicles (hay seeds, etc.), e.g. cover load, etc.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 11: Research sites	
QLD	Code of practice for researchers working on weeds would be useful.
QLD	Weed control implemented before sale of research stations, and at the end of research projects.
SA	Continued implementation of weed risk management procedures developed in the Salinity CRC/Weeds CRC.
SA	Legislated financial liability for eradication of all escaped plants should focus the containment efforts of all research groups to a remarkable degree.
VIC	State government traditionally fails to enforce weed laws in relation to government instrumentalities. Argument along the lines of 'government can't sue itself'. Education of plant breeders vis-à-vis their legal requirements.
WA	Many trial sites are abandoned after use and never cleaned up, allowing many weed species to move off site. Proper site hygiene requirements, and follow-up work, would reduce the risk significantly.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 12: Livestock movement	
ACT	Identification of those species spread by this means, targeted regulation/education of relevant industries.
ACT	Insufficient resources.
NSW	But it is not a pathway you can regulate very well. Any ruminant would need to be quarantined for 2-3 weeks to minimise the low but important risks.
NSW	Improved recognition by livestock producers to quarantine livestock for 7-10 days, at key periods of the year, to minimise weed introductions.
NSW	Requirement that vendors provide adequate information on weeds that livestock have been in contact with – similar to declarations on pasture and cropping seed.
NSW	Under Noxious Weeds Act, no weeds are prescribed by regulations limiting movement. Only notifiable weeds are regulated for movement.
NT	Different between states.
QLD	Compulsory quarantine processes.
QLD	Education.
QLD	Industry takes responsibility to reduce threats – invest time now to reduce land degradation in the future.
QLD	More enforcement of legislation.
SA	More resources for monitoring and enforcement.
SA	More surveillance and monitoring.
WA	Better education of those involved.
WA	Livestock should be inspected by a trained, independent assessor, either at the point of origin, or a designated inspection facility prior to movement.
WA	More checks on stock movements intrastate.
WA	Needs regulation within WA, not just from outside WA.
WA	See comments above.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 13: Waste disposal	
ACT	Insufficient field staff to enforce.
NSW	Almost impossible to police.
NSW	Dumping of garden refuse should be a state-wide offence.
NSW	Not particularly – the problem is that dumpers essentially have to be caught in the act.
QLD	Containment at the waste site.
QLD	I'm thinking about illegal dumping, which obviously is illegal and so unregulated at the time of dumping. This poses a significant risk of introducing weeds into native vegetation in wet tropical habitats.

QLD	In many instances, neighbours to bushland areas are the main offenders. The situation may be occurring for some time before rangers are aware of the problem, and by then, it may take a while to rectify the situation. Our council has set up a Bushland Neighbours Assistance scheme, in order to manage the neighbours of our natural areas. They are given advice, boundaries of where to, and not to work, herbicide if necessary, and plants for revegetation or reinstatement if necessary.
QLD	More weed surveys to identify weeds before they are dumped.
QLD	Tighten up laws and undertake prosecutions.
QLD	Too difficult to enforce as we can't catch people doing the dumping.
SA	Education to staff, and fact sheets with plants and their ability to spread.
SA	More resources for monitoring and enforcement, greater understanding by public about risk of weed spread.
TAS	All local government bodies should provide areas for free dumping of garden waste (to discourage dumping in bush areas).
TAS	Enforce Weed Management Act, 1999, and regulations.
VIC	Applying fines to offenders.
VIC	Education about the damage, then fines if caught.
VIC	No resources, and when you do get hold of someone, they usually make excuses for not turning up, and then do nothing to control weeds into the future.
WA	Better signage and to fine perpetrators.
WA	Code of practice, staff training, and public education.
WA	Dumping of garden waste is a significant social problem, the same as the dumping of unwanted cats, dogs and aquaria fish. A major social change needs to be undergone to remove this problem.
WA	It is very hard to regulate this industry, a lot of illegal dumping or treatment in rubbish tips with insufficient regulations for machinery cleaning, and what constitutes deep burial. This is very difficult to regulate.
WA	Through legislation.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 14: Birds	
ACT	Difficult to regulate wildlife activity, and difficult to prevent seeding.
NSW	Is a tricky one, as how do you stop animals spreading weeds, besides removing the weed. Some native birds also rely on weeds as food source and habitat, so replacing it with effective ones has to be addressed if you remove them.
NSW	Not possible to manage birds – though who needs an excuse to shoot starlings!
NSW	Only the control of bird-spread weeds at their sources will ultimately be able to regulate this pathway.
QLD	Almost impossible to regulate because birds fly everywhere.
QLD	Control weeds at source.
QLD	Education to the public on the threat that garden plants can have on surrounding and distant natural areas. Council may be embarking on street meetings shortly to discuss with residents the impact their gardens are having on the surrounding bushland. I know that this is used in other councils; we have a weed swap with residents in one

	locality to try to eradicate a known environmental weed growing in many gardens in one township. The local environmental group grew the alternative, and council officers inspected properties and gave advice on the weed treatment.
QLD	Impossible to regulate the movements of birds. There is some scope for replacement of weeds with native plants.
QLD	This is an area where legislation is impossible.
SA	No.
VIC	Need landholders to treat weed sources before they seed, and introduce alternative food sources.
WA	I can't see how you can regulate bird movement, or for that matter any other wild animals.
WA	Impossible to regulate.
WA	Public education regarding use of weedy species that are spread by birds.
WA	Regulation of movement of weeds via natural bird movement will rely on informing land and householders about reducing weed propagules in gardens, etc. I.e. remove agapanthus flowers after they are spent to reduce seed development and movement by birds – cut down all the camphor laurel trees, etc.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 15: Other animals	
NSW	Additional research into what animals are moving what weeds, and where.
QLD	Reduction of seed sources.
QLD	Very difficult, since it's hard to control animal behaviour.
WA	No enforcement/management plans to do fox control/reduction for weed spread.
WA	See comments for above question.

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 16: Wind	
NSW	Besides existing listed noxious weeds in each state, education and good management practices can help weeds spreading.
NSW	E.g. New Zealand tussock: compulsory removal of all tussock before flowering, so that seed dispersed by wind AND fines to ensure that this happened (talk to Shona).
NSW	Enforce control requirements on landholders with infestations.
NSW	Need to adopt a landscape management approach, e.g. windbreaks along ridgelines to act as traps, and to reduce weed seeds from being in the best position to be distributed by wind.
NSW	Place limitations on import of weedy wind dispersed plants.
QLD	Some scope for reducing seed sources, and implementing barrier plantings that interfere with dispersal.
QLD	Wind-borns are more dangerous than bird-spread, and so they should be considered more for their risk factor. E.g. moth vine is our most destructive vine, and we live in a mountainous landscape. All our roads are along the highest point in the landscape, and this is one of the weeds that established itself beautifully under/on top of Lantana.

	Self-explanatory.
SA	Requiring stubble or ground cover would reduce transport by wind.
VIC	Need legislation for control of weeds on private land.
WA	Better public education, labels on nursery plants.
WA	Public education about wind-dispersed plants and their ability to damage bushland.
WA (2)	Impossible to regulate. (Two responses).

Do you have any suggestions for improving the effectiveness of regulation for this pathway? Pathway 17: Water	
NSW	Waterweeds and/or their propagules are effectively carried downstream in a flowing watercourse. This occurs, for example, in the spread of willows in temperate regions in southern Australia. Removal of plants producing vegetative propagules can be effective in the case of willows.
NT	Could require a land manager to have a buffer strip adjacent to waterways.
QLD	It is not clear in some areas who is responsible for weed control around waterways, in some cases more cooperation is required.
SA	Regulation prevents weeds getting into the pathway, or ensures they are removed from it.
VIC	As per previous reasons.
WA	Impossible to regulate.
WA	See comment in question above.

2.3 Q5(c) Do you have any suggestions for managing current and future risks with regard to this pathway?

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 1: Ornamental plant trade
ID of weedy species for staff, as they mainly recognise garden plants, and not their potential.
1. WWF is currently undertaking an excellent programme to uniform LABELLING, which would ID the 'weediness' of the plant. 2. All nurseries need to have displays about their own local weeds.
Better education.
Better knowledge of what plants have the potential to become weeds, better information on those that have already become plants, so that this information is known, and a better way to disseminate the information to everyone.
Better training of inspectors, multi skilling of all govt. inspectors that visit nurseries.
Bring back registration of vendors.
Consistency of weed lists, current botanical names (see answer to [a]).
Councils should encourage the disposal of garden waste by providing free disposal facilities for defined green waste. This may help redirect waste that contains weeds, which is currently disposed of indiscriminately along roadsides and neglected areas. A much cheaper alternative than the current haphazard approach to finding, and then responding, to weeds issues, often after the weed has become well established. Perhaps Landcare could be encouraged to take a more leading role because it has a more universal appeal.
Current legislation prevents introduction into a state, but does not regulate/ban sale within the state.
Education and awareness followed by regulation.
Get the nursery industry on board and visit all outlets regularly, keep promoting the message and develop much more information, run training programs for nursery people, and make it mandatory, conditional on being able to trade, that they meet certain requirements in this area.
Identify movement of plants and materials – which will be difficult, but could include a vendor declaration scheme as per the beef industry.
Improve quarantine measures and risk assessment.
Improving the accessibility/frequency of green waste collection, and expanding awareness raising around the issue of garden escapes. Improving awareness to cottage garden and permaculture movement of weed risk from Cynara cardunculus may be useful.
Increased research into the potential impacts of introduced plants and cultivars in different environments.
Informing the general public of the potential in their garden for new and emerging weed.
More resources for inspections, or a certification process for weed free suppliers.
More stringent checking of plant imports for weed potential, police internet plant sales (how though?), improve clarity of plant labelling to remove ambiguity about which are weedy.
More weeds that are not currently declared need to be declared to try to prevent establishment as weeds.
Not only do the suppliers need to be accountable, but also the landscape design industry, the garden clubs, television garden shows, and lifestyle shows and their associated garden magazines. For too long, these types of pathways have been allowed to promote known environmental weeds. Having an accreditation for the landscapers, garden design students, landscape architects, gardening businesses, and not just the nursery industry, would be a step in the right direction. There needs to be a stop in the production of known environmental

weeds that invade our bushland areas. Before a stop in production occurs, the nursery industry needs to be provided with suitable alternative species so that it is able to ramp up its production, so that it is able to put them on the shelf immediately after the stop in production of the weed species.
Ornamental gardens should be inspected regularly by weed inspectors.
Risk assessment.
The 'grow me instead' programme has great potential to educate the public and reduce demand for plants that have weedy properties, whilst maintaining capacity for nurseries to generate income.
There would have to be a national and consistent system of assessing costs and benefits of candidate plants (see suggestion a, above).
Work with industry to assess risk posed by plants for sale.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 2: Aquarium plant trade
Additional research into surveying aquatic areas; additional work into cooperative mgmt with aquarium and pet industry.
Cataloguing the spp. currently in trade, and risk assessment as noted above.
For many of the new and emerging aquatic weeds, and even some of the established ones, there are no safe aquatic herbicides. Issue of maintaining water quality for potable water, preventing damage to local flora and fauna, all pose issues for the registration of herbicides. More work is also required on non-chemical means of managing aquatic weeds.
Highlight invasive aquarium escapes.
Improved extension through aquatic plant outlets illustrating the dangers of irresponsible aquatic plant disposal.
Improved knowledge of the use of aquatic plants – which plants are sold where, and improved education and capacity of the aquarium industry to decrease/stop trade of known weeds.
Increase awareness with industry, both formal and informal industry.
No.
Require all such traders to register and pay for inspections/education. Increase inspection resources.
Resources, resources, and resources. We know what needs to be done, don't develop any more strategies, just get the resources and get it done.
We need appropriately registered and environmentally safe compounds that can be applied to aquatic/semi-aquatic environments.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 3: Medicinal plant trade
Enforce contractors to clean machinery, and train them on how to avoid spread. I would have done 90% of the roadside which is weed free first, and then come back to the bad sections and freighted the machine in between reducing the risk of spread and work involved in cleaning, and then washed everything down afterwards before I moved onto the next job. It would have been so easy to do. Think.
Increase awareness and surveillance.
Medicinal sellers changing the common name on internet sites.
No.
There must be some industry audit processes in place to guarantee purity, so this could be used to educate growers about plants behaving badly.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 4: Food plant trade
Change.
Compulsory weed management system for all weed potential plants to be written into management plans and implemented/regulated.
No.
We need to identify what food plants pose a weed risk.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 5: Fodder trade
Accessing the records of the private companies that undertake seed and fodder certification for sale to determine the range and importance of the various contaminants.
Again, more information will enable risks of weed spread to be mitigated.
As above. (Two responses).
Better assessment of the weedy characteristics of the species prior to distribution.
Better regulation of the trade.
Implement reporting system of weedy species that may contaminate product, so purchasers can make informed decisions when purchasing; ensure appropriate penalties are implemented.
Industry must commit time and resources to this issue, which is a barrier.
More education to alert property owners of this risk of weed incursion.
More intensive work with pasture industry; more choice of native fodder species investigated; identify and quantify damage done by non-native fodder species escape; investigate costs of user-pays scheme with relation to escaped fodder species.
More work to identify if this method of transport is important.

Need to create more awareness about e.g. use of silage instead of hay to control weeds.
The information probably exists, but farmers need to know the life expectancy of weed seeds imported onto their property in fodder, so that they can keep an eye out on feed out zones for the necessary period of time.
There are minimal pieces of information available on fodder carrying weed seeds, but in the desperation of drought, feeding checks are not always adequate.
This is a very difficult one.
Why more strategies? We know it is a key factor, just take action now.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 6: Revegetation and forestry
Anecdotal evidence received suggests that St. John's Wort has been spread in this manner from forests in other regions. Debarking of logs, and strict adherence to routes, would make it easier to manage this situation. There would need to be dialogue between foresters and control authorities so that situations could be monitored.
As above.
It should not need addressing, but sadly I have seen all to many above situations. I guess it would be easy through Landcare Australia to raise the awareness of the importance of maintenance for such sites.
Need a contactor code of conduct and practices that ensures a come clean/go clean policy.
Need to get a balanced view about ecosystems, e.g. you can revegetate with plants from neighbouring ecosystems and use some exotics to control erosion risks while permanent species get established.
Spatial information on locations of plantations & spread of trees from plantations.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 7: Human apparel and equipment
As above.
Difficult one.
Further research on weed seed adhesion properties and methods of prevention/containment.
Having a management strategy set up to control machinery, and humans moving weed seeds, etc, around areas, may help some organizations reduce this occurring, whether it be bush regenenerators, horticulturists, and agriculturists spreading weeds. Regular training courses through DPI type bodies, improved legislation (if not already covered), to placing the issues in relevant tertiary education courses.
Increase awareness, e.g. among national park visitors. Provide facility for cleaning off clothing and boots before embarking on walking tracks. Few would use it though.
Increasing community awareness of the impacts of weed spread and their effect upon the environment, economy and social amenity.
More scientific studies required.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 8: Machinery and vehicles
As above.
At the present time, machinery and vehicle hygiene is largely voluntary. There is a whole range of public utilities and industries that could be targeted to improve weeds awareness.
Awareness through compulsory wash downs and declarations.
Better contract management by councils and road authorities.
Better education to see this as a problem. To deal with the infestation before they go near them.
Better machinery design, training for contractors, etc.
Current wash down bay designs ARE INADEQUATE. They do not allow for the complete washing of all vehicle parts to remove soil and seeds. New designs in wash down bays need to be implemented, and wash down bays need to be provided free of charge at regular positions around local areas.
Education and awareness programs followed by regulation.
Education.
Establishing monitoring and surveillance protocols and implementing them.
Having a management strategy set up to control machinery, and humans moving weed seeds, etc, around areas, may help some organizations reduce this occurring, whether it be bush regenenerators, horticulturists, and agriculturists spreading weeds. Regular training courses through DPI type bodies, improved legislation (if not already covered), to placing the issues in relevant tertiary education courses.
I have previously attached my discussion paper on roadside management, but I will summarize it here as well. DMR and Council current work practices are contributing in a massive way to the 1. Build up of invasive weeds 2. In the dramatic SPREAD of the same. The bottom line is that all work done on roadsides is undertaken by untrained staff, and it is only done for vehicle safety, with NO CONSERVATION considerations at all. It is an area were agencies have taken the line that they can save money by doing the bare bones minimal, which is costing the environment dearly. The SOLUTION is the formation of a Dept of Conservation & Land Management within DMR state-wide. DMR have flown under the radar on NRM management, while all other practitioners have committed their org's to best practice NRM – especially weed management.
Improvement of machinery design to minimise voids and spaces where seeds can be carried.
In regard to cars and trucks, it would be useful to have a better understanding of the conditions and locations in which propagule loads are shed.
Increased training for weed management contractors, and road management authorities, to improve hygiene practices.
No. (Two responses).
No current course to qualify wash down inspectors.
Officers can’t be everywhere all of the time, so education and awareness are really the only options for many on the land. Phone ins (like dob in a dumper).
Only limited work has been done on slashers, etc, to minimise spread of weeds; council and other authorities are known to spread weeds when they access properties for inspections. Staff should be aware of this issue, but it is easy to ignore because maintaining vehicle hygiene takes time.
Paradigm shift in roadside vegetation management by councils. Effective standard operating procedures and hygiene procedures need to be effectively implemented across council roadside vegetation management practices. This means re-educating individuals involved in roadside vegetation management, or imposing work conditions that force compliance. Apathetic, disinterested, or sub intelligent attitudes from some workers are a real and serious impediment to change here.
Weed mapping allows for the creation of benchmarks, buffer zones, etc, by which managers can be assessed. This provides the impetus for hygiene prescriptions to be included as a matter of course in contracts for such things as roadside management. Increased hygiene training and the capacity to perform basic hygiene practices (i.e. the provision of clean-down equipment at the local level), coupled with the inclusion of hygiene in maintenance contracts will play a big part in improving weed management.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 9: Construction and landscaping materials
As a bush regenerator, weeds that are common problems are still planted as ornamental plants by horticultural and landscape industry including Rhapiolepis, Lantana, Protasparagus, etc. Within a catchment and genetic provenance sense, this can affect the quality of bushland. Suggestion would include vegetation management plans or strategies that protect natural areas with buffers, and using genetically provenant vegetation for wildlife corridors and street trees.
As above.
As above – pasteurisation is expensive – thorough composting methods that are aligned with the type of weeds present in a region – keeping waste within a region will reduce spread – enabling communities to recycle and re-use their own green waste – there are some great state-based programmes underway – eco-recycle in Vic, and similar in NSW.
Education of people moving soil/plant material.
In an ideal situation, there would be site evaluations made at the time of environmental impact assessments for these industries, and strategies designed to minimise or eliminate risk altogether.
It may not occur any longer, but this should be checked.
Main roads/council need to be aware of weeds establishing in gravel pits/stockpiles.
No.
Only fill that is guaranteed free of weed seed should be used in areas adjacent to bushland.
Paradigm shift in roadside spoil/fill management by councils and contractors. Effective standard operating procedures and hygiene procedures need to be effectively implemented across roadside drains, spoil and fill management practices. This means re-educating individuals involved in roadside management, or imposing work conditions which force compliance. Apathetic, disinterested, or sub intelligent attitudes from some workers are a real and serious impediment to change here.
The cessation of doing this should be a priority, but the wheels turn slow in DMR. Even though my research has clearly demonstrated the problem, and for which I have offered a simply solution, nothing has so far happened. The solution is to have designated permanent soil dumps/green waste facilities. Green waste that is contaminated needs to be dealt with separately from clean green waste.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 10: Agricultural produce
A stronger message on the risks associated with poor quality feed grain, and the need to use this grain appropriately, is required. Feed grain treatments should also be considered.
As above. (Two responses).
Awareness through compulsory declarations.
Establish and implement surveillance and monitoring procedures, and follow up with enforcement if needed.
From time to time, DPI supports training and produces guides to managing prosecutions for weeds officers. But there are inadequate guides for landholders on how to manage a successful civil case. This is clearly a role for NFF or NSW Farmers.
No.
Only a general appreciation of the problem, rather than a specific focus each time fodder conservation is used.

Possibly one of the hardest tasks to develop a manageable strategy.
Regular extension to fodder about the risks of buying fodder, and the methods to manage those risks.
Stock feed producer should be held responsible for management of weeds that originate from contaminated feed.
Where practical, enforce feeding out with pelletised products, rather than whole grain. This increases costs, but has a number of other spin-offs, including significant reduction in food wastage, reduced shy/greedy feeding. Farmers report zero weed germination from pelletised feed products. Spreading practical messages about feeding out to reduce weed incursion may also help.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 11: Research sites
Need more information on safe buffer distances and management requirements to limit spread of high value species. Plus standard hygiene to remove species (including propagules) from trial plots at their end.
Research institutes need to have budgetary capacity to manage their grounds, with sufficient expertise to prevent escape and naturalisation of any species.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 12: Livestock movement
As above, need to identify those species and infestations that are susceptible.
Awareness through self-regulated quarantine.
Better education.
Better education and management strategies.
Education, regulation, onus for declaration on vendors, transporters of livestock.
Extension, targeting livestock owners is essential to point out the dangers of moving livestock from risk areas. On-property quarantine areas are an important way of isolating new stock, which allows them to empty out in a confined space that can be more easily monitored.
No.
Promote as a major threat to sustainable industry.
Specific studies of seed survival in animal guts.
Strengthen legislation (regulations) publicity, education awareness campaigns.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 13: Waste disposal
All local government bodies should provide areas for free dumping of garden waste (to discourage dumping in bush areas).
As above.
Increase the ease with which members of the public can dispose of their green waste.
More education to bring public awareness into it.
No – and very despondent about it.
Posters displayed in nurseries may be useful in spreading the message about improper disposal of unwanted garden waste.
Provide alternative waste disposal methods, e.g. green waste collections.
Public education/awareness, improve accessibility/frequency of green waste collection.
The issue in my mind here is the likely release of aquatic weeds (and non-native tropical fish into sensitive Australian waterways, when a family going on holiday, or ceasing to look after an indoor aquarium, empty the contents of the aquarium into an Australian water course. This is suspected to have occurred with the introduction of Salvinia molesta into Lake Moondarra, near Mount Isa in Queensland, and of other waterweeds into creeks near Brisbane.
With increased penalties, better waste management, and containment of weed species for disposal.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 14: Birds
Bird proof netting for crops known to be weedy and bird dispersed.
Determining adequate buffer distances around infestations of weeds to contain their movement, in which searching needs to be done and control undertaken.
Improved knowledge of survival of weed species in the gut.
Natural resource ecologists need to develop a wider understanding of weeds.
Need landholders to treat weed sources before they seed, and introduce alternative food sources.
Once again, education approach to relevant industries, and the importance of removing or not planting vegetation that can be spread by animals such as Cotoneaster, Privet, Pyracantha, Protoasparagus, etc.
One of the management strategies that is likely to reduce the risk is reducing the weed populations and seed production.
Preventing seed production at the source is the only effective practical way.
Replacement of weeds with native plants.
Research.
Since it's hard to control the pathway itself (birds), it's important to control the seed sources. We need to prioritise and manage the major sources of propagules, and/or the sources closest to sensitive areas. Sale and growth of exotic, fleshy, fruited ornamental plants should be banned (or sterile varieties developed and tested), as the species of this group are almost all a high risk (e.g. Murraya and Ochna are still grown in gardens in Brisbane, but Ochna is increasing in importance as a bushland weed, and our research indicates that Murraya has the potential to

invade natural areas. There are plenty of native or less risky introduced alternatives.
The work by Dr. Kath Moran at Griffith Uni – Brisbane could be helpful. Her work was done on native species, but I have found that it is the same for weed spread by birds and bats.
This is a very difficult pathway to manage. Plant selection possibly favouring indigenous species would overcome some of the problems associated with exotics. It would also favour a balance of bird species common to each area. Birds are adaptable to improved feed availability, and appear to move to previously uninhabited areas for their species.
Very difficult, as movement is uncontrollable.
We do know a lot about most of the weed species present in our shire, but every week we are encountering more.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 15: Other animals
Management of feral animals is important. Prioritise control of populations of weeds that might be spread by animals that are in close proximity to sensitive natural areas.
Might be scope for restricting movement of some of the larger animals.
Native and feral animals will always be a source of weed seed spread. Physical barriers (fences) are usually not practical and are very expensive.
Reduce mature weed infestations.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 16: Wind
As above. This needs to be considered as a higher factor when evaluation of a plant is undertaken for declaration.
Control the weeds in the first place before they have a chance to become windborne.
Difficult to control the wind, so need to reduce major source populations!
Draconian legislation.
Education, awareness. Target transport corridor land mangers to mange their weeds effectively (particularly invasive wind borne weeds), thereby slowing weed spread.
I still don't think there's that much know about wind breaks, etc.
Models of dispersal over landscapes, and the interaction of wind with landscape features, are necessary in order to predict populations with a high probability of contributing to spread via this mechanism.
No.
Research into genetic markers (high priority species only, e.g. class 1 weeds) for identifying relationships between infestations to determine trends.

Do you have any suggestions for managing current and future risks with regard to this pathway? Pathway 17: Water
Control weeds in catchments, particularly in riparian zones.
No.
Prioritise weed infestations along waterways for targeted management.
Regular inspection of waterways, management of source infestations.
The trick with this one is that the only effective management across a range of weed species is going to be maintaining healthy and uninvaded vegetation upstream, and as just about everywhere is upstream of somewhere else, we would need to maintain uninvaded vegetation just about everywhere - a BIG job.

2.4 Q5(d) Are there any other ways in which management of this pathway is inadequate?

Are there any other ways in which management of this pathway is inadequate? Pathway 1: Ornamental plant trade
1. An area that is greatly overlooked is the 'markets'. There is absolutely NO regulation governing these outlets. They contribute markedly to the problem, because the plants that are sold are those ones that I class as 'easy to grow freebies to friends'. These are usually all the plants that grow vegetatively and are all up there as garden escapees. 2. Teaching the peri-urban settlers not to plant ornamental plants into bushland areas on their properties. This is the beginning of the classic 'garden escapee' scenario. In my workshops, I teach people how to plan their gardens, how to always divide the property into zones, native bushland, house/garden zone, useable – veg/fruit zone. It is critically important to get the message out to the peri-urbans that it is ok to plant natives in the garden zone, BUT not to plant any ornamentals in the bushland zone. 3. The knowledge of what is 'Australian NATIVE' is poorly understood by the general public. It is generally accepted that Greville's are the only native plant, and that they are the only things that attract birds. This is a massively serious problem, especially in an area such as ours – rainforests. The level of the knowledge of the target group must be clearly understood, and information targeted at their level. Vast areas, which have been cow paddocks adjacent to remnant rainforest, are now being turned into ornamental garden. Where the remnant was previously healthy and safe, is now under a totally new threat.
Change DPI's priorities and management. As a quote from management to me, we are not here to make a difference, we are only here to be seen to be doing something. With that attitude, you will never achieve any results.
Drought causing 'tough' plants to be supplied. Need to manage nurseries to reduce impact.
Even the system described above doesn't necessarily account for new potential weeds – it's reactive. Incorrect labelling undermines any system.
Gardening information (TV, radio, magazines, etc) appears to some people to be the expert, and not always gives the right information on plants/potential weeds, especially regarding different state issues, and promotion of new plants can instigate a new weed quickly.
Getting information out to the horticulture trade and gardening public is still inadequate.
Greater public awareness is required to ensure further distribution of weeds, and to recognise the impacts of garden plantings on environmental and production systems.
Inadequate labelling of nursery species, either by use of common names, or variety names, where the correct scientific name should be used.
Incorrect plant labels, lack of knowledge in the trade.
Industry is demand-driven.
Insufficient knowledge of new plant ecologies, e.g. climax data for new cultivars.
It is only a voluntary regulation. Also, weekend markets where plants are sold are not covered by this.
It's not just nurseries, but markets and private plant collectors.
Legislation often slow to catch up to new weed species, more public education is always required.
Needs to be more public awareness so the public can also police the plants that they purchase.
Online sales need to be monitored, plant labelling showing a map of Australia, indicating where a species is likely to be weedy.
Plant sales through non-formal pathways, e.g. market stalls.
Probably, but I'm not sure what they are.
Provide information to all stakeholders on issues of spread.

Public education is needed to give up on oddities in favour of less-threatening species.
Recent attempts at voluntary regulation by nursery industry are too little too late. Imposed restrictions will be needed, as too many involved have no conscience if there is a profit to be made. Plant identification can be problematic, with use of alternative names allowing people to go on selling weedy species that might be on the noxious weeds list (e.g. brooms), by labelling them as something else, e.g. Genista monspessulana as Cytisus racemosus nana.
Still too many potential weeds used as garden plants.
The identification of many species in trade is debatable, and much more needs to be done to confirm the correct identity of many plants in trade.
The public may take no notice of regulations, poor identification of plant species, lack of understanding of weediness, conflicts of interest.
There are no labelling standards in the aquatic plant trade. A labelling standard will reduce the risk of plant suppliers selling them declared aquatic weeds.
There simply aren't enough resources available to inspect all possible sources and points of entry.
Voluntary measures give a market incentive to shift supply of weedy species to those that do not undertake voluntary withdrawal.

Are there any other ways in which management of this pathway is inadequate? Pathway 2: Aquarium plant trade
Attitude and commitment of governments and DPI.
Current research project is conducting competition experiments between potential weed species, known weeds and natives. More work is required to increase the number of potential weed species that are evaluated. The aim is provide hard evidence to wholesale nurseries that certain spp should not be propagated and sold as they pose to great a risk to the environment.
Improved education of pet trade /aquarium operators
Labelling standards for aquarium plants. Plants are not labelled and storeowners often have no knowledge of what species the aquatic plant suppliers supply them with. O
Management is difficult due to the potential for collection and distribution of waterweeds as aquarium plants. Regulation exists, but general public awareness is still limited.
Movement of plants through informal hobby networks and possible black markets.
Probably, but I really am not very clued into waterweeds.
Regulate the industry.
See previous question’s answer.
The public may take no notice of regulations, sales of aquarium plants through non-commercial entities, lack of understanding of weed risk, poor identification of plant species.
There seems no way to prevent the introduction and cultivation of aquatic plants in natural waterways.

Are there any other ways in which management of this pathway is inadequate? Pathway 3: Medicinal plant trade
A lot needs to be done to regulate the sales and distribution of medicinal species used in herbal medicines. Possibly a system like Germany's, where all herbal medicines are licensed and regulated under an authority, just like ordinary pharmaceuticals.
Adequate enforcement processes, and the power for the people to take legal action against the perpetrators, like the shires and contractors.
Because possible medicinal benefits are perceived to outweigh weed risks (especially in a political context), there is a lack of will to specifically tackle the issue, so that it tends to be buried in responses to herb growing or similar.
Control of internet traffic in plant species, sales of seed through unregulated bodies, poor identification of plant species, deliberate flouting of regulations.
Weekend market traders need addressing.
You are dealing with plant swappers, not necessarily formal businesses.

Are there any other ways in which management of this pathway is inadequate? Pathway 4: Food plant trade
I believe the pathway should be monitored by enforcement officers.
I think of olives as an example – there are large numbers on roadsides near my workplace, which is only a few kms from the river, yet nothing seems to be done – I think this is a typical example of how when things are left, they get out of hand.

Are there any other ways in which management of this pathway is inadequate? Pathway 5: Fodder trade
A variance between state based legislations, which, during periods of drought, see fodder moving greater distances and typically across state borders.
Demand from farmers for new fodder species continues despite the huge risks these species impart. Most farmers and researchers, however, are wholly ignorant of these risks, and continue to push hard for new taxa to be introduced.
Farmers need to have more information on problems of new weeds coming in on fodder.
Farmers need to know where they have fed out fodder in the past, so that these areas can be routinely checked for emergent weeds in to the future. It would be nice to know the extent to which weed seeds are lost in transit from fodder, especially uncovered or poorly covered hay loads. Seeds would undoubtedly blow off and establish along roadsides.
Huge amounts of fodder transported. Not enough resources to police it.
Lack of ability to enforce declarations.
Lack of receiver checking of source of fodder.
Need to educate users about on-going management, especially for purchased fodder.
No management at present.
No regulation of spread of fodder species.
No resources from DPI and NO COMMITMENT.

Political will is lacking to regulate improved pastures.
Regulation is in place, but not often used or enforced.
Regulatory resources to monitor breaches.
Repeated extension material is needed.
Some government agencies actively promote and encourage the use of highly invasive species. The pastoral industry holds a privileged and powerful position far in excess of its numbers and financial contribution.
Transport regulations should require that hay shipments be covered when moved long distances along roads.
Where fodder is in short supply, and quality variable, it is difficult to impose strict controls on primary producers.

Are there any other ways in which management of this pathway is inadequate? Pathway 6: Revegetation and forestry
Assessment of the weediness of potential species used in this sector (Bitou bush, radiata pine).
Don't permit soil conservation authorities to select species for soil conservation use.
Full knowledge on how plantation species are spread, e.g. birds, wind, soil, etc. Having clean weed seed vehicles during plantation activities is vital to stop the introduction of new weeds.
Lack of funds.
No.
Sometimes weeds are mistakenly used in revegetation projects (e.g. grasses, acacias, rushes).
Training of contractor staff.

Are there any other ways in which management of this pathway is inadequate? Pathway 7: Human apparel and equipment
Inadequate ability to detect weeds.
N.
Not enough education, so management plans can be successful.
Often people don't know about the problem in the first place, it's more the inconvenience of 'prickles' in your socks and clothing.
People not appreciating the damaging effects of weed seed spread.
Poor regulation, difficulty in promoting community action to minimise weed movement, lack of commitment by state authorities and by national government in its failure to continue funding for the national weeds body.
Public awareness.
Regulation is not the answer, as it is largely unenforceable, and minimisation of spread by this pathway depends on voluntary action.
The information is out there, but seems to be under utilised by organizations, as well as by private contractors and the same members of general community. So I think education, awareness, with legislative requirement, may improve this.

We are a very transient population now, so how to get the message out for the whole landscape is a very difficult one.

Are there any other ways in which management of this pathway is inadequate? Pathway 8: Machinery and vehicles
Better design of machinery (e.g. slashers) so not catch so many seeds. Provision and geographical placement of wash down facilities.
But improving e.g. the introduction of wash down bays.
Compliance can be useful. However, the procedures have not been adequately tested by the Qld dept responsible for the legislation.
Education of general public is lacking; enforcement of clean down policies for government, council, and contractors, is not sufficient – as demonstrated by the continual spread of grasses (grader grass, Chilean needle grass, African love grass, etc, along road ways).
Farm and utility machinery probably now aware of issue, but 4WD users are not.
Inability to detect weeds, failure of the public to understand the importance of this pathway.
Inadequate roadside signage of weed infestations. Lack of enforcement of the Act. Redesign of equipment and vehicles to minimise propagule collection and dispersal is required.
It is just a function of the way society is structured currently, with high mobility and increasing centralisation of service provision, which would be hard to get around without major restructuring of society (which may have to come if we are going to reduce out climate footprint).
It is not managed at all.
It's tricky when you think of the growing number of Jim's mowing style operators, which are excellent at spreading things like Chilean needle grass and African love grass through their rounds – it's a large and decentralised workforce. Larger contractors and municipalities would be more efficient to train.
No compulsory requirement for wash down facilities to be carried by contractors.
No wash down facilities.
No.
Not enough wash down facilities.
Not only is the issue of roadside management overlooked, but also an additional area under DMR is the total abandonment of large tracks of land when a road is upgraded or annexed off. These sites have become massive weed banks. With the establishment of an above Dept of C & LM, these areas could be placed into a reserve system and valued, instead of what is occurring at present.
Practicalities.
Provision of public wash down facilities.
See above.
Seeds are frequently, but unwittingly, shifted about, it depends on the receptiveness of the environment and chance.
The information is out there, but seems to be under utilised by organizations, as well as by private contractors and the same members of the general community. So I think education, awareness, with legislative requirement, may improve this.
There's little more that regulation can do; enforcement is rarely feasible, so compliance is left to the conscientiousness of vehicle/machinery operators.
Transport industry engagement is poor; it is better in regard to the movement of boas through the rec. fishing industry.
Understaffed.

Are there any other ways in which management of this pathway is inadequate? Pathway 9: Construction and landscaping materials
Developers selling topsoil.
Inadequate if the management plans are not adhered to.
No.
Once again, a combination of regulation, and awareness through education, from community level to management level, which can design strategies and implement them.
People receiving landfill should receive prior warning.
Sand leases along river systems that contain African lovegrass are a major source of contaminated material. Fortunately, a large amount of this is entrapped in concrete, but a lot is moved in a secondary fashion to small-scale worksites. These need to be followed up to prevent establishment of further new infestations.

Are there any other ways in which management of this pathway is inadequate? Pathway 10: Agricultural produce
As above, regulation does not guarantee compliance. There is a need for the industries at risk from weed spread to take responsibility for inspection and quality guarantees of produce, for example, the Lucerne seed industry acting to protect itself from spread of dodder seed.
Can fodder conservation practices be changed so that weed propagules are effectively controlled?
Compliance can be useful, however the procedures have not been adequately tested by the Qld dept. responsible for the legislation.
No.
Relies too much on industry codes of practice at the farm gate.
There needs to be repeated extension to remind fodder buyers to ask quality questions when buying agricultural produce.
Trade between neighbours is unmanageable.
What regulation is available is not implemented.

Are there any other ways in which management of this pathway is inadequate? Pathway 11: Research sites
Enforcement of the Act is required, including regular inspections.
No routine government involvement nationally in approval for new species trials. Even if a prohibited import into Australia is beyond AQIS jurisdiction, but rarely declared in a state/territory.
Scientific staff are appalling at recognising that they are potentially the biggest risk of deliberate weed introductions, the cost of clean up after research trials should come off of their future budgets!!

Are there any other ways in which management of this pathway is inadequate? Pathway 12: Livestock movement
Assumption is that most landholders do this.
Awareness of the risk to industry members – there is plenty of evidence/information, however, industry must take more responsibility.
Compulsory vehicle wash downs before leaving drop-off points.
Difficult or impossible to restrict the movement of native and feral species.
Difficulty of ensuring compliance. Legislation was useful a generation ago, when most livestock was sold through saleyards, where they could be inspected by the many inspectors employed by local government. Now 85% of stock are sold directly and bypass the saleyards, and weeds inspectors are fewer on the ground. Weeds like silverleaf nightshade and broomrape, which are transported internally by stock, cannot be detected anyway.
Failure to put management strategies in place.
Movement of livestock in times of drought is a situation when owners are more prepared to take risks in order to hold stock, and think of the consequences later. Wash down points for transporters in this situation is another area of concern, and needs close scrutiny.
No
Removal of all viable weed propagules from animals before transport is physically impractical. All that can be done is employ means of minimising spread, or refusing to buy animals from weed contaminated areas.
See (a).

Are there any other ways in which management of this pathway is inadequate? Pathway 13: Waste disposal
A barrier to proper green waste disposal could be charges associated with correct dumping. These should be waved for specified live plant material. Organised waste collection should be encouraged.
Better weed collection strategies by councils might help.
Failure of the public to understand the importance of weed risk.
Insufficient funds provided for deterrents, e.g. fencing or gating of crown reserves and other vulnerable land, and for clean up of dumped material and resulting infestations.
There just isn't a tough enough, nationally recognised, penalty system in place.
Too many councils cut costs by reducing collection points. Bonfires are banned; the result is illegal dumping of green waste.

Are there any other ways in which management of this pathway is inadequate? Pathway 14: Birds
Education to landholders so that they can devise an effective management plan.
Inability to control bird movement.
Land managers need more information on where birds are likely to deposit seeds, so as to target control measures – reinvasion of areas by blackberries would be a good case study.

Are there any other ways in which management of this pathway is inadequate? Pathway 15: Other animals
Inability to control animal movement.

Are there any other ways in which management of this pathway is inadequate? Pathway 16: Wind
Adequate, economically feasible, control methods have yet to be found for fireweed (Senecio madagascariensis), the main weed in this category in this region.
Not enough public awareness.
People like many tree weeds, and are very hostile at attempts to control them. Some, e.g. Sycamores, are very difficult to control.
Reduce the incidence and abundance of these species.
Unable to control wind.

Are there any other ways in which management of this pathway is inadequate? Pathway 17: Water
I don't know how much regulation can really help here. I think we need more carrots than sticks in this case, helping land managers improve land management for desirable vegetation.
Inability to manage propagule load of streams.
People carrying noxious aquatic weeds need to be caught red handed planting or moving material to be prosecuted. Once an infestation has been identified, it is then up to the local council to remove/control the weed according to the local or regional weeds plan.
The development of environmentally acceptable herbicides into aquatic environments.

2.5 Q6 What is the outlook for this pathway in the future? Please give the reasons for your choice.

** There were instances where respondents nominated an outlook for the pathway (e.g. More Important), but did not provide a reason. These responses have been omitted from the tables below.*

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice. **Pathway 1: Ornamental plant trade**	
Outlook	*Reasons*
More Important.	65% of weeds are result of garden escapes.
More Important.	As above – peri-urban growth.
More Important.	As dry gardening becomes more necessary, more drought-adapted plants will be promoted, which are likely to adapt beyond the garden also.
More Important.	Business is growing.
More Important.	Climate change has the public seeking alternative garden species, and in turn, the garden industry searching for more local climate tolerant plant species to supply to the market.
More Important.	Deal with garden escapees on a regular basis and undertake nursery inspections, etc.
More Important.	Gardeners are always looking for different and unusual plants for their gardens and introductions have, in general, not been assessed for their weediness.
More Important.	Growing population and mobility means the greater risk of weed spread by this method.
More Important.	Higher focus on escaped weeds.
More Important.	Increased disposable income, increased popularity of gardening, more players in garden industry trying to make their fortunes.
More Important.	Increased focus on drought tolerant garden plants, and increased encroachment of housing on environmental areas, are likely to increase the potential impacts of cultivated plants.
More Important.	Increasing pressure from urban development.
More Important.	Internet plant sales allow for increased importation from other states (and overseas). This is likely to outstrip the combined increase in nursery voluntary compliance, and any possible increase in detection capability.
More Important.	It is a prime source of weed invasion. Until it is regulated there is constant threat of new and existing species introductions/further spread. Trade is conducted at all levels, down to plant swaps/sales at garden clubs, markets and fetes to retail outlets and via the Internet.
More Important.	Low membership rate of nurseries to state associations that can better develop and enforce self-regulation is a concern for future weed spread prevention.
More Important.	Many of the plants that will be weeds of the future are sitting in gardens right now. Climate change, and the intro of new plants suited to future climates, will continue to exacerbate this problem.
More Important.	More plants are bought into Australia now than ever, therefore the risk of bringing in weedy types is higher.
More Important.	Most of the noxious weeds originated as garden plants.

More Important.	Popular trade activity.
More Important.	The amount of species that have entered Australia that are known are sleeper weeds is worrying. We do not yet know the impact of climate change on our own areas yet as well.
More Important.	The opportunity provided for weedy species to establish into new ecological niches being promoted by humans seems to be insurmountable.
More Important.	The trade in plants, especially in novel species, is increasing due to the internet, and with lack of expertise on identifying many of these species, the real risk is not fully understood.
More Important.	There appears to be an increase in garden escapes being identified as new weedy species, and there also appears to be a trend to plant more exotic species.
More Important.	There are now limits on the entry of new invasive species into the country, but many home garden enthusiasts, and the nursery trade, are fiercely protective of their right to grow whatever they want. There is increasing awareness of environmental weed issues, but still many who will deliberately flout laws and voluntary agreements. Frequently, plants in garden centres are misidentified, so even well meaning people can inadvertently contribute to the problem.
More Important.	There has been an increase in gardening & lifestyle advertising in the media.
More Important.	They are responsible for people's attitude, and can make a huge difference to how people shop/buy or spread plants/weeds. Main educational ways for public, as they provide the place for people to obtain plants.
More Important.	This is the biggest source of new weeds.
More Important.	This method of weed introduction is becoming more frequent, rather than less frequent.
More Important.	This pathway is very mobile, therefore hard to regulate and prevent weed incursions.
More Important.	Water gardens will remain popular despite water restrictions. The increasing popularity of tree change lifestyle will bring problems, as they tend to build dams on their properties and stock them with species.
More Important.	With less water available, landowners are changing species, now is a golden opportunity to educate nursery staff, etc, to pass on the info and ID of plants and their nature to become weedy.
More Important.	With the increased demand for plants that survive under dry conditions, and with climate change, we may see more environments become suitable for many of these species. Hardy weedy plants often get the choice, as they are survivors.
More Important.	With the marketing of drought tolerant plants, the potential for a greater diversity of weeds exist.
As Important.	As more land is used for housing, more weeds will be introduced to new gardens.
As Important.	Education.
As Important.	Hard to see this changing.
As Important.	Importation of new plant species.
As Important.	Increase in leisure time, and the demand for landscaping species, hence an increased risk in weed spread.
As Important.	It will take a long time for the weeds currently in the system to work their way out in the gardens, and then to become weeds.
As Important.	Large problem outside of nursery industry, e.g. lawn sales, etc.
As Important.	More species being introduced, and while formal assessment occurs as to weediness, it's always going to be difficult to assess which ones ultimately become weedy.
As Important.	New plant species will be introduced to take advantage of water wise marketing, and will be drought tolerant weeds species.
As Important.	New spp. require constant vigilance.

As Important.	This will control the problem in the future.
As Important.	People continue to have gardens, and enjoy living in less urban areas where spread into the natural environment is made easier by its proximity.
As Important.	People like gardens. This will continue.
As Important.	People will always love to garden, and as water continues to be scarce, drought proof species will stay in favour. Also, weed potential of many native species is unknown, and I expect a proliferation of native species to be planted widely beyond native ranges.
As Important.	People will continue to buy plants.
As Important.	People will swap attractive garden plants.
As Important.	Plant breeders do not test for weediness.
As Important.	Regulation is improving.
As Important.	Some plants we have to watch as new plants could have the potential to be 'sleeper weeds', however, the days of introducing the lantanas are hopefully over.
As Important.	The nursery industry is the key interface for the broad community for plants sales and advice.
As Important.	The nursery trade has a voracious appetite for new species. That these species might be weedy is of less concern to the industry than the financial imperative.
As Important.	The nursery trade will always select those plants with the ability to survive, e.g. withstand harsh conditions – those traits that determine a good weed.
As Important.	There are so many gardens out there with weed species growing in them, plus the fact that more garden plants are becoming weeds, i.e. 'sleepers'.
As Important.	There will always be new cultivars that may have unknown, weedy properties, and unmanaged gardens, from which plants will escape. Climate change will exacerbate the propensity some spp. have to spread, regardless of the level of public education about the potential for garden escapees to become weeds.
As Important.	Until better regulation takes place, market forces will continue to lead growers to sell potential weeds.
As Important.	Weeds will continue to be distributed in this manner until appropriate regulation is enforced. New garden species will continue to be introduced.
As Important.	Will take political will to restrict private sales of weeds.
Less Important.	Awareness among nursery trade.
Less Important.	Awareness increasing.
Less Important.	Depending on how many registered nurseries take a responsible approach into the future. However, there are countless back yard and market stalls that may well be unaware of the implications of their actions, or may not care.
Less Important.	Education of the nursery industry of the role of ornamental plants, as weeds industry will reduce the incidences of weeds being sold. However, the industry is still reactive, rather than proactive, in regard to the introduction of new weeds.
Less Important.	Greater awareness of this pathway among those involved.
Less Important.	Growing awareness both in public, and in business, concerning the risks of introducing and spreading invasive spp.
Less Important.	If the level of resources devoted to minimising this pathway continues, there will no longer be weedy species on the market.
Less Important.	Mentalities and awareness are changing; nursery industry is becoming more proactive.
Less Important.	National collaborative developments between governments and the nursery & garden industry. Greater consumer awareness.
Less Important.	We are becoming more aware of plants that have the ability to become weeds.
Unsure.	Significant gains with nursery industry are currently being made, and on current trajectory, weed risk from mainstream nurseries will be negligible in the near future.

	Mail order and cottage nurseries may continue to be a problem. It is difficult to target which species will be future/sleeper garden escapees and regulate them now. Also difficult to know likely importance of garden rubbish dumping in the future, but will probably is an ongoing issue.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice.
Pathway 2: Aquarium plant trade

Outlook	*Reasons*
More Important.	Again, many of the weeds of the future are being grown and introduced into the aquaria of today. In Australia, our natural water resources will become more limited as the climate changes, and as our population grows. Natural aquatic areas are already quite limited and over-exploited, so it is imperative that any natural areas are conserved as best as possible.
More Important.	Aquarium industry is an expanding area.
More Important.	Aquatic weeds are important weeds in the region, and readily traded.
More Important.	As for the broader ornamental industry, there is a growing on-line trade in aquatic plants. The cooperation of EBay, for example, has been encouraging, but a more formal approach to the selling of plants online needs to be adopted.
More Important.	Continual pressure to introduce new species will eventually introduce pest species.
More Important.	Growing populations, spreading out into the bush, more and more pressure on our natural environment, new weeds arriving all the time, etc.
More Important.	Hard to regulate, and again, mobile and spread by individuals to areas that they can propagate aquatics. Also need to look at the population with regard to alligator weed, as it is propagated as a backyard vegetable.
More Important.	Increasing retail spending means increasing penetration of invasive species via this pathway.
More Important.	Lack of surveillance and active management.
More Important.	New species of algae are rapidly being moved by human and other taxa.
More Important.	See previous question's answer.
More Important.	Some permitted species are invasive.
More Important.	The number of new and emerging weeds species showing up in waterways is increasing.
More Important.	With the marketing of drought tolerant plants, the potential for a greater diversity of weeds exist.
As Important.	Continual introduction of waterweeds, and potentially pest organisms, via the aquarium trade.
As Important.	Despite good awareness of the potential for this pathway to initiate or sustain problems, these continue to occur, and some may require continued vigilance of infested waters and wetlands to minimise the possibility of new outbreaks.
As Important.	Difficulty in enforcing/regulating – would essentially require weeds officers going out and checking shops and online sales – a recent example in Victoria found water hyacinth being sold online and though aquarium sales – the investigations were very involved.
As Important.	Hard to see this changing.
As Important.	I expect the situation will remain much the same.
As Important.	Part of overall weed control.

As Important.	People like exotic plants, and with smaller gardens and more indoor and glasshouse type plants, opportunity to grow aquatic plants for sale is high.
As Important.	Public still largely ignorant regarding pest management.
As Important.	Same as the previous pathway.
As Important.	The introduction of CMAs may go a long way in assisting the identification and control of new species and infestations.
As Important.	The market for these plants is strong and insufficiently regulated.
As Important.	There seems to be more effort in educating the general public on the importance of weeds in the environment, and business dealing in plant materials tends to be responding in a positive way (not totally cooperative).
As Important.	We need water, and people love to look at water, whether it be an aquarium, lake or river.
As Important.	Weeds will continue to move in aquatic environments. However, research into surveying and spread may lessen future impacts.
Less Important.	Aquarium plants are being increasingly supplied by fewer, and more professional suppliers, who utilise purpose built facilities to grow plants. The removal of high weed risk plants from sale will decrease likelihood of 'backyard suppliers' seeding waterways with weedy aquarium species.
Less Important.	Greater awareness of problem.
Less Important.	Most of the serious potential aquatic weeds in the country have been identified and regulated. There are restrictions on importation of further species. There are, and will continue to be, instances of people flouting laws and voluntary agreements, but overall, I believe that this problem will be less important than it has been in the past.
Unsure.	Depends very much on how regulations are enforced.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice.
Pathway 3: Medicinal plant trade

Outlook	*Reasons*
More Important.	A high demand for medicinal plants is always there.
More Important.	Blatant and deliberate spread is only going to get worse and with the increased range of weeds, like Chilean needle grass and other stipas, before long they will be everywhere.
More Important.	There is a tendency for 'miracle cures' to be heavily promoted, possibly leading to sudden increases in the trade of particular plants. These are often made available in small quantities or in forms that are also hard to detect. Desperate people will flout the law in order to be cured, and this problem is certain to get worse.
More Important.	There is an increasing demand for products from this source, brought about by dissatisfaction with conventional medicine.
More Important.	This business is growing.
As Important.	Little enforcement.
Less Important.	Many of the medicinal plant species have already been spread. However, new genotypes will be introduced.
Less Important.	More research going into medicinal plants for human consumption than ever.
Less Important.	Trade in these species is generally not all that large, and speculators tend not to concentrate on these species to make a quick buck.
Unsure.	Greater internet trade in the future.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice. **Pathway 4: Food plant trade**	
Outlook	*Reasons*
More Important.	As more new crops are trialled, and more genetically modified foods are utilised in industry.
More Important.	GM crops will up the ante on transport spread.
More Important.	New crops being brought into state as investment crops, and they aren't always managed adequately – regarding weeds.
More Important.	The rise of permaculture and peri-urban lifestyles, and an increasing ethnic community size, means this pathway will increase significantly.
As Important.	Climate change, declining terms of trade, and the societal attitude that they can make a buck quickly with minimal effort (supported by TV programs like 'Who Wants to Be a Millionaire?') will continue to result in speculation. Speculation is ok if markets are developed or exploited to ensure the product is used.
As Important.	People will always try and smuggle in their favourite foods, no matter what the rules say.
As Important.	There needs to be a continued awareness of weeds and disease to the food and transport industries.
As Important.	This will remain a high threat to weed distribution, particularly when a new crop is planted over large areas, i.e. potential biodiesel weeds as a crop over large areas.
As Important.	Vigilance necessary.
As Important.	Depends on community education and uptake of info.
Less Important.	Food plants are often only occasional weeds, and many species have already been introduced. Major crop species have low levels of genetic diversity, which reduces their potential weediness.
Less Important.	More information is available for human consumption, so people can take educated steps to control.
Less Important.	Regulation in place, genetically modified crops may have herbicide resistance traits that will require that they produce sterile progeny.
Less Important.	There is a limit to the available species of food plants.
Less Important.	We probably already have most edible plants brought into the country and well distributed.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice. **Pathway 5: Fodder trade**	
Outlook	*Reasons*
More Important.	As dry seasons occur, weed distribution in hay for animals always results in the spread of new weeds, or introduction of new weed species.
More Important.	As land managers want to increase production from their land, they will be looking for more hardy species, or new species that may not have been properly assessed.
More Important.	As more fodder is moved greater distances.
More Important.	Climate change may increase the need for fodder transport.
More Important.	Drier climates cause more fodder to be harvested and transported, increasing the risk of introduction to new areas.
More Important.	Drought conditions & weed adaptability.

More Important.	Drought conditions put greater demand on fodder imports from places not previously sourced, and make receival areas more susceptible to weed invasion.
More Important.	Drought impacts are likely to increase the need for fodder transport.
More Important.	Increase transporting of fodder will increase this as a problem.
More Important.	Increasing areas planted to exotic species.
More Important.	Increasing trade in fodder (especially under drought conditions).
More Important.	Is increasing knowledge of improved pasture species and requirements for using in more situations. Plus encroachment of residential areas into rural.
More Important.	There is anecdotal about transport in fodder, and this is likely to increase.
More Important.	More droughts lead to more movement of fodder.
More Important.	Potential impacts of an increasing number of weeds species is a major NRM issue, over an above other highly promoted issues.
More Important.	Research bodies are still looking overseas for fodder plants, and nurseries are still promoting things as fodder, even among customers with no practical need for fodder plants.
More Important.	The likelihood of increasing frequency and extent of drought will promote greater movement of stock feeds. Unless it is regulated, invasive plants will continue to be spread, both knowingly and unknowingly.
More Important.	Whilst ever suspect plants can be freely solved, there are more and more locations being established from which they can expect into neighbouring areas.
More Important.	With a drought, purchasing of fodder outside of local area much more common, therefore potential for weed seed spread high.
More Important.	With the loss of productive primary production, stock/mulch is being sourced from further a field than ever before. E.g. Last year MALENY WAS GETTING IT'S Sugar CANE Mulch from Bundaberg (previously only 50km at Nambour). This sugar cane was seriously affected with invasive plant material, which was totally new to the region. This situation will simply grow especially given the drought continuing.
As Important.	Already recognised as an issue.
As Important.	As climate change occurs, more drought resistant varieties & species will be sought.
As Important.	Climate change.
As Important.	Climate change will increase unreliability of sufficient local fodder production; increasing development of specialist fodder producers; increased dependence on imported fodder in dairy industry; growth of feed lots and similar with reduced use of open land grazing.
As Important.	Climate change, drought will increase the incidence of feed movement and opportunities for weed seeds to germinate in new, drought affected, areas.
As Important.	Continuing drought contributing people trying to find alternatives to grow, etc.
As Important.	Exotic fodder crops will be spread.
As Important.	I can’t see the current situation changing. Very little education on this issue.
As Important.	I see it as a major cause of spread of weeds.
As Important.	It is hard to see how this pathway could in future be any more important than it is now, but I don't foresee it becoming any less important. The pastoral lobby is politically powerful and incredibly selfish, and I can't see it relinquishing any of its highly privileged status. My considerable experience of this industry suggests a complete absence of concern for off-site impacts of exotic pastures, and in fact total denial that a problem exists.
As Important.	It will continue to be a primary source of distribution of plant propagules through the movement of contaminated fodder and grain.
As Important.	More awareness of problem.

As Important.	Need to keep up the surveillance of fodder movement.
As Important.	New weeds and continued use of fodder has the potential to spread weeds.
As Important.	Situation should remain the same.
As Important.	There is a strong push for perennial pastures in areas where cropping is marginal, or in catchments where salinity is an issue, so we could see an expansion of these species being planted in the next 20 years.
As Important.	This is an issue that will continue to play an important role, and climate variability may actually increase the need for fodder transport over greater distances.
As Important.	This is not a new issue. Nothing changes, just the fashions. Example: new fodder crops, or bio fuels – nothing new, just changing fashions, like from flares to stovepipe jeans.
As Important.	Until the consensus is reached that weeds should not be used as fodder species, they will continue to escape.
Less Important.	Large-scale weed risk assessment programs, linked to weed management, have been initiated in the NT. This is a slow process, but cost/benefit analyses should give balanced, defendable guidelines.
Less Important.	Previous environmental problems will limit the introduction of new pasture species.
Less Important.	Recent weed risk assessment procedures reduce the risk of import of serious weeds as pasture species.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice.
Pathway 6: Revegetation and forestry

Outlook	*Reasons*
More Important.	As the need for revegetation increases, the use of weeds for these projects has potential to increase.
More Important.	Due to industry growth potential.
More Important.	Federal approaches to ameliorating climate change are likely to include corridor planning to enable biota to move across the landscape more freely. These corridors, together with offset plantings, are likely to also enhance the ability of many weed species to move within the landscape.
More Important.	Increased investment programs into plantation crops, and spreading to high rainfall areas due to climate change.
More Important.	Increasing planting of pines in our region, increasing numbers of reveg. projects with inadequate oversight.
More Important.	Increasing tree plantings.
More Important.	This is a new industry in WA: we have not seen the worst effects yet.
More Important.	Tree planting to sequester carbon may increase exotic tree plantations. As natural forests are removed from logging exploitation we will depend more heavily on plantations.
More Important.	With more revegetation and plantations as a response to climate change, there will be greater investments, without necessarily considering the species used, or their origin.
As Important.	A lot of soil is being moved around states and interstate, so regulations need to be strong to reduce the movement.
As Important.	As above.
As Important.	As more forestry blocks mature, and in a wider range of environments, this will increasingly become an issue.

As Important.	Cannot see the current situation changing.
As Important.	Examples will still occur.
As Important.	Forestry is a major industry in our region, and the ongoing production cycle will also present weed threats.
As Important.	More areas are going as tree farms in high rainfall areas, and after planting, receive very little management or attention with regard to pest monitoring and weed surveillance.
As Important.	Plantation forestry uses long-lived species selected for commercial reasons that have nothing to do with potential for off-site spread. Mine site managers continue to use invasive species for stabilising tailings. Until operators are made financially accountable for the off-site behaviour of their trees, nothing will change. I see no signs that plant spread off-site will ever be treated in the same way as other pollutants.
As Important.	There is now recognition of the damage that can be done by species planted with the best intentions.
Less Important.	Better weed risk assessment procedures will see fewer weeds introduced. More emphasis placed on impact of plantings for these purposes.
Less Important.	Forestry is a monoculture, and the timber species themselves can be weeds, or the activity surrounding the forestry can promote weeds. They are very averse to fire, and exclude weeds if at all possible.
Less Important.	Limited number of species. Most reveg. uses local indigenous spp.
Less Important.	More awareness.
Less Important.	Move to native species.
Unsure.	Plants that are being used, or that may be used in the future, may cause problems.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice. Pathway 7: Human apparel and equipment	
Outlook	*Reasons*
More Important.	As more people move around the country, the risk of weed spread will increase greatly.
More Important.	Increased tourism into wilderness areas departing from urban and weedy areas.
More Important.	Increasing grain & fodder movement.
More Important.	Increasing human population.
More Important.	Increasing leisure time, higher mobility, and more overseas travel with opportunity to import seed on clothing.
More Important.	Increasing populations, and increasing ability to move freely about the country.
More Important.	Increasingly mobile population.
More Important.	Movement into pristine areas might increase as road access to remote areas improves (e.g. Cape York).
More Important.	This pathway is the most underrated pathway in weed movement.
More Important.	Problem must be controlled.
More Important.	Significant spread of wide range of spp.

More Important.	With increasing mobility of people, this pathway will become more important.
As Important.	Even if legislation and education & awareness reduce the inadvertent transport of seeds in clothing and footwear, more people are travelling further to more remote locations.
As Important.	Hard to see it changing.
As Important.	I consider that public awareness is greater, however the volume of traffic is high.
As Important.	Impossible to regulate.
As Important.	Increase travel and holidays by a wider cross section of the community.
As Important.	Need to have a continuing awareness of movement of weeds.
As Important.	New people will take up outdoor activities, so the need for education will continue; the risks will still be there.
As Important.	Ongoing issue especially in amenity areas.
As Important.	Population shifts (tree changers).
As Important.	Reducing vectors to spread weeds is something that can be easily reduced.
As Important.	Situation will remain the same.
As Important.	The problem will always exist.
As Important.	Urban areas now contain large areas of weeds that are transported by humans.
Less Important.	Awareness of this pathway is increasing, so it should become les important over time.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice.
Pathway 8: Machinery and vehicles

Outlook	*Reasons*
More Important.	As the weed situation changes, this will become more important.
More Important.	Development, recreational fishing, continue to grow, and these issues will increase without appropriate intervention.
More Important.	Even if regulation, or awareness, reduces weeds being transported inadvertently in machinery, machinery is gaining access to more and more remote regions, thus increasing the probability of weed spread. Roads continue to be constructed into remote areas, providing corridors for movement of weeds on graders and slashers.
More Important.	Increase in contracting.
More Important.	Increased development and fragmentation of landscapes will mean that weeds are spread further, and into more core bushland areas.
More Important.	Increased road transport, and the creation of new corridors, increase both the extent of areas requiring management, and the total area of 'edge' into which weeds can spread. The increased movement of specialised equipment is also likely to contribute to weed spread within Australia.
More Important.	Increased use of contractors, and increased corporate holdings, will increase risk of weed seeds being moved over distance.
More Important.	Increased vehicle travel will increase dispersal.
More Important.	Increasing mobility of vehicles and machinery will accentuate this pathway.

More Important.	Increasing urban and semi-rural populations ignorant of the effect of weed invasion; increases stock, feeds and grain movements as droughts become more prolonged and occur more often.
More Important.	Increasing use of contract machinery is increasing sources of weeds.
More Important.	Increasingly mobile population, contractors, etc.
More Important.	It relies upon people to do the right thing. If people do not comply with vehicle wash downs, etc, it will continue to be a major pathway for weed spread.
More Important.	Many weed species still of limited distribution relative to their ecological limits; increased road and vehicle use.
More Important.	More and more machinery movements are taking place in Australia.
More Important.	More development, more machines, and more work in remote areas, e.g. Telstra.
More Important.	More machinery and vehicle movements in the future.
More Important.	More people travelling into more way out places.
More Important.	More weed species are being found in new areas.
More Important.	More weeds, more likely to be spread.
More Important.	Movement of machinery into more marginal farming areas and the greater mechanisation of farm tasks and the greater use of contractors due to the price of machinery.
More Important.	Will continue to be most important of weed-spread pathways. As others become regulated and better managed, this will become increasingly important.
As Important.	Actions that cause this type of spread are likely to continue at the same rate.
As Important.	As important pathway for spread of weeds in second hand machinery.
As Important.	Concerned about spread of some grass weeds in the region mainly through machinery and livestock movements.
As Important.	Current movement is unlikely to change.
As Important.	Hard to see how it could change.
As Important.	High diversity of vectors, their geographic location and weed species.
As Important.	High fuel prices will limit 4WD travel; other will remain same.
As Important.	I cannot see the current situation changing.
As Important.	I would like to think we will wise up, and go back to local service provision and less movement of personnel, goods and livestock around the country, as the need to deal with climate change starts to bite, but who knows?
As Important.	Impossible to inspect all machinery, etc.
As Important.	Increase in small-scale hobby farmers, with potentially less knowledge of weeds in their landscape, will present challenges.
As Important.	Machinery movement will always occur.
As Important.	Machinery will continue to be used for farming operations, and will continue to spread weed seeds and propagules.
As Important.	Movement of Ag machinery, both interstate and within local government areas, transports seeds from paddock to paddock and from one roadside to another. This is also a problem with utilities vehicles, e.g. Telstra, electricity supply, gas pipelines, etc.
As Important.	No prospect of change in some councils.

As Important.	Part of control.
As Important.	Reducing vectors to spread weeds is something that can be easily reduced.
As Important.	Substantial change required in approach.
As Important.	There are more weeds being found and there will always be movement of machinery.
As Important.	There are no apparent factors that would see this pathway change.
As Important.	There will be more movement around the country, allowing for a greater risk of spread.
As Important.	This is an ongoing problem that is currently being addressed in a small way.
As Important.	Total enforcement of wash down will be difficult.
As Important.	Where high-risk operators of machinery take care, they can have a big impact on the reduction in spread rate of weeds. With increase movement of vehicles, etc, through weed areas, the potential for spread increases.
As Important.	Will always be some equipment moving around, and it is not possible to stop all weed spread via this pathway.
Less Important.	Current focus on the pathway and vehicle hygiene programs, wash down areas, etc, plus increasing implementation of codes of practice, should reduce the incidence of spread by this pathway. Improved weed management by Vic Roads in recent years has reduced the potential for spread along major roads.
Less Important.	It is hard to convey this message to shire and road workers as being important.
Unsure.	Maybe people will be less likely to have lawns under dryer conditions? Maybe we'll become less reliant on fossil fuels.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice.
Pathway 9: Construction and landscaping materials

Outlook	*Reasons*
More Important.	As above.
More Important.	Construction activities, especially in more and more remote areas, will continue to escalate, increasing the chances of weed seeds being dispersed.
More Important.	Development continues to grow, and these issues will increase without appropriate intervention.
More Important.	If weeds are spreading more at their current rate, their cost of control may increase, and biodiversity maybe affected, stopping this may help.
More Important.	Increased development and fragmentation of landscapes will mean that weeds are spread further and into more core bushland areas.
More Important.	Increasing human activity over larger areas.
More Important.	This is one of the biggest areas of movement we encounter.
As Important.	Can't see it changing.
As Important.	Construction and soil movement will always be with us. Sale and movement of mulches may increase as their use is being promoted.
As Important.	Continuing problem.
As Important.	Difficult to police.
As Important.	Hard to see a change in the immediate future.

As Important.	In WA, movement of soil, gravel, lime, etc, is governed by the Extractive Industries committee, and the regulations have recently been upgraded to increase weed control in some areas.
As Important.	Increased use of recycled materials in landscaping.
As Important.	Landscaping growth due to population growth.
As Important.	Limited regulation.
As Important.	Ongoing issue.
As Important.	Ongoing source of spread for high-impact declared weeds such as gorse and white weed.
As Important.	Part of control.
As Important.	Roads will always be constructed or upgraded, and the problem will always exist.
As Important.	There will always be a need for these items.
As Important.	There's heaps of fill being moved around every day. Illegal dumping is still occurring, and inappropriate fill is still being used.
As Important.	This kind of activity will continue and will increase.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice.
Pathway 10: Agricultural produce

Outlook	*Reasons*
More Important.	As grazing enterprises become more sophisticated, it is likely that supplementary feeding will become more commonplace.
More Important.	Basically, other pathways will be more easily managed.
More Important.	Climate change may require livestock producers to import more fodder in dry years
More Important.	Climate change will lead to more movements of produce.
More Important.	Increase in contracting.
More Important.	Increased likelihood of drought, changed land uses and increased movement of produce.
More Important.	Increasing trade in this sector will make this pathway more important.
More Important.	Increasing transport of produce over long distance, e.g. hay from the Katherine region to Victoria.
More Important.	Introduction of herbicide resistant weeds.
More Important.	More crop choices, more trade.
More Important.	More hay being transported due to climate changes.
More Important.	More trade in produce.
More Important.	More weed species are occurring – more feed is being transported during times of drought.
More Important.	Prolonged drought increasing the need to transport fodder to more areas.

More Important.	Shift away from wool towards prime lamb production, drought conditions and Tasmania's heavy dependence on imported mainland feed grain, suggest that this pathway will be as, or more important in the future.
More Important.	The need for these products especially during hardships, i.e. drought, flood, means hygiene protocols are ignored.
As Important.	An ongoing issue, while some weeds either diminish in importance through changed farming practices, or spread to their ecological limits, others arrive from overseas. Globalisation and relaxation of import barriers may even increase the number of new arrivals.
As Important.	As indicated, emergencies will arise from time to time, requiring the importation of feed grain into Tasmania from mainland states.
As Important.	Direct sales to other producers will ensure some weeds will be transferred.
As Important.	During droughts, the amount of weed seeds in fodder is inversely proportional to the price.
As Important.	Each year, some examples of weed seed movement are reported in bird seed and stock feed.
As Important.	Free trade will not allow too many restrictions.
As Important.	Hay will continue to be a major tradeable commodity.
As Important.	Increasing specialisation leading to greater need to import feed fodder, etc, to the livestock.
As Important.	Management of agricultural weeds is expensive, and is considered important to primary producers.
As Important.	Movement of agricultural produce will continue more or less for the same reasons as it has in the past.
As Important.	Need to sustain current legislation for movement and spread of weeds.
As Important.	No matter how good the seed cleaning, there are always some weed seeds in large bulk lots.
As Important.	Ongoing issue – see comments earlier about drought, etc.
As Important.	Same.
As Important.	Situation should stay the same.
As Important.	There will be no change unless the change is at the source of the commodity.
As Important.	This is nothing new. There have always been opportunities for civil cases. There have been opportunities for statute legal action under noxious weeds law for 100 years in NSW.
Less Important.	Adequate regulation.
Less Important.	As awareness of this issue increases, the pathway will become less important.
Less Important.	To my knowledge, quite good regulatory pathways that are well established.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice. Pathway 11: Research sites	
Outlook	*Reasons*
More Important.	High number of research stations being sold.
As Important.	Ongoing conflicts of interest between primary industry and natural environment. Push for biofuels.
As Important.	Research into GMOs may create new, unknown risks, but this is mostly to my knowledge a well-managed pathway.
As Important.	There is always a guru somewhere advocating the benefits of species as an oil tree crop fodder or yield increase.
Less Important.	Better practises now than in the past.
Less Important.	I believe that research groups are becoming more responsible in their attitudes to trial sites.
Less Important.	Improved quarantine laws.
Less Important.	Improved regulation and improved knowledge of researchers will decrease weed species utilised in trials and research, as well as improved management strategies decreasing risk of weed spread.
Less Important.	Increased knowledge of weed risks and better practice.
Less Important.	More aware of escape.
Less Important.	People more aware of weeds and travelling as contaminants.
Less Important.	Strict guidelines for managers of sites.
Less Important.	The severe negative effects of fodder grass introduction programs have been exposed. Weed risk assessment processes have been implemented in relation to most areas in which plants used in research may pose a weed risk.
Unsure.	Will depend on how much weed research will continue into the future.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice. Pathway 12: Livestock movement	
Outlook	*Reasons*
More Important.	Again, the increasing transport of livestock will require increasing vigilance.
More Important.	Climate change will lead to more stock movements.
More Important.	Greater movement of livestock in times of drought, and a greater dependence on feedlots and other intensive finishing properties.
More Important.	Increased movements of livestock due to changing climate increasing probability of drought, and movement of stock for agistment, etc.
More Important.	More agistment of livestock due to climate change.
More Important.	More animals being moved around and fewer inspections.
More Important.	More stock being moved greater distances.

More Important.	Quarantine protocols are in the process of being relaxed in light of producer imperatives, and the shortage of trained staff.
More Important.	Weeds are being spread in this way more each day. Wash down facilities for stock need to be looked at.
As Important.	Always be stock movement.
As Important.	Even if legislation or awareness reduce the chances of weeds being transported with stock, stock will continue to be moved about the countryside, especially with increasingly erratic weather conditions, and weeds will inevitable go with them.
As Important.	Fodder and grain products have higher potential for spread.
As Important.	I have found it a major source of spread from property to property, especially in movement of sheep.
As Important.	Increased climatic variability will create new establishment opportunities.
As Important.	It is a pathway that exists, but is unlikely to be a major source – more one that leads to the occasional, but important spread of a weed.
As Important.	Our modern lifestyle will continue to keep this pathway important.
As Important.	Same.
As Important.	Stock movement and transport remains a high-risk pathway.
As Important.	Stock will continue to be moved long distance in Australia.
As Important.	The situation is unlikely to change, because livestock will continue to be moved for the same reasons as they have in the past.
As Important.	There are weeds adapted to movement by stock that have not yet reached their ecological limits, so this movement will continue. There is no likelihood of a return to saleyard inspections, and the effectiveness of such inspections was never demonstrated.
As Important.	There will always be livestock movements.
As Important.	To sustain current controls.
As Important.	Weed seed passage will always occur through livestock, and quarantining transported livestock will not become a standard, accepted practice in the foreseeable future.
As Important.	With the continued movement of stock, this will remain an issue.
Less Important.	Awareness is increasing, so importance will decrease.
Less Important.	Better wash down procedures, focus on roadside management.
Less Important.	Greater awareness.
Less Important.	Industry is implementing best practice for livestock movements, including good hygiene and quarantine.
Less Important.	Much easier to control animal movement if compulsory shearing and cleaning of animals implemented, with bio-security protocols practiced.
Less Important.	NLIS has a trace back component that may stop vendors deliberately moving stock that are infested with weeds.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice. Pathway 13: Waste disposal	
Outlook	*Reasons*
More Important.	Development cues bushland areas to be more fragmented, and more neighbours to our shrinking sites means that we are going to ensure that residents don't dump over the fence, and also don't plant known environmental species in their gardens.
More Important.	Due to great variety of garden plants.
More Important.	Increasing popularity of gardening, closing of local tips so that people have to drive further to deposit waste, and pay a dumping fee, which they did not previously have to.
More Important.	Increasing pressure by humans on open and green spaces.
More Important.	There is a need to raise awareness of the plants ability to spread from being dumped, etc.
More Important.	Urban areas adjacent to bushland have the greatest effect, and urban areas are increasing.
As Important.	Can't see problem disappearing.
As Important.	Duping of garden waste continues.
As Important.	Eradication of all the weeds currently in gardens would be impossible.
As Important.	Garden waste disposal is difficult to regulate and likely to continue unless an extensive education campaign was instigated.
As Important.	Hard to see this changing.
As Important.	Illegal dumping, and mismanagement of road verges and waste sites, seem to assist the problems of weeds spreading into the environment, so if this is not stemmed it will always be a problem.
As Important.	Increased tip fees, difficulty in policing dumping events and enforcing illegal dumping regulations.
As Important.	Indiscriminate disposal will continue.
As Important.	Insufficient understanding of the level of this pathway.
As Important.	It is difficult and expensive to dispose of weeds.
As Important.	Low risk, but still present and of local importance.
As Important.	More gardens being grown in sensitive areas – tipping fees at council refuse sites.
As Important.	Ongoing issue.
As Important.	Over time, the number of illegal dumping sites is increasing.
As Important.	The people who dump garden waste are unlikely to be significantly swayed by legislation or education.
As Important.	Without a change in management strategy, and with increasing fuel (and therefore transport costs), I don't envisage a reduction in illegal dumping of green waste.
Less Important.	Better awareness of problem.
Less Important.	I'm hoping that, as more municipalities collect household green waste, there will be less incentive for people to dump. Also, I think people are generally getting the message that dumping stuff is not as good an idea as it might seem.

Unsure.	In my experience, illegal dumping of garden refuse has lessened as people have been educated.
Unsure.	More information required.
Unsure.	This is a council responsibility.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice.
Pathway 14: Birds

Outlook	*Reasons*
More Important.	Bird-dispersed weeds are still spreading in many areas, which means greater propagule pressure, which means this pathway is likely to become more important.
More Important.	As more exotic plant species are planted and come into reproductive phases, this pathway will grow in importance.
More Important.	As native foods disappear, birds rely on weed seeds as food.
More Important.	As weed populations increase, so will the importance of this pathway.
More Important.	Better control of weeds needed.
More Important.	Loss of habitat and climate change.
More Important.	The spread of pest birds, such as Starlings, is continually increasing, and directly related to the spread of pest birds is their reliance on pest plant species, such as African boxthorn.
As Important.	Be aware of feral animals, and reduce numbers to help to stem some of the flow of weeds.
As Important.	Birds can move weed seed from private property to reserve areas.
As Important.	Birds will always spread weeds if they are present.
As Important.	Birds will continue to eat fruit.
As Important.	Birds will continue to fly.
As Important.	Circumstances unlikely to change.
As Important.	Difficult to assess and quantify.
As Important.	High volume of weeds, range of species, range of bird species. Can't easily curtail bird movement.
As Important.	I think it is important, as weeds become more naturalised, and native animals adapt to rely on them, we may have a problem with weeds spreading, and a reduction of native fauna, such as blue wrens, that utilise such weeds as blackberry or lantana for habitat and food.
As Important.	In natural resource areas, birds are probably spreading weeds into new areas very effectively, but it would be very difficult to regulate – management of weed sources is though possible.
As Important.	Inadequate resources available for dealing with this issue.
As Important.	Less natural environment forces birds to forage in urban and semi rural environments.
As Important.	Limited species that birds eat, or that have sticky seeds.
As Important.	Native and introduced birds will continue to eat fruits and seeds of potential weeds and disperse them. Many weeds are pre-adapted to avian dispersal.

As Important.	Ongoing issue – how to regulate birds?
As Important.	Spread by this pathway unlikely to increase/reduce in the future.
As Important.	There are still many sources of bird-spread weeds, and many birds that are spreading them. In my experience, fruit-bearing plants are on the increase in bushland due to a change in fire regimes.
As Important.	There will always be dispersers, and there will always be weeds to disperse.
As Important.	There will always be plants that will be spread by wildlife.
Less Important.	Can be dealt with reactively.
Unsure.	Depends on management of weeds that can be spread this way.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice. Pathway 15: Other animals	
Outlook	*Reasons*
More Important.	Again, the increasing populations of weeds means that the risk from this pathway will increase.
More Important.	As feral animals and weeds become more abundant, spread will increase.
As Important.	Always be native and feral animals transporting seed.
As Important.	Animals will still move.
As Important.	Circumstances unlikely to change.
As Important.	I think it is important, as weeds become more naturalised, and native animals adapt to rely on them, we may have a problem with weeds spreading, and a reduction of native fauna, such as blue wrens, that utilise such weeds as blackberry or lantana for habitat and food.
As Important.	No reason to suspect that it will decline in importance.
As Important.	Ongoing issue.
As Important.	The vectors involved, such as foxes and marsupials, will continue to spread weeds.
Less Important.	Limited ability to reduce the movement of native animals.
Less Important.	There's currently a lot of work going on to control/eradicate feral animal populations. If successfully reduced, this might become a less important pathway.
Unsure.	Depends on the management of weed species that can be spread in this manner.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice. **Pathway 16: Wind**	
Outlook	*Reasons*
More Important.	As above.
More Important.	As control is almost non-existent, then species that use this as their primary mechanism for dispersal will increase. A warmer climate could increase frequency of stronger wind events, and so move larger seeds over shorter distances.
More Important.	Climate change will allow other varieties of plants to grow in new areas.
More Important.	Fireweed continues to expand in the region, and nothing is likely to stop it. Serrated tussock is also likely to get worse, but is not quite so hard to control.
More Important.	Illegal clearing providing space for spread of weeds by wind.
More Important.	Increasing population, more clearing = loss of habitat, general stress on natural areas.
More Important.	Management arrangements require landowner cooperation to contain weed spread. As infestations of certain wind spread weeds become larger, they will be more difficult to contain, and therefore will become a more important problem into the future.
More Important.	More weeds, more frequent storm events, more drought and dust storms.
More Important.	Wind blown species increase as a problem with stubble retention.
More Important.	With more weeds, and larger populations, this pathway will increase with importance.
As Important.	As per previous.
As Important.	Circumstances unlikely to change.
As Important.	Deal with a number of windborne weeds – movement along transport corridors particularly important.
As Important.	For example, broomrape seed can be wind dispersed.
As Important.	I think it is important, as weeds do spread via wind. If better strategies and tougher legislation are developed, this impact can be slowed. Examples include weeds blowing between rural properties to urban backyards and bushland.
As Important.	Impossible to regulate.
As Important.	Lots of species have wind blown seeds.
As Important.	More winds – same or worse weather conditions.
As Important.	Natural wind distribution remains a common method of distribution, and is not possible to regulate.
As Important.	No reason to believe that the importance of this pathway will lessen.
As Important.	Not possible to regulate awareness.
As Important.	Ongoing issue.
As Important.	The wind will continue to blow.
As Important.	This is not as significant pathway as many seem to think.
As Important.	Unchanged.

As Important.	Wind conditions unlikely to change.
As Important.	Wind dispersed weeds have been present for a long time, and from time to time, the actual species that is of concern may change, but it isn't a new phenomenon, but a new perception.
As Important.	Wind will always be there.
As Important.	Wind will always disperse susceptible weeds.
As Important.	Wind will continue to blow.
Less Important.	More management plans being developed for species that can be spread in this manner.
Unsure.	I am not sure how to redirect the wind to areas of better weed management.

What is the outlook for this pathway in the future? Will it be More Important, As Important, or Less Important? Please give the reasons for your choice.
Pathway 17: Water

Outlook	*Reasons*
More Important.	As previously.
More Important.	Floods move different weeds at different rates and distances, as each species has different characteristics.
More Important.	If we end up with more droughts and floods (under climate change), this sounds like a great combination for weed establishment.
More Important.	Increase focus on the value of water and the management of the resource.
More Important.	Increase in the concern over the condition of riparian areas.
More Important.	It is getting harder to use chemicals as a management tool in waterways.
More Important.	Low levels of surveillance, and management without the appropriate tools.
More Important.	More and more species of plants are moving through the aquatic nursery trade. Therefore, the risk of the pathway as a source of weed spread is likely to increase.
More Important.	Weed propagules will continue to be carried by rivers. Riparian zones will continue to suffer degradation by stock, ferals, and humans, and provide ideal conditions for germination and survival of many exotic species. Flooding events are likely to become more frequent.
As Important.	As previous comment.
As Important.	As river systems and lakes dry, the pathway will be very important to protect existing wetlands.
As Important.	Circumstances unlikely to change.
As Important.	Currently high priority – planned for.
As Important.	I think it is important, as weeds, especially in an urban bushland context, are rapidly spread by water; high nutrient content also accelerates this too. I think current measures nationally are on the right track, especially for such issues as Salvinia, keep up funding.
As Important.	Impossible to regulate.
As Important.	Need of an awareness of water borne weeds.
As Important.	Water movement will continue to disperse weed propagules as it has in the past.

As Important.	Waterways will continue to flood, resulting in uncontrolled movement of weeds.
As Important.	Water will still flow, carrying weed seed.
As Important.	Waterways will continue to transport weed propagules.

2.6 Q7 Do you know of any scientific or other research that has investigated this pathway in an Australian context?

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 1: Ornamental plant trade
A number of studies have looked at the weed risk posed by species in the nursery trade. E.g. WWF, 2006.
As above.
Barker, J., Randall, R.P. and Grice, T. (2006). Weeds of the future? Threats to Australia's grazing industries from garden plants. Project number NBP.357, final report prepared for Meat & Livestock Australia Ltd. by the CRC for Australian Weed Management. (129 pp.). Randall, R.P. (2001). Garden thugs, a national list of invasive and potentially invasive garden plants. Plant Protection Quarterly 16 (4), 138-171. Spafford-Jacob, H., Randall, R.P. and Lloyd, S.G. (2004). Front Door Wide Open to Weeds: An examination of the weed species permitted for import without risk assessment. WWF Australia (140 pp.). Spafford-Jacob, H., Randall, R.P. (2006). An evaluation of National and State policy and procedures for the prevention of the importation of weeds into Australian rangelands. The Rangeland Journal. CSIRO Vol. 28. Issue 1, 1-8. Spafford-Jacob, H., Randall, R.P. and Lloyd, S.G. (2004). A Challenge to Australian Quarantine Law. Proceedings of the 14th Australian Weeds Conference, Ed's B.M. Sindel and S.B. Johnson (Weeds Society of New South Wales). Virtue, J.G., Bennett, S.J. and Randall, R.P. (2004). Plant introductions in Australia: How can we resolve weedy conflicts of interest? Proceedings of the 14th Australian Weeds Conference, Ed's B.M. Sindel and S.B. Johnson (Weeds Society of New South Wales).
CSIRO/DPI.
CSIRO and WWF reports.
CSIRO/WWF 'Over the Garden Gate', and work by Gosper & Vivian-Smith, for example.
Current project – weed risk assessment of tradeable aquatic plants by NSW DPI.
Groves and Hosking have documented some of this work.
Groves et al.
'Jumping the Garden Fence', WWF report, Groves et al., 'Weed Categories for Agricultural and Ecosystem Management'.
Kate Blood's work. Ongoing activity by Daniel Joubert et al. DPI Vic.
Lonsdale work.
Lots – see Weeds CRC and WWF publications.
No. (Eighteen responses).
No – maybe NRW, or the nursery industry themselves.
No other than the CSIRO and WWF Jumping the Fence Report, and AABR, AUSTRALIAN ASSOCIATION OF BUSH REGENERATORS, has produced a report with WWF-Australia on the effect of garden plant escapes on bushland in Eastern Australia. The report is based on information from those working in remnant natural areas.
No, and this is typical of weed management. There is very little scientific research to support regional initiatives on either garden escapes, hygiene, or environmental weeds.
Not specifically, but they have been done.
Only what was researched by Jane Moreton and CSIRO.
Yes. (Four responses).

Rod Randall's database. Victorian DPI.
Some evaluation by government.
There were a fair number of presentations about ornamental plants becoming naturalised at the 14th Australian Weeds Conference.
Where do you want me to start? Have a look at anything the WWF has produced over the last decade or so. Then chat with all weed risk assessors that work for state governments for a list of references, e.g. Csurhes and Edwards. This is a very active field of research and policy development. Please contact me if you need a start.
Work presented at Wagga Wagga Weeds conference – forgotten authors' names.
WWF/Weeds CRC reports, Invasive species inquiry.
Yes – a lot of studies and government awareness funding.
Yes, many journal and conference papers exist.
Yes, the Victorian DPI have done a pathways study – see Steel, Hunt, Weiss and King, conference paper from EMAPI9 conference in Perth, Sept 07.
Yes, there are a number of surveys that have been conducted.
Yes, well studied.
Yes. E.g. Jumping the Garden Fence report, WWF, 2005.
Yes. Published nationally.

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 2: Aquarium plant trade
Again where do I start? Please contact Paul Champion of NIWA New Zealand, and Andrew Petrochevsky of NSW DPI Grafton, for numerous published studies, and information on a risk assessment project currently underway to try and assess, and then regulate, this trade a bit. We have engaged the major traders and industry groups to ensure that the results are taken up by industry – this is often sadly lacking in other legislative approaches.
CSIRO/DPI.
Current project: Aquatic Weeds Risk Assessment project; jointly conducted by NIWA (NZ), and NSW DPI.
I know its available, but not specifics.
Local weed authorities.
National aquatic weed program (though WONS program).
No. (12 responses).
No, only in research for better control measures of some species.
Not specifically.
Research on biological control of Salvinia molesta, Eichhornia crassipes, and Mimosa pigra.
See previous question's answer.
Survey work is extant for several species.
The risk assessment project funded by 'Defeating the Weed Menace' will in part examine this pathway.

There must be some.

Weed risk assessment of tradeable aquatic plant species by NSW DPI. Many studies into this industry, both in the USA and New Zealand.

WWF/Weeds CRC/Aquatic Weeds Project (WONS).

Yes.

Yes – through the WONS National Aquatic Weed Management Group.

Yes, studies on introductions at the state barrier through WAQIS.

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 3: Medicinal plant trade
No. (Seven responses).
No, although studies into the use of St John's Wort may provide some insights into the pathway.
Not sure.
Not sure, but it so well known as a pathway, that we do not need to research it any more, we need to make sure we avoid this spread method through proper management.
See Johnson (2007) Conflicts of Interest paper. Proceedings of the NSW Weeds Conference. I can supply if necessary. This paper discusses examples, and proposes a framework to address conflict of interest species using herbal (and food) species as an example. Other species examples can be found in Edwards and Csurhes book, and a casual search on the internet.

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 4: Food plant trade
Institute of Land and Food Resources, the University of Melbourne.
Lalith Gun (spelling) did some work on alligator weed.
No. (Seven responses).
Scientific groups are starting to consider new crop weeds, and weeds in response to climate change.
See Johnson (2007) Conflicts of interest paper. Proceedings of the NSW Weeds Conference. I can supply if necessary. This paper discusses examples, and proposes a framework to address conflict of interest species using herbal (and food) species as an example. Other species examples can be found in Edwards and Csurhes book, and a casual search on the internet.
Yes, in regards to olives in SA.
Yes. There are surveys of species escaping cultivation.

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 5: Fodder trade
Although it is a well-known method, I am not aware of any quantifiable research done on the issue.
Considerable research investigating pasture species that have become weeds.
Considerable work being done at Charles Darwin University, especially by Nat Rossiter, Sam Setterfield, et al.
Cook & Dias 2006. Australian Journal of Botany, 2006, 54, 601-625 TURNER REVIEW No. 12: It was no accident: deliberate plant introductions by Australian government agencies during the 20th century. Whalley, R. D. B. 1970. Exotic or native species – the orientation of pasture research in Australia. The Journal of the Australian Institute of Agricultural Science 36:111-118.
CRC Future Farm Industries – my own work is on weed risk assessment of perennial pasture species, to identify high weed risk species prior to release or promotion by a research organization. Management guidelines for key species are planned to be developed in the near future.
For a review see – Gardner, A (1998) The duty of care for sustainable land management. The Australian Journal of Natural Resources Law and Policy 5(1) 29-63. Martin, P. Verbeek, M. (2007) Sustainability strategy (Federation Press) Martin, P. Verbeek, M. (2000) Cartography for environmental law: Finding new paths to effective resource use regulation. Report: Methodology for NRM Law-in Context studies (Project No TPF1) (The Profit Foundation, Sutherland, NSW).
Lonsdale, W.M. (1994). Inviting trouble: Introduced pasture species in Northern Australia. Australian Journal of Ecology 19, pp: 345-354. Barker, J., Randall, R.P. and Grice, T. (2006). Weeds of the future? Threats to Australia's grazing industries from garden plants. Project number NBP.357, final report prepared for Meat & Livestock Australia Ltd. by the CRC for Australian Weed Management. (129 pp.).
No. (Thirteen responses).
Not specifically in elation to fodder.
Papers on weedy grasses and Parthenium.
PIRSA.
Some 1990s study by Michael Moerkerk, DPI Horsham. Current PhD study by Kate Gosney, University of Ballarat.
There are several in NT, Qld, and WA.
Too much to list.
Yes. (Four responses).
Yes, there would be some papers on fodder as weed sources in rangelands.
Yes, but cannot recall specific papers.
Yes, plenty, beginning with Lonsdale et al. 'inviting trouble' in the 1990s, and more recently coming out of Charles Darwin University (Michael Douglas, Samantha Setterfield, Peter Whitehead, David Bowman and colleagues and students), Parks & Wildlife in Darwin, and CSIRO in Darwin.
Yes, Qld weed seed spread group are investigating this avenue, particularly between states.

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 6: Revegetation and forestry
ACMER, ACARP, numerous universities, on site research project is by the various mines, etc.
Bitou bush is an obvious example.
No. (Nine responses)
No, but I'm sure there is some out there, at least for Pinus radiata.
Papers by Glenda Wardle on pine invasions in Australia (radiata pine).
Research on Bitou bush, several grasses and tree species.
Some assessment of forestry spp. invasive potential has been conducted in SA.
Various MTSRF-funded projects are currently addressing this.
Yes.

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 7: Human apparel and equipment
CRC.
Heaps been done – best was 700+ spp. from a wash bay in Melbourne.
No. (Seventeen responses).
Yes, I understand so, studies have been done.

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 8: Machinery and vehicles
A lot of trace back work shows spread of seeds through movement of sand, slashers, etc. Siam weed a good example, also Mimosa pigra in the Peter Faust dam.
As above.
Information does exist, and training courses are held for those who wish to attend based on vehicle hygiene practices.
Limited number of studies that have tracked weed movement on machinery.
Michael Moerkerk in Vic has done some work on this – see 15th Australian Weeds Conference proceedings, p. 458.
Michael Moerkerk studies of weeds found on vehicles & equipment, associated with weed spread prevention, and vehicle hygiene programs of DPI Vic. Australian and Victorian weed conferences. Victoria University studies (Erakovic et al., David McLaren) on slasher design, etc. Recent European studies of weed movement along motorways.
No. (Twenty responses).
No, but there is plenty of anecdotal evidence.
No. See previous response to this question.

Only mine.
Parthenium experience.
See WAQIS for details of inspections vs. cleaning treatments.
Some studies on particular weeds.
Vic Dept. NRE has done some work on slasher cover design.
Victorian University study on slasher design. Branched broomrape 15AWC conference paper looked at likely links between properties for movement.
Yes. (Three responses).
Yes – ANU Botany school looking at weed seed collected from a car wash.
Yes – for example, Wace, N.M., 1979. Assessment of dispersal of plant species – the car-borne flora in Canberra. Proceedings of the Ecological Society of Australia 10: 167-186.
Yes – heard of a study of weeds on tourist vehicles at Alice Springs or Uluru.
Yes – NRW.
Yes, see Vic DPI.
Yes. Work by NSW DPI and Vic DPI.
Yes. Michael Moerkerk's work.
Yes. Moerkerk in Victoria.

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 9: Construction and landscaping materials
A lot of trace back work shows spread of seeds through movement of sand, slashers, etc. Siam weed a good example.
BRS recently conducted a survey of local governments on their green waste recycling methods, report pending.
No. (Fourteen responses).
Only mine.
Yes, not substantial.
Yes. On several occasions, weeds have been spread with this method.

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 10: Agricultural produce
CRC for Weed management – Technical Series – #13 by John Ireson et al.
No. (Twelve responses).
No – however NRW would have carried out some for sure.
No, see AGWEST plant laboratories for records of plant samples from seed requested for testing.
Parthenium taskforce.
PIRSA.
Powles' studies on seed contamination in farmers grain at sowing.
Seeder box surveys by Michael Moerkerk and Steve Powles group at WAHRI.
Yes. (Three responses).
Yes. Research on weed seed content, of both hay (NSW) and sowing seed (Vic, WA).

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 11: Research sites
Cook and Dias Aust. J Botany, 2006, 54 601-625, Lonsdale Aust. J Ecology, 1994, 19 345-354, Emms J and Virtue J TMS 2.5 Duty of Care – Trial Weediness Survey/Audit, 2005, unpublished report to Australian Wool Innovation.
I am aware of a situation in the 1980s, where a new weed infestation was the result of a species introduced to a specific area to undertake an ecophysiological study. Although attempts were made to remove all seeds, some remained, and a population of this species has existed at this site since then. Thankfully, the species doesn't appear to have spread extensively from this site.
Lonsdale did a great paper on this. Some grey literature in the NT gives the other side. It is, however, pretty obvious that some of the NT grass weeds came in when being evaluated for fodder.
No. (Seven responses).
Quite a lot, e.g. G. Cook & Diez – deliberate introduction of weedy fodder grasses.
Yes, survey of introduced legumes.

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 12: Livestock movement
No. (Eight responses).
No – NRW would have some.
NPWS, RLPB's among many.
PIRSA.
Plenty of literature on weed seed passage through livestock.
Steven Bray; UQ, PhD thesis on giant rat's tail grass.
There are publications, but none specifically.
Yes. (Four responses).
Yes. Scientific studies on a number of weed species. Work on animal retention of weed seeds.
Yes.

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 13: Waste disposal
No. (Twelve responses).
Only the work conducted by consultants in regards to littering.
Yes. (Two responses).

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 14: Birds
A PhD study is currently underway on the west coast of SA, looking at seed viability of ingested seeds, and water dependence of starlings.
As above.
Buckley et al., 2007, Journal of Applied Ecology, 2006, 43, 848-857, Management of plant invasions mediated by frugivorous interactions. Works also by Carl Gosper and Gabrielle Vivian Smith.
Considerable research on bird-dispersed weeds.
CRC and CSIRO have investigated bird dispersal.
Current National Feral Animal Control Programme project, investigating the role of animals in weed spread (WA – Laurie Twigg).
Gosper & Vivian-Smith, and Westcott-group work.
I am sure some studies have been done on bird and pig movement of weeds.
It has been described in numerous publications.

No. (Six responses).
Quite a bit of research done in the Weeds CRC – see publications by Gosper, Vivian-Smith et al.
See Weed CRC studies on bird-dispersed weeds.
Weeds CRC – Carl Gosper and co.
Yes. (Five responses).
Yes – e.g. G. Vivian-Smith and C. Gosper's work.
Yes – WONS Boneseed Management Manual, 2006, Gorse National Best Practice Manual.
Yes, there were some papers presented at the 15th Australian Weeds Conference.

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 15: Other animals
I am not aware of studies into unusual species.
No. (Eight responses).
Not offhand.
State DPI/Parks agencies are doing work in this area.
Yes. (Two responses).
Yes, but only one or two papers – can't think of them off the top of my head.
Yes. Studies of weed propagule movement by foxes, feral camels, and other species.

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 16: Wind
An honours thesis by Piers Barrow (Charles Darwin University) on Gamba grass (Andropogon gayanus) in mid 1990s.
Done some wind tunnel work on broomrape.
Fair chance that Brian Sindel did some work with fireweed, and has considered spread of serrated tussock.
I gather there has been some research into a biological control, but with no outcome yet.
Lots.
Lots of papers on wind dispersal, most focus on Ag species, and most dispersal is relatively close to the parent plant, virtually all less than 100 m.
My own work on weed recruitment post-cyclonic events, and Murphy's work on the same topic.
No. (Ten responses).
Not sure.
Nothing recent.

Only mine.
Yes. (Four responses).
Serrated tussock literature.
Some.
WAHRI research on pollen spread.
Yes, and they don't move very far.
Yes. Scientific research on dispersal of wind-borne seed.
Yes. DPIWE Mediterranean daisy weed status report, The Serrated Tussock Manager's Fact Pack.

Do you know of any scientific or other research that has investigated this pathway in an Australian context? Pathway 17: Water
MDBC, Land and Water Australia, CRC Weeds.
No. (Twelve responses).
Publications for WONS, such as Salvinia, document this problem well.
Yes. (Two responses).
Yes. Movement of water weeds along creek lines/water ways.
Yes. Studies of several weed species moved by water.

2.7 Q8 Do you have any other comments to make about this pathway?

Do you have any other comments to make about this pathway? Pathway 1: Ornamental plant trade
No.
A critical one for Australia, as most species here can affect the biodiversity of Australia.
A major source of weed incursions in a coastal environment.
Any management strategies must be for the whole of the country (Australia), so that invasive species cannot be traded between states, nor traded over the Internet.
As above.
As stated above, education is probably the only realistic way of dealing with this pathway, but this is a big challenge, given that many people don't care whether the plants they are growing are weeds or not.
Highlights the need for a nationally coordinated weed legislation, and changes to plant labelling that will clearly identify plants with weed potential, or known weed species, i.e. Lantana sp.
I continue to be appalled by seeing exotic, potentially invasive species planted around visitor centres in national parks, around park ranger housing, around buildings in remote mine sites, gardens of remote houses, etc. Even people who should know better fall for the allure of exotic ornamental plants. It is obviously deeply ingrained in the human psyche.
I think that huge progress has been made in recent years by engaging and increasing awareness in this sector – we've come a long way since the 'garden thug' idea brought this issue upfront with the industry now presenting papers at conferences, and being proud of their responsible and proactive approach.
Intense propagule pressure is a key thing that can make this a most effective pathway.
It is probably the best way for new weeds to establish.
Local governments and weed specialists (Universities/interested persons) can carry out their own regular inspections. However, if weed species are present – they are not always declared, therefore there are no avenues to prevent the sale/spread. And getting support to research and declare a species is very hard.
Many members of the nursery industry are very concerned about weed impacts, and do a great deal to reduce these. Schemes such as Sustainable Gardening Australia, and the NGIA 'Grow Me Instead' program, have achieved much. Blaming the industry makes the problem worse. Much more work has to be done on understanding the industry, and analysing the risks posed by cultivars and varieties developed for ornamental purposes. As weed risk assessors, we tend to deal with species; the industry usually does not, and we both have to work together to overcome this.
Need to develop national standards to ensure that weeds species are not traded between states.
Needs good political support.
No. (Nine responses).
Nursery industry needs to become more pro active in identifying potential weeds, rather than waiting for regulatory bodies to find them being sold.
Outside of nurseries, there are private sellers at markets and collectors that swap plants amongst themselves.
Said enough.
Sale of plants at markets is poorly monitored, because appropriate staff do not work on weekends to be able to target. Some plants are sold at markets with no identification.
The pond plant industry consists of many small backyard operators, many of whom source plants from the wild. Some in the industry will seed creeks with exotic species to collect for

wild harvest. The rise.
This is the single most important pathway for new weed species, as well as many hundreds of well-known species of weeds that are not yet present in Australia.
This pathway chews up up to 50% of my weed risk workload, and because the industry is so defensive about it, it is like pulling teeth. Please do not use this quote.
Vast majority of species in cultivation pose minimal weed risk. It's just the volume of species in the trade that leads to this being the major source of weeds in Australia.
Very diverse industry, and person-to-person transfer of plants makes it almost impossible to regulate.
We need to consider not only the deliberately planted species that escape from gardens, but those inadvertently introduced in the course of gardening activities, in imported soil, mulching materials, animal manure, weed seed in potting mix, weeds actually growing in pots at the time of purchase. As an ex-gardener and nursery employee, I have imported weeds to my property by all these routes, and some are proving impossible to eradicate.
Weeds CRC did some good work in this area.

Do you have any other comments to make about this pathway? Pathway 2: Aquarium plant trade
Because of the difficulty of control of aquatic weeds, this is a big issue and needs a lot more public focus.
No. (Ten responses).
Only aware of it second hand, with no direct observations of my own, so have chosen not to answer this one.
Only know of a situation where a declared aquatic weed was promoted as a good permaculture species – owner wasn't aware of its status.
See Q7 comments.
The aquarium plant trade has historically played a major role in the introduction and distribution of aquatic plants, mostly through the deliberate seeding and wild harvesting practices of aquatic plant suppliers. However, recent initiatives, by both the industry and government, are likely to reduce the weed threat. The backyard operators are being squeezed out by the professional growers, whilst the WRA is likely to lead to the removal of potential aquatic weeds from the industry. The aquarium plant trade is represented by the Pet Industry Association of Australia, who is an active member on the National Aquatic Weeds Management Group, and has recently produced an aquatic weeds training DVD for their industry. The potential to introduce state-wide or national labelling standards on aquatic plants should be explored.
The main issues in future will stem from people carelessly or maliciously translocating existing weedy aquatics into new environments, or from people smuggling new species into the country.
This trade is essentially an ancillary of the nursery trade, and its sales and income is considered part of the nursery trade.
We have about 5 river systems in our shire. Presently, they are free of any aquatic weeds. This may be due to being in a more temperate zone, but the potential risk of incursions is a big worry.

Do you have any other comments to make about this pathway? Pathway 3: Medicinal plant trade
Generally of lower priority, as introductions come to light quickly via queries made to NSW DPI. Many species are not extremely invasive, but note, Equisetum species (also garden planted) are an obvious exception, and are banned across Australia as a result.
It is an important pathway, the people involved in medicinal plants are committed, and some are prepared to smuggle plants in.
No. (Four responses).
No research, only regulatory examples where declared weeds have been obtained from health food shops.
This may have occurred in earlier days of settlement, but does not loom large as a threat for the spread of weeds presently.

Do you have any other comments to make about this pathway? Pathway 4: Food plant trade
A major pathway with the pasture and cropping industries, and scientific community, a major threat as new species and GMOs are tried as crops.
Anecdotally, alligator weed has been propagated as a food plant by the Sri Lankan community in Hobart, as mistakenly identified as another aquatic food plant. I am ignorant of the facts in this case, however. This is in no way an attempt to discriminate against, or racially vilify, members of the Sri Lankan community.
Chinee apple!
I don't have adequate knowledge of this pathway to comment.
I'm not aware of any current local examples, but I am sure this will become more prominent over time, e.g. increasing popularity of olive orchards in this area.
It would appear that this pathway would only be operational in rare instances and, as happened with Mukinawana, proved to be tracked down fairly readily on ethnic lines.
Maybe buffer zones for monitoring purposes for spread of weed.
No. (Five responses).
Peri-urban life stylers, permaculture, and ethnic communities, all utilise food plants, and tend to smuggle plants or obtain them by swapping with friends. Very few are purchased. They use gardens, ponds, or local waterways to grow their plants. This issue will be a very difficult one to address through legislation alone, as many users are either unaware of the law or simply disregard them.
Somewhere between providing good educational material on food plant weed potential, hygiene, and stricter legislation to prevent escape into bushland.

Do you have any other comments to make about this pathway? Pathway 5: Fodder trade
Continued education of landholders is likely to be the most effective means of controlling spread of weeds.
Education and awareness must be supported by enforcement. Spread of weeds throughout Australia through this path is increasing. Stock feed producers may need to be registered to ensure that weed spread is minimised.
Fodder conservation can help control weeds as well as spread them – the first use needs to be used more.
I know of a few species that may be spread this way, but knowledge is inadequate to comment in detail.
In tropical and semi-arid Australia at least, this would have to be the most significant source of serious, landscape-altering, weed species, and the most significant pathway for weed spread.
No. (Seven responses).
One of the main reasons for weed spread.
Politically important issue in the NT, and the horse has already bolted on several key species that should have been acted upon several years ago.
Possibly most serious vector of spread of weeds.
Successful pasture species will be inherently weedy. Prior to distribution of a new species or cultivar, a judgement needs to be made as to whether the potential benefits to agriculture exceed potential damage to the environment that may be caused by the distribution of the species.
This comment covers all deliberate spread by humans – weed pathways 1-6. Irrespective of whether a plant is noxious weed or not, there should be promoted an ethic based on environmental and economic risk management: when someone grows a plant in a crop, garden, landscape, or other situation, they must consider the risks of using their land so as to not cause injury to their neighbour; and morally, they should consider the environmental and economic impact on future owners of their land. This means that no new crop should be planted (an active act) unless it can be managed in the landscape, or unless the farmer accepts being sued if it escapes. It's similar to lighting a fire to do some burning off – irrespective of whether a permit is held, if the fire escapes, then the landholder is liable to their neighbours. This is point source pollution, where the polluter can be identified as making an active act. This is different from where a weed or bushfire invades land (a passive act), and then spreads to a neighbour's before the landholder can reasonably act. And it is different from when a weed or bushfire invades land (a passive act) and the landholder 1] could reasonably predict that it will spread further to neighbours, 2] has reasonable opportunity to prevent that spread, but 3] fails to prevent that spread (a negligent act). There is ample evidence that any agronomist should provide a disclaimer if they provide agronomic advice where they promote any plants, or other activity, that could injure neighbours (example – contrast: when spraying, they advise to reduce off target and off field damage; when sowing, they advise to reduce off field damage).
This overlaps with the livestock movement pathway, as fodder weeds are transported, both by natural means (e.g. wind, water birds) and by livestock once planted. I have answered this question with both of those in mind.
Very difficult to monitor in a free trade environment. Probably the most effective strategy would be to have buyers of fodder aware of the risks, and skilled in sourcing clean produce.
Very high-risk pathway.

Do you have any other comments to make about this pathway? Pathway 6: Revegetation and forestry
Again, inadequate knowledge, but think that operators in these areas would be aware of the problems that introduced plants can present, and would manage accordingly.
Foresters don't often see the weeds for the trees.
I don't think it is deliberate, rather the lack of knowledge to realise that weeds can be spread from property to property by contamination.
No. (Six responses).
Planting itself is not an issue, not managing weeds is the issue, and using uncleaned equipment is the issue. I have not answered this section, as regulation and about tree planting is not a concern, it is the management of the weeds later that is the issue.
Soil conservationists in the past had tunnel vision. Their sole role was to save soil. In the process, the planted many highly invasive, and agriculturally and environmentally harmful species, e.g. Bitou bush, Coolatai grass, African lovegrass, Lippia, Galenia, Mesquite, Kochia.
Wildings from pine plantations can penetrate deeply into undisturbed forest, possibly assisted by black cockatoos. Resources are not available to search them all out and remove them, and eventually they will begin to reproduce. Even more insidious is the use of non-local provenance local eucalypt and wattle species in plantations, which has been promoted by the Private Native Forestry project in the last decade. Effects will not be visible, but no doubt there will be effects.
Would assist with regulation by local government intervention.

Do you have any other comments to make about this pathway? Pathway 7: Human apparel and equipment
Even in Nadgee Nature Reserve, with a low and highly regulated visitation rate, and inhospitable soils, there are weeds, such as Parramatta grass, along all the tracks (mostly walking, as there is very little vehicle access), especially around camping areas, where soil fertility is also enhanced. The method of spread is significant, but very hard to control.
My experience is of overseas examples and anecdotal only.
No. (Nine responses).
Not a major vector of spread, but certainly does happen, and is possible into the future.

Do you have any other comments to make about this pathway? Pathway 8: Machinery and vehicles
A critical issue that is at the core of the problem, is that both DMR and local councils negate their responsibilities with roadside weeds, because most are Class 3, or not declared. There is no commitment to work on an ethical level. E.g. our major weed is Lantana, which is along every road on the range, and it has not been sprayed for at least 15 years. Both agencies use the excuse that it is only a CLASS 3 in Qld. Doesn't matter that it is a WONS, THEY BOTH simply say they don't have to legally do anything about it, so they don't. If any issue needs urgent redress, it is this IMPASSE that they use. To review the category of CLASS 3, so that government agencies are held accountable. All agencies that deal with our roadsides need to meet to facilitate change, and to obtain a commitment to best practice. E.g. currently DMR only: 1. Slash twice a year in a high rainfall area. 2. Slashing is always done as a wet weather job, when it should be done when dry. 3. Only ONE WIDTH (of the tractor) is slashed, therefore leaving large tracks to go to weeds, firstly Lantana, then everything else follows. 4. No wash down of slasher is ever undertaken. 5. Large sections of road, up to 20 km, can be done in one day. The same machine is used for the whole region of over 200 sq kms, effectively moving weeds around. All these work practises are contributing dramatically to the spread of all invasive weeds. Especially those reproduced vegetatively.
Anecdotally one of the most important (actual and perceived) pathways for weed spread in the region.
Awareness important.
Currently very complex and resource intensive – perhaps self-regulated through compulsory weed declarations would be easier long term project.
Don't know how practical it is, but protocols should be put in place and enforced for DPI, and others, to clean vehicles after leaving the property. It is only accidental if you are unaware. Most is deliberate.
Highway verges are one of the main sources of new weed introductions in this region, and one of the main means of spread once the plant is in, via slashing. Sporadic herbicide use by the RTA to create a receptive seedbed, but seldom in time to prevent seeding, also contributes. Council funding is inadequate to deal with new infestations, even of noxious weeds (and no funding at all for unlisted weeds), and many plants which deserve to be on the noxious list, and so funded for control to some extent, do not get so listed locally until they are well established, by which time it is too late.
In Tasmania, this pathway is particularly relevant to Spanish heath (Erica lusitanica).
No. (Ten response).
Regular monitoring of popular rest stops and parking areas for stock transport, tourism and grain terminals.
Roadside slashers and graders are notorious for quickly moving weed infestations along road corridors. Contractors must operate at a profit, and are very reluctant to vary their routines to avoid spreading weeds, i.e. moving towards weed infestations, or outwards from conservation areas.
There will always be some people who do not take sufficient care in cleaning equipment before moving it to new paddocks, properties, or regions.
This is a big problem for pasture weeds.
This is basically fossil-fuelled weed-spread. How accidental is it if we know it's happening, but don't do anything about it?
Will need to target regions/devices/vehicles to make strategic progress.

Do you have any other comments to make about this pathway? Pathway 9: Construction and landscaping materials
Dumping of spoil/fill distant from its site of origin is a very important pathway for the spread of weeds along roadsides in the region.
I don't consider this ACCIDENTAL. We know too much now, it's just that people don't care, or it's too hard, or too expensive.
I have personally come across invasive, ecosystem-altering, pasture grasses, introduced in a pile of building sand into an extremely remote, almost pristine, corner of Arnhemland, bridal creeper corms in track-making gravel into a remote national park on Kangaroo Island, and Mexican poppy spread deep into the MacDonnell Ranges in contaminated backfill of a buried pipeline. It is very easy for weed propagules to be spread carelessly in construction and landscaping materials.
I have seen instances of weed spread by this method, but only minor so far.
No. (Ten responses).
Soil is often transported locally. However, in WA, in 2007, we had one instance of weeds being moved 400 km in lime from the coast, to cropping properties in the wheat belt. This is quite unusual, but has the potential to spread plants across large areas in one movement.

Do you have any other comments to make about this pathway? Pathway 10: Agricultural produce
Critical way of moving new weeds to clean situations.
Currently very complex and resource intensive – perhaps self-regulated through compulsory weed declarations would be easier long term project.
Declarations by vendors may be a solution, but only if purchasers of hay, seed, etc, are motivated to have some concern at weeds arriving on their land. Weed invasion is a slow process, and with the trend towards agribusiness and short-term planning, the next generation of corporate farm managers are less likely to worry about weeds than were the owner-occupiers of the past.
Has been, and will continue to be, an important pathway for weeds to be moved.
Insufficient knowledge to comment.
It really is a case of the buyer beware, so extension activities targeting buyers will, to some extent, drive improved standards by demanding clean produce.
No. (Seven responses).
Not enough study done on actual impacts within Australia.
Probably the single most important pathway for weed spread from mainland Australia into Tasmania, and the source of unusual weed incursions.
This can be locally significant, especially in drought times, e.g. importation of Paterson's curse in hay or, as I observed recently, in pasture seed sown to replace an African lovegrass infestation – now that property has both lovegrass and the curse! If people controlled these infestations promptly, it would not be highly significant, but unfortunately, many don't.
This is probably the major domestic spread pathway for agricultural weeds.
Very important if GMO crops are introduced – see lots of canola plants along roads in the south west of WA, but will be hard to control if GMO modified to herbicides.
Weed numbers increased following drought (due to heavy grazing).
Work needs to be done with animal nutritionists to help manage weeds through the animal. Alan Kaiser had an interest in this, but not many others.

Do you have any other comments to make about this pathway? Pathway 11: Research sites
Apparently some north Qld weed species are escapees from research stations.
Improved hygiene protocols for research institutions means this should decline as a source of weeds spread.
In the past, this has been a serious issue, with many old pasture and forestry plots simply abandoned: examples that I know of include the escape of the tree, Hura crepitans, from an old forestry plot near Darwin, and the escape of mission grass also from plots near Darwin. More recently, mismanaged plantings of Gamba grass, at the Berrimah Research Farm in Darwin, resulted in massive invasion of the surrounding landscape.
More review of trialled pasture species should lower risk.
No. (Three responses).
Times and attitudes change.
Weed research institute grounds have populations of regionally prohibited weeds, introduced by researchers, now out of control and not managed. Inadequate appreciation of the problem by relevant administrators, lack of funds to undertake remedial control. Poor comprehension by weed researchers, 1950-1990s, of the potential impact of their propagation activities.

Do you have any other comments to make about this pathway? Pathway 12: Livestock movement
Declarations by vendors may be a solution, but only if purchasers of livestock are motivated to have some concern at weeds arriving on their land. Weed invasion is a slow process, and with the trend towards agribusiness and short-term planning, the next generation of corporate farm managers are less likely to worry about weeds than were the owner-occupiers of the past.
I have seen African lovegrass transferred between paddocks by this method, and horse droppings sprouting exotic pasture grasses and weeds in otherwise clean areas, such as cemeteries, into which they have been placed briefly. I don't have many opinions on this one, so I have chosen to skip it.
I have seen mass germination of seeds of Prosopis spp. and Mimosa pigra (on separate occasions) in cattle dung.
No. (Five responses).
Requires better implementation of regulatory provisions.
Sheep wool has the potential to carry seed – neighbour had Patterson's curse seeds brought in this way.

Do you have any other comments to make about this pathway? Pathway 13: Waste disposal
Better public awareness nationally of the problems associated with rubbish dumping, and spread of weed propagules.
Dumping of aquarium plants into waterways is intrinsically more dangerous than the average dumping of garden waste onto the local vacant block. The aquatic environment almost guarantees that the plants will survive, thrive, and spread, but there are undoubtedly far more species of general garden plants that could escape cultivation. Most dumping occurs on already degraded urban wastelands or urban fringes, and is rarely done over long distances. However, the establishment of Salvinia molest in a lagoon at Nhulunbuy, in the remotest corner of NE Arnhemland, was through someone emptying their aquarium into a local stormwater drain.
I think it can still be a problem on a local scale, but it's so obviously illegal; local information campaigns, with a bit of prosecution thrown in if it continues, should be able to sort it out.
It is difficult to prevent some people from dumping garden waste into reserves. Sometimes tip costs and opening times may contribute to this problem.

Laws need to be followed up more strictly, with penalties enforced.
No. (Seven responses).
This is a significant method of transporting weeds into relatively undisturbed native vegetation; it would otherwise have difficulty penetrating, especially when dumping is along tracks, rather than edges. It is a constant problem for reserve managers (councils and NPWS).
This pathway is not abused to a large extent in this area, although the risk is always there.
Very important in peri-urban situations.

Do you have any other comments to make about this pathway? Pathway 14: Birds
Can't see how you can regulate native bird movement, so instead need to think about how to reduce presentation of weed fruits & seeds to birds, or find the weeds after dissemination.
Distribution via this pathway is seasonal depending on the availability of fruiting material.
Garden escapee story is an indicator of this problem.
I have observed, over many years, that woody weeds are only spread up to 500m, with a max drop at 200m from the original source. Knowing this is an important aspect of weed education to help reduce the spread through more accurate reduction of the weed species.
In my experience, bird dispersal is generally over relatively short distances (hundreds of metres), and often is concentrated around tall, exposed, perching trees.
It will be dependant on the extent of the weeds, and their ability to be spread by birds – very complex system – best method is to reduce mature weeds on country.
No. (Seven responses).
Quite a significant route of spread, and for some surprising species that don't have soft fruits (e.g. Lagunaria patersonii). Not much you can do about it, other than stop planting exotics/ non-local natives, with this means of spread.
Significant pathway for spread of declared weeds African boxthorn, bridal creeper and boneseed in southern Tasmania. Perching trees are target sites for bridal creeper survey in southern Tasmania.
The source of weed seed needs to be controlled/substituted – you can't regulate the birds.

Do you have any other comments to make about this pathway? Pathway 15: Other animals
I suspect wombats and wallabies of transporting seed of exotic grasses around my property, along with more obvious things, such as Bidens pilosa. It can be significant, as they can move weeds into inaccessible areas where they then reproduce undetected for some time. It also appears that water birds, such as wood ducks, introduce water plants onto farm dams, mostly native, but some weeds, presumably through external attachment.
Landholders have reported on numerous occasions that they can trace movement of weeds, such as St John's wort, to regular pathways frequented by wild animals.
No. (Seven responses).
Very difficult to regulate.

Do you have any other comments to make about this pathway? Pathway 16: Wind
An important pathway of spread for thistles, Mediterranean daisy (Urospermum dalechampii), and serrated tussock in southern Tasmania.
As with birds, you can't regulate for the wind, so need to either reduce seed production, or better cope with new infestations.
Is critically important, especially given that many of these types of weeds can be easily removed or reduced when they are in an area where they are accessible.
It is probably the most significant in this region in recent years, at least in economic terms, because of the extreme invasiveness of fireweed and its impact on farm productivity.
Most important for serrated tussock.
No. (Nine responses).
Only applicable to rubber vine.
Several studies, of which I am aware, indicate that, even for seeds pre-adapted to wind dispersal (e.g. Chromolaena odorata), the mean distances travelled are remarkably short.
The only thing that can be done about this pathway is to reduce the weed problem at the source.
The use of windbreaks – upwind to minimise seed entry, and downwind to minimise seed escape – should be considered as part of an overall strategy. Windbreaks may not always meet their purpose, as their efficiency is dependent on the density of the fireweed both upwind and downwind, the topography, and density and height of the trees. Windbreaks provide a wide range of benefits to agriculture, the environment and amenity. Consider all benefits before planting a windbreak solely for weed control.
This is a greater problem in northern NSW and Qld than it was 30 years ago. Milk thistle, fleabane, perennial blown grasses. Growing less competitive crops, such as pulses.
This is probably the most intractable, but probably requires most research in order to understand – wind can move pollen large distances, while species such as skeleton weed are probably moving far greater distance than we understand.

Do you have any other comments to make about this pathway? Pathway 17: Water
A significant pathway for transport of gorse and blackberries into inaccessible parts of the Tasmanian Wilderness World Heritage Area. New Zealand flax and African feathergrass appear to be spread by water/flood events in southern Tasmania.
Nearly all our local waterways are a hotbed of weeds, due to reliable moisture supply, and fertile loam on banks (though plenty will grow in sand deposits in the bed too). Rivers can be a significant means of introducing weeds into new areas, but I'm sure I have answered my 5 by now.
No. (Eight responses).
Very limited in WA, of high importance to the Ord region in the states north.
Weed movement in this area by this pathway, although a factor in this area, is not the cause of major distribution, and generally confined to riparian zones.

Do you have any other comments to make about this pathway? Other Pathway - Crop and herbicide rotation
A key element is management skills. Highly variable and difficult to quantify over time.

3 Additional Comments

Additional Comments
Climate change will probably change the relative importance of some pathways.
Good luck with your work. Looking forward to seeing a summary of the results.
Huge opportunity for people to overstate the case for weed spread prevention. People fear new things. Where spear, nodding, and saffron thistles are widespread, people are likely to fear Scotch thistle. This can be an addition, or a substitution type issue – introduction of a new phalaris variety may 1] increase agricultural production, and 2] may increase the phalaris weed burden. Any code developed must be realistic. Many people insist on best practices, but we know that many of the best practices will stop all trade and industry. Best practice is possible, but to expect that it will be extensively implemented is utter nonsense. And to expect it to be extensively regulated is too.
Weed aware management of seed dispersal: an interim code as part of the National Weed Spread Prevention Action Plan, a protocol to reduce weed spread is being developed. However, the issue is critical. These notes are provided to guide reduced weed seed spread, while the protocol is being developed. Natural dispersal of weeds, by wind, water, or whatever, is generally hard to manage. We seldom have control over natural phenomenon. In most cases, control of spread is best tackled by control of the weed. This code prompts us all to be on the alert of accidental (or deliberate) spread of weeds by some of the human assisted mechanisms: stock feed, stock, earthmoving equipment. One approach to handling problems like this is to have a code of practice for each issue. This would outline best practices in preventing weed dispersal. Managers would need to be weed aware all the way along the seed production and dispersal trail. The following best practices will contain points that you may already be practising. There will be some points that you could do with very little extra costs, and there may be some points that you will find impossible to achieve. And remember, it is illegal to move or sell fodder, stock, or machinery contaminated with notifiable, and certain other noxious weeds. Special laws apply for movement of agricultural machinery from Queensland. People who spread weeds because they do not take due diligence can be sued. These best practices presented here are drafts that could be developed further with consultation. Weed spread programs should be reasonable. There is little need for a program that prevents barley grass, and capeweed infested things, being moved to an area where these weeds are already prolific-effectively, the weeds are not being distributed. However, if transport goes through areas clean of these weeds, something should be done to prevent seeds blowing off. Weed aware management of seed dispersal: stock feed either moves within a property or between properties. To ensure that weeds are not moved in fodder, insist that best practices, as suggested in box 1, take place. What other best practices can you do to minimise spread of weed seeds in fodder? How would a code of practice for seed sales differ? (Remember that certified seed does not mean that the seed is free of weeds). People often take desperate actions to keep their stock alive during droughts, or after fire or floods. Poor quality hay is often moved long distances. A code of practice would be impossible to completely enforce. Take home message: weed seeds will disperse in fodder, especially during a drought. There is not much we can do to fully prevent it, but we can prompt people to think about their actions, and to take action to minimise any potential problems. We all must be weed aware.
List 1. Management of weeds in stock feed: control weeds in the fodder paddock prior to harvest. (In some cases the weed may not be declared noxious in the region where the fodder is grown). Segregate contaminated fodder. Ensure contaminated fodder is not sold, or is sold locally, or to feedlots or abattoirs. Fodder sellers fully describe their product, including quality, contaminants and weeds. Fodder buyers only buy from known sources. Fodder buyers ask for a description of the product. Fodder buyers inspect the product at purchase. Loads are covered during transport. Inspect fodder when feeding out. Feed out in home yards, or other areas, which can be readily monitored for new weeds. Hold stock that has eaten contaminated feed for 14 or more days (most seeds come out by day 7, 1% of seeds are still coming out at day 14, and there may still be an occasional seed after day 20). Inspect areas where contaminated fodder has been fed out regularly, and for several years. Control all new weeds. Consider selling stock to a feedlot instead of buying fodder. Weed aware management of seed dispersal: stock in the perfect world, farm born stock will be grown out on farm and sold for slaughter, stock from weedy paddocks will not move to clean paddocks. But in our imperfect world, the best practices suggested in box 2 may be reasonable. Take home message: mostly, landholders are aware of weed seeds on the outside of stock – they can generally be seen. But weed seeds inside stock can be managed. It's time to take more care with stock movement decisions. We all must be weed aware.
List 2. Management of weeds with stock: control weeds in the paddock prior to seed set. Segregate stock from weedy paddocks. Control weeds on roadsides prior to droving them. Sell stock from weedy paddocks to either abattoirs, feed lots, or to similarly weedy areas. Shear sheep, comb cattle, and feed stock in clean paddocks for 14 days prior to trucking. Buy stock from known sources. Ask for a list of weeds on the farm of origin. Inspect stock at time of purchase. Wash trucks at an appropriate place. Hold new stock in home or small paddocks for

14 days prior to moving to general-purpose paddocks. Control all new weeds. Follow similar steps for agistment decisions. Weed aware management of seed dispersal: earth-moving equipment, earth moving, forestry, and other equipment, undoubtedly move weeds. A similar list of best practices, box 3, is suggested for plant. Equipment operators are generally interested in their job; they might not be very interested in yours. At the end of a 10-day shift, working 10-hour days, in the heat of summer, running 4 hours late for the next job, the operator may not consider your weed problem! If a contract includes the requirements of a code, then you can insist that they are carried out. Take home message: ultimately, it's the bull-dozer or grader driver who is going to decide if weeds are going to be allowed to spread on his equipment – they have to be on side. We all must make sure that any code of practice is agreed, and addresses the needs of the operator. We all must be weed aware.

List 3. Management of weeds with plant: control weeds in areas where quarrying or works often takes place. Contractors nominate future quarry sites, so that the weed officer can ensure control of weeds prior to quarrying. Machinery arrives clean, leaves clean. Key areas to check include radiator and air conditioner cores, mudguards, wheels and tracks, decks, rails, and platforms. Dispose of weed material carefully. Grader operators grading into weed infested areas, not out of them. Regenerate area afterwards to prevent seedling establishment – plant trees or grass. Regular checks by landholder, weeds officer, and operator for some time after work. Nominate specific clean-down areas on significant transport routes. If a machine arrives infested, then send it back to a clean-down area.

I believe there needs to be a coordinated national approach towards better weed legislation. Especially where local government is concerned, interpreting weed strategies (if they currently exist), but not acting upon them. This way, a plan of action could be implemented by giving definitions of whose responsibility it is.

I found this survey incredibly boring and time consuming. Took me 1.5 hours

In my role as a former regulatory officer with NSW DPI (NSW Agriculture-Noxious Plants Advisory Officer), and my current role as a specialist sales and R&D representative, I see the movement of many weed species in all pathways listed in this document. I am actively involved in the supply of herbicides, and weed management advice, to the forestry industry, local government, railways, electricity supply, national parks, RTA and other local, state, and federal government agencies, as well as private contractors.

Natural spread by all those listed pathways will result in weedy crops spreading into areas where they are not wanted. Growers of such crops must be made responsible for the establishment of wild plants, and be required to contribute to their control. Spread by wind, water, birds, animals, are big factors for many weedy species. Education and awareness programs are essential to develop an informed community, committed to better weed management. Trade via the internet makes weed spread between states with differing laws, and internationally, simple and easy. Regulation would be difficult. At the national level, states should develop a national list of weeds – noxious and environmental – and ban any trade in these.

Note that I am aware of many instances where the pathways of wind and water have played a major part in the spread of weeds, but I stuck to the only 5 pathways rule. For some of the other pathways, I have heard of them, but have had less or no direct experience of situations where they have led to weed problems.