Chapter 5

Further information

5.1 Fireweed legal status and responsibilities in Australia

Table 5.1 briefly describes what legal provisions relate to fireweed in each state and territory and at the national level.

Table 5.1 Declaration status of fireweed in jurisdictions (current as of May 2023).

Jurisdiction	Legislation	Declaration	Description
Australia	*Biosecurity Act 2015*	Not permitted	Not permitted for entry into Australia.
Australian Capital Territory	*Pest Plants and Animals Act 2005*	Declared	Notifiable. Must be suppressed (i.e. all infestations on a premises must be controlled). Prohibited (i.e. supply and propagation is not allowed). This includes the importation of fireweed plants, seeds or materials contaminated with plants or seeds into the ACT. Turf cannot be imported from turf farms in NSW where fireweed is known to occur (ACT Government, 2014).
New South Wales	*Biosecurity Act 2015*	Declared	Must not be imported into the state, sold, bartered, exchanged or offered for sale. General biosecurity duty to ensure a biosecurity risk is prevented, eliminated or minimised, so far as is reasonably practicable. Regional strategic weed management priority in certain parts of the state (refer to NSW DPI website for current regions).
Northern Territory	*Weeds Management Act 2001*	Declared	Not to be introduced to the Northern Territory (Class C).
Queensland	*Biosecurity Act 2014*	Declared	Category 3 restricted invasive plant. Illegal to give away, sell or release into the environment. General biosecurity obligation to take all reasonable and practical measures to minimise the biosecurity risks associated with dealing with fireweed. Contact local councils for any additional control requirements.
South Australia	*Landscape South Australia Act 2019*	Declared	Prohibited entry to South Australia. Cannot be moved or sold as a plant or contaminant. Land owners to control the plant on their properties. Recovery of control costs on adjoining road reserves.
Tasmania	*Biosecurity Act 2019* (Note the *Weed Management Act 1999* is expected to be repealed in 2023)	Declared	The importation, sale and distribution of fireweed are prohibited in Tasmania.
Victoria	*Catchment and Land Protection Act 1994*	Declared	Restricted weed in whole of the state. Trade in fireweed and its propagules (either as plants, seeds or contaminants in other materials) is prohibited.
Western Australia	*Biosecurity and Agriculture Management Act 2007*	Not declared	Prohibited organism to be excluded from WA.

5.2 Sources of pasture management information, decision tools and training

The following tables provide web links to sources of further information, decision tools and training for pasture management.

Table 5.2 Sources of online information on pasture establishment and management.

Business Queensland	www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/grazing-pasture
Dairy Australia	www.dairyaustralia.com.au Follow the **Feed & Nutrition > Growing Feed for the Herd** links for information on growing and grazing dairy pastures.
FutureBeef	futurebeef.com.au/
NSW Local Land Services	www.lls.nsw.gov.au/
Meat & Livestock Australia (MLA)	www.mla.com.au/ **MLA's persistent pastures hub** provides information on a wide range of pasture types found across southern Australia. www.mla.com.au/extension-training-and-tools/feedbase-hub/persistent-pastures/
NSW Department of Primary Industries	www.dpi.nsw.gov.au/agriculture/pastures-and-rangelands This includes the checklist of **Eight steps for achieving successful perennial pasture establishment**, which are also broadly applicable to renovating existing pastures. www.dpi.nsw.gov.au/agriculture/pastures-and-rangelands/establishment-mgmt/establishment/eight-steps
Pasture management for South East Queensland	futurebeef.com.au/wp-content/uploads/SEQ-pasture-sml.pdf A detailed guide on species suitable for production pastures in this region.

Table 5.3 Online tools to assist with pasture management decision-making.

Australian Wool Innovation 'Feed On Offer'	www.wool.com/land/pastures/feed-on-offer
Future Beef	futurebeef.com.au/land_management/decision-support-tools/
Meat & Livestock Australia (MLA) tools and calculators	etools.mla.com.au/hub/
MLA 'More Beef from Pastures' online manual	mbfp.mla.com.au/
Pastures Australia 'Pasture Selection Tool'	keys.lucidcentral.org/keys/v3/pastures/
Stocktake GLM decision support app	stocktakeglm.com.au/

Table 5.4 Example sources of training in pasture management (May 2023).

ACS Distance Education 'Pasture Management'	www.acs.edu.au/courses/pasture-management-180.aspx
Meat & Livestock Australia (MLA) 'Grazing land management EDGE'	www.mla.com.au/extension-training-and-tools/edgenetwork
MLA Healthy Soils & Pastures training package	elearning.mla.com.au/courses/?filter-categories=healthy-soils-pastures
NSW Department of Primary Industries 'PROGRAZE'	www.dpi.nsw.gov.au/agriculture/pastures-and-rangelands/establishment-mgmt/grazing-management2/prograze-profitable,-sustainable-grazing
Pinion Advisory 'Pasture Principles'	www.pinionadvisory.com/training-workshops
RCS 'Grazing for Profit School'	www.rcsaustralia.com.au/products/family-business/grazing-for-profit-2
Tocal College 'Introduction to pastures'	www.tocal.nsw.edu.au/courses/short-courses/weeds/introduction-to-pastures

5.3 Competitive pasture species observed to suppress fireweed germination and growth

Key information sources: Allan et al. (2005), Sindel et al. (2012), Sindel and Coleman (2012) and Wijayabandara (2021). Additional information sources for particular species are given below.

The following table lists pasture species that have been observed to be competitive against fireweed.

Table 5.5 Pasture species observed to suppress fireweed germination and growth.

Pasture species	Description
Cocksfoot *Dactylis glomerata*	▪ Cool season, perennial tussock grass ▪ Grows mainly in autumn and spring, with less growth over winter ▪ Requires at least 450 mm annual rainfall per year in southern, cool temperate zone and 550 mm in northern temperate ▪ Varieties differ in levels of summer dormancy and hence moisture requirements for persistence and growth ▪ Suited to low fertility soils and tolerates soil acidity (Hackney and Dear, 2007)
Kikuyu *Cenchrus clandestinus*	▪ Warm season, perennial grass with prostrate growth ▪ Most growth in spring, summer and autumn ▪ Spreads via runners (stolons) and rhizomes ▪ Suited to very fertile, well-drained soils in areas receiving at least 800 mm annual rainfall. Good drought tolerance ▪ Poor winter growth. Frost sensitive ▪ Kikuyu-dominated pastures not suitable for horses owing to risk of oxalate poisoning ▪ Can be invasive in horticulture, field crops and native vegetation (NSW DPI, 2004a)
Paspalum *Paspalum dilatatum*	▪ Warm season perennial grass with upright, tufted growth to 1 m ▪ Suited to wetter sites in coastal and inland areas with at least 750 mm annual rainfall ▪ Requires regular slashing/mulching to maintain feed quality ▪ Suited to heavy, fertile soils ▪ Moderate frost tolerance ▪ Invades ryegrass and clover pastures (NSW DPI, 2022c)
Phalaris *Phalaris aquatica*	▪ Cool season perennial grass forming dense swards ▪ Suited to higher fertility soils in tablelands areas with at least 550–600 mm annual rainfall ▪ Varieties differ in their levels of winter and summer dormancy ▪ Highly persistent and drought tolerant ▪ Tolerates wet soils ▪ Not suitable for highly acidic soils ▪ Potential to cause phalaris poisoning in livestock (NSW DPI, 2017)

Rhodes grass *Chloris gayana*	▪ Warm season, perennial grass with upright, tufted growth ▪ Most growth in spring, summer and autumn ▪ Spreads via runners ▪ Grows on a wide range of soils from light sandy loams to well-drained clays ▪ Suited to areas of at least 500 mm annual, summer-dominant rainfall ▪ Moderate resistance to drought and frost. Poor tolerance of waterlogging ▪ Low oxalate levels render it suitable for horses (NSW DPI, 2004b)
Ryegrasses *Lolium* spp. and hybrids	▪ Cool season grasses of short, upright growth from autumn to spring ▪ Annual, biennial, short-rotation and perennial varieties for fertile soils ▪ Longer-lived varieties require cooler summers with adequate soil moisture (or irrigation) to persist. Perennial ryegrass requires a minimum average annual rainfall of 700–900 mm, depending on summer temperatures ▪ Annual and biennial varieties have faster winter growth rates making them highly competitive with fireweed ▪ Autumn sowing from seed should consider herbicide use, to suppress germinating fireweed and other weeds ▪ Tolerant of acid soils, waterlogging and repeat grazing (Dairy Australia, 2020; Launders et al., 2010; Kemp et al., 2004)
Setaria *Setaria sphacelata*	▪ Warm season perennial grass with tall, tussock growth ▪ Most growth in spring, summer and autumn ▪ Suited to warm coastal areas in areas receiving at least 1000 mm annual rainfall ▪ Tolerates acid soils and moderate waterlogging ▪ High oxalate levels make setaria unsuitable for horses (Clarke, 2002)
Tall fescue *Festuca arundinacea*	▪ Perennial, tussock-forming grass with varieties varying in levels of winter and summer growth ▪ Suitable to tablelands and other temperate areas with at least 500 mm annual rainfall for winter-active/summer-dormant varieties, or 750 mm for spring/summer-active varieties ▪ Grows on a wide range of soil types. Tolerates low fertility soils and wet areas ▪ Winter-active varieties will be more directly competitive with fireweed ▪ More frost-tolerant than phalaris and cocksfoot ▪ Slow to establish as seedlings, hence the importance of weed control (including for fireweed) (Harris and Lowien, 2003; NSW DPI, 2022d)
Weeping grass *Microlaena stipoides*	▪ Native, perennial grass with upright growth ▪ Has green growth year-round but most productive from spring to autumn ▪ Adapted to cooler tablelands areas ▪ Suited to a wide range of soils ▪ Tolerant of acid soils, drought and frost (NSW DPI, 2022b)
White clover *Trifolium repens*	▪ Perennial legume that spreads via stolons to form a dense ground cover ▪ Most growth from spring to autumn but can be productive and competitive during winter ▪ Suited to a wide range of soils in areas with at least 750 mm annual rainfall ▪ Needs good summer rainfall or irrigation to persist. Poor heat and drought tolerance ▪ Requires medium to high fertility soils. Tolerates acidic soils ▪ Combines well with many perennial grasses ▪ Can be surface-sown or direct-drilled into existing pasture (NSW DPI, 2022e)

5.4 Registered and permitted herbicides for fireweed

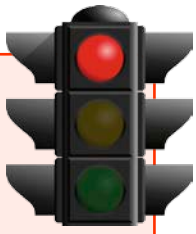
State/territory 'control of use' legislation and off-label use

Pesticide use in Australia varies between states and territories because each jurisdiction has responsibility for developing local regulations on its use. This includes jurisdictional requirements and approvals for off-label use of herbicides, and any restrictions on use or application of particular herbicides. It is your legal responsibility to be aware of and comply with these state/territory requirements, in addition to following the product label instructions.

Off-label use is the use of a herbicide to control a weed that is not covered by an APVMA-approved product label, or by a permit allowing 'persons generally' or specific groups of people to use the herbicide as stated on the permit. Wilful misuse, on the other hand, represents an active or negligent disregard for all instructions and legal requirements with no consideration of the risks.

Table 5.6 summarises current provisions for control of use (off-label use) across states and territories. Table 5.7 provides web links for further information on state or territory pesticide control of use. State/territory contacts for weed control information are given in Section 5.5.

If you are unsure which herbicides may be legally used on a particular weed in your state, contact the weed or biosecurity section of your state or territory department of primary industries or your local weeds officer.



Warning!

Off-label practices DO NOT exclude or override product maximum residue limits, work health and safety or environmental safety.

If intending to use the product off-label, the user must consider the rate of pesticide, time and frequency of application, the likelihood of residues and the potential for worker exposure.

'Off-label use' DOES NOT override Directions for Use 'DO NOT' statements on labels and permits, such as 'DO NOT apply to crops or pastures with clover, lucerne or medics'.

The pesticide manufacturer is not liable for off-label use of their product.

Table 5.8 lists types of herbicides and their registered or permitted uses for fireweed control in Australia in pastures and crops and in other situations, as at September 2022 (APVMA, 2022; Growcom, 2022; NSW DPI, 2019; QDAF, 2022).

Individual herbicide products are not listed since there are >150 registered for use on fireweed, their availability may change over time and new products may enter the market.

To perform a current search on registered herbicide products visit the APVMA website **www.apvma.gov.au** and click on 'Registered chemical products (PubCRIS)'.

Fireweed control minor use permits for some herbicides have been issued for specific situations in individual state and territory jurisdictions. To perform a current search for off-label and minor use permits, visit the APVMA website **www.apvma.gov.au** and click on 'Permits'.

Alternatively, herbicide registrations and permits can be obtained through the INFOPEST Database **www.infopest.com.au**.

In addition to an APVMA search, you should review current herbicide information on the website of the relevant organisation/s of your state or territory government.

Table 5.6 State control of use legislation (off-label) in agricultural chemicals.

Herbicides allowed Yes (Y) / No (N)		ACT	NSW	Qld	WA	SA	NT	Tas	Vic
Rates of application	Lower rate than on label	Y	Y	Y	Y	Y	Y	Y	Y
	Higher rate than on label	N	N	N	N	N	N	N	N
	Lower frequency than on label	Y	Y	Y	Y	Y	Y	Y	Y
	Higher frequency or rate than on label	N	N	N	N	N	N	N	N
Weed	Different weed than on label	Y	Y	Y	Y	Y	Y	Y	Y
Situations and crops	Different crop or situation than on label	N	N	N	N	N	N	N	Y
Application equipment	Different application equipment than on label	N	N	Y	Y	Y	Y	N	Y
Preparation	Tank mixes	Y	Y	Y	Y	Y	Y	Y	Y

For more information: www.awe.gov.au/agriculture-land/farm-food-drought/ag-vet-chemicals/domestic-policy/haccut

Table 5.7 Sources of further information on state/territory pesticide control of use.

Jurisdiction	Web link/s
ACT	www.accesscanberra.act.gov.au/s/article/pest-and-weed-control-tab-Agvet-chemical-use
NSW	www.epa.nsw.gov.au/your-environment/pesticides/pesticides-nsw-overview
Northern Territory	nt.gov.au/industry/agriculture/farm-management/using-chemicals-responsibly
Queensland	www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/land-management/chemical-controls
South Australia	www.pir.sa.gov.au/biosecurity/rural_chemicals
Tasmania	nre.tas.gov.au/agriculture/agvet-chemicals
Victoria	agriculture.vic.gov.au/farm-management/chemicals/offlabel-chemical-use
Western Australia	www.agric.wa.gov.au/biosecurity/pest-and-disease-information-service-padis
	health.wa.gov.au/Articles/U_Z/Using-pesticides-safely

For state and territory department weed control contacts see Section 5.5.

Table 5.8 Herbicides registered or permitted for control of fireweed, October 2022.

Herbicide[a]	State or territory[b]	Registered or permitted situation	Timing	Application[c]	Comments
Bromoxynil (200 g/L) ***Mode of action:*** **Group 6 (= C)**	Various products registered with differing state/territory registrations. Check label to confirm a product is registered for use on fireweed or *Senecio* spp. in your state or territory.	***Pastures:*** Grass, lucerne and clover-based pastures. ***Crops:*** Cereals (wheat, barley, cereal rye, oats, triticale), including those undersown with clover, lucerne or medic (Vic only).	Apply during the autumn–winter period when fireweed plants are young and actively growing. Less effective on mature fireweed plants, which can regrow from the base.	***Boom spray:*** Prior to flower development 1.4 L/ha. Early flowering stage 2.8 L/ha. Use 50–200 L water/ha. Use higher volume (minimum 160 L) where the weed infestation is heavy or pasture cover is dense. ***Spot spray:*** **Handgun:** 75 mL/100 L water. **Knapsack:** 15 mL/100 m^2 per 15 L water. As a contact herbicide, ensure thorough coverage of weeds.	***Withholding period:*** Do not graze or cut for stock food for 8 weeks after application. ***Safety:*** Product is poisonous if inhaled or swallowed. Follow safety directions. ***Contact herbicide:*** Herbicide is not translocated. Older plants may not be killed – reshooting from the base and/or other parts of the plant that received insufficient herbicide exposure. ***Off-target risks:*** Pasture legumes at greater risk if frost damaged, if frosts are imminent, or if maximum temperatures >20°C may follow for some days after application. Certain clovers (e.g. berseem, Persian) and medics (polymorpha types) can be highly sensitive. Consult the product label. ***Other formulations:*** 400 g/L bromoxynil products also registered for fireweed, applied at a lower application rate (refer to label).
Bromoxynil (250 g/L) + diflufenican (25 g/L) ***Mode of action:*** **Groups 6 (= C) & 12 (= F)**	Various products registered with differing state/territory registrations. Check label to confirm a product is registered for use on fireweed or *Senecio* spp. in your state or territory.	***Pastures:*** Newly sown and established clover and/or lucerne-based pastures (but see risks). Including these as cover crops in vineyards. ***Crops:*** Cereals (wheat, barley, cereal rye, oats, triticale), including those undersown with clover and/or lucerne. Including these sown as cover crops in vineyards.	Control of fireweed seedlings up to 4-leaf stage.	***Boom spray:*** 500 mL/ha. Use 70–100 L water/ha. Use higher volume where the weed infestation is heavy or pasture cover is dense. As a contact herbicide, ensure thorough coverage of weeds.	***Withholding period:*** Do not graze or cut for stock food for 8 weeks after application. ***Safety:*** Product is harmful if inhaled or swallowed. Irritant. Follow safety directions. ***Off-target risks:*** Pasture legumes at greater risk if frost has damaged plants, if frosts are imminent, or if maximum temperatures >20°C may follow for some days after application. The tolerance of clover and lucerne varieties can vary with rate of application, soil type, crop health, stage of growth and degree of moisture and temperature stress. Certain clovers (e.g. berseem, Persian, Haifa white, arrowleaf) and medics (polymorpha types) can be highly sensitive. Consult the product label.

Herbicide[a]	State or territory[b]	Registered or permitted situation	Timing	Application[c]	Comments
Bromoxynil (250 g/L) + diflufenican (25 g/L) + MCPA (250 g/L) ***Mode of action:*** **Groups 6 (= C), 12 (= F) & 4 (= I)**	All (some products not WA). One product (Adama Triathlon®) currently registered for fireweed suppression in clover pasture.	***Pastures:*** Newly sown and established clover-based pasture, clover for hay and seed production (but see risks).	Suppression of fireweed seedlings up to 4-leaf stage.	***Boom spray:*** 1 L/ha Good coverage of weeds is essential. Coarse spray droplet size.	***Withholding period:*** Do not graze or cut for stock food for 8 weeks after application. Sprayed weeds may become more palatable to stock, which may result in poisoning. ***Safety:*** Product is harmful if inhaled or swallowed. Irritant. Follow safety directions. ***Off-target risks:*** Pasture legumes at greater risk if frost has damaged plants, if frosts are imminent, or if maximum temperatures >20°C may follow for some days after application. Certain clovers (e.g. rose, strawberry), lucerne and medics can be highly sensitive. Some pasture grasses, including cocksfoot and phalaris, can show initial reduction in growth. Consult the product label. Phenoxy herbicides can cause severe damage to native vegetation and susceptible crops, including grapes, tomatoes, oilseed crops and ornamentals. ***Other formulations:*** Similar products with differing herbicide concentrations available and with addition of picolinafen herbicide.
		Crops: Cereals (wheat, barley, triticale, cereal rye, oats).			
	One product (Stature®) currently registered for turf.	***Other:*** Recreational turf (not home lawns or any other residential turf).			
Bromoxynil (200 g/L) product & 2,4-D amine (625 g/L) product *tank mix of two herbicides* ***Mode of action:*** **Groups 6 (= C) & 4 (= I)**	NSW only; Permit PER12105	***Pastures:*** Pasture.	Apply as an overall spray when fireweed plants are actively growing.	***Boom spray:*** 1.5 L/ha bromoxynil + 1.5 L/ha 2,4-D amine as a tank mix. Ground-based application only, with coarse spray droplet size.	***Withholding period:*** Do not graze or cut for stock food for 8 weeks after application. ***Safety:*** Harmful if inhaled, swallowed or contact with eyes. Irritant. Follow safety directions. ***Off-target risks:*** Risk of legume damage (see previous bromoxynil information above). ***Spray-drift risk:*** Phenoxy herbicides can cause severe damage to native vegetation and susceptible crops including grapes, tomatoes, oilseed crops and ornamentals. Aerial application for fireweed is not allowed under this permit.

Herbicide[a]	State or territory[b]	Registered or permitted situation	Timing	Application[c]	Comments
Diflufenican (25 g/L) + MCPA (250 g/L) ***Mode of action:*** **Groups 12 (= F) & 4 (= I)**	All	***Pastures:*** Newly sown and established clover-based pastures (but see risks). ***Crops:*** Cereals (wheat, barley, triticale, cereal rye, oats), including those undersown with clover.	Suppression of fireweed seedlings up to 4-leaf stage.	***Boom spray:*** 1 L/ha. Do not apply to pastures or weeds that are stressed owing to dry or excessively moist conditions. Do not apply to frost-damaged plants or if frosts are imminent. Good coverage of weeds is essential. Coarse spray droplet size.	***Withholding period:*** Do not graze or cut for stock food for 7 days after application. Sprayed weeds may become more palatable to stock and may result in poisoning. ***Safety:*** Harmful if swallowed or contact with eyes. Irritant. Follow safety directions. ***Off-target risks:*** The tolerance of clover varieties can vary with rate of application, soil type, crop health, stage of growth and degree of moisture and temperature stress. Certain clovers (e.g. rose, strawberry), lucerne and medics can be highly sensitive. Some pasture grasses, including cocksfoot and phalaris, can show initial reduction in growth. Consult the product label. Phenoxy herbicides can cause severe damage to various crops, ornamentals and native plants. ***Other formulations:*** Similar product with differing MCPA herbicide concentration available.
2,4-D (300 g/L) ***Mode of action:*** **Group 4 (= I)**	Qld only One product (Apparent Affray 300) currently registered for use on fireweed in Qld.	***Pastures:*** Pasture. ***Other:*** Non-crop areas.	Apply as an overall spray when fireweed plants are actively growing.	***Spot spray:*** **Handgun:** 700 mL/100 L water. Maximum of 15 L water/ha, with coarse spray droplet size.	***Withholding period:*** Do not graze or cut for stock food for 7 days after application. ***Safety:*** Harmful if inhaled, swallowed or has contact with eyes. Irritant. Follow safety directions. ***Spray-drift risk:*** Not to be applied by a boom sprayer because of risks of spray drift. Phenoxy herbicides can cause severe damage to various crops, ornamentals and native plants.

Herbicide[a]	State or territory[b]	Registered or permitted situation	Timing	Application[c]	Comments
2,4-D amine (625 g/L or 700 g/L) ***Mode of action:*** **Group 4 (= I)**	Qld only; Permit PER13195	***Pastures:*** Pasture (in areas not suitable for ground-based applications).	Apply as an overall spray when fireweed plants are actively growing.	***Helicopter spray application only:*** 2.5–3.0 L/ha or 320 mL/100 L water (for 625 g/L products). 2.2–2.6 L/ha or 285 mL/100 L water (for 700 g/L products). Coarse spray droplet size.	***Withholding period:*** Do not graze or cut for stock food for 7 days after application. ***Safety:*** Harmful if inhaled, swallowed or has contact with eyes. Irritant. Follow safety directions. ***Spray-drift risk:*** Not to be applied by a boom sprayer because of risks of spray drift. Phenoxy herbicides can cause severe damage to various crops, ornamentals and native plants.
Metsulfuron-methyl (600 g/kg) ***Mode of action:*** **Group 2 (= B)**	NSW only; Permit PER87436 Qld only; Permit PER80929	***Pastures:*** Pastures. ***Other:*** Roadsides, non-crop areas, rights of way, forests, reserves and bushlands.	Apply once per year in autumn.	***Boom spray:*** 40 g/ha in 100 L water/ha. ***Spot spray:*** **Handgun:** 10 g/100 L water. **Knapsack:** 1.5 g/15 L water. For spot spraying use at least 1000 L water/ha.	***Withholding period:*** Nil ***Safety:*** Harmful if swallowed. Irritant. Follow safety directions. ***Off-target risks:*** Will kill legumes present in pastures and may impede their regeneration from seed in the following season. Impedes growth of some grasses (e.g. paspalum, setaria) for several months. ***Permit condition:*** may only be applied only once per year.
Aminopyralid (10 g/L) + fluroxypyr (140 g/L) ***Mode of action:*** **Group 4 (= I)**	All Two products currently available: Hotshot® and Choice Shotup Herbicide	***Pastures:*** Pastures. ***Other:*** Agricultural non-crop areas, commercial and industrial areas, rights of way.	Seedlings and flowering plants up to 30 cm tall.	***Boom spray:*** For seedling plants up until flowering, 1.5 L/ha in at least 80 L of water/ha. ***Spot spray:*** For flowering plants – **Handgun:** 500 mL/100 L water. Do not apply when plants are not actively growing, including those stressed because of extreme cold, dry or excessively moist conditions.	***Withholding period:*** Nil mandatory withholding periods for cutting or grazing pastures for stockfeed. However, certain export markets have restrictions – consult the product label. Hay, silage, animal manures or compost intended for use off-farm should not be cut/sent within 6 months of application – consult the product label. ***Safety:*** Damaging to eyes. Irritant. Follow safety directions. ***Off-target risks:*** Will kill legumes present in pastures and impede their regeneration from seed in the following season. Many broadleaved plants are highly susceptible, including vines, vegetables, tomatoes, ornamentals, native vegetation and planted trees. Susceptible crops cannot be planted for up to 20 months – consult the product label. Manage residue risks in farm products.

Herbicide[a]	State or territory[b]	Registered or permitted situation	Timing	Application[c]	Comments
Aminopyralid (8 g/) + picloram (100 g/L) + triclopyr (300 g/L) ***Mode of action:*** **Group 4 (= I)**	All Two products currently available: Grazon® Extra and Extra Grass Herbicide	***Pastures:*** Pastures. ***Other:*** Agricultural non-crop areas, commercial and industrial areas, rights of way.	Flowering plants.	***Spot spray:*** **Handgun:** 350 mL/100 L water **Knapsack:** 53 mL/15 L water Apply as a thorough foliage spray to ensure full coverage of leaves and stems. Do not apply when plants are not actively growing, including those stressed because of extreme cold, dry or excessively moist conditions.	***Withholding period:*** Nil mandatory withholding periods for cutting or grazing pastures for stockfeed. However, certain export markets have restrictions – consult the product label. Hay, silage, animal manures or compost intended for use off-farm should not be cut/sent within 6 months of application – consult the product label. Sprayed weeds may become more palatable to stock, which may result in poisoning. ***Safety:*** Irritant. Follow safety directions. ***Off-target risks:*** Will kill legumes present in pastures and impede their regeneration from seed in the following season. Many broadleaved plants are highly susceptible, including vines, vegetables, tomatoes, ornamentals, native vegetation and planted trees. Susceptible crops cannot be planted for up to 20 months. Consult the product label. Manage residue risks in farm products.
Aminopyralid (25 g/L) + halauxifen (30 g/L) product + fluroxypr (333 g/L) as Starane® Advanced product ***Mode of action:*** **Group 4 (= I)**	All One product currently available: Trezac® Arylex® Active	***Pastures:*** Pastures. ***Other:*** Agricultural non-crop areas, commercial and industrial areas, forests, pastures and rights of way.	Active growth prior to flowering and up to 30 cm tall.	***Spot spray:*** **Handgun:** 200 mL + 210 mL Starane® Advanced /100 L water, as a tank mix. Apply as a thorough foliage spray to ensure full coverage of leaves and stems. Do not apply when plants are not actively growing, including those stressed because of extreme cold, dry or excessively moist conditions.	***Withholding period:*** Nil mandatory withholding periods for cutting or grazing pastures for stockfeed. However, certain export markets have restrictions – consult the product label. Hay, silage, animal manures or compost intended for use off-farm should not be cut/sent within 6 months of application – consult the product label. ***Safety:*** Irritant. Follow safety directions. ***Off-target risks:*** Will kill legumes present in pastures and impede their regeneration from seed in the following season. Many broadleaved plants are highly susceptible, including vines, vegetables, tomatoes, ornamentals, native vegetation and planted trees. Susceptible crops cannot be planted for up to 20 months. Consult the product label. Manage residue risks in farm products.

Herbicide[a]	State or territory[b]	Registered or permitted situation	Timing	Application[c]	Comments
Aminocyclopyrachlor (240 g/L) ***Mode of action:*** **Group 4**	All One product currently available: Method® 240 SL	***Pastures:*** Pastoral grazing land. ***Other:*** Native conservation areas, industrial sites such as railways, roadways and utility rights of way.	Seedlings to flowering plants.	***Spot spray:*** **Handgun:** 200 mL/100 L water. **Knapsack:** 13 mL/15 L water. Use sufficient spray volume to thoroughly and uniformly wet target weed, starting at the top and covering sides. However, avoid spraying to the point of run-off. Apply to actively growing weeds (i.e. not drought or cold-stressed).	***Safety:*** Follow safety directions. ***Off-target risks:*** May injure or kill most crops and may injure or kill desirable vegetation. Certain trees, shrubs, legumes are susceptible to very low doses. May suppress or severely injure certain established grasses. Herbicide in soil can be taken up by plant roots. Beware of contaminating irrigation water. Follow label directions. ***Spray-drift risk:*** Applications should be made only when there is little or no hazard from spray drift – follow label directions. ***Pastures:*** Manufacturer advises that 'pastoral grazing land' is equivalent to 'pastures' (Envu, 2022).
Glyphosate (various concentrations) ***Mode of action:*** **Group M (= 9)**	Qld only; Permit PER11463 NSW and ACT only; Permit PER9907	***Other:*** **Qld permit:** Non-agricultural areas, domestic and public service areas, commercial and industrial areas, bushland/ native forests, roadsides, rights of way, vacant lots, wastelands, wetlands, dunal and coastal areas **NSW permit:** Forests including native vegetation areas, bushland reserve areas, national park areas. Non-cropland, including rights of way, commercial and industrial areas, domestic and urban areas, public service areas, botanic gardens.	Seedlings to flowering plants.	***Spot spray:*** Knapsack: 150 mL/15 L water (for 360 g/L glyphosate products).	***Withholding period:*** Nil for non-agricultural uses. ***Safety:*** Irritant. Follow safety directions. ***Off-target risks:*** Non-selective. Avoid any contact with desirable plants. ***Environmental:*** In aquatic and wetland areas, use only glyphosate products registered for use in such situations.

Herbicide[a]	State or territory[b]	Registered or permitted situation	Timing	Application[c]	Comments
Paraquat (135 g/L) + diquat (115 g/L)	Northern NSW and Qld only	***Crops:*** **Fallows and in direct drilling of crops:** Broadacre crops – winter (cereals, canola, chickpeas, field beans) Broadacre crops – summer (cotton, maize, millet, mung beans, navy beans, peanuts, pigeon peas, safflower, sorghum, soybeans, sunflower).	1- to 12-leaf stage.	***Boom spray:*** 0.8–2.4 L/ha, depending on growth stage and situation.	***Withholding period:*** Do not graze or cut sprayed vegetation for stock food for at least 1 day or graze horses for 7 days after application. ***Safety:*** Very dangerous, particularly the concentrate. Poisonous is absorbed by skin contact, inhalation or swallowing. Irritant. Follow safety directions. ***Off-target risks:*** Broad spectrum contact herbicide, applied before crop emergence.
Sulfometuron-methyl (750g/kg) ***Mode of action:*** **Group 2 (= B)**	Vic, SA, Tas, WA, ACT and southern NSW only	***Other:*** Post-planting of *Eucalyptus globutus*, *E. nitens* plantations, including farm tree plantations.	Bare ground up to 3-leaf stage	***Boom spray:*** 50–70 g/ha in 100 L water/ha. Applied as an inter-row directed spray using a shielded sprayer. ***Spot spray:*** **Handgun:** 5–7 g/100 L water. **Knapsack:** 7.5–10.5 g/15 L water. Use higher rate for longer term residual control.	***Withholding period:*** Nil. ***Safety:*** Irritant. Follow safety directions. ***Off-target risks:*** Soil residual herbicide. Allow 12 months after the transplanting of tree seedlings before applying the chemical. Direct drift or spray onto any part of a Eucalypt seedling will result in severe injury or death.

[a] Mode of action categorisation is transitioning from the Australian letter system to the international number system (CropLife Australia, 2022).

[b] Products may be registered for use on fireweed in all states and territories (shown as 'All') or only in the specific states and territories listed. Further, additional uses not listed on the label may be allowed under permit, for specified states or territories. If a state or territory is not listed on the label and there is no applicable permit, use as specified on the label for the same situation may still be allowed under jurisdictional legislation, where considered low risk – seek government advice.

[c] Application rates are general advice only and may vary between products. Check the product label for specified rates and application methods (or the permit, as applicable).

5.5 State/territory contacts for weed control information

State and territory government departments provide information on controlling weeds. Contact details are provided in Table 5.9. Local/regional weed management authorities can also be contacted for information and advice.

Table 5.9 Contact details of state and territory departments for weed management (May 2023).

State/ territory	Department	Phone	Email	Website
ACT	ACT Parks and Conservation Service	13 22 81	ACTBiosecurity@act.gov.au	www.environment.act.gov.au/parks-conservation/plants-and-animals/biosecurity/invasive-plants
NSW	Department of Primary Industries	1800 680 244	weeds@dpi.nsw.gov.au	www.dpi.nsw.gov.au/biosecurity/weeds
NT	Department of Environment, Parks and Water Security	08 8999 4567	weedinfo@nt.gov.au	www.nt.gov.au/environment/weeds
Qld	Department of Agriculture and Fisheries	13 25 23	info@daf.qld.gov.au	www.daf.qld.gov.au/business-priorities/biosecurity/invasive-plants-animals/plants-weeds
SA	Department of Primary Industries and Regions	08 8303 9620	invasivespecies@sa.gov.au	www.pir.sa.gov.au/biosecurity/weeds
TAS	Department of Natural Resources and Environment Tasmania	1300 368 550	biosecurity.tasmania@nre.tas.gov.au	www.nre.tas.gov.au/invasive-species/weeds
Vic	Agriculture Victoria	13 61 86	Refer to www.agriculture.vic.gov.au for contact options	www.agriculture.vic.gov.au/biosecurity/weeds
WA	Department of Primary Industries and Regional Development	1300 374 731	enquiries@dpird.wa.gov.au	www.agric.wa.gov.au/pests-weeds-diseases/weeds

5.6 Property planning resources

The following tables provide sources of online guidance for property-level planning regarding overall property management, biosecurity management and weed management. The tables are not exhaustive and new resources and initiatives may be become available.

Table 5.10 Sources of online information on property management planning (May 2023).

Source	Web link	Description
Queensland Government **Farm Business Resilience Program**	www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/disaster/drought/assistance/business-resilience-plan	Helps farmers and graziers to prepare for and manage business and climate risks.
Local Land Services NSW **Farm planning – setting your vision for your land**	www.lls.nsw.gov.au/what-we-do/our-major-projects/every-bit-counts/resources/rural-property-ownership/property-management/farm-planning-setting-your-vision-for-your-land	Outlines how to undertake a basic property planning.
Dairy Australia **Our Farm, Our Plan**	www.dairyaustralia.com.au/farm-business/our-farm-our-plan#.Y2SpaWIBwQ8	Provides resources and templates, supported by workshops for eligible farmers.
Dairy NZ **Farm business planning**	www.dairynz.co.nz/business/planning/	Has templates and guides. General principles apply to Australian livestock enterprises.
Agriculture Victoria **Land Health**	agriculture.vic.gov.au/farm-management/land-and-pasture-management/land-health	Outlines farm planning services provided through the Victorian government.

Table 5.11 Sources of online information on property biosecurity planning (May 2023).

Source	Web link	Description
Animal Health Australia (AHA) and **Plant Health Australia (PHA)** **Farm Biosecurity Program** *(joint initiative)*	www.farmbiosecurity.com.au	This website is a national hub of farm biosecurity information. It includes information to help producers understand disease, pest and weed risks, what they can do to reduce those risks, and how to go about it. It provides information and tools, including an app, to help producers implement biosecurity measures on their property.
Animal Health Australia (AHA) **Better On-farm Biosecurity**	animalhealthaustralia.com.au/better-on-farm-biosecurity/	AHA has an on-farm biosecurity plan template for livestock enterprises, including beef and dairy cattle, sheep, goats and alpaca.
Integrity Systems **Livestock Production Assurance (LPA)**	www.integritysystems.com.au/on-farm-assurance/Biosecurity/	The LPA program is the Australian red meat industry's on-farm assurance program, providing evidence of livestock history and on-farm practices when transferring animals through the value chain. It includes a requirement to have a farm biosecurity plan and provides a template (similar to that provided by AHA).

Queensland Government Department of Agriculture and Fisheries On-farm biosecurity	www.daf.qld.gov.au/news-media/campaigns/on-farm-biosecurity	This state government website explains how to meet legal requirements to prevent or minimise the spread of biosecurity risks, including weeds.
NSW Government Department of Primary Industries Your role in Biosecurity	www.dpi.nsw.gov.au/biosecurity/your-role-in-biosecurity	This state government website explains how to meet legal requirements to prevent or minimise the spread of biosecurity risks, including weeds.
NSW Government and Small Farms and Rural Living Network Building biosecurity for small farms	www.dpi.nsw.gov.au/__data/assets/pdf_file/0007/1155931/Building-biosecurity-for-small-farms.pdf	A biosecurity guide for small farms and lifestyle properties.
Western Australian Government Biosecurity plans for small landholders	www.agric.wa.gov.au/small-landholders-western-australia/biosecurity-plans-small-landholders?nopaging=1	The website is broadly applicable across Australia.

Table 5.12 Sources of online information on property weed management planning (May 2023).

Source	Web link	Description
Local Land Services NSW South East Preparing a Whole of Property Weed Management Plan	www.lls.nsw.gov.au/regions/south-east/articles,-plans-and-publications (Filter by Topic of Weeds)	Provides a guide and template for preparing a property weed management plan.
NRM North (Tasmania) Guide for Developing a Weed Management Plan	nrmnorth.org.au/resources/ (Search for 'weed plan')	Provides general guidance on how to develop a best practice plan for weed management.
Meat & Livestock Australia (MLA) Weed control hub	www.mla.com.au/extension-training-and-tools/feedbase-hub/weed-control/	The hub details six principles that provide the basis for an effective pasture weed control plan.
University of New England Weed Detection and Control on Small Farms	www.une.edu.au/__data/assets/pdf_file/0004/23575/2010-Weed-Detection-and-Control-on-Small-Farms-A-Guide-for-Owners.pdf	The guide describes pathways of weed spread to farms, where to look for weeds and how to control them.
Queensland Government Vehicle and machinery clean-down procedures	www.daf.qld.gov.au/__data/assets/pdf_file/0011/58178/cleandown-procedures.pdf	The site gives detailed guidance on how to prevent weed movement by such means.
Victorian Serrated Tussock Working Party Best Practice Serrated Tussock Weed Hygiene Guide	serratedtussock.com/ (Search for 'hygiene guide')	The guide is broadly applicable to preventing and stopping the spread of pasture weeds.

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