Addendum

Safe and Effective Herbicide Use: A handbook for near-water applications

In October 2007, the Environment Protection Authority released *Safe and Effective Herbicide Use: A handbook for near-water applications*.

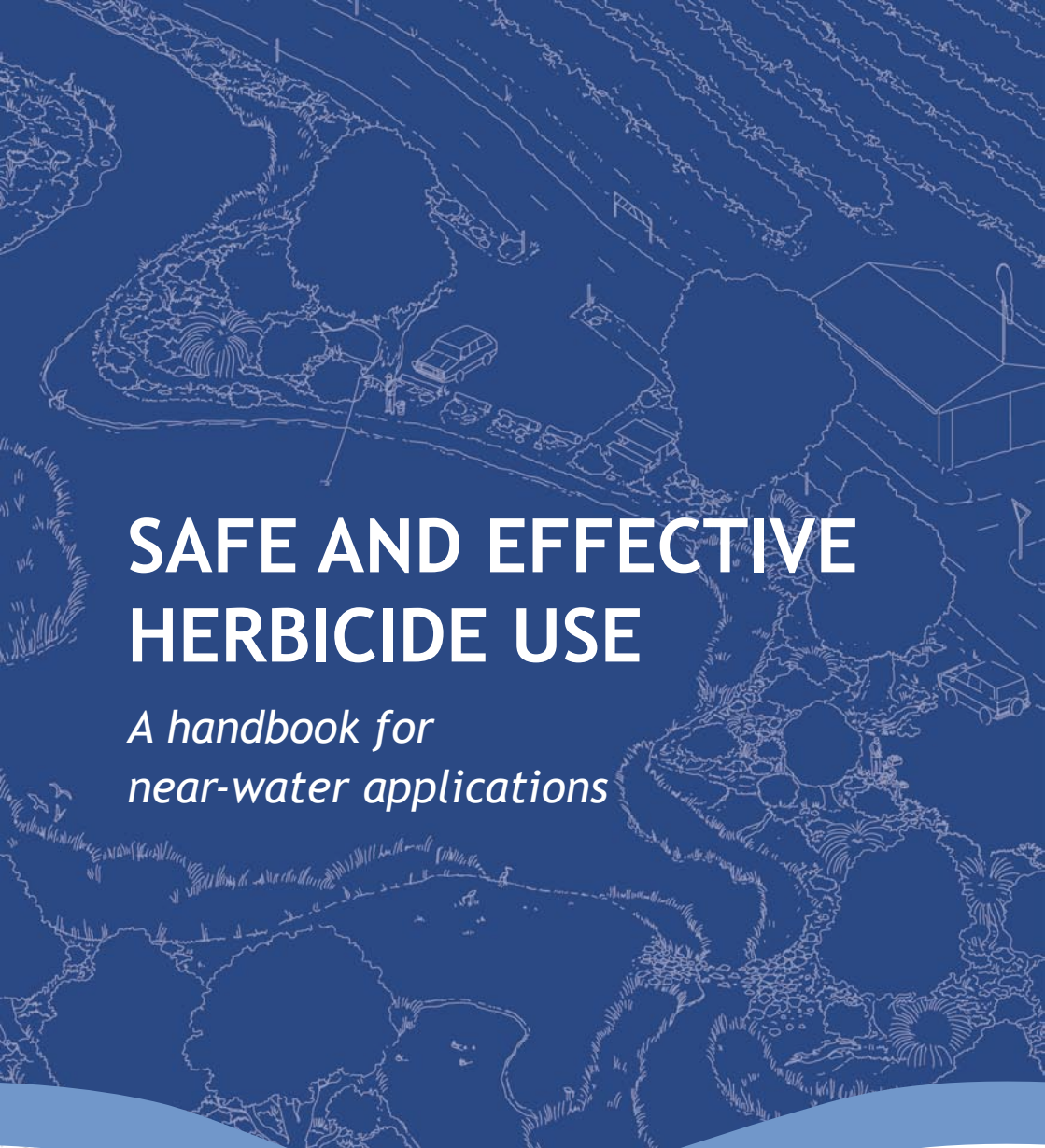
Due to an error realised since the release, the publication has the following change:

> On page 10, within Table 1. Herbicide classification, the middle column has been removed. This is due to a mistake in labelling Bipyridiliums (e.g. Paraquat) as pre-emergent. Subsequent examination of the examples has lead to the EPA removing this column to remove ambiguity.

Bipyridiliums are not pre-emergent. They are a contact herbicide that becomes tightly locked up when applied to soil.

Updated April 2017 according to *Environment Protection (Water Quality) Policy 2015*.

An updated version of this handbook is overleaf.



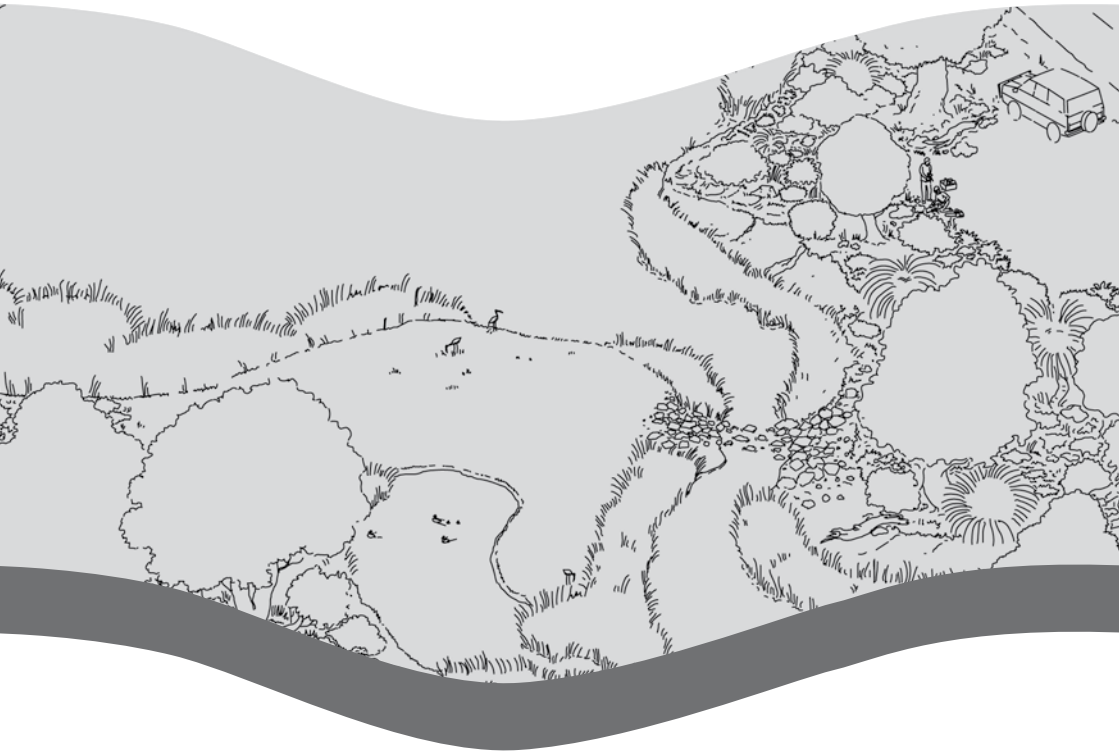
SAFE AND EFFECTIVE HERBICIDE USE

A handbook for near-water applications

EPA
South Australia

SAFE AND EFFECTIVE HERBICIDE USE

A handbook for near-water applications



EPA
South Australia

CONTENTS

INTRODUCTION

The purpose of this handbook is to advise South Australians on how to safely and effectively use herbicides to control weeds near waterbodies as part of a sustainable weed management plan for their properties. It focuses on application techniques and the selection of appropriate herbicides for the control of the weed species most commonly encountered near waterbodies.

Landholders should always consider non-chemical solutions as a preferred option before deciding to use herbicides

This handbook is one in a series of three. The others are:

- *Safe and effective pesticide use: a handbook for lifestyle landholders*
- *Safe and effective pesticide use: a handbook for commercial spray operators.*

The handbook for lifestyle landholders includes more general information on the use of pesticides.

The control and management of weeds near waterbodies is a challenge faced by most landholders across South Australia. Waterbodies are particularly sensitive to herbicide pollution, so the decision to apply herbicides in the vicinity must be taken with great care. Landholders should always consider non-chemical solutions as a preferred option before deciding to use herbicides.

Weed control near waterbodies requires a long-term commitment to eradication, as the seed banks of many 'woody' weed species (e.g. blackberries, gorse) may remain viable for decades. Weeds may also readily spread downstream along watercourses, making their control difficult. A gradual, planned approach to weed control, alongside a program to re-establish desirable native species, is necessary to ensure sustainable management of riparian areas.

Remember that herbicides can enter waterbodies either directly through spray or spray drift, or they can move into waterbodies via surface water run-off or leaching and sub-surface draining

Herbicides are designed to control pest plants ('weeds') and are useful in many situations for effective eradication. It is important to realise, however, that many herbicides are toxic in aquatic ecosystems. Plants, invertebrates, amphibians and fish may be harmed when herbicide moves into a body of water. Inappropriate use of herbicides may also cause significant risks to human health where water is pumped from a bore for domestic use, or flows to reservoirs. The EPA hopes that publication of this booklet will help the community to understand the link between issues of water quality and responsible use of herbicides.

Remember that herbicides can enter waterbodies either directly through spray or spray drift, or they can move into waterbodies via surface water run-off or leaching and sub-surface draining.

Definitions

What is a weed?

There are a number of definitions available as to what constitutes a weed species. For the purposes of this booklet, a weed may be defined as any plant species which is not locally indigenous to the area in which it is located.

It is true, however, that some locally indigenous species may become 'weedy', meaning they spread widely and cause problems for landholders. An example is the common reed, *Phragmites australis*, which in watercourses may trap sediment, resulting in flooding of surrounding land. For the control of locally indigenous species which become 'weedy', formal native vegetation clearance approval is required.

What is a waterbody?

Waterbodies can include natural watercourses (streams, creeks, rivers), constructed drainage channels and ponds, natural

wetlands, ponds, lagoons, reservoirs and lakes. Waterbodies can be categorised as:

- *Permanently inundated/aquatic/perennial*. These have water all year round (e.g. spring-fed streams and wetlands, lagoons and reservoirs).
- *Occasionally inundated/intermittent*. These have water some time of the year (e.g. occasionally flooded floodplains, backwaters, some wetlands, major riparian channels that drain through catchments).
- *Rarely inundated/ephemeral*. These are areas that rarely contain water (e.g. areas that flood on rare occasions).

A healthy riparian zone contributes to maintaining water quality as the riparian vegetation filters surface water entering the watercourse

Whatever the type, never spray herbicides over an open body of water!

What is riparian land?
Riparian land can be defined as any land that adjoins, directly influences, or is influenced by a body of water at any time of the year.

What is riparian vegetation?
Riparian vegetation is vegetation located on riparian land. This vegetation plays a vital role in maintaining a healthy aquatic ecosystem. A healthy watercourse will have a relatively stable stream bed and banks. The stream bed and banks will usually be vegetated and provide habitat for a wide variety of birds, fish, frogs, lizards and other animals.

Riparian vegetation also assists in binding sediment and preventing watercourse erosion during periods of high flow. A healthy riparian zone contributes to maintaining water quality as the riparian vegetation filters surface water entering the watercourse.

As a landholder you have legal obligations to protect the environment from harm

What is a herbicide?
Herbicides are chemical substances or mixtures of substances intended for killing pest plants. They may be applied to the target areas as sprays or by hand using various techniques.

What is spray drift?
Spray drift is the airborne movement of agricultural chemicals away from the target area, during or shortly after its application. Spray drift can be in the form of droplets, particles (fine dust) or vapour, and becomes an issue when it has the potential to impact on human health, trade and the environment. It can occur to some degree even when the chemical is being applied according to label instructions.

Spray drift is not the only process by which chemicals can potentially leave the target area. Chemical trespass is the broader term used to describe the off-target impact of a chemical on air, soil, groundwater and surface water, and can also occur via transport mechanisms other than spray drift (e.g. spillage).

Your legal obligations

Many introduced plants and animals are declared as pests under the *Natural Resources Management Act 2004* (formerly, *Animal & Plant Control Act 1986*), because they pose threats to agriculture, the environment or to public safety, and have the potential to spread beyond their current range. Landholders are required by law to control these species.

However, as a landholder you have legal obligations to protect the environment from harm. Herbicide use must be consistent with provisions in the *Environment Protection Act 1993* and the *Environment Protection (Water Quality) Policy 2015* (Water Quality Policy).

The 'General Environmental Duty' under Section 25 of the Environment Protection Act reads:

A person must not undertake any activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to prevent or minimize any resulting environmental harm.

Further information on a broad range of environmental regulation can be obtained from *EPA Guidelines for Responsible Pesticide Use 2005* <www.epa.sa.gov.au/pdfs/guide_pesticides.pdf> and from PIRSA's website <www.pir.sa.gov.au/lego/>.

It is essential to draw up an action plan before you tackle the problem of weed infestation in riparian areas

How to control weeds in riparian and aquatic areas

It is important to think long-term when managing riparian and aquatic areas—perhaps 5–10 years or more. Gradual and consistent weed control and re-establishment of local native plant species are integral to sustainable management of these areas. Restoring native vegetation helps to reduce the presence of weed species, ensuring the stability of banks, shading of the waterway (which minimises evaporation), and provision of habitat for local fauna.

It is essential to draw up an action plan before you tackle the problem of weed infestation in riparian areas. This will ensure that you have considered all aspects of the problem, and all possible options for control. It will also save you money in the long term, as a planned approach is more likely to bring you the desired results. If you need to bring in a commercial spray operator, long-term planning is still a good idea, and may even be required by the operator.

You will almost certainly need to restore the habitat once weeds have been eradicated

A planned approach

Assess your site

What type of waterbody is it?

If your site is permanently inundated, you need to consider very carefully the choice of herbicide, recognising the risk of toxicity to your aquatic ecosystem and the danger that the herbicide may affect the surrounding environment. You also need to identify points of access to the site.

If your site is occasionally or rarely inundated, choose the time of herbicide application to coincide with when rainfall, and therefore run-off, is likely to be low.

What types of weeds are present?

Identify the species of weed and the extent of the infestation. Table 2 (page 13) details, for main weed species, the recommended herbicide control, the method, and time of year for application, and suggests alternatives to the use of chemicals.

Do the weeds have value at the site?

Consider whether the weeds are serving a useful purpose at the site. They may be acting as a buffer to control erosion, or as a filter to promote water quality. They may have a value to animal species as a source of food or shelter.

If you believe that you have native plants or animals that might be adversely affected by your proposed weed control, seek professional advice.

You may be able to stage the removal of weeds to minimise any impact on erosion or on animal life. You will almost certainly need to restore the habitat once weeds have been eradicated.

Are native species present at the site?
Identify any native plant species at your site. Some species may be protected under the *Native Vegetation Act 1991*. Consider the possible effect of herbicides on native plants, and whether you can safeguard such plants from accidental eradication.

Choose your control method
Where possible, you should carry out weed control using non-chemical methods. These include biological control (e.g. by introduction of gorse mite), slashing, mulching, controlled grazing, or hand removal. Often a combination of chemical and non-chemical methods is most appropriate. Whichever method or combination of methods is used, it is important to consider the potential negative impacts on the environment and limit these as much as possible.

If you plan to use herbicides, be aware of their characteristics and properties to ensure they are suitable and safe for use near waterbodies

If you plan to use herbicides, be aware of their characteristics and properties to ensure they are suitable and safe for use near waterbodies.

Understanding herbicides
Herbicides can be broadly classified according to their chemical structures and modes of action. Table 1 shows the three major types of herbicide, with their generic names and main characteristics.

Herbicides applied to the edge of a waterbody, or in wetted areas around its edge, must be registered for use in aquatic environments by the Australian Pesticides & Veterinary Medicines Authority

Table 1: Herbicide classification

Pre-emergent (residual)	These herbicides are designed to inhibit the germination of pest plants. They are therefore applied before the pest plant germinates and are often residual in the soil for long periods. They are generally not considered to be safe for use near waterbodies and are not recommended for use due to their persistence in the environment.
Knockdown non-selective	These herbicides are designed to be applied directly to the target pest plant, either through being sprayed onto foliage or applied directly to the cambium layer through any of the direct application methods described in Table 3 (pages 19–20). They may vary in mode of action and some may persist as residues in the environment.
Selective	Selective herbicides are designed to act on only one type of pest plant. Generally, selective herbicides will control either broadleaf (e.g. Salvation Jane), grasses (e.g. Phalaris) or woody weeds (e.g. Broom). These herbicides are useful when the focus may be on controlling a particular weed species (e.g. Phalaris amongst native shrubs). These herbicides may persist as residues in the environment.

Herbicides applied to the edge of a waterbody, or in wetted areas around its edge, must be registered for use in aquatic environments by the Australian Pesticides & Veterinary Medicines Authority. Such herbicides need the following characteristics:

- low eco-toxicity
- nil or low volatility at all temperatures (e.g. <10–6 mm Hg) (to reduce spray drift potential)
- low water solubility (e.g. <3 mg/L) (to reduce potential for leaching to groundwater)
- high soil absorption co-efficient (e.g. Koc >1900 cm^3/g) (to reduce potential for leaching to groundwater)
- short half-life (in water <15 days; aerobic soil metabolism <610 days; anaerobic soil metabolism <9 days).

If you are confused by these terms it is recommended that you hire a licenced spray contractor who complies with the industry standard Quality Assurance Management System.

Use IPM in all situations if possible

Consider integrated pest management (IPM)

Integrated pest management (IPM) is a planned approach that coordinates environmentally acceptable methods of pest control with careful and minimal use of toxic pesticides. IPM programs are based on a comprehensive assessment of local conditions, including factors such as climate, season, the biology of the pest species, and government regulations.

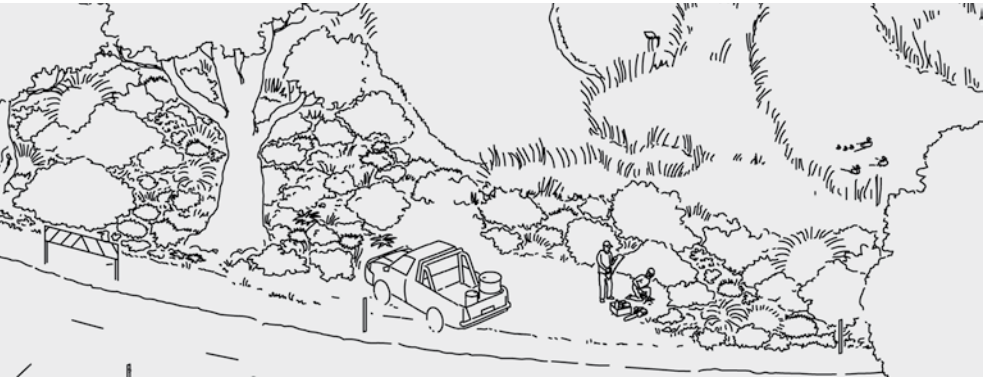
Strategies employed may include the staged removal of weeds and the biological control and re-planting of riparian areas with native species to discourage the regeneration of weeds. For more information about IPM, see the companion booklet *Safe and effective pesticide use: a handbook for lifestyle landholders*, and Resources (page 25).

Consult and plan

Draw up a calendar for action. The time of year when herbicides will be most effective on the weed should be a major influence on the make-up of this calendar. Herbicides are generally most effective during the growing season of the weed rather than when it is dormant or approaching dormancy. The staged removal of weeds over several seasons may be less disturbing to your aquatic environment and minimise any adverse impact on fauna.

Consult with neighbours who may be affected by your weed control operation, especially if you think there is any risk of spray drift to adjoining properties. You may also decide to seek advice from experts before taking further action, or approach commercial spray contractors to assess your particular situation.

SAFETY FIRST



Before using a chemical, read the label carefully. Pay particular attention to the toxicity warning and directions for use

As a responsible user of pesticides you will need to consider all aspects of safety, including safe transport, storage and mixing of chemicals. You will need personal protective equipment, and you will need to understand how to operate spray equipment and the principles of calibration. First, you should know how to read the labels on pesticide containers.

Understanding labels

Chemical labels are not advertising. They provide technical information designed to help you use the contents correctly without causing personal or environmental harm. Labels contain information about the product, including instructions for handling and information about the chemical's toxicity.

Before using a chemical, read the label carefully. Pay particular attention to the toxicity warning and directions for use.

Toxicity warning

Chemicals are either not classified (unscheduled) or classified according to toxicity and listed as being either Schedule 5, Schedule 6 or Schedule 7 chemicals. Signal headings (key warnings)

at the top of the label are related to human health and indicate the chemical's schedule.

Table 2: Toxicity warnings

Signal heading	Schedule	Degree of hazard
No signal heading required; 'Keep out of the reach of children' only	Unscheduled	Low toxicity
'Caution'	Schedule 5	Slight degree of hazard
'Poison'	Schedule 6	Moderate degree of hazard
'Dangerous Poison'	*Schedule 7	High degree of hazard

*By law, Schedule 7 chemicals must not be sold to or be used by persons who have not completed appropriate training (e.g. ChemCert or equivalent) and shall not be used in domestic settings.

Directions for use

This section of the label provides details about the pests the chemical will control, the situations in which it can be used, how it is to be applied and the rates at which it must be used. This information is usually presented in a panel or table. Different rates may be specified depending on methods of application and the pest to be controlled.

Read all sections of the label before purchasing the chemical. When using it, follow label directions exactly. Variations from the directions may cause off-target damage or result in the chemical being ineffective.

Labels also include general information on:

- conditions required to achieve best results
- any other warnings such as effect of the product on plants or fauna

When purchasing a herbicide, ensure the container is in good condition and not leaking

- mixing instructions
- storage of product
- cleanup, spills and disposal of containers
- safety directions and first aid.

If you still have doubts or would like more information, seek advice or obtain a material safety data sheet (MSDS) from the chemical supplier.

Accidents and emergency situations

Preparation is the best defence against emergencies. You should develop an appropriate emergency plan allowing you to deal with such a situation. Make sure you have access to appropriate emergency equipment including protective clothing, spill containment and clean-up equipment.

If chemical is splashed in the eye, wash it immediately in running water for 15 minutes and call a doctor immediately. The Poisons Information Centre can be contacted on 13 11 26 at any time.

Other considerations

Other things which need to be considered as aspects of the safe use of herbicides include:

Transport

When purchasing a herbicide, ensure the container is in good condition and not leaking. Purchase only the amount you need as this reduces the amount being transported and any subsequent risk in storage. Always check product labels to ensure they are present and intact.

In addition, ensure the risk of spill is minimised by transporting the product inside another container or a thick, securely closed plastic bag, and purchase herbicides as the final item before travelling

home or to the point of storage to reduce unnecessary stages of their transportation.

Storage

Lock herbicides in a cupboard in a shed, preferably away from the workbench and areas of activity or areas accessed by children. If storing herbicides in the house, keep them in a locked cupboard away from children and the kitchen. Keep pesticides stored in a cool area, away from sunlight.

In addition, store herbicides in original containers only, making sure labels are protected and readable. Keep personal protective equipment near the storage facility so it can be reached easily if a spill or accident occurs. A 'spills kit', including absorbent material, should also be kept close to the storage location so it can be reached quickly in the event of a spill.

Personal protective equipment

Personal protective equipment (PPE) is designed to safeguard against both acute and chronic herbicide poisoning and generally includes products that prevent absorption of herbicide through the skin or eyes, or by inhalation. PPE commonly recommended for use when applying herbicide includes:

- goggles or face shield to protect the eyes
- chemical-resistant gloves to protect hands
- overalls to protect legs, arms, torso and groin
- respirator with filter cartridges to prevent inhalation of herbicide vapour or mist
- rubber or PVC boots to protect feet
- washable or chemical-resistant hat to protect head and scalp
- PVC apron for use during mixing.

Mixing

Herbicides should be measured and mixed in areas that are well-ventilated, level, well-lit, and with a supply of clean water. Operators should wear appropriate personal protective equipment while mixing herbicides, and follow all instructions on the label.

Only prepare the volume of mix required to complete the task. This avoids the need to store or dispose of unused chemicals.

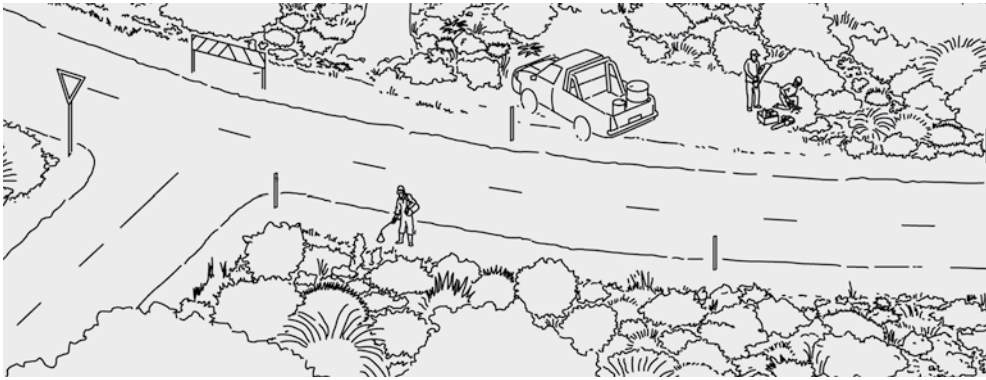
Calibration

The correct calibration of spraying equipment is the key to safe, effective and cost-efficient herbicide use. Correct calibration means you are applying the right amount of chemical at the right concentration. Over-application of herbicide can cause off-target damage and pollute the environment. Under-application will not treat the target pest effectively and so is a waste of time and money. Furthermore, it is illegal to apply herbicides at a higher rate than that stated on the label.

Additionally, correct calibration should avoid the problem of disposing of excess herbicide, as you will mix only the amount you need to complete the job.

For a more detailed discussion of the safe transport and storage of herbicides, personal protective equipment, mixing herbicides and the calibration of spray equipment, please consult the companion booklet, *Safe and effective pesticide use: a handbook for lifestyle landholders*.

BEFORE SPRAYING



If you do decide to spray herbicides near waterbodies, you will need to do a thorough risk assessment of the work. You should consider the:

- feasibility/practicability of the required job
- physical characteristics of the job site
- optimal pest control method, including alternatives to herbicides
- characteristics of the herbicide (physical, chemical and environmental)
- potential environmental effects resulting from spraying
- related human health issues.

In addition, you should have a property management plan that considers the sensitivity of neighbouring land to any chemical use. You should also be mindful of:

- awareness zones
- buffer zones
- the possibility of spray drift and other off-target migration
- weather conditions.

You should also ensure good communication with your neighbours, both in the planning stages and immediately prior to spraying.

For a more detailed discussion of these issues and others related to spraying, please consult the companion booklet, *Safe and effective pesticide use: a handbook for lifestyle landholders*.

Do you need to spray?

It is recommended that only trained, licensed contractors carry out spraying operations near waterbodies, because of the sensitivity of these environments. However, if you feel you can select the appropriate chemical and apply it according to best practice, and so avoid environmental or personal harm, then the following points are critical:

Never spray herbicides over a waterbody!

- Never spray herbicides over a waterbody!
- When you are working near the edge of a waterbody, direct the spray away from the waterbody where possible.
- Spray only to the extent of covering foliage with droplets.
- Spray when weather is calm; strong winds may carry herbicide drift into waterbodies.
- Use a flat fan nozzle and a low pump/spray pressure to reduce the likelihood of spray drift.
- Do not spray when rainfall is forecast within six hours as herbicide can be washed off the pest plant and run off into aquatic ecosystems.

Licensed, trained spray operators are able to minimise the risk of spray drift by professionally assessing your property, neighbouring properties, and mapping potentially sensitive areas. The type of weed problem you have will determine both the type of herbicide used and its application method. Table 3 shows recommended herbicide and application methods for common weeds, along with the best time of year for application, and alternatives to herbicide use. It applies to both permanently and occasionally inundated sites, except where indicated. Table 4 shows recommended herbicide application techniques for different types of weed.

Table 3: Common weeds and recommended herbicides and treatment

Weed	Herbicide	Application techniques	Time to act	Alternatives to chemical use
Trees				
Olive (*Olea europaea*)	Triclopyr	Cut and Swab	Aug to Dec	Hand removal (seedlings)
Hawthorn (*Crataugus* sp.)	Glyphosate	Drill and Fill		
Pittosporum (*Pittosporum undulatum*)	Triclopyr	Frill and Paint		
Ash (*Fraxinus* sp.)	Triclopyr	Cut and Swab	Nov to Mar	Hand removal (young plants)
Willow (*Salix* sp.)	Glyphosate	Drill and Fill		
Poplar (*Populus* sp.)	Triclopyr	Frill and Paint		
Wattle (*Acacia baileyana*)	Triclopyr	Cut and Swab	Aug to Dec	Hand removal (young plants)
Wattle (*Acacia longifolia* var. *longifolia*)	Triclopyr	Frill and Paint		
Pine (*Pinus* sp.)	Triclopyr	Cut and Swab or Frill and Paint	Jan to Dec	Hand removal (young plants) Ringbark
Woody Weeds				
Tree heath (*Erica arborea*)	Triclopyr	Cut and Swab Foliar Spray*	Aug to Dec	Hand removal (young plants)
Sapnish heath (*Erica lusitan-ica*)				
Blackberry (*Rubus* sp.)	Triclopyr	Cut and Swab	Nov to Mar	Slash/groom; grub out seedlings
	Triclopyr	Foliar Spray*		
	Glyphosate	Scrape and Paint		

** For occasionally inundated waterbodies only, and only when they are dry*

Table 3, continued

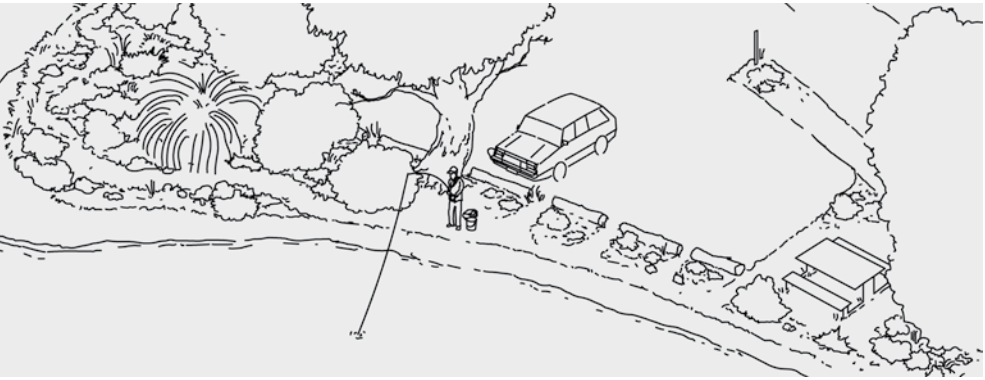
Weed	Herbicide	Application techniques	Time to act	Alternatives to chemical use
Woody weeds (continued)				
Boneseed (Chrys*anthemoides monilifera*)	Glyphosate	Foliar Spray*	Nov to Feb	Hand removal
Broom (*Genista* sp., *Cytisus* sp.) Gorse (*Ulex europaeus*)	Triclopyr	Cut and Swab	Nov to Mar	Hand removal (young plants) Slash/Groom Burn thickets
	Triclopyr	Foliar Spray*		
	Glyphosate	Cut and Swab		
Bulbs and herbs				
Watsonia (*Watsonia bulbilifera*)	Glyphosate	Wick Wipe Spot Spray	Aug to Nov	Dig out bulbs (remove from site)
Bridal Creeper (*Myrsiphyllum asparagoides*)	Glyphosate	Spot Spray	July to Sept	Dig out Biological control
Ivy (*Hedera helix*)	Glyphosate	Cut and Swab	Aug to Dec	Cover with black plastic (solarisation)
Introduced Grasses (*Pennisetum* sp., *Phalaris* sp. *Piptatherum* sp.)	Glyphosate	Spot Spray	Aug to Dec	Slash prior to seeding

** For occasionally inundated waterbodies only, and only when they are dry*

Table 4: Herbicide application techniques

	Method	Type of weed	Equipment Required	Notes
	Foliar Spray	Herbs, bulbs, woody weeds	Knapsack Vehicle mounted tank Herbicide mix Personal protective equipment (see product label)	Ensure herbicides is being applied at right concentration and rate to cover the foliage of the pest plant with fine droplets and avoid run-off. A flat fan nozzle and low pump pressure will assist in reducing spray drift
	Cut and Swab	Woody weeds, shrubs and trees	Saw, chainsaw, loppers Herbicide mix Personal protective equipment (goggles and gloves as a minimun) Bush/sponge for herbicide application	Ensure herbicide is applied quickly to cut stump (within 30 seconds in most cases) Apply during active growth period of plant for best results Do not apply herbicide to the point of run-off
	Frill and Paint	Shrubs and trees	Axe, hatchet Herbicide mix Personal protective equipment (goggles and gloves as a minimum) Brush for herbicide application	Frill trunk thoroughly, also treat major surface roots where visible Expose sapwood and apply herbicide to it immediately For deciduous species, apply during active growth period.
	Drill and Fill	Shrubs and trees	Drill Application bottle, injection gun Herbicide Personal protective equipment (goggles and gloves as a minimun)	Drill to sapwood only and apply herbicide to drill hole immediately Drill and fill major surface roots where appropiate For deciduous species, apply during active growth period
	Scrape and Paint	Woody weeds	Knife or sharp blade Paint brush, sponge, applicator bottle Herbicide Personal protective equipment(goggles and gloves as a minimum)	Scrape main or major stems of plant Apply herbicide immediately after scraping
	Wick Wipe	Herbs bulbs, rushes	Knapsack Vehicle-mounted tank Wick applicator Herbicide mix Personal protective equipment (as per label)	Cover foliage thoroughly Apply during active growth period

AFTER SPRAYING



Do not deposit wastewater where it will run into waterways, drainage lines or stormwater systems

Clean up

Equipment should always be cleaned in a safe location where spills can be contained and will not result in environmental harm. Using water to clean equipment will further dilute any residual herbicide to low levels, and the resulting solution is best sprayed onto a lawned area or bare ground taking the following precautions:

- Do not apply wash-water to the point of saturation and run-off.
- Do not apply wash-water along boundary fence lines as this will increase the chance of herbicides escaping from your property.
- Do not dispose of wastewater into areas where children play, or pets have access, as low levels of herbicide are still likely to be present.
- Do not deposit wastewater where it will run into waterways, drainage lines or stormwater systems.

Disposal

If you do happen to have surplus spray mix or herbicide waste, label it with the herbicide name, including any risk and safety information displayed on the original label. Store it safely until it can be disposed of appropriately.

You must follow label directions for the disposal of wastes and herbicide containers. Only dispose of waste herbicides at authorised collection centres, such as licensed waste disposal centres or the EPA's Hazardous Household Waste Depot at Dry Creek.

Consider weed management as a long-term process, staged over several years

Do not dispose toxic herbicide waste:

- through sewerage systems, where it can interfere with the sewage treatment process
- down the drain or gutter, where it will pass through the stormwater system and then into waterways
- to landfill via dumping or domestic waste, as it can contaminate soil and leach into groundwater and stormwater.

Monitor, evaluate and follow up

Consider weed management as a long-term process, staged over several years. Monitor, evaluate and follow up your weed-control measures as an integral part of your plan.

Monitor

Observe and keep records of your weed problems and the effect of any measures you take to control them. This could involve:

- the use of visual records, including property maps, aerial and other photography
- the use of a calendar or diary to record when actions were taken.

Evaluate

Evaluate the success of any weed control program by considering

the current extent of the weed problem and reviewing your control measures. Important questions might include:

- Is my weed control work going to plan, or do my targets need reviewing?
- What is the appropriate weed control measure now?
- Is there a need for external (expert) assistance?

Follow up

Re-implement weed control actions following the results of your monitoring and evaluation. Continue to monitor this follow-up work, and so begin an ongoing cycle of weed management.

RESOURCES

Topic	Contact details	Notes
Disposal of unwanted concentrated pesticide	EPA Ph: (08) 8204 2004 or 1800 623 445 or epainfo@epa.sa.gov.au or www.epa.sa.gov.au	*Household hazardous waste—management and disposal*; EPA guideline
	ChemClear Ph: 1800 008 182 www.chemclear.com.au	
Disposal of unwanted pesticide containers	drumMuster www.drummuster.com.au, or Ph: (08) 8554 7268 or 0409 834 113	Contact local council
Emergency	000	Fire, ambulance, police
Emergency (environmental)	Environment Protection Authority Ph: 1800 100 833	Emergency Response Line (to report an incident that has actually, or may potentially, cause serious or material environmental harm)
Emergency (poisoning)	Poisons Information Centre Ph: 13 11 26	24 hours a day, 7 days a week

Topic	Contact details	Notes
General pesticide information	EPA Ph: (08) 8204 2004 or 1800 623 445 or epainfo@epa.sa.gov.au or www.epa.sa.gov.au	EPA *Guidelines for Responsible Pesticide Use* 2005
	PIRSA Ph: (08) 8226 0405	*inFINDer* set of CDs, available from PIRSA (pesticide labels, MSDS, and registered uses of pesticides);
	EXTOXNET http://extoxnet.orst.edu	Website of Oregon State University/ USA with chemical & physical characteristics of pesticides relating to environmental safety and transport
	Natural Resources Management Boards www.nrm.sa.gov.au	
Integrated pest management (IPM)	National Association for Sustainable Agriculture Australia www.nasaa.com.au/ PO Box 768 Stirling SA 5152 Ph: (08) 8370 8455 Fax: (08) 8370 8381 Email: enquiries@nasaa.com.au	Organic growers
	BFA www.bfa.com.au/	Organic growers
	www.environment.act.gov.au/petsandlocalwildlife/integratedpest management.html	Another useful website

Topic	Contact	Notes
Licenced contractors	Natural Resources Management Boards www.nrm.sa.gov.au Groundsprayers Association of South Australia c/ Wrenhaven Pty Ltd Ph: (08) 8391 1999	
Pesticide storage, transport and handling	PIRSA, Rural Chemicals Program Ph: (08) 8226 0549	*Agricultural & Veterinary Chemicals (Control of Use) Act 2002*
Reporting a significant pesticide spill	Police Ph: 131 444 (24 hrs) Department of Human Services Ph: (08) 8226 7107 (24 hrs)	*Controlled Substances Act 1984,* and Regulations
Spray drift management: principles, strategies and supporting information.	PIRSA Chemical Trespass Coordinator Ph: (08) 8226 0528 Fax: (08) 8226 1844	PISC (SCARM) Report 82, Primary Industries Report Series, CSIRO Publishing /PISC (SCARM), October 2002.
Training in the use of farm chemicals	ChemCert Australia (SA) Inc Ph: (08) 8842 4048	*Controlled Substances Act 1984,* and Regulations. *Agricultural and Veterinary Products (Control of Use) Act 2002* and Regulations.
Weed management	CRC for Weed Management Ph: (08) 8303 6590	
Workplace health and safety	Workplace Services, DAIS Ph: 1300 365 255 www.eric.sa.gov.au wisinfo@eric.sa.gov.au	*Occupational, Health, Safety and Welfare Act 1986*

NOTES

EPA South Australia
77 Grenfell Street (SA Water House)
Adelaide SA 5000

Telephone: (61 8) 8204 2000
Freecall (country): 1800 623 445

Email: epainfo@epa.sa.gov.au
www.epa.sa.gov.au

Government of South Australia

This project was jointly funded by the South Australian Government's Adelaide and Mount Lofty Ranges Natural Resources Management Board and the South Australian Murray-Darling Basin Natural Resources Management Board

Design, illustrations and editing by Ecocreative® <www.ecocreative.com.au>