Natural Area
CONSULTING MANAGEMENT SERVICES

Shire of Mundaring

Priority Weeds and Control Options

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Contents

1.0 Introduction

Natural Area Consulting Management Services (Natural Area) was contracted by the Shire of Mundaring to undertake a review of weed treatment options that may be utilised within the Shire's reserves.
The main objectives of this report are to:

- Identify weed treatment options available for use within bushlands.
- Provide information on these weed treatment strategies, including any restrictions.
- Provide weed treatment options for each priority species outlined by the Shire, and review government databased to ensure any significant weeds within the Shire are added to the priority list.

2.0 Methodology

A review of the weed list provided by the Shire of Mundaring was undertaken to ensure names were current and species were historically recorded within the area. Searches of current Department of Biodiversity, Conservation and Attractions (DBCA) databases was undertaken (FloraBase and NatureMap) to identify any additional weed species that may be present within the Shire. The impact and invasiveness of the weeds on this list was assessed using:

- the national list of significant weeds (Weeds of National Significance, Weeds Australia, 2019)
- the Western Australian Organism List (WAOL) database, which lists declared pest species classified under the *Biosecurity and Agriculture Management Act 2007* (WA) (DPIRD, 2019)
- the Swan Region impact and invasiveness rating of weeds (DBCA, 2016)
- internal company experience; Natural Area has over 12 years of weed management experience within the Perth Metropolitan Region.

A review of the current weed treatment options available for the Shire was undertaken including chemical, manual and biological weed control. Each option was briefly described and assessed to determine the advantages, disadvantages, and any restrictions that may impact the Shire's ability to implement that control. This information was determined using:

- relevant legislative documents
- government body advice
- published studies
- available product information including product labels and safety data sheets (SDS)
- internal company experience; over 12 years of weed management experience within the Perth Metropolitan Region has allowed for optimal treatment strategies to be developed internally.

The priority species as outlined by the Shire and the additional priority species recommended had optimal treatment strategies assigned, including treatment options at different life stages, population sizes and the options for treatments in wetlands and near water bodies, where the majority of herbicides cannot be applied.

2.1 Limitations

This strategy is based on a desktop review of weed data obtained from the Shire and DBCA databases and as such only has information on weed species that have been formally reported as occurring within the Shire of Mundaring is recorded; other weed species may occur that have not yet been recorded. The DBCA searches include historical data and weed species recorded may not currently be present within the Shire. The additional priority rankings recommended have been assigned based on the assumption that weed species present have similar densities; weed species that have higher densities may present a higher risk to biodiversity and human safety and need to be prioritised accordingly.

3.0 Weed Species

A total of 83 weed species were provided by the Shire of Mundaring, and are categorised into six types:

- grasses/rushes
- herbs/small shrubs
- bulbous
- vines/creepers
- woody
- cactus.

This list was reviewed, with outdated names updated (e.g. *Homeria flaccida* to *Moraea flaccida*). A search of NatureMap and FloraBase (DBCA 2019a, DBCA 2019b) for weeds located within the Shire of Mundaring included 184 and 181 weeds recorded, respectively (Appendix 1). Some species listed in the Mundaring weed compilation were not within the DBCA listings. This may be due to misidentification however it is more likely that the Shire's list is more current due to ongoing, on-ground observations. Some of the additional species from the DBCA searches were subspecies, or species very similar in characteristics to plants on the Shire's weed list, such as *Gladiolus alata* (*Gladiolus caryophyllaceus* on Shire's list) and *Hypochaeris glabra* (*Hypochaeris radicata* on Shire's list) and are treated using the same method. These three lists were compiled to give a total of 224 weed species.

The Department of Biodiversity, Conservation and Attractions (DBCA) *Swan Regional Impacts and Invasiveness* document (2016) listed 51 of the 224 species as having a high ecological impact and invasiveness (Appendix 1). A high ecological impact includes significantly dominating or altering vegetation structure, composition and the functioning of an ecosystem. This may include altering the fire regime, reducing biodiversity and changing nutrient conditions and soil erosion patterns (DBCA, 2016). Invasiveness is a measure of the species ability to disperse and establish in an environment and includes time to maturity, dispersal method and reproductive strategy (DBCA, 2016). Of the 51 species listed as high impact and invasiveness in the databases, 17 are currently not listed as a priority on the Shire of Mundaring species list including:

- Cape Weed (*Arctotheca calendula*)
- Bearded Oat (*Avena barbata*)
- Baboon Flower (*Babiana angustifolia*)
- Fountain Grass (*Cenchrus setaceus*)
- Pampas Grass (*Cortaderia selloana* subsp. *selloana*)
- Couch (*Cynodon dactylon*)
- Perennial Veldt Grass (*Ehrharta calycina*)
- African Lovegrass (*Eragrostis curvula*)
- Freesia (*Freesia alba x leichtlinii*)
- Wild Gladiolus (*Gladiolus caryophyllaceus*)
- Wild Gladiolus (*Gladiolus undulatus*)
- Tambookie Grass (*Hyparrhenia hirta*)
- Flat Weed (*Hypochaeris radicata*)
- Sharp Rush (*Juncus acutus*)
- Coast Teatree (*Leptospermum laevigatum*)
- Haas Grass (*Tribolium uniolae*)

- Typha / Bulrush (*Typha orientalis*).

As the *Swan Regional Impacts and Invasiveness* list does not consider the dispersal and density within the Shire, it is recommended that the density and spread of the species outlined above is reviewed and species that the Shire has the resources to eradicate or significantly reduce populations of should be also placed on the priority list. The Shire has provided comments on the species outlined above and has recommended that eight additional species are added to the priority list, namely Fountain Grass, Perennial Veldt Grass, African Lovegrass, Freesia, Wild Gladiolus (two species), Tambookie Grass and Coast Teatree.

Based on Natural Area's experience with weed treatment in the Perth Metropolitan Region it is recommended that three additional species not outlined above are added to the Shire's weed priority list:

- Fig (*Ficus carica*)
- Brazilian Pepper (*Schinus terebinthifolius*)
- Black Flag (*Ferraria crispa*)

Fig and Brazilian Pepper, like Sydney Golden Wattle (*Acacia longifolia*), are fast growing, easily dispersed woody weeds that can quickly outcompete natives in drainage lines and wetland areas. These species can be treated in conjunctions as they usually occupy similar areas. Black Flag is a geophytic species that spreads quickly and is very difficult to manage once established due to its resistance to most herbicides. This species has been reported as occurring within the Shire (DBCA 2019a, DBCA 2019b). Although the soil types within the Shire are not ideal for Black Flag the species may establish along roadsides and in highly degraded areas. Typha (*Typha orientalis*) was also considered when assessing the impact of weed species on the native environment. Typha is a highly invasive species that can smother wetland habitat; however, it has recently been reclassified as native in Western Australia and therefore should not be added to the priority list.

4.0 Control Methods

Weed control within local government areas is largely limited to manual control and the use of herbicides, however biological, organic control methods, or hydrothermal (steam) treatment can be used in certain scenarios. Weeds are considered to be one of the major threatening processes to biodiversity; and treatment of widespread weeds can require a high input of resources. Effective control methods are an important consideration for land managers so that the best possible results are achieved in the most economical way possible.

This section identifies weed control methods, their advantages and disadvantages and any restrictions that may impact the ability of the Shire to implement these methods. Weed control should be undertaken by appropriately trained and where appropriate, licenced technicians, with suitable personal protective equipment (PPE) used as specified by herbicide Safety Data Sheets (SDS). Hydrothermal weed control is not recommended in bushland settings due to the potential impact of heat on the soil microorganisms and the technical limitations which is yet to be adequately researched, and the limitation of steam weed control needing to be undertaken in close proximity to the boiler (located on a vehicle).

4.1 Manual Weed Control

Manual weed control can be an effective method of control, particularly where the presence of native species limits the use of herbicides or when the weed populations are too small to warrant herbicide use. Manual weed control can include hand weeding and the use of tools like shovels and trowels to remove weeds from the environment. Removal of green waste reduces the fire fuel load and the weed seed bank, reducing competition for resources and enabling native species to colonise open areas. This method is particularly useful in areas of high conservation value and low weed densities; however, these techniques can be labour intensive, not suited to large infestations and is not suited to all weed types such as in the case of bulbous weeds.

Hand pulling of weeds is the most common form of manual control and is useful for small seedling and non-geophytic herbs. Digging tools can be useful to remove weeds with extensive root systems to prevent weeds reshooting. Manual weed control is often favoured by the community as it has a perceived lower health risks and a lower risk of off-target damage to native flora. It also requires a low level of training and can be undertaken by volunteers.

The main benefits of manual weed control include:

- minimised risks of off target damage to native species
- supplements other control methods
- it is selective
- perceived lower health risks
- prevention of seeding and spread of seed
- very effective for small weed infestations
- effective treatment for herbicide resistant weeds
- it is effective on perennial species
- this treatment method is not affected by weather and can be undertaken all year round

- this method can be used by people without pesticide and herbicide licences, and is commonly undertaken by volunteers, which can make it cost effective.

The disadvantages of manual weed control include:

- it is labour intensive
- higher risk of physical injury to personnel undertaking weed control
- can disturb soils through increased trampling and plant removal
- potential spread of bulbs or corms produced by geophytes if they're not all removed
- plants can resprout if the entire root system is not removed
- unsuited to large infestations due to time required for removal
- not practical for certain weeds such as bulbous species
- increased risk of erosion.

Hand weeding is most suited to low density herbs and small shrubs, or the saplings of large shrubs and woody weeds. Small, isolated patches of priority species such as Narrowleaf Cottonbush, Paterson's Curse and Italian Lavender can be eradicated using this method, although follow-up may be required due to the seed bank. Additionally, hand pulling large shrub and woody weed saplings is the most effective way of controlling these species, as the removal of larger woody weeds is more labour intensive. Populations of priority species such as weedy wattles, Tagasaste and Flaxleaf Broom can be effectively managed using this method, although the removal of mature trees is also required for effective control.

Hand weeding is not suitable for the majority of bulbous species; stems are likely to break off leaving the tubers in the ground to resprout the following season. In some bulbous species, hand weeding can cause dormancy, which may lead to the establishment of a population thought to be eradicated.

4.2 Chemical Weed Control

Chemical weed control is the most common form of weed control used in bushland areas. It involves the application of herbicides at nominated rates and application methods. The typical application method is spraying a dilute solution of herbicide using a knapsack or motorised spray rig. Chemical wiping, drilling and filling, and basal barking are methods involving a more concentrated herbicide solution to target certain species or reduce the likelihood of off target damage.

Herbicides, by law, can only be used as specified on the label, or under off label permits outlined by the Australian Pesticide and Veterinary Medicines Authority (APVMA). Declared Pests and environmental weed species can have herbicide applied to it as specified under PER13236 and PER13333 respectively; all weeds listed are classified as environmental weeds (APVMA, 2016a and APVMA, 2017; Appendix 2). All recommendations outlined in Section 5 comply with the labelled use or the off-label permits outlined above. All chemical weed control activities should be undertaken by appropriately trained, licenced technicians, with appropriate personal protective equipment (PPE) used as specified by herbicide Safety Data Sheets (SDS) or the Shire's guidelines. Chemical control is largely weather dependent with wind, rain and temperature affecting the effectiveness of herbicides.

There are a number of advantages of using chemical weed control methods including:

- it is more efficient than other forms of weed control, with larger areas able to be targeted with weed-specific herbicides
- can be used for small or large infestations
- less erosion potential than manual control methods
- can be utilised to treat large woody weeds
- it can be more cost effective, providing a greater return or outcome based on the investment in terms of both financial and human resources
- it is less physically demanding for operators
- it can inhibit weed germination within the seed bank.

Disadvantages of chemical weed control include:

- there is the potential for off target damage to native flora species, particularly in windy conditions or through misidentification of native and weed species by untrained staff
- many herbicides are not suitable for use in or around wetlands and waterways
- some weed species can develop a resistance to herbicides with continual use over time or through natural selection
- a higher perceived risk of health to operator/s and community members, with chemicals having varying degrees of toxicity that may contribute to negative public reactions
- chemicals require the use of personal protective clothing; this varies based on the toxicity of the chemicals used and adds to the cost of treatment
- residual chemicals can remain or build up in the soil over time posing a threat to microorganisms and fauna, and inhibiting the germination of native seeds within the soil seed bank
- herbicide use can also be limited by weather, with rain making herbicide ineffective, windy conditions causing a higher risk of off-target damage, and high temperature making plant stomates close up reducing absorption of herbicide and making it less effective.

4.2.1 Non-selective herbicide (Glyphosate)

The most widely used non-selective herbicide for bushland management is Glyphosate. Glyphosate is a highly useful tool in controlling weeds as it affects a wide range of plant species, has a very low impact on animals, and does not have residual effect in the soil (Sfiligoj 2019, Mann and Bidwell 1999, Rueppel *et al.* 1977). Plants affected by Glyphosate stop growing very rapidly, but symptom development after that often occurs very slowly (1-4 weeks) and typically results in plant death. Care needs to be taken when spraying non-selective herbicide to ensure no off-target damage occurs to native species. Glyphosate Biactive should be utilised in or around waterbodies and wetlands as it is one of the few herbicides approved for use in aquatic settings (APVMA, 2017).

A low concentration of Glyphosate can be used to control herbaceous and grass weed species such as Cape Weed, Flat Weed, and Perennial Veldt Grass. It is also useful to control the saplings of woody weeds and large shrubs if hand-weeding is not a feasible option due to high density. A higher concentration of Glyphosate can be utilised to control bulbous species, although this involves methods other than spraying (see Section 4.2.6) and is used to stop woody weeds resprouting (Section 4.2.5). It can also be used in conjunction with manual weed control (Section 2.3). Non-selective herbicide control is not suitable for areas

in which natives and weeds grow amongst each other, or for species that can resprout from tubers, rhizomes or bulbs (unless otherwise outlined).

Glyphosate Risk to Humans

Concerns have been raised about the risk Glyphosate exposure causes to humans following the International Agency for Research on Cancer assessment which classified Glyphosate as 'probably carcinogenic to humans' along with shift work disrupting the circadian rhythm, sodium nitrate (used to cure meats and pickle vegetables), and the consumption of hot (>65^{O}C) beverages and red meat (IARC, 2018). A review undertaken by the APVMA (2016b) and published in the document *Regulatory Position: consideration of the evidence for a formal reconsideration of glyphosate* determined that:

- Glyphosate exposure to humans does not pose a carcinogenic risk
- there is not enough scientific evidence to formally revise Glyphosate or products containing Glyphosate
- if Glyphosate is used as per the label instructions it is unlikely to be harmful to humans as recommended PPE is adequate to mitigate the known adverse effects such as skin and eye irritation.

There is a disparity between the risk of Glyphosate and the public's concern over its use, particularly due to recent high profile court cases involving plaintiffs who have had high levels of exposure with minimal or no protective equipment. However public perception does need to be taken into consideration when undertaking weed control, and some residents do express more concern for Glyphosate use than other herbicides. It's recommended that treatment using Glyphosate near high traffic areas is undertaken outside of peak usage time to reduce the public's exposure to the perceived risk. If there are areas where there are strong concerns about the herbicide, notifications can be sent out informing the public where the chemical will be applied, or the use of alternative treatments explored. Ensure all personnel who undertake Glyphosate application are sufficiently informed and can confidently answer or field any questions regarding the risk level of this chemical. Research will continue to be undertaken on Glyphosate and the Shire should continue to follow advice from state and federal government agencies.

4.2.2 Semi-selective herbicide (Metsulfuron Methyl)

Semi-selective herbicides such as Metsulfuron Methyl can be used to target geophytic (bulbous) weeds, and a selection of other species. It is absorbed through the leaves of growing plants and also can affect the emergence of geophytic plants; with a half-life in the soil ranging from 14 – 180 days, persisting longest in alkaline soils. As it can affect a range of species, and the effects on native plants is widely unknown, it is recommended that spot spraying is undertaken in areas with native vegetation present. Anecdotally, Metsulfuron can impact species such as *Anigozanthos* spp., *Conostylis* spp., *Corynotheca micrantha*, and *Banksia dallanneyi*.

It is recommended that herbicides such as Metsulfuron only be used once a year at the recommended dose within particular sites to reduce residual effect in soils. This will aid in minimising the potential for weed species becoming resistant to their effects and associated death of non-target species.

Metsulfuron affects bulbous species, including the germination of these plants; it is not recommended in areas that are known to have a high presence of native bulbous species such as orchids, *Dichopogon* spp., and *Thysanotus* spp. The chemical is not suitable for wetlands, other treatment options should be sought if treatment near waterways is required.

4.2.3 Selective Grass Treatment (Fluazifop-p-butyl and Quizalofop-p-ethyl)

Quizalofop-p-ethyl and Fluazifop-p-butyl are post emergent herbicides (treat actively growing plants) which only affect grass (Poaceae) species. Both herbicides are not mobile in soil meaning they should not leach significantly into water. Quizalofop-p-ethyl is moderately persistent in soils with a half-life of 60 days; with treatments only occurring once or twice a year, this is not an issue for consideration in a parks and bushland context. Fluazifop-p-butyl does not persist in soils. Both herbicides are commonly used by councils, however Fluazifop-p-butyl is more than double the price of Quizalofop-p-ethyl.

Fluazifop-p-butyl has a very low impact on aquatic organisms and vertebrates (Brain & O'Connor 1988; Woodcock *et.al.* 1993). Although this chemical is recommended for use in wetlands by various government authorities (Water and River Commissions 2001, DEC 2012), the use in wetlands is not specified on the label, and the off label permit for environmental weeds states that only products "that have label approvals currently in place for aquatic use may be used in or near aquatic areas" (APVMA, 2017). Only Glyphosate products that specifically outline use in aquatic situations (such as Roundup Biactive) can be used within 2 meters of water bodies, and in wetland and damplands situations.

Grass selective herbicides can be used around revegetation planting and in native vegetation to reduce the potential of off-target damage that may occur with non-selective herbicide use. As there is less likelihood of off-target damage, spray works can be undertaken at a faster rate that spot spraying with non-selective herbicide.

Grass weeds can have a significant impact on the fire fuel load of bushlands and have the propensity to colonise and spread rapidly. Tambookie grass and Perennial Veldt Grass in particular can smother native vegetation and create a very high fire fuel load. If areas of high grass fuel load already exist in the Shire, one option is to slash and spray the area (Section 4.3) to allow for more effective chemical application and reduce the fire fuel load more rapidly. Selective grass treatment will not control non-grassy weeds.

4.2.4 Organic herbicides

Organic herbicides can be a useful alternative to other herbicides in built up areas, where there may be a perceived greater risk to public safety from chemicals. The use of alternatives to herbicides are relatively new and peer reviewed research on effectiveness and possible damage to soil profile and biota is not readily available. For this reason, use of alternatives should be used with caution particularly in sensitive bushland areas.

The advantages of using organic herbicide includes:

- organic weed control methods are considered safe to use for operators in public areas
- they usually work quickly when applied in ideal weather conditions
- they reduce harm to plant stem and roots, which can help in stabilising soils
- they can reduce weed seed bank in soil if used at optimal timing.

The disadvantages of using organic herbicide includes:

- can be less effective and more costly than herbicides
- effectiveness is more variable, with repeat treatments often required

- may not reduce the need for herbicide use
- may have adverse environmental effects such as increasing soil pH
- can cause skin, eye and airway irritation
- there are no long term studies on the environmental or health effects
- more labour intensive
- increased chance of off-target damage to native species.

Slasher® Weedkiller

Slasher® Weedkiller is a non-selective and contains pelargonic (nonanoic) acid, emulsifiers and suitable solvents. This herbicide kills herbs, moss, algae and lichen. It works quickly by stripping the waxy coating off leaves causing them to dehydrate. The effectiveness of this product does decrease if the weeds being sprayed are wet, as this dilutes the spray. Off-target damage can occur; this herbicide needs to be treated as non-selective and only spot-spraying is recommended. As it is highly acidic it should not be used in wetland situations, near water bodies, or other environmentally sensitive areas. It is a class A corrosive chemical and can cause skin, eye and airway irritation or damage so appropriate PPE is required. No long-term studies on the effects of this herbicide on humans or the ecological environment have been undertaken, so long-term risks are unknown (Organic Crop Protectants, 2017).

Weed Zap

Weed Zap is an organic herbicide made from vegetable oils, typically comprised of clove oil (19%), cinnamon oil (19%), cottonseed oil (19%), oleic acid (19%), lauric acid (19%) and lactose/water (5%). It is a broad-spectrum herbicide that targets a wide range of weed species. It works by binding to the surface of the plant, where it translocates into the cells and begins to destroy the plant cell structure through a burn-down process. Results can be seen in as little as six hours after application. Weed Zap works best in non-shaded open areas, and on herbaceous weeds six inches or less. As the main components are oils it should not be used in wetland situations or near bodies of water. This herbicide will only control actively growing, emerged green vegetation; it does not damage non-green, woody plants (SaferGro, 2015). This product can cause skin and eye irritation and appropriate PPE should be worn.

4.2.5 Drill and fill and Basal Barking

Also known as stem injection, drilling and filling is used for trees and woody weeds with stems or trunks large enough to drill into. Using a battery powered drill with a large drill bit (10 mm), a ring of angled holes is drilled into the trunk near the base of the tree, with holes approximately 50 mm apart (Figure 1). The holes are then filled with herbicide using a syringe or squirt bottle to deliver, with approximately 5 mL of 50% Glyphosate per hole used. Glyphosate Biactive should be utilised if drilling and filling in wetland areas.

Basal-barking typically refers to ‘painting’ the lower 60 cm of a trunk as well as any exposed roots with herbicide (loaded with penetrating oil). A mixture of Grazon (Triclopyr) and Biosafe (1:60 ratio) is typically utilised for basal barking. Glyphosate Biactive and water (1:1 ratio) can also be utilised for basal barking in wetlands and adjacent to waterways. For many woody weeds in the Perth Metropolitan area basal barking is not sufficient for mature trees as the herbicide does not penetrate the bark. Therefore, basal barking should be undertaken on younger trees and stems that are too large to be manually removed, but too small to drill and fill. If basal barking larger trees it is common practice to cut (using a small hatchet or saw) a wide

(approx. 30 cm) ring of bark from the trunk before painting the exposed areas with herbicide, however this is a time intensive process compared to drilling and filling.

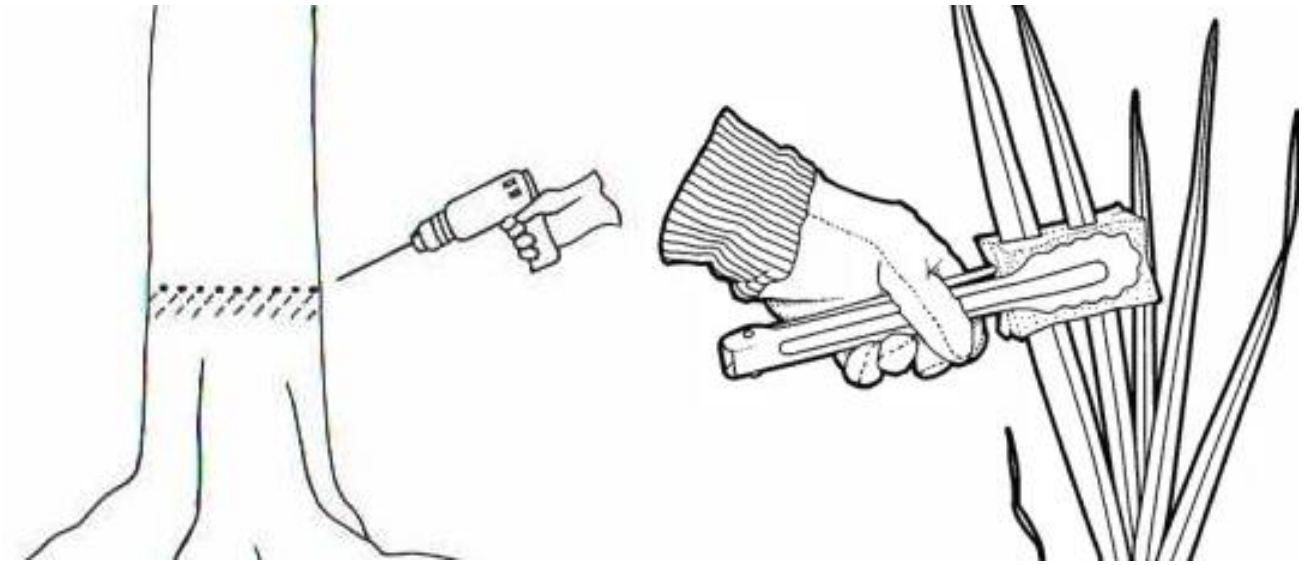
The advantage of these method is they can be undertaken year round in almost all weather conditions. It is not recommended that it be undertaken in heavy rainfall, due to the likelihood of chemical dilution and runoff. This method of woody weed control is effective in areas of dense vegetation where the manual removal of trees may be difficult. It is also useful for controlling species that can sucker from rootstock, such as Brazilian Pepper and Sydney Golden Wattle, as cut painting can trigger suckers to shoot. This method leaves dead, standing trees which may be visually unappealing, present a safety hazard to the community and contribute to a higher fire fuel load in the area.

4.2.6 Chemical wiping/painting

In environmentally sensitive areas or areas in which there is a high level of native vegetation it is not practicable to spray herbicide using conventional means. Wiping herbicide on the leaves of weeds using sponges attached to tongs can be an effective way to get sufficient coverage on leaves (Figure 1). A paintbrush can also be utilised for wider, stiffer leaves. A ratio of 2:1 water: glyphosate is outlined for wiping on the label, however high rates can be used for Declared Pests. This method can also be used to treat scattered bulbiferous species, or geophytes in wetland environments, where the use of semi-selective herbicide (Metsulfuron) is not permitted. Chemical wiping/painting is used for:

- Bulbiferous species such as Watsonia, Gladiolus, One-leaf Cape Tulip, Freesia, Black Flag – scattered individuals or wetland situations
- Arum Lily and Bridal Creeper in areas where Metsulfuron cannot be utilised (wetlands) although effectiveness is not certain
- Prickly Pear can be painted (or sprayed) with a ratio of 60:1 Biosafe to Grazon.
- Bulrush/typha – scattered individuals.

Chemical wiping is labour intensive and should not be utilised for dense populations or over a wide area unless other means are not available.



Technique for drilling and filling
Source: Department of Primary Industries (2018)

Chemical wiping using tongs and sponges
Source: Blue Mountains City Council (2018)

Figure 1: Diagrams of techniques for herbicide weed control

4.3 Manual weed control with chemicals

To reduce the fire fuel load or weed seed bank within the area or improve aesthetic values of a bushland manual weed control is often carried out in conjunction with chemical weed control.

4.3.1 Cut Painting

Cut painting, also known as cut stumping, involves cutting of trees to the base of the trunk followed by painting the exposed surface with a herbicide solution. Typically, a 1:1 ratio of Glyphosate and water is used for cut painting, however Grazon and Biosafe (1:60 ratio) can also be used. Use Glyphosate Biactive in wetlands and adjacent to waterways. Unlike the drill and fill or basal barking method, this procedure can involve the removal of woody weed material, thus reducing the fire fuel of areas and increasing the aesthetics and safety of the area. The herbicide solution should be applied immediately for best results. For larger trees only the outer ring needs to be painted. Cut painting can be undertaken year round. This method should be used for species which cannot resprout or 'sucker' such as most Acacia species and larger shrubs which cannot be manually pulled, like Broom and Narrowleaf Cottonbush. Cut Painting is not recommended for Prickly Pear, Sydney Golden Wattle or Brazilian Pepper.

4.3.2 Slash and Spray

Slash and spraying involves cutting down taller herbaceous or grassy weeds within an area, usually using a brushcutter or slasher, in conjunction with a herbicide spray. The herbicide spray can be undertaken prior to, or after slashing has commenced, depending on the weed targeted. Generally, spraying post-slashing uses less herbicide and targets actively growing material which allows for greater herbicide effectiveness. The slashing of weeds is useful in reducing the fire fuel load of an area, with slashed material decomposing much quicker than standing material. However, the slashing of bushland areas can lead to off target damage of native herbs and smaller shrubs, particularly if the weed level is high. This method is recommended if there are high densities of grasses in an area, such as Perennial Veldt Grass or Tambookie grass.

4.4 Biological Weed Control

Biological weed control is the release of a predator or pathogen, typically an insect or fungus, that controls the population of a weed in its natural range. Biological control can be a very powerful tool in controlling weeds; there was great success controlling Prickly Pear (*Opuntia inermis*) with Cactus Moth (*Cactoblastis cactorum*) in Queensland in the 1920's. However, the consequences of inappropriate biological control releases can be disastrous, such as the Cane Toad (*Rhinella marina*) release, and extensive testing needs to be undertaken before it is deemed safe for use. Many species classified as Weeds of National Significance (WoNS) have had testing undertaken, with a range of success rates. Many of these trials were not undertaken in Western Australia (such as Bitu Bush and Arum Lily), and the climatic condition in the southwest are not suitable for other biological control options (e.g. Prickly Pear, Hosking, 2012). Bridal Creeper (*Asparagus asparagoides*) is the only species with an approved biological control that may be effectively released into populations within the Shire. Biological control can reduce high density populations but is not successful in completely eradicating species (Yeoh *et al.*, 2012, Scott, 2012, Adair *et al.* 2012, Hosking 2012).

Bridal Creeper has two successful methods of biological control:

- the bridal creeper leafhopper (*Zygina* sp.)
- a leaf fungus known as rust (*Puccinia myrsiphylli*).

Both methods have had successful releases in the south-west, and the fungus and leaf hopper can be released together for more effective control (CSIRO, 2017). This method of control is safe and can engage the community, with schools and community groups previously involved in the breeding and release of the leaf hopper into areas, and the release of rust into new locations (CSIRO, 2017). Rust can be acquired by taking infected material from sites and transferring it to uninfected sites. Leafhopper can be spread using the same method, ensuring that the material is stored in a manner that prevents the insects escaping during transit. DBCA and Facebook groups such as Weeds of Western Australia can be contacted for up to date information on close locations of infested Bridal Creeper populations. Although this method is helpful in controlling large populations Bridal Creeper it does not eradicate the species, with herbicide control more effective in eradicating small, isolated patches.

5.0 Weed Treatment Recommendations

The following treatments are recommended for the Priority weeds outlined by the Shire, as well as the additional weeds Natural Area has recommended are added to the priority list. The most effective treatment will depend on the size of the population and the resources available to the Shire. Many of these priority weeds will require follow-up treatments and, depending on the areas of infestations, may require a staged approach. Note that all treatments were approved and recommended at the time of report, check FloraBase, HerbiGuide, or the most recent herbicide label for the most current recommended treatment methods (DBCA 2019, HerbiGuide 2019).

Common Name	Name	Type	Treatment Method	Timing
African Lovegrass	*Eragrostis curvula*	Grass	Remove small populations and isolated individuals manually **hand pulling** with trowels and shovels to help remove tiller buds. Foliar spray with 2% (2 L per 100 L water) Glyphosate. Grass selective herbicides are *not* effective. If foliar spray is not possible due to off-target damage a higher concentration of Glyphosate and water (1:2 ratio) can be painted onto the centre of the plant. Follow-up treatment will be required.	Nov-May
Arum Lily	*Zantedeschia aethiopica*	Bulbous	Targeted herbicide treatment using knapsack. If individuals are not located in/near water 2.7 g metsulfuron and 1.5 L Glyphosate per 100 L water is recommended. If located in wetlands /waterways, wipe plants with 1 L Glyphosate Biactive to 1 L water. Check the same spot the following years for new individuals, bulbs can remain dormant for up to 5 years.	Jul-Sep
Bitou Bush	*Chrysanthemoides monilifera subsp. monilifera*	Herb/ small shrub	The removal of seedlings can be undertaken manually by **hand pulling** if in isolated patches. If wider areas are infested a foliar spray of 1% (1 L per 100 L) Glyphosate with a surfactant (e.g. Pulse) after the majority of seedling emergence (DPIRD, 2018). If isolated individuals are mature **cut and paint** the plants and remove vegetative material. Follow up treatment of the areas where the species is present is recommended in the following years due to the soil seed bank.	May-June (spray). Cut paint any time

Common Name	Name	Type	Treatment Method	Timing
Black Flag	*Ferraria crispa*	Bulbous	Hand remove very small populations, use trowels and sift soil to find all corms. This should not be undertaken in areas of high conservation value as it is highly disruptive to the soil profile. Spray larger populations with 1 L Glyphosate and 1.25 g metsulfuron per 100 L water with a surfactant (e.g. Pulse). Retreatment will be required.	Aug-Sep
Blackberry	*Rubus spp.*	Woody	The removal of isolated, small seedlings may be undertaken by **hand pulling**; however, a strong taproot establishes early. If plants are not amongst native species a foliar spray of 1.3% Glyphosate (1.3 L / 100 L water) with a surfactant (e.g. Pulse), or 1.3% Glyphosate Biactive (with no surfactant) if near waterways. If plants are located amongst native species spray with 10 g metsulfuron per 100 L water with a surfactant. If located amongst native species in wetlands or near water bodies manual slashing (using a brushcutter, loppers or secateurs), followed by painting the stump with 50% Glyphosate Biactive (1 L / 1 L water) is recommended. Thickets of dead blackberry present a health and safety hazard and a fire hazard; slashing (as outlined above) is recommended post treatment, followed by **cut and painting** the stump to prevent resprouting. Resprouting is typical and retreatment may be necessary.	Dec-Feb with follow up treatment biannually

Common Name	Name	Type	Treatment Method	Timing
Bridal Creeper	*Asparagus asparagoides*	Geophyte	Semi-selective herbicide applications – spray of 1.3 g metsulfuron and a surfactant (e.g. Pulse) per 100 L water – note that this herbicide cannot be used in wetland situations or near water bodies. Check the same areas the following years as it may take multiple rounds of treatment to eradicate. If present in high density or in wetland areas, consider the release of a biological control. Hand weeding is not suitable due to the presence of many tubers per plant which easily break off when hand weeding is attempted.	Aug-Sep
Brazilian Pepper	*Schinus terebinthifolius*	Woody	The removal of saplings can be undertaken manually by **hand pulling**. For mature individuals **Drill and fill** (if trunks are >10 cm diameter) or **Basal Barking** (if trunks <10 cm diameter. The removal of dead mature trees may be required for safety, aesthetic and fire fuel load reduction purposes. Cut painting is not recommended as this species resprouts from suckers.	Any time
Buckthorn	*Rhamnus alaternus*	Woody	The removal of saplings may be undertaken manually by **hand pulling** if in isolated patches. Ensure all root material is removed or plants will resprout. If dense areas of saplings are present a foliar spray of 1.5% (1.5 L per 100 L) Glyphosate with a surfactant (e.g. Pulse) may be required. Adult trees may be removed in two ways: a) **Drill and fill** (if trunks are >10 cm diameter) or **Basal Barking** (if trunks <10 cm diameter). The removal of dead mature trees may be required for safety, aesthetic and fire fuel load reduction purposes. b) **Cut painting** the mature individuals. Cut material should be removed from site to prevent a high fire fuel load.	Any time

Common Name	Name	Type	Treatment Method	Timing
Coast Teatree	*Leptospermum laevigatum*	Woody	The removal of saplings may be undertaken manually by **hand pulling** if in isolated patches. Adult trees may be removed in two ways: a) **Drill and fill** (if trunks are >10 cm diameter) or **Basal Barking** (if trunks <10 cm diameter). The removal of dead mature trees may be required for safety, aesthetic and fire fuel load reduction purposes. b) **Cut painting** the mature individuals. Cut material should be removed from site to prevent a high fire fuel load.	
Doublegee	*Rumex hypogaeus* (*Emex australis*)	Herb/ small shrub	For smaller infestations **hand pulling** may the most effective, ensuring all material is removed from site. For larger infestation a spray of 1% Glyphosate (1 L per 100 L water) with a surfactant (e.g. Pulse) or wipe plants with 50% Glyphosate solution. Follow up treatment is essential to deplete the soil seed bank; bare areas will quickly recolonise.	Jun-Oct (hand pull) May-Aug (spray)
Fig	*Ficus carica*	Woody	The removal of saplings can be undertaken manually by **hand pulling**. There are two possible methods of treatment for mature individuals: a) **Drill and fill** (if trunks are >10 cm diameter) or **Basal Barking** (if trunks <10 cm diameter). The removal of dead mature trees may be required for safety, aesthetic and fire fuel load reduction purposes. b) **Cut painting** the mature individuals. Cut material should be removed from site to prevent a high fire fuel load.	Any time
Flaxleaf Broom	*Genista linifolia*	Woody	The removal of seedlings can be undertaken manually by **hand pulling** if in isolated patches. If wider areas are infested a foliar spray of 1% (1 L per 100 L) Glyphosate with a surfactant (e.g. Pulse) after the majority of seedling emergence is recommended. If isolated individuals are mature **cut and paint** the plants and remove vegetative material. Follow up treatment of the areas where the species was present is recommended in the following years due to the soil seed bank.	Jun-Nov (spray) Any time (cut paint)

Common Name	Name	Type	Treatment Method	Timing
Freesia	*Freesia alba x leichtlinii*	Bulbous	Very small infestation can be treated by wiping the leaves with 1 L Glyphosate to 2 L water. This method can also be utilised in wetland situations using Glyphosate Biactive. Larger infestations can be treated with 1.5 g to 5 g metsulfuron and a surfactant (e.g. Pulse) per 100 L water – the rate of application will depend on the adjacent native vegetation. Note that metsulfuron cannot be used in wetland situations or near water bodies. Larger infestations in wetlands and near water bodies can be treated with 1% Glyphosate Biactive (1 L per 100 L water) although this method is not as effective. Retreatment will be required for at least two seasons.	
Fountain Grass	*Cenchrus setaceus*	Grass	Remove small populations and isolated individuals manually **hand pulling** with trowels and shovels to help remove tiller buds. Slash and spray if larger populations are presenting a high fire fuel load. Spray with 1% Glyphosate with a surfactant (e.g. Pulse); spraying will be more effective on new growth. Follow up treatment on seedlings will be required to eradicate populations.	Jun-Aug (slash) Nov-Dec or Mar-Apr (spray)
Lantana	*Lantana camara*	Woody	The removal of seedlings can be undertaken manually by **hand pulling** if in isolated patches. If wider areas are infested a foliar spray of 1.5% (1.5 L per 100 L) Glyphosate with a surfactant (e.g. Pulse) can be utilised providing they are not amongst native species. If larger individuals are present, **cut and paint** the plants and remove vegetative material.	Mar-May (spray) Any time (cut paint)
Lavender	*Lavandula stoechas*	Herb/ small shrub	The removal of most plants may be undertaken manually by **hand pulling** if in isolated patches, ensure all root material is removed. If individuals are too large to hand pull **cut and paint** the plants and remove vegetative material. If dense areas are infested a foliar spray of 1% (1 L per 100 L) Glyphosate with a surfactant (e.g. Pulse) may be required, with slashing followed to remove the high fuel load.	Sep-Nov (spray) Any time (cut paint)

Common Name	Name	Type	Treatment Method	Timing
Madiera Vine	*Anredera cordifolia*	Vine	The removal of seedlings can be undertaken manually by **hand pulling**, although all of the tuber needs to be removed. **Cut painting** mature individuals or **drill and fill** if stem is large enough. Note that aerial tubers may be present and ground tuber will resprout and will need retreatment periodically (2-3 times per year); up to 10 years follow-up treatment may be required.	Sep-May
Narrowleaf Cottonbush	*Gomphocarpus fruticosus*	Herb/ small shrub	The removal of most individuals can be undertaken manually by **hand pulling** if in isolated patches. If wider areas are infested a foliar spray of 1.5% (1.5 L per 100 L) Glyphosate with a surfactant (e.g. Pulse) after the majority of seedlings have emerged. If isolated individuals are too large to hand pull, **cut and paint** the plants and remove vegetative material. Follow up treatment of the areas where the species is present is recommended in the following years due to the soil seed bank.	Sep-Dec
One-leaf Cape Tulip	*Moraea flaccida*	Bulbous	Spray with 1.3 g metsulfuron and a surfactant (e.g. Pulse) per 100 L water – note that this herbicide cannot be used in wetland situations or near water bodies. Control in wetlands is limited to hand weeding (ensuring bulbs are removed) or wiping leaves with Glyphosate Biactive and water (1:2 ratio). Up to 60% of corms can remain dormant each growing season, retreatment will be necessary. Fire can promote the germination of a much larger proportion of corms within the soil, ensure that infested areas which have been burnt are treated as a priority.	Jul-Aug
Paterson's Curse	*Echium plantagineum*	Herb/ small shrub	The removal of plants can be undertaken manually by **hand pulling** if they are in low density, isolated patches. Semi-selective herbicide application – spray of 0.5 g metsulfuron and a surfactant (e.g. Pulse) per 100 L water – note that this herbicide cannot be used in wetland situations or near water bodies. Non-selective herbicide applications – spray 650 mL Glyphosate per 100 L water, note that Glyphosate Biactive can be used in wetland situations or near water bodies. Check the same areas the following years as it may take multiple rounds of treatment to eradicate.	Aug-Sep

Common Name	Name	Type	Treatment Method	Timing
Perennial Veldt Grass	*Ehrharta calycina*	Grass	Remove small populations and isolated individuals manually **hand pulling;** use trowels for larger plants to minimise disturbance. For large infestations spray with 1% Quizalofop or 1.4% Fluazifop with a surfactant (e.g. Pulse) prior to plant flowering. Follow up in subsequent years.	Jun-Aug
Prickly Pear	*Opuntia sp.*	Cactus	**Hand pull** smaller individuals, ensuring *all material is removed from site* and deposited in a deep burial facility. **Drill and fill** can be used on larger individuals, with injection into the fleshy pads of some species required. Basal barking and cut painting are *not* recommended. Follow-up likely due to the persistence and likelihood of new individual from vegetative material. For more information see Managing Opuntiod Cacti in Australia (Sheehan and Potter 2017).	Any time
Tagasaste	*Chamaecytisus palmensis*	Woody	The removal of saplings can be undertaken manually by **hand pulling**. There are two possible methods of treatment for mature individuals: a) **Drill and fill** (if trunks are >10 cm diameter) or **Basal Barking** (if trunks <10 cm diameter). The removal of dead mature trees may be required for safety, aesthetic and fire fuel load reduction purposes. b) **Cut painting** the mature individuals. Cut material should be removed from site to prevent a high fire fuel load and remove seed on mature plants.	Any time
Tambookie Grass	*Hyparrhenia hirta*	Grass	Remove small populations and isolated individuals manually **hand pulling** with trowels and shovels to help remove tiller buds. Slash and spray if larger populations are present, as they represent a high fire fuel load. Spray with either 3% Glyphosate, 1% Quizalofop, or 1.4% Fluazifop with a surfactant (e.g. Pulse) when regrowth is 15 cm high. Multiple treatments will be required.	Aug-Oct (slash) Nov-Jan (spray)

Common Name	Name	Type	Treatment Method	Timing
Watsonia	*Watsonia spp.*	Bulbous	Smaller infestation can be treated by wiping the leaves with 1 L Glyphosate to 2 L water. This method can also be utilised in wetland situations using Glyphosate Biactive. Spot spray larger populations with 1 L glyphosate and 1.25 g metsulfuron per 100 L water with a surfactant (e.g. Pulse).	Sep
Weedy Wattles	*Acacia spp.*	Woody	The removal of saplings can be undertaken manually by **hand pulling**. There are two possible methods of treatment for mature individuals: a) **Drill and fill** (if trunks are >10 cm diameter) or **Basal Barking** (if trunks <10 cm diameter. The removal of dead mature trees may be required for safety, aesthetic and fire fuel load reduction purposes. b) **Cut painting** the mature individuals. Note that cutting the trunks too far from the ground can result in reshooting below the cut point (particularly in *A. longifolia*), so the drill and fill method should be utilised where possible. Cut material should be removed from site to prevent a high fire fuel load.	Any time
Wild Gladiolus	*Gladiolus caryophyllaceus* and *Gladiolus undulatus*	Bulbous	Smaller infestation can be treated by wiping the leaves with 1 L Glyphosate to 2 L water. This method can also be utilised in wetland situations using Glyphosate Biactive. Spray degraded areas with 1% Glyphosate with a surfactant (e.g. Pulse). Spot spray populations amongst natives with 1.25 g metsulfuron per 100 L water with a surfactant (e.g. Pulse). The death of mature corms promotes germinations of smaller bulbs, retreatment will be required in the following season, and likely subsequent seasons after.	Jul-Sep

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Appendix 1: Weed list

Ecological Impact	Invasiveness
U = Unknown	U = Unknown
L = Low	S = Slow
M = Medium	M = Moderate
H = High	R = Rapid

Species Name	Common Name	NatureMap	FloraBase	Mundaring	Ecological Impact	Invasiveness	Priority
Acacia baileyana	Cootamundra	X	X	X	H	M	Y
Acacia decurrens	Early Black Wattle			X	H	M	Y
Acacia iteaphylla	Flinder's Range Wattle			X	H	R	Y
Acacia longifolia	Sydney Gold Wattle			X	H	R	Y
Acacia podalyriifolia	Queensland Silver Wattle			X	H	M	Y
Acacia pycnantha	Golden Wattle	X	X	X	U	U	Y
Aira caryophyllea	Silvery Hairgrass	X			U	U	
Aira cupaniana	Silvery Hairgrass	X	X		U	U	
Aira elegantissima		X	X		U	U	
Aizoon pubescens	Coastal Galenia	X	X				
Albuca flaccida		X	X				
Allium porrum	Leek	X	X				
Allium triquetrum	Three Cornered Garlic			X	H	M	
Alstroemeria psittacina		X	X		L	S	
Amaranthus albus	Tumbleweed	X	X		L	M	
Anredera cordifolia	Madeira Vine			X	M	S	Y
Arctotheca calendula	Cape Weed		X	X	H	R	
Aristida ramosa	Purple Wiregrass	X	X		U	M	
Arundo donax	False Bamboo			X	H	S	
Asparagus asparagoides	Bridal Creeper			X	H	R	Y

Species Name	Common Name	NatureMap	FloraBase	Mundaring	Ecological Impact	Invasiveness	Priority
Asparagus officinalis	Asparagus	X	X		L	S	
Asphodelus fistulosus	Onion Weed			X	U	R	
Avellinia michelii		X	X		U	U	
Avena barbata	Bearded Oat	X	X	X	H	R	
Babiana angustifolia	Baboon Flower	X	X	X	H	R	
Baeometra uniflora		X	X		H	S	
Bambusa spp.	Bamboo			X			
Bellardia trixago	Bellardia	X	X				
Bidens pilosa	Cobbler's Pegs	X	X				
Brachypodium distachyon	False Brome	X			U	R	
Briza maxima	Blowfly Grass	X	X	X	U	R	
Briza minor	Shivery Grass	X	X	X	U	R	
Bromus hordeaceus	Soft Brome	X	X		H	R	
Campylopus introflexus		X	X				
Casuarina cunninghamiana subsp. cunninghamiana		X	X		L	S	
Cenchrus longisetus	Feathertop	X	X	X	H	R	
Cenchrus setaceus	Fountain Grass	X	X	X	H	R	Y
Cenchrus clandestinus	Kikuyu			X	H	S	
Centaurium erythraea	Common Centaury	X			U	R	
Centaurium tenuiflorum		X	X		U	R	
Centranthus macrosiphon		X	X		H	R	
Cerastium glomeratum	Mouse Ear Chickweed	X	X		L	R	
Chamaecytisus palmensis	Tagasaste	X	X	X	M	M	Y
Chamelaucium uncinatum	Geraldton Wax			X	M	S	
Chasmanthe floribunda	African Cornflag	X	X		H	M	
Chrysanthemoides monilifera subsp. monilifera	Boneseed/Bitou	X	X	X	H	R	Y

Species Name	Common Name	NatureMap	FloraBase	Mundaring	Ecological Impact	Invasiveness	Priority
Cicendia filiformis	Slender Cicendia	X	X		L	R	
Cichorium intybus	Chicory	X	X		L	S	
Conyza bonariensis	Fleabane - Flaxleaf			X	L	M	
Conyza sumatrensis	Fleabane - Tall	X	X	X	M	R	
Corrigiola litoralis	Strapwort	X	X		U	U	
Cortaderia selloana subsp. selloana	Pampas Grass	X	X	X	H	R	
Corymbia citriodora		X	X				
Cotoneaster glaucophylla	Cotoneaster			X	L	S	
Crassula alata		X	X		L	M	
Crassula natans		X	X		H	R	
Crepis foetida subsp. foetida	Stinking Hawksbeard	X	X		U	M	
Cucumis myriocarpus subsp. myriocarpus		X	X		L	M	
Cyanella hyacinthoides		X	X		H	M	
Cynodon dactylon	Couch	X	X	X	H	R	
Cynosurus echinatus	Rough Dogstail	X	X		H	U	
Cyperus congestus	Dense Flat-sedge	X	X		U	M	
Cyperus tenellus	Tiny Flatsedge	X	X		L	U	
Cyperus tenuiflorus	Scaly Sedge	X	X		U	M	
Datura ferox	Fierce Thornapple	X	X		L	S	
Dietes grandiflora		X	X				
Diplotaxis muralis	Wall Rocket	X	X		L	S	
Disa bracteata		X	X		U	R	
Dischisma capitatum	Woolly-headed Dischisma	X	X		U	R	
Dittrichia graveolens	Stinkwort	X	X	X	M	R	
Echium plantagineum	Paterson's Curse	X	X	X	H	M	Y
Ehrharta calycina	Perennial Veldt Grass			X	H	R	Y
Ehrharta longiflora	Annual Veldt Grass	X	X	X	M	R	
Eragrostis cilianensis	Stinkgrass	X	X		U	U	

Species Name	Common Name	NatureMap	FloraBase	Mundaring	Ecological Impact	Invasiveness	Priority
Eragrostis curvula	African Lovegrass	X	X	X	H	R	Y
Erodium botrys	Long Storksbill	X	X		U	M	
Erodium moschatum	Musky Crowfoot	X	X		L	S	
Euphorbia dendroides		X			L	S	
Euphorbia terracina	Geraldton Carnation Weed	X	X		H	R	
Ferraria crispa subsp. crispa	Black Flag	X	X		H	R	Y
Festuca arundinacea	Tall Fescue	X	X		U	U	
Ficus carica	Common Fig	X	X	X	H	M	Y
Freesia alba x leichtlinii		X	X	X	H	R	Y
Fumaria bastardii		X	X				
Fumaria capreolata	Whiteflower Fumitory	X	X		H	R	
Galium divaricatum		X	X		L	R	
Gastridium phleoides	Nitgrass	X	X		U	U	
Genista linifolia	Flaxleaf Broom	X	X	X	H	M	Y
Gladiolus alatus		X	X		H	U	
Gladiolus caryophyllaceus	Wild Gladiolus	X	X	X	H	R	Y
Gladiolus undulatus	Wild Gladiolus	X	X	X	H	R	Y
Gomphocarpus fruticosus	Narrowleaf Cottonbush	X	X	X	H	R	Y
Grammatotheca bergiana var. bergiana		X	X				
Heliotropium europaeum	Common Heliotrope	X	X				
Hesperantha falcata		X	X		H	R	
Hibiscus diversifolius subsp. diversifolius		X	X		U	U	
Holcus lanatus	Yorkshire Fog	X	X		H	U	
Holcus setiger	Annual Fog	X	X		H	U	
Hyparrhenia hirta	Tambookie Grass	X	X	X	H	R	Y
Hypochaeris glabra	Smooth Catsear	X	X		H	R	
Hypochaeris radicata	Flat Weed		X	X	H	R	
Ipomoea cairica	Mile-a-minute			X	H	M	

Species Name	Common Name	NatureMap	FloraBase	Mundaring	Ecological Impact	Invasiveness	Priority
Ipomoea indica	Morning Glory			X	H	M	
Ixia maculata	Yellow Ixia	X			H	R	
Juncus acutus	Sharp Rush			X	H	R	
Juncus bufonius	Toad Rush	X	X		U	R	
Juncus capitatus	Capitate Rush	X	X		U	R	
Juncus microcephalus		X	X		U	U	
Kickxia elatine subsp. crinita		X	X		L	U	
Kickxia elatine subsp. elatine		X	X		L	U	
Kickxia spuria	Roundleaf Toadflax	X	X		L	U	
Lactuca serriola forma serriola		X	X		H	R	
Lantana camara	Common Lantana			X	H	M	Y
Lathyrus tingitanus	Tangier Pea	X	X	X	M	M	
Lavandula stoechas	Lavender			X	U	M	Y
Lepidium didymum		X	X		L	U	
Leptospermum laevigatum	Coast Teatree	X	X	X	H	R	Y
Linaria maroccana		X	X				
Linum trigynum	French Flax	X	X		L	M	
Logfia gallica		X	X				
Lolium perenne	Perennial Ryegrass	X	X		H	R	
Lonicera japonica	Japanese Honeysuckle	X	X	X	M	M	
Lotus angustissimus	Narrowleaf Trefoil	X	X		H	R	
Lotus subbiflorus		X	X		H	R	
Lupinus angustifolius	Narrowleaf Lupin	X	X	X	H	M	
Lupinus cosentinii	Pearl Lupin	X	X	X	H	M	
Lysimachia arvensis	Pimpernel	X	X		U	R	
Melilotus indicus		X	X		U	R	
Misopates orontium	Lesser Snapdragon	X	X		L	R	
Momordica balsamina	Balsam Apple	X	X				

Species Name	Common Name	NatureMap	FloraBase	Mundaring	Ecological Impact	Invasiveness	Priority
Monoculus monstrosus		X	X		M	R	
Monopsis debilis var. depressa		X	X		M	R	
Moraea flaccida	One-leaf Cape Tulip			X	H	R	Y
Narcissus papyraceus		X	X		L	S	
Narcissus tazetta	Jonquil	X	X		L	S	
Narcissus tazetta subsp. italicus		X	X		L	S	
Nerium oleander	Oleander			X	L	R	
Oenothera mollissima		X	X		L	S	
Olea europaea subsp. europaea	Olive	X	X		H	R	
Opuntia spp.	Prickly Pear			X			Y
Orobanche minor	Lesser Broomrape	X	X		U	R	
Osteospermum ecklonis	African Veldt Daisy			X			
Oxalis glabra		X	X		H	S	
Oxalis incarnata		X	X		L	S	
Oxalis pes-caprae	Soursob			X	H	S	
Oxalis purpurea	Largeflower Wood Sorrel	X	X		H	S	
Pandorea pandorana	Wonga Wonga Vine			X			
Papaver somniferum	Opium Poppy	X	X				
Parentucellia latifolia	Common Bartsia	X	X		U	R	
Parkinsonia aculeata	Parkinsonia	X	X				
Paspalum dilatatum	Paspalum	X	X	X	H	M	
Paspalum urvillei	Vasey Grass	X	X		H	M	
Pavonia hastata		X	X				
Pentameris pallida		X	X		H	U	
Petrorhagia dubia		X	X		M	R	
Phyllanthus tenellus		X	X				
Piptatherum miliaceum	Rice Millet	X	X		L	U	
Plantago lanceolata	Ribwort Plantain	X	X		U	U	

Species Name	Common Name	NatureMap	FloraBase	Mundaring	Ecological Impact	Invasiveness	Priority
Podalyria sericea		X	X		U	M	
Polycarpon tetraphyllum	Fourleaf Allseed	X	X		M	R	
Polygala myrtifolia	Milkwort/Polygala			X	H	M	
Polypogon monspeliensis	Annual Beardgrass	X	X		M	R	
Protea repens		X	X				
Quercus robur		X	X				
Ranunculus muricatus	Sharp Buttercup	X	X		L	U	
Raphanus raphanistrum	Wild Radish	X	X	X	U	M	
Retama raetam		X	X		H	R	
Rhamnus alaternus	Buckthorn	X	X	X	H	R	Y
Ricinus communis	Castor Oil Bush			X	M	R	
Robinia pseudoacacia		X	X		U	S	
Romulea rosea var. australis	Guildford Grass	X	X	X	U	R	
Romulea rosea var. communis		X	X		U	R	
Rosa chinensis x moschata		X	X		L	S	
Rubus anglocandicans		X	X	X	H	M	Y
Rubus laudatus		X	X	X	H	M	Y
Rubus ulmifolius	Blackberry	X	X	X	H	M	Y
Rubus ulmifolius var. ulmifolius		X	X	X	H	M	Y
Rumex crispus	Curled Dock			X	U	R	
Rumex hypogaeus	Doublegee			X	L	R	Y
Sagina apetala	Annual Pearlwort	X	X		L	R	
Salix babylonica	Weeping Willow			X	M	S	
Salvia verbenaca	Wild Sage	X	X		U	R	
Scabiosa atropurpurea	Purple Pincushion	X	X		U	R	
Schinus terebinthifolius	Brazilian Pepper			X	H	M	Y
Senecio vulgaris	Common Groundsel	X	X		L	U	
Setaria parviflora		X	X		L	U	

Species Name	Common Name	NatureMap	FloraBase	Mundaring	Ecological Impact	Invasiveness	Priority
Silene vulgaris	Bladder Campion	X	X				
Solanum nigrum	Blackberry Nightshade			X	M	R	
Solidago chilensis		X	X		L	S	
Sonchus oleraceus	Common Sowthistle	X	X		U	R	
Sorghum x drummondii	Sudan Grass	X	X				
Sparaxis bulbifera		X	X		H	R	
Spergula arvensis	Corn Spurry	X	X		L	R	
Sporobolus africanus	Parramatta Grass	X	X		L	U	
Stachys arvensis	Staggerweed	X	X		U	R	
Stenotaphrum secundatum	Buffalo Grass	X	X		H	S	
Syringa vulgaris		X	X		L	S	
Tecoma capensis	Cape Honeysuckle			X	U	U	
Thunbergia alata		X	X				
Tribolium uniolae	Haas Grass	X	X	X	H	R	
Trifolium angustifolium var. angustifolium		X	X		U	U	
Trifolium campestre var. campestre	Hop Clover	X	X		U	U	
Trifolium dubium	Suckling Clover	X	X		U	U	
Trifolium incarnatum	Crimson Clover	X	X		L	U	
Trifolium ligusticum	Ligurian Clover	X			L	U	
Trifolium subterraneum	Subterranean Clover	X	X		U	U	
Tritonia gladiolaris	Lined Tritonia	X	X		U	U	
Tropaeolum majus	Nasturtium			X	L	M	
Typha orientalis	Typha/Bulrush			X	H	R	
Ursinia anthemoides	Ursinia	X	X		U	R	
Vellereophyton dealbatum	White Cudweed	X	X		U	R	
Verbascum virgatum	Twiggy Mullein	X	X		L	R	
Veronica persica	Creeping Speedwell	X	X		L	R	
Vinca major	Blue Periwinkle			X	H	S	

Species Name	Common Name	NatureMap	FloraBase	Mundaring	Ecological Impact	Invasiveness	Priority
Vitis vinifera		X	X		U	U	
Vulpia bromoides	Squirrel Tail Fescue	X	X		H	R	
Vulpia myuros	Rat's Tail Fescue	X	X		H	R	
Watsonia borbonica		X	X	X	H	R	Y
Watsonia knysnana		X	X	X	L	S	Y
Watsonia marginata		X	X	X	H	R	Y
Watsonia meriana var. bulbillifera		X	X	X	H	R	Y
Watsonia meriana var. meriana		X	X	X	H	R	Y
Xanthium spinosum	Bathurst Burr		X				
Zantedeschia aethiopica	Arum Lily	X	X	X	H	R	Y

Source: DBCA 2019a, DBCA2019b, DBCA 2016

Appendix 2: Relevant Off-use Permits

Directions for Use:

Situation	Purpose	Rate
Crop and non-crop areas as specified for WA on the approved label.	Control of declared plants as specified under the *Biosecurity and Agriculture Management Act 2007* and the *Biosecurity and Agriculture Management Regulations 2013*.	Apply up to maximum registered label rates and in accordance with Department of Agriculture and Food WA advice for control of Declared Plants.

Critical Use Comments:

- Apply as per the registered labels and in accordance with Department of Agriculture and Food WA advice for control of Declared Plants only.
- Information on the declared plants and actual use patterns can be obtained via the following links on the Department of Agriculture and Food WA website;

Declared Plants Database
https://www.agric.wa.gov.au/bam/western-australian-organism-list-waol
Download the declared plants list
(http://www.agric.wa.gov.au/objtwr/imported_assets/content/pw/weed/decp/dec_plants_list.pdf)

Withholding Period:
Refer to individual product labels.

Jurisdiction:
WA only.

Additional Conditions:

This PERMIT provides for weeds other than specified on the approved label of the product. Unless otherwise stated in this permit, the use of the product must be in accordance with instructions on its label.

PERSONS who wish to prepare for use and/or use the products for the purposes specified in this permit must read, or have read to them, the DETAILS and CONDITIONS of the permit.

Issued by the Australian Pesticides and Veterinary Medicines Authority

Notes:
08/02/2012. Amended to cover existing registered products and their variants (Active Constituent concentration, g/kg or g/L). Issued as version 2.
13/10/2015. Expiry date extended to 31/03/2022. Issued as version 3.
02/09/2016. Amendment to reference *Biosecurity and Agriculture Management Act* 2007. All registered products containing 800 g/L daconate added under Products to be used. Issued as version 4.
15/12/2016. Amendment to reference *Biosecurity and Agriculture Management Act 2007* and the *Biosecurity and Agriculture Management Regulations 2013*. Issued as version 5.

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CONDITIONS OF USE

Product to be used:

□ ALL REGISTERED PRODUCTS
Containing: 100 g/L, 360 g/L, 450 g/L, 470 g/L, 490 g/L 500 g/L, 510 g/L, 540 g/L, 600 g/kg, 680 g/kg, 690 g/kg, 700 g/kg 840 g/kg OR 875 g/kg **GYPHOSATE** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 225 g/L, 300 g/L, 400 g/L, 450 g/L, 475 g/L, 500 g/L, 625 g/L, 720 g/L OR 800 g/kg **2,4-D AMINE** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 600 g/L, 680 g/L OR 800 g/L **2,4-D ESTER** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 250 g/L **BROMOXYNIL** plus 25 g/L **DIFLUFENICAN** OR 230 g/L **BROMOXYNIL** plus 21 g/L **DIFLUFENICAN** as their only active constituents

□ ALL REGISTERED PRODUCTS
Containing: 250 g/L **MCPA** plus 25 g/L **DIFLUFENICAN** OR 230 g/L **MCPA** plus 21 g/L **DIFLUFENICAN** as their only active constituents

□ ALL REGISTERED PRODUCTS
Containing: 500 g/L **TERBUTRYN** as their only active constituent

□ ALL REGISTERED PRODUCTS
Containing: 200 g/L **BROMOXYNIL** plus 200 g/L **MCPA** as their only active constituents.

□ ALL REGISTERED PRODUCTS
Containing: 240 g/L OR 700 g/kg **IMAZETHAPYR** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 500 g/L OR 900 g/kg **CYANAZINE** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 740 g/kg **2,2-DPA** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 150 g/L, 200 g/kg, 250 g/L OR 750 g/kg **HEXAZINONE** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 67.5 g/kg **DICHLOBENIL** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 600 g/kg **METSULFURON METHYL** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 835 g/kg **GLYPHOSATE** plus 10 g/kg **METSULFURON METHYL** as their only active constituents

□ ALL REGISTERED PRODUCTS
Containing: 300 g/L **2,4-D** plus 75 g/L **PICLORAM** as their only active constituents.

□ ALL REGISTERED PRODUCTS
Containing: 750 g/kg **CHLORSULFURON** as their only active constituent.

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Product to be used (cont.):

□ ALL REGISTERED PRODUCTS
Containing: 300 g/L **CLOPYRALID** as the TRIISOPROPANOLAMINE SALT OR 750 g/kg **CLOPYRALID** as the POTASSIUM SALT as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 500 g/L OR 700 g/kg **DICAMBA** as the DIMETHYLAMINE SALT as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 375 g/L OR 500 g/L **DICLOFOP-METHYL** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 500 g/L **DIFLUFENICAN** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 200 g/L **DIQUAT** as DIQUAT DIBROMIDE MONOHYDRATE as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 128 g/L OR 212 g/L **FLUAZIFOP-P** as the BUTYL ESTER as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 800 g/kg **FLUMETSULAM** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 200 g/L, 333 g/L OR 400 g/L **FLUROXYPYR** as the METHYL HEPTYL ESTER as their only active constituent.

□ ALL REGISTERED PRODUCTS CONTAINING
Containing: 130 g/L OR 520 g/L **HALOXYFOP-R** as HALOXYFOP-R METHYL ESTER as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 250 g/L OR 750 g/kg **IMAZAPYR** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 500 g/L OR 750 g/L **MCPA** as the DIMETHYLAMINE SALT as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 100 g/L **METOSULAM** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 135 g/L **PARAQUAT** plus 115 g/L **DIQUAT** as their only active constituents.

□ ALL REGISTERED PRODUCTS
Containing: 250 g/L OR 334 g/L **PARAQUAT** as PARAQUAT DICHLORIDE as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 20 g/kg **PICLORAM** as the TRIETHANOLAMINE SALT as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 100 g/L OR 200 g/L **QUIZALOFOP-P-ETHYL** as their only active constituent.

Product to be used (cont.):

□ ALL REGISTERED PRODUCTS
Containing: 500 g/L 600 g/L OR 900 g/kg **SIMAZINE** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 750 g/kg **TRIASULFURON** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 600 g/L OR 755 g/L **TRICLOPYR** as the BUTOXYETHYL ESTER as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 300 g/L **TRICLOPYR** plus 100 g/L **PICLORAM** as their only active constituents.

□ ALL REGISTERED PRODUCTS
Containing: 120 g/L PICLORAM plus 240 g/L **TRICLOPYR** as their only active constituents.

□ ALL REGISTERED PRODUCTS
Containing: 250 g/L **AMITROLE** plus 220 g/L **AMMONIUM THIOCYANATE** as their only active constituents.

□ ALL REGISTERED PRODUCTS
Containing: 200 g/L **GLUFOSINATE-AMMONIUM** as their only active constituent.

□ ALL REGISTERED PRODUCTS
Containing: 26 g/L **PICLORAM** as the POTASSIUM SALT plus 420 g/L **MCPA** as the POTASSIUM SALT as their only active constituents.

□ ALL REGISTERED PRODUCTS
Containing: 800 g/L **DACONATE** as their only active constituents.

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Directions for Use:

Situation	Purpose	Rate
Crop and non-crop areas as specified for WA on the approved label.	Control of declared plants as specified under the *Biosecurity and Agriculture Management Act 2007* and the *Biosecurity and Agriculture Management Regulations 2013*.	Apply up to maximum registered label rates and in accordance with Department of Agriculture and Food WA advice for control of Declared Plants.

Critical Use Comments:

- Apply as per the registered labels and in accordance with Department of Agriculture and Food WA advice for control of Declared Plants only.
- Information on the declared plants and actual use patterns can be obtained via the following links on the Department of Agriculture and Food WA website;

Declared Plants Database
https://www.agric.wa.gov.au/bam/western-australian-organism-list-waol
Download the declared plants list
(http://www.agric.wa.gov.au/objtwr/imported_assets/content/pw/weed/decp/dec_plants_list.pdf)

Withholding Period:
Refer to individual product labels.

Jurisdiction:
WA only.

Additional Conditions:

This PERMIT provides for weeds other than specified on the approved label of the product. Unless otherwise stated in this permit, the use of the product must be in accordance with instructions on its label.

PERSONS who wish to prepare for use and/or use the products for the purposes specified in this permit must read, or have read to them, the DETAILS and CONDITIONS of the permit.

Issued by the Australian Pesticides and Veterinary Medicines Authority

Notes:
08/02/2012. Amended to cover existing registered products and their variants (Active Constituent concentration, g/kg or g/L). Issued as version 2.
13/10/2015. Expiry date extended to 31/03/2022. Issued as version 3.
02/09/2016. Amendment to reference *Biosecurity and Agriculture Management Act* 2007. All registered products containing 800 g/L daconate added under Products to be used. Issued as version 4.
15/12/2016. Amendment to reference *Biosecurity and Agriculture Management Act 2007* and the *Biosecurity and Agriculture Management Regulations 2013*. Issued as version 5.

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Australian Government
Australian Pesticides and Veterinary Medicines Authority

PERMIT TO ALLOW MINOR USE OF AN AGVET CHEMICAL PRODUCT

FOR CONTROL OF ENVIRONMENTAL WEEDS IN VARIOUS SITUATIONS

PERMIT NUMBER – PER13333

This permit is issued to the Permit Holder in response to an application granted by the APVMA under section 112 of the Agvet Codes of the jurisdictions set out below. This permit allows a person, as stipulated below, to use the product in the manner specified in this permit in the designated jurisdictions. This permit also allows any person to claim that the product can be used in the manner specified in this permit.

THIS PERMIT IS IN FORCE FROM 2 MARCH 2012 TO 31 MARCH 2022

Permit Holder:
DEPARTMENT OF AGRICULTURE AND FOOD WESTERN AUSTRALIA
3 Baron-Hay Court
SOUTH PERTH WA 6151

Persons who can use the product under this permit:
Persons generally

CONDITIONS OF USE

Products to be used:

ROUNDUP HERBICIDE
Plus other REGISTERED PRODUCTS Containing: 360 g/L GLYPHOSATE present as the ISOPROPYLAMINE SALT as their only active constituent

ROUNDUP CT BROADACRE HERBICIDE
Plus other REGISTERED PRODUCTS Containing: 450 g/L GLYPHOSATE present as the ISOPROPYLAMINE SALT as their only active constituent

METSURAM 600 WG HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 600 g/kg METSULFURON-METHYL as their only active constituent

TROUNCE BRUSH-PACK HERBICIDE BY MONSANTO
Plus other REGISTERED PRODUCTS
Containing: 835 g/kg GLYPHOSATE present as the MONO-AMMONIUM SALT and 10 g/kg METSULFURON METHYL as their only active constituents

TORDON 75-D HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 300 g/L 2, 4-D as the TRIISOPROPANOLAMINE SALT and 75 g/L PICLORAM as the TRIISOPROPANOLAMINE SALT as their only active constituents.

SINON ANGLE 750 WG HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 750 g/kg CHLORSULFURON as their only active constituents.

LONTREL HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 300 g/L CLOPYRALID present as the TRIISOPROPANOLAMINE SALT as their only active constituent.

NUFARM KAMBA DRY SELECTIVE HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 700 g/kg DICAMBA as the SODIUM SALT as their only active constituent.

NUFARM NUGRASS SELECTIVE HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 375 g/L DICLOFOP-METHYL as their only active constituent

BRODAL OPTIONS SELECTIVE HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 500 g/L DIFLUFENICAN as their only active constituent.

REGLONE NON-RESIDUAL HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 200 g/L DIQUAT as DIQUAT DIBROMIDE MONOHYDRATE as their only active constituent.

FUSILADE POST-EMERGENCE SELECTIVE HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 212 g/L FLUAZIFOP-P present as the BUTYL ESTER as their only active constituent.

BROADSTRIKE HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 800 g/kg FLUMETSULAM as their only active constituent

STARANE 200 HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 200 g/L FLUROXYPYR as the METHYL HEPTYL ESTER as their only active constituent.

VERDICT 520 HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 520 g/L HALOXYFOP-R as the HALOXYFOP-R METHYL ESTER as their only active constituent.

APPARENT POACHER 750 HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 750 g/kg IMAZAPYR as their only active constituent.

NUFARM MCPA 500 SELECTIVE HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 500 g/L MCPA present as the DIMETHYLAMINE SALT as their only active constituent.

ECLIPSE HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 714 g/kg METOSULAM as their only active constituent

ECLIPSE 100SC HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 100 g/L METOSULAM as their only active constituent

SPRAY.SEED 250 HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 135 g/L PARAQUAT present as PARAQUAT DICHLORIDE and 115 g/L DIQUAT as DIQUAT DIBROMIDE MONOHYDRATE as their only active constituents

GRAMOXONE 250 HERBICIDE
NUFARM NUQUAT 250 NON-RESIDUAL KNOCKDOWN HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 250 g/L PARAQUAT as PARAQUAT DICHLORIDE as their only active constituent.

TORDON GRANULES-WEED & BRUSH HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 20 g/kg PICLORAM as the TRIETHANOLAMINE SALT as their only active constituent.

LEOPARD 200 EC HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 100, 200 and 250 g/L QUIZALOFOP-P-ETHYL as their only active constituent.

PANTERA SELECTIVE HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 120 g/L QUIZALOFOP-P-TEFURYL as their only active constituent.

SIMPLEX 500 SC HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 500 g/L and 900 g/kg SIMAZINE as their only active constituents.

LOGRAN 750 WG SELECTIVE HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 750 g/kg TRIASULFURON as their only active constituents.

GARLON 600 HERBICIDE
NUFARM INVADER 600 HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 600 g/L TRICLOPYR as the BUTOXYETHYL ESTER as their only active constituent

GRAZON DS HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 300 g/L TRICLOPYR present as the BUTOXYETHYL ESTER,
100 g/L PICLORAM present as the HEXYLOXYPROPYLAMINE SALT as their only active constituents.

GRAZON EXTRA HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 300 g/L TRICLOPYR present as the BUTOXYETHYL ESTER,
100 g/L PICLORAM present as the HEXYLOXYPROPYLAMINE SALT and
8 g/L AMINOPYRALID present as HEXYLOXYPROPYLAMINE SALT as their only active constituents.

ACCESS HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 240 g/L TRICLOPYR present as the BUTOXYETHYL ESTER and 120g/L PICLORAM present as ISOCTYL ESTER as their only active constituents.

AC AMON HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 250 g/L AMITROLE and 220 g/L AMMONIUM THIOCYANATE 55% as their only active constituents.

BASTA NON-SELECTIVE HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 200 g/L GLUFOSINATE-AMMONIUM as their only active constituent.

DACONATE 720 HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 720 g/L MSMA as their only active constituent.

IMTRADE MSMA POST EMERGENCE HERBICIDE
Plus other REGISTERED PRODUCTS
Containing: 800 g/L MSMA as their only active constituent.

Directions for Use:

Crop	Pest	Rate
Agricultural non-crop areas Land associated with farmland, but not used for cultivation and/or regular grazing. **Non-crop areas** These areas include industrial sites, timber yards, areas around farm buildings, along fences and roadsides, rights-of-way, storage areas, wastelands, vacant lots, cemeteries etc. **Commercial and industrial areas** Factories, factory land, industrial sites, parking lots, fuel tank farms, outside chemical storage areas. **Wetlands, Bushlands and Forests**	Environmental weeds	Apply in accordance with those instructions as contained in **Attachment 1**.

Critical Use Comments:
Apply strictly in accordance with the application methods listed in **Attachment 1**.
This permit does not include use in residential areas.

Critical Use Comments:
Apply strictly in accordance with the application methods listed in **Attachment 1**.

Jurisdiction:
WA only.

Additional Conditions:
Use of Glyphosate formulations in aquatic situations; only those specific glyphosate products that have label approvals currently in place for aquatic use may be used in or near aquatic areas.

CONDITIONS OF PERMIT

This PERMIT provides for the use of a product in a manner other than specified on the approved label of the product. Unless otherwise stated in this permit, the use of the product must be in accordance with instructions on its label.

PERSONS who wish to prepare for use and/or use the products for the purposes specified in this permit must read, or have read to them, the DETAILS and CONDITIONS of the permit.

Issued by the Australian Pesticides and Veterinary Medicines Authority.

Notes
25/07/2014. Permit amended to include 200 and 250 g/L Quizalofop-P-Ethyl products, to exclude use in residential areas, and to change DFU Table to align definitions with the Ag Labelling Code. Issued as Version 2.
13/10/2016. Expiry date extended until 31/03/2022. Permit Holder address updated. Unregistered 200 g/L DICAMBA products removed. Issued as Version 3.
10/08/2017. MSMA based herbicide products added for cactus control. Issued as Version 4.

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HERBICIDES FOR THE CONTROL OF ENVIRONMENTAL WEEDS IN AGRICULTURAL NON-CROP AREAS, NON-CROP AREAS, COMMERCIAL AND INDUSTRIAL AREAS, WETLANDS, BUSHLANDS AND FORESTS (WA)

Crop/animal/situation			
Non-crop areas			
Active ingredient	**Weed**	**Rate**	**Application method and comments**
Glyphosate 360 g/L Products registered for use in aquatic situations	Annual and perennial grass and broadleaf weeds	1 L/100 L water. Or 10 L/ha. Or label rate for specific weed.	Spot spraying in aquatic and wetland areas.
Glyphosate 360 g/L	Annual and perennial grass and broadleaf weeds	1 L/100 L water. Or 10 L/ha. Or label rate for specific weed.	Spot spraying in dry land areas.
Glyphosate (other formulations)	Annual and perennial grass and broadleaf weeds	360 g ai/100 L water. Or 360 g ai/ha. Or label rate for specific weed.	Spot spraying in dry land areas.
Glyphosate	Woody weeds	2 mL/drilled hole or cut	Drill, frill, axe or injection.
Glyphosate	Woody weeds and trees	Undiluted to 1 L/5 L water.	Paint stump immediately after cutting or paint basal bark.
Glyphosate	Annual and perennial grass and broadleaf weeds	Undiluted to 1 L/5 L water.	Wipe onto leaves.
Glufosinate 200 g/L e.g. Basta	Annual grasses and broadleaf weeds.	1 L/100 L water plus wetting agent. Or 10 L/ha. Or label rate for specific weed.	Spot spray.
Metsulfuron-methyl 600 g/kg e.g. Metsuram	Annual and perennial broadleaf weeds and bulbs.	10 g/100 L plus wetting agent or spray oil. Or 100 g/ha plus wetting agent or spray oil. Or label rate for specific weed.	Spot spraying.
		10 g per 1 L plus wetting agent or spray oil. Or 100 g/ha plus wetting agent or spray oil.	Blanket wiper, wick applicator or hand painting.
Glyphosate 835 g/kg Plus **Metsulfuron-methyl** 10 g/kg e.g. Trounce	Annual and perennial grass and broadleaf weeds	173 g pack/100 L water plus wetting agent.	Spot spraying.

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Crop/animal/situation			
Non-crop areas			
Active ingredient	**Weed**	**Rate**	**Application method and comments**
2,4-D 300 g/L Plus **Picloram** 75 g/L e.g. Tordon 75-D	Annual broadleaf weeds.	1 L/100 L water plus wetting agent. Or 10 L/ha. Or label rate for specific weed.	Spot spray.
Amitrole 250 g/L	Annual grasses and broad leaf weeds.	1 L/100 L water plus wetting agent. Or 10 L/ha Or label rate for specific weed.	Spot spray.
Chlorsulfuron 750 g/kg e.g. Sinon	Annual grasses and broad leaf weeds and some monocots such as Onion Weed, Onion Grass and Arum Lily	10 g/100 L plus wetting agent or spray oil. Or 100 g/ha. Or label rate for specific weed.	Spot spray.
	Annual grasses and broad leaf weeds and some monocots	10 g/1 L plus wetting agent or spray oil.	Blanket wiper or wick applicator or hand painting.
Clopyralid 300 g/L e.g. Lontrel	Asteraceae and Fabaceae weeds.	500 mL/100 L water plus wetting agent. Or 5 L/ha. Or label rate for specific weed.	Spot spray.
Dicamba 700 g/kg e.g. Nufarm Kamba	Polygonaceae and Fabaceae weeds	200g/100 L water plus wetting agent. Or 2 Kg/ha. Or label rate for specific weed.	Spot spray.
Diclofop methyl 375 g/L e.g. Nufarm Nugrass	Annual Ryegrass, Wild Oats and Phalaris	500 mL/100 L water plus wetting agent or spray oil. Or 5 L/ha. Or label rate for specific weed.	Spot spray.
Diflufenican 500 g/L e.g. Brodal	Brassicaceae weeds	100 mL/100 L water plus spray oil. Or 1 L/ha. Or label rate for specific weed.	Spot spray with residual weed control.
Diquat **200 g/L** **e.g. Reglone**	Annual grasses and broadleaf weeds.	1 L/100 L water plus wetting agent. Or 10 L/ha. Or label rate for specific weed.	Spot spray.
Fluazifop 212 g/L e.g. Fusilade	Annual and perennial grasses	400 mL/100 L water plus wetting agent or spray oil. Or 4 L/ha. Or label rate for specific weed.	Spot spray. Or overall spray in broad leaf host situations.

Crop/animal/situation			
Non-crop areas			
Active ingredient	**Weed**	**Rate**	**Application method and comments**
Flumetsulam 800 g/kg e.g. Broadstrike	Brassicaceae and some Asteraceae weeds	10 g/100 L water plus spray oil. Or 100 g/ha. Or label rate for specific weed.	Spot spray.
Fluroxypyr 200 g/L	Asteraceae, Euphorbiaceae and Solonaceae weeds	1 L/100 L water plus wetting agent. Or 10 L/ha. Or label rate for specific weed.	Spot spray.
Haloxyfop 520 g/L e.g. Verdict	Annual and perennial grasses	100 mL/100 L water plus wetting agent or spray oil. Or 1 L/ha. Or label rate for specific weed.	Spot spray. Or overall spray in broad leaf host situations.
Imazapyr 750 g/kg	Chincherinchee (*Ornithogalum* spp.), annual grass and broadleaf weeds.	200 mL/100 L water plus wetting agent. Or 2 L/ha. Or label rate for specific weed.	Spot spray.
MCPA 500 g/L	Asteraceae and Geraniaceae weeds.	1 L/100 L water plus wetting agent. Or 10 L/ha. Or label rate for specific weed.	Spot spray
Metosulam 714 g/kg e.g. Eclipse	Brassicaceae weeds	5 g/100 L water plus spray oil. Or 50 g/ha. Or label rate for specific weed.	Spot spray.
Metosulam 100 g/L e.g. Eclipse 100SC	Brassicaceae weeds	35mL/ha Or label rate for specific weed.	Spot spray.
MSMA 720 g/L e.g. Daconate 720	Opuntioid Cactus (Declared pest cacti)	1.1 L/40 L water	Spot spray. Thoroughly cover all pad surfaces.
MSMA 800 g/L e.g. Imtrade MSMA	Opuntioid Cactus (Declared pest cacti)	1 L/40 L water	Spot spray. Thoroughly cover all pad surfaces.

Crop/animal/situation			
Non-crop areas			
Active ingredient	**Weed**	**Rate**	**Application method and comments**
Paraquat 135 g/L Plus **Diquat** 115 g/L e.g. Spray.Seed	Annual grasses, broad leaf weeds and some bulbs such as Arum Lily	1 L/100 L water plus wetting agent. Or 10 L/ha Or label rate for specific weed.	Spot spray.
Paraquat 250 g/L e.g. Gramoxone	Annual grasses and broadleaf weeds.	1 L/100 L water plus wetting agent. Or 10 L/ha. Or label rate for specific weed.	Spot spray.
Picloram 20 g/kg	Boxthorn	50 g/m^2	Sprinkle granules around base and out to the drip line.
Quizalofop 100 g/L e.g. Targa, Leopard and Pantera	Annual and perennial grasses	300 mL/100 L water plus wetting agent or spray oil. Or 3 L/ha. Or label rate for specific weed.	Spot spray. Or overall spray in broad leaf host situations.
Quizalofop 200 g/L e.g. Titan	Annual and perennial grasses	150 mL/100 L water plus wetting agent or spray oil. Or 1.5 L/ha. Or label rate for specific weed.	Spot spray. Or overall spray in broad leaf host situations.
Quizalofop 250 g/L e.g. Imtrade Tiger	Annual and perennial grasses	120 mL/100 L water plus wetting agent or spray oil. Or 1.2 L/ha. Or label rate for specific weed.	Spot spray. Or overall spray in broad leaf host situations.
Simazine 500 g/L	Annual grasses and broadleaf weeds	1 L /100 L water. Or 10 L/ha Or label rate for specific weed.	Spot spray before weeds emerge.
Simazine 900 g/kg	Annual grasses and broadleaf weeds	500 g/100 L water. Or 5 Kg/ha Or label rate for specific weed.	Spot spray before weeds emerge.
Triasulfuron 750 g/kg e.g. Logran	Brassicaceae weeds post emergence and other annual broad leaf and grass weeds pre emergence.	10 g/100 L water plus spray oil. Or 100 g/ha. Or label rate for specific weed.	Spot spray.

Crop/animal/situation			
Non-crop areas			
Active ingredient	**Weed**	**Rate**	**Application method and comments**
Triclopyr 240 g/L Plus **Picloram** 120 g/L e.g. Access	Woody weeds and trees	1 L/60 L diesel.	Paint stump immediately after cutting. Or paint or spray basal bark.
Triclopyr 300 g/L Plus **Picloram** 100 g/L e.g. Grazon DS **Triclopyr** 300 g/L Plus **Picloram** 100 g/L Plus **Aminopyralid** 8g/L e.g. Grazon Extra	Annual and perennial broadleaf weeds.	1 L/100 L water plus wetting agent or spray oil. Or label rate for specific weed.	Spot spraying where residual weed control is required.
Triclopyr 600 g/L e.g. Garlon	Annual and perennial broadleaf weeds.	1 L/100 L water plus wetting agent or spray oil. Or label rate for specific weed.	Spot spraying.