6 Weed control approaches

6.1 Priorities

Much less effort is required to eradicate a weed when it is just starting to invade than later when it has become common. One of the most frequent mistakes is to ignore new weeds until they have reached large numbers.

Work from the least weedy places in to the most weedy

When a weed is already common it is tempting to try to tackle the worst places first and to try to get the whole job done in one go. This is a mistake. Large weeds are harder to dig out or kill, it creates a large area

of disturbance and there will be many weed seeds or fragments left. Heavily infested areas usually quickly revert to being weedy if follow-up is postponed, undoing all the original work. Highest priority should go to maintaining places that are in best condition. Remove outlying weeds before they can reproduce and then work on the large clumps. This way the natural regeneration or replanting of native species[17] can keep up with the clearing.

Choose a method to keep disturbance to a minimum

Other reasons for not attempting complete removal of large weed infestations in one go are the effects on bank stability and on habitat for native wildlife. Weeds may be stabilising banks, providing shade to the creek, or providing cover for birds and other animals. Sudden removal of weeds on a large scale may cause considerable harm, although the replacement native vegetation will be better in the end. A gradual process is often preferable. Where weeds are growing in a slow-flowing creek, killing large amounts at once may make the water deoxygenated and foul as the dead weeds rot away.

Ensure that natural regeneration or replanting keeps pace with weed removal

If weed problems are very large or difficult to control it may be best to simply contain them so they don't spread any further. This can consist of a low level of effort to remove new plants outside the infested area and, for some species, slashing to prevent seed production. When weeds already dominate the whole riparian zone and resources are limited, another option may be to create just small weed free patches. These patches can be a starting point for replanting or natural regeneration of native species. Information on revegetation of riparian zones is available from several sources[1, 17] .

To help in planning weed control Table 6 contains information on characteristics of selected riparian weeds and recommended techniques. The information is simplified and the following should be remembered when reading it. Effects on stock are difficult to summarise. Even desirable pasture species can cause problems if suddenly fed in large amounts. Many weeds sometimes cause illness in stock but usually don't, either because the stock avoid eating them or because the amount available is too small[18]. If lack of alternative food and/or a sudden increase in availability occurs, these weeds may become harmful.

The column on dispersal and seed persistence is based on best available knowledge and indicates the most common situation. Downstream dispersal of seeds or plant parts is an issue with all riparian weeds and is one reason why a coordinated approach with neighbours is important. There is often a lack of information on how long seeds remain viable, which is why no time is shown for some species.

Table 6. Effects of selected riparian weeds and how to control them

Weed	Effect on stock	Other impacts and properties	Dispersal & persistence	Recommended control techniques R=registered herbicide treatment OL=off-label herbicide treatment
Arum lily, calla lily *Zantedeschia aethiopica* Large perennial. Distinctive white flowers.	Cattle deaths reported. May displace pasture species in moist areas.	Displaces ground layer plants, probably inhibits regeneration of canopy species. Fruit is poisonous to humans. May block small channels. Shade tolerant.	Seeds spread by birds and in water. Short seed life. Dense mass of tubers.	Small-scale: dig out, including tubers. Large scale: herbicide spray (**OL**); slash to suppress seed production.
Blackberry *Rubus* fruticosus agg. Shrub with long prickly stems that root at the tip.	Avoided by sheep and cattle once established and therefore reduces productivity.	Out-competes native shrubs and reduces tree regeneration. Can channel stock into narrow tracks that become eroded. Provides cover for foxes and rabbits. Suppressed by heavy shade.	Seed spread by birds. Short seed life. Crowns and roots hard to kill completely.	Small-scale: dig out or slash several times per year. Large-scale: herbicide spray (**R**). Goats are effective if native shrubs and grasses are not present and if erosion is not likely.
Blue periwinkle *Vinca major* Low creeping perennial with tough wiry stems and distinctive blue flowers.	Not a problem with regular sheep or cattle grazing but common in horse paddocks. Leaves contain a toxin but not a frequent cause of poisoning.	Forms a dense low mat that excludes most other plants.	Mostly spread by movement of stem fragments in floods or when soil is disturbed. Occasionally spread by seed in water or when soil is moved.	Only very small infestations can be removed by hand. Alternatively slash then cover with black plastic sheet for the summer. For medium or large areas: herbicides by foliar spray (**OL**) over 2-4 years.
Bridal creeper, smilax. *Asparagus asparagoides.* Perennial climber dies back in summer.	Readily eaten by stock and not a pasture problem.	Covers other plants preventing their growth. Dense mat of tubers formed. Fences may be covered too.	Seeds spread by birds and have short life in soil.	Very small-scale: dig out whole plant. Larger-scale: repeated treatments with herbicide spray (**OL**).
Crack willow *Salix fragilis* Low, branching deciduous tree.	Grazing reduces establishment of new trees in areas accessible to stock.	Excludes native plants. Roots trap sediment and cause waterways to silt up.	Some willows set seeds but mostly spread when twigs or branches fall off and establish new trees.	Small plants (up to 2 m) may be sprayed (**R**) or simply pulled out if not firmly rooted. Medium-sized trees may be treated by cut-stump (**R**) but fragments must be removed to prevent spread. For larger trees stem injection (**R**) is better.
English ivy, *Hedera helix.* Woody evergreen climber or creeper.	Unlikely to spread into pasture unless grazing is very light.	Grows over shrubs/small trees and may cause them to collapse. As a ground cover, it suppresses native species. Grows in full sun to deep shade.	Seeds spread by birds. Stem fragments will take root.	Small-scale: remove by hand. Larger-scale: if growing up trees cut off and treat stumps with herbicide (**OL**). When growing on the ground herbicide spray (**R**).

Weed	Effect on stock	Other impacts and properties	Dispersal & persistence	Recommended control techniques R=registered herbicide treatment OL=off-label herbicide treatment
Gorse, furze *Ulex europaeus* Medium to tall spiny shrub.	Young seedlings grazed, larger plants avoided, reducing pasture productivity. Dense growth limits stock movement.	Displaces native plants but may provide cover for native fauna. Harbours rabbits and foxes. Dense patches are a severe fire hazard. Suppressed by heavy shade	Seeds spread by explosive pods, also by birds and on animal hooves. Seeds last more than 25 years. Seed bank can be extremely large.	Small-scale: dig out plants or slash frequently to weaken them. Larger-scale: ideally, slash or burn then use grazing or herbicide spray (**R**) as a follow-up. Cut-stump herbicide treatment (**R**) is an alternative for larger plants.
Hawthorn *Crataegus monogyna* Deciduous tall shrub to small tree.	Young seedlings grazed by sheep, larger plants avoided. Dense growth limits stock movement.	Impedes access when dense. Competes with native shrubs and shades out ground plants. Harbours rabbits and foxes. May be a food source for native birds.	Seeds spread by birds.	Small seedlings: pull up, including the root. Larger seedlings and small bushes: herbicide spray to leaves or basal bark (**R**). Large bushes/trees cut-stump herbicide (**R**).
Ragwort *Senecio jacobaea* (State Priority Weed) Biennial or perennial broad-leaved herb.	Poisonous to sheep and cattle. Cattle generally avoid ragwort (unless present in hay) and sheep tolerate quite large amounts. Reduces pasture productivity.	A problem in open sunny places where dense growth may interfere with regeneration or planting.	Seeds spread by animals and in wind and water. Seeds are moderately persistent in soil (some more than 10 years).	Small scale: hand-pull or dig out. Large-scale: herbicide spray (**R**). If developing tree cover is beginning to suppress ragwort it may be sufficient to prevent seed production by slashing.
Reed sweet grass, Poa aquatica, glyceria *Glyceria maxima* Tall perennial grass.	Can cause cyanide poisoning of stock. Cattle can become bogged after breaking through the root mat.	Displaces native plants. May cover small creeks with effects on aquatic fauna. Can grow across creeks and block flow. Water may then be tainted. Suppressed by moderate to heavy shade.	Rhizome fragments spread downstream. Seeds spread in water or in mud on hooves, machinery etc.	Establish a dense shade cover or use herbicide spray (**R** for terrestrial, **OL** aquatic situations). Grazing may suppress it if this is considered safe.
Serrated tussock *Nassella trichotoma* (State Priority weed) Perennial tussock grass.	Usually avoided, low feed value, seeds contaminate wool.	Competes with native grasses. Suppressed by tree or shrub cover or by vigorous improved pasture.	Seeds spread by wind and animals. Seeds are moderately persistent in soil.	Dense tree and shrub cover will suppress it. Small-scale: dig out tussocks. Large-scale: herbicide spray (**R**). Burning then allowing regrowth before spraying will remove dead material and kill surface seeds.

Weed	Effect on stock	Other impacts and properties	Dispersal & persistence	Recommended control techniques R=registered herbicide treatment OL=off-label herbicide treatment
Tradescantia, wandering Jew *Tradescantia fluminensis* Low succulent creeper. Referred to as *Tradescantia albiflora* on herbicide labels.	Does not invade pastures. Nitrate poisoning has occurred when cattle are given access to large amounts.	Dense growth out-competes other ground layer plants and seedlings of trees and shrubs. Highly shade tolerant, less vigorous in full sun.	No viable seeds seem to be produced. Spreads when stem fragments are moved around.	Small-scale: weakly rooted and easily removed with a rake. Hand-weed any regrowth. Alternatively, cover with plastic sheet. Larger-scale: herbicide spray (**R**).
Spiny rush *Juncus acutus* Large tussock-forming rush.	Not readily eaten. Sharp spines on leaves deter stock access. Mostly a problem on poorer wet land.	Eliminates almost all other vegetation. Harbours rabbits. May block drains and watercourses.	Small seeds moved by water and in mud on vehicles etc.	Herbicides registered for control of rushes may be applied by wick-wiper (**R**). Mature plants can be dug out, stacked and burned. Follow either method with repeated cultivation to destroy seedlings, then plant replacement species.
Sweet briar, briar rose *Rosa rubiginosa* Spiny shrub with red fruit.	Not usually able to invade well-used pasture. Once established thickets can restrict stock movement.	Competes with native shrubs and tree seedlings. Prevents human access and provides harbour for rabbits.	Seeds dispersed by birds and foxes that eat the fruit and by water.	Dig out whole crown of small plants. Large plants by cut-stump herbicide (**R**). Larger-scale: basal bark or foliar herbicide treatment (**R**). Goats are effective.
Wild garlic, field garlic *Allium vineale* Erect strong-smelling perennial herb, slender hollow leaves. White, pink or greenish flowers. Dies back to underground bulbs in summer.	Even small amounts cause a strong garlic taint in meat and milk.	Desirable vegetation may be damaged by efforts to control this persistent weed.	Flowering is rare, most stalks produce only bulbils (about the size of a wheat grain) and many plants produce neither seeds nor bulbils. Spread is slow except when disturbance moves bulbs or bulbils around.	On a very small scale dig out whole plants making sure all bulbs are removed. For larger scale work foliar herbicides (**R**). Regular mowing will weaken bulbs and prevent bulbils forming but not eliminate infestations.
Wild watsonia, bulbil watsonia *Watsonia meriana* var. *bulbillifera.* Large perennial herb, sword-like leaves. Red, orange or pink flowers on long spikes. Dies back to corms in summer.	Not invasive in improved pasture.	Dense stands dominate the ground layer and must be removed before native species can be established. Dense growth may block drains.	No seed is produced but bulbils develop on the flowering stem and these are spread by water or during slashing etc.	Dig out whole plants making sure corms are removed. For larger scale work foliar herbicides (**R**). Slashing new growth can prevent spread and weaken the weed but **MUST** be done before bulbils begin to form on stems.

6.2 *Protecting native plants*

Any exotic plant that becomes common is displacing the native plant species that would otherwise grow there and is therefore reducing the habitat for insects and other creatures that rely on the native plants. However, sometimes native plants can survive beneath a cover of weeds, so it is always worthwhile checking before using non-selective control techniques.

Species that are native to the locality can sometimes seem to be a problem where particular conditions have allowed them to become unusually vigorous. Regulations in all planning schemes in Victoria exist to conserve and protect native vegetation. These regulations require a permit to remove, destroy or lop native vegetation, although some exemptions apply. If your weed problem involves native vegetation in any way always check with your local government office to determine if a planning permit is required.

Table 7 Suitability of different control methods

Method	Suitable situations (See also references *1* & *9*)	Comments
Remove by hand	Small areas, weeds that can be removed intact without much soil disturbance.	Recommended for situations where it is otherwise difficult to avoid damaging sensitive native species or where erosion may occur due to loss of vegetative cover if too much bare earth is exposed at once.
Mechanical removal	Areas with no native vegetation that are accessible to machinery.	Risk of soil compaction and erosion. Replanting or reseeding and follow-up weed control essential. Consult CMA before working on a waterway.
Slashing	Apply in accessible areas to suppress and weaken perennial weeds or to prevent seed production. Only where native species can be avoided.	Some weeds need frequent slashing to weaken them. Take care not to spread weeds while slashing them by cleaning slasher before and after each use prior to leaving each site.
Weed mat	Weeds that will die when covered where weed cover is continuous and area small.	Livestock, wind, floods may disturb the mat.
Goats	To remove susceptible weeds where native plants are absent or only present as large trees. Several seasons may be needed.	Not recommended where goats may damage native ground flora or shrubs. Extra fencing to contain goats can be a big expense.
Controlled grazing (sheep and cattle)	Palatable weeds and with grazing-tolerant native plants. Where grazing can be tightly controlled.	Disturbance of the soil and damage to native species may offset weed control benefits.
Biological control	Applies only to some weeds for which biological control agents have been introduced (see Appendix 1).	Not suitable if eradication is feasible. Effects can be slow; other measures may also be needed.
Ring-bark	Trees that don't re-sprout.	Dead tree may be a safety concern or problem for fences when it falls.

Method	Suitable situations (See also references *1* & *9*)	Comments
Cut-paint herbicide	Trees and shrubs that would otherwise re-sprout, where the number of stems to treat is manageable.	Reduces the risk of herbicide drift or run off causing off-target damage to native plants or contaminating waterway.
Herbicide by knapsack spray	Small infestations of grasses, herbs or small shrubs. Basal bark treatment or seedlings of larger species.	Good where weeds are amongst sensitive native plants, but be sure to cover or avoid native plants. Not suitable for large areas or dense/tall bushes.
Herbicide by hand-gun	Larger infestations and tall/dense bushes.	High output requires care to avoid drift or runoff affecting waterway and non-target plants.
Herbicide by wick-wiper	Hand-held: best for highly selective application to small weeds in sensitive native vegetation. Machine-mounted: where weeds are taller than other plants and land is fairly even.	Seek advice on whether this technique is effective for particular species. Wiping avoids possible problems with spray drift.
Flame gun	Small annual weeds can be killed by heat or to suppress/kill flower stems of perennials. Small-scale.	Injury to native species may be a problem; few riparian weeds are susceptible to this method.
Controlled burn	Fire-sensitive weeds in native vegetation where fire is appropriate.	Follow-up weed control needed. Many safety concerns; consult CFA and DSE/CMA (if riparian zone involves public land river frontage).