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TWEED SHIRE COUNCIL

# Riparian Restoration Plan

Outward Bound 3022 Kyogle Road Kunghur, NSW

| | |
|---|---|
| **Land owners:** | [redacted] |
| **Land managers:** | Outward Bound |
| **Operations Coordinator:** | Melanie Ruetzel |
| **Land tenure:** | Private |
| **Address:** | 3022 Kyogle Road Kunghur, NSW |
| **Lot & DP:** | 10//1194471 & 11//1194471 |
| **Waterway frontage:** | 575m (lot 10) & 700m (lot 11) |
| **Landuse:** | Outdoor education |

A small separate section of land is included in this plan as it is leased and managed by Outward Bound to run their programs (Refer to Zone 4 in the Map below). Landowner approval is required before restoration works are undertaken in this section.

| | |
|---|---|
| **Land owners:** | [redacted] |
| **Land managers:** | Outward Bound |
| **Operations Coordinator:** | Melanie Ruetzel |
| **Land tenure:** | Private |
| **Address:** | 3034 Kyogle Road Kunghur, NSW |
| **Lot & DP:** | 101//1087122 |
| **Waterway frontage:** | 130m for the purpose of this plan |
| **Landuse:** | Outdoor education / chemical free restoration. |

## Purpose of the Riparian Restoration Plan

This riparian (riverside) restoration plan has been prepared at the request of Outward Bound to assist the organisation identify works appropriate for students to undertake as part of their stay at the centre.

This plan has been deliberately written in a simple format targeting students, facilitators and managers of the site, and will ideally be modified and updated to suit the needs of users over time. This plan does not cover use of herbicides commonly used in the bush regeneration industry, given that students will be undertaking the work. However, mention of herbicide use is made in relation to Camphor Laurel control, and for Madeira Vine in Appendix 4 for general information.

The site supports significant environmental values, including the endangered Giant Barred Frog (*Mixopheys iterates*) as well as serious weed threats including Madeira vine (*Anredera cordifolia*). Both of these species requires specialized management and it is recommended that a full habitat restoration plan is prepared for the site to guide environmental works beyond the scope of volunteer students. A good plan can assist in directing bush regeneration works, monitoring environmental recovery and can form a basis for grant applications.

Appendix 1 contains information and photos of key weeds present throughout the property.

Appendix 2 contains recommended species for revegetation plantings along the riparian zone.

Appendix 3 contains information and recommended management actions for the endangered Giant Barred Frog, which has been recorded on the property.

For further information, contact Matthew Bloor, Project Officer – Waterways. mbloor@tweed.nsw.gov.au

## Vegetation description and Ecological Values

Native vegetation communities on the property are described in Tweed Shire Council Vegetation Strategy 2004 (TVMS 2004). Sclerophyll open forest on bedrock is the main vegetation type mapped, as the site is within a confined valley setting. There is also rainforest and riparian communities mapped on the property, fringing the Tweed River and on small floodplain pockets. Much of this vegetation is highly disturbed, and is regenerating after clearing and/or heavily infested with weeds.

## Giant Barred Frog

The riparian zone, within 30m of the Tweed River or other watercourse, is known habitat for the endangered Giant Barred Frog Frog (*Mixopheys iterates*). This is Australia's second largest frog species and has experienced significant population declines, primarily due to the introduced Chytrid fungus. It is always found close to water, and is easy to identify by the deep guttural call of males in spring and summer after rain (the call is available on website link below). Key breeding habitat is the bank toe, particularly where overhanging vegetation is present. Frogs may be present anywhere along the riparian zone, but especially where there is good leaf litter and habitat for foraging and hiding.

The recommended strategy for managing riparian restoration work is to develop a dense canopy to provide shade and suppress dense pasture grass which is a barrier to frog movement.

Images taken from NSW Office of Environment anc
http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10538

Appendix 3 includes protocols developed for bush regeneration in Giant Barred Frog habitat, as well as a map for the property identifying key habitats. **Weed control and planting works are ideally undertaken between May and September,** outside of the breeding season (October-May). It is recommended a search for frogs is undertaken prior to works (survey ideally undertaken by someone familiar with the frog and its call – they are very well camouflaged). If frogs are inhabiting the area, it is advised to keep students out to avoid disturbing (including trampling) them or impacting on their habitat.

Chytrid fungus is the key threat to Giant Barred Frog populations. It is a microscopic fungus that can be present in footwear and other items carrying mud (eg vehicle tyres and hand tools like shovels). It is highly advised that prior to any works in the riparian zone, **footwear is thoroughly cleaned** by scraping away mud and standing the soles in a disinfectant such as 5% bleach solution followed by a rinse over the rest of the shoes. Solution should be prevented from entering waterways, being placed in a suitable storage container and being transported off site. See Appendix 3 for more information.

## Madeira Vine

Madeira vine (*Anredera cordifolia*) is recognised as one of Australia's worst weeds, and is listed as a Weed of National Significance. It is a succulent climbing vine that is capable of smothering and collapsing mature rainforest canopy, transforming and degrading healthy riparian habitats. It reproduces via knobbly aerial tubers which can break off and spread during flood events, and rarely sets viable seed. It flowers in late summer, producing showy white 'lambs tail' flowers, and is an ideal time to identify mature infestations.

Tweed Shire Council has mapped Madeira vine distribution and the most upstream site known is at Mt Burrell, only a few kilometres upstream. It is therefore important to consider the spread of Madeira vine to downstream habitats and recognise that some control techniques can increase its spread.

Madeira vine occurs throughout the riparian area on the property, and is likely to be more dominant on the downstream and inaccessible reaches. It favours the edge of the tree line where light levels are high, and reduces in density under a shady canopy.

Physical removal of madeira vine can be difficult as the plant produces underground and aerial tubers which will result in new plants, especially when they are in the canopy and fall after the vine is severed. Pulling vines from the canopy can also lead to injury from falling branches.

The key is selecting an area and following up over a long period of time to remove re-shooting plants. Tubers should be removed from the site in heavy duty garbage bags, or burnt. Composting is not recommended unless high temperatures in the pile can be achieved over 3-4 days (eg high nitrogen input into compost, regular turning and adequate moisture content in pile) – otherwise tubers will remain alive and begin a new infestation.

A good plan may be to focus on areas where madeira vine is sparse and threatens young or regenerating) native vegetation. It is important to keep it out of planting sites otherwise vigorous vine growth can quickly smother saplings. It may be best to focus regeneration and planting works in highly visible areas where regular monitoring can be done and follow up control undertaken regularly.

The usual strategy is to work from high quality areas of vegetation first. However with inexperienced students undertaking manual removal, there is a high risk of damaging native vegetation, including threatened plant species which are more likely to be present in riparian habitats. Therefore it is recommended that two or three restoration sites are established and maintained for student activities, and professional bush regenerators are engaged to tackle larger infestations or work in sensitive areas.

Madeira vine is edible and palatable, creative cooks can use this weed in the kitchen for a spinach replacement!

More information is available online, and see Appendix 4 for standard control measures (brochure from Richmond Landcare).

**Appendix 2 contains a brief description of other environmental weeds in the riparian zone.**

Images below copied from Madeira vine Weeds of National Significance document:
http://weeds.ala.org.au/WoNS/madeiravine/docs/47053_ERGO_Weed_Mgmt_guide_Madeira_vine_Pages.pdf

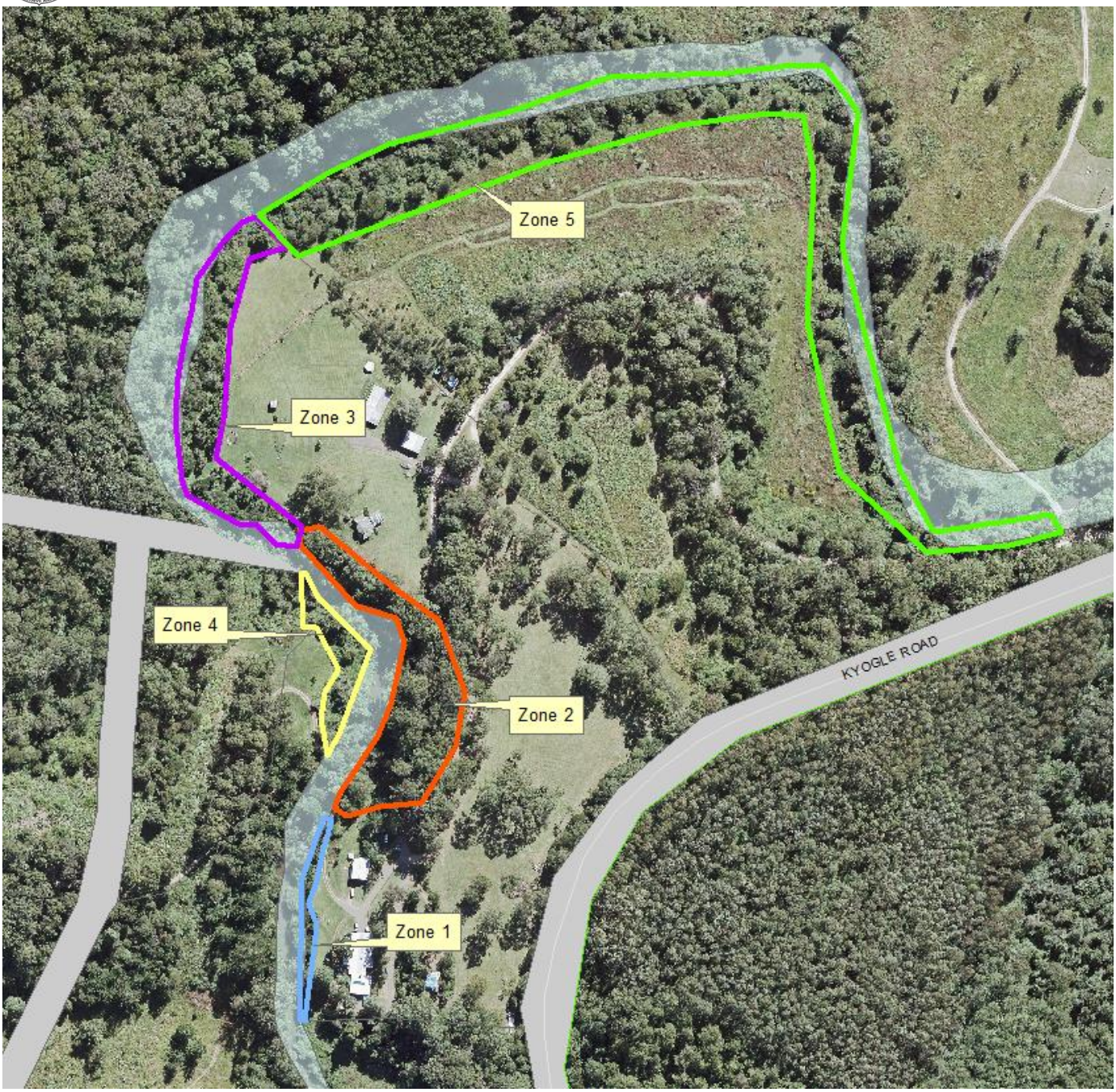

1. Waxy-green heart-shaped leaves and immature inflorescence spikes; 2. Large clumps of aerial tubers (these can also grow as small individual tubers from nodes in the stem); 3. Lambs tail-like Madeira vine inflorescences; 4. Madeira vine inflorescence showing individual flowers.
Photos: 1 - Biosecurity Queensland; 2-4 - Sheldon Navie.

Madeira vine seedling growing from a fallen aerial tuber. Photo: Sheldon Navie.

## Work Zones

The riparian area has been divided into 5 zones for the purpose of this plan. A basic list of weeds and threats has been listed for each zone, as well as opportunities for manual restoration works. Outward Bound may like to prepare a photographic list of weeds to guide identification by students when undertaking works.

This action plan is by no means exhaustive, and as mentioned earlier – the plan may be updated as required and depending on the resources and opportunities available.



Map 1 – Riparian area Work Zones.

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## Zone 1


Zone 1 is approximately 120m long and 5-10m wide. Previous work has included planting native saplings and hand weeding, as well professional bush regeneration works focussing on Madeira vine control.

Any hand or physical weed removal should be done in a manner to minimise soil disturbance, as this will only favour further weed growth. Protect and identify young native plants (e.g. with bamboo stake or flagging tape) and seedlings wherever possible.

Refer to Appendix 1 for a list of weeds species common throughout the riparian zone. In zone 1 at the time of writing this plan, **Silver Leaf Desmodium or Velcro vine** (*Desmodium uncinatum)* is common in this zone smothering other weeds and native vegetation. Other common weeds include pasture grasses and other herbaceous weeds including polka dot plant (or freckle face), Trad ('wandering jew'), Maderia Vine and Lantana. Take care if removing toxic Castor Oil plants.

This is a high priority area for further hand weeding and revegetation planting activities. Plan to establish a dense canopy along the river bank to reduce weed densities (refer to Appendix 2 for recommended species list). Protect vegetation along the toe (or creek edge), unless there is dense grass growing. It may be difficult to control, but dense grass should be avoided to protect Giant Barred frog habitat. At a minimum, aim to ensure setaria and palm grass (or other large grasses) do not establish in bare areas after weeding (hand weed or brushcut).

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## Zone 2


Zone 2 is approximately 200m long and extends to the road side above the offices. This area contains remnant trees throughout its length, and was probably not cleared due to its rocky steep nature. This area supports both rainforest along the Tweed River, which has high conservation values and probably supports threatened plant species, as well as wet sclerophyll forest on the rocky slopes above the river.

This zone is prime habitat for the Giant Barred Frog. It is particularly important to retain (and foster regeneration of) lomandra hystrix (creek mat rush) plants in this zone, as the frogs kick eggs onto overhanging vegetation after laying eggs in the water.

Apart from a few herbaceous weeds on the ground layer (including devils tomato, mistflower, polka dot plant, Trad/wandering jew, lantana, silver leaf desmodium and broad leaf paspalum), this area is intact. Given the sensitivity of young rainforest plants being accidentally pulled or trampled, only experienced students familiar with target weeds should undertake work in this zone. No planting is required in this zone.

There has been some Madeira Vine control in this zone. Well trained student volunteers could certainly undertake hand removal of this weed in this zone, especially along the edges where its growth threatens regenerating native plants. Care needs to be taken not to disturb native plants when removing the vine from trees, or stepping on seedlings on the ground layer.

This zone is ideal to have professional bush regenerators undertake sensitive work throughout.

## Zone 3


Zone 3 is located adjacent to the camping area, and has been revegetated with riparian tree plantings in the past. The zone is around 225m in length and approximately half a hectare, and represents a high priority area for student restoration works.

Most, if not all, of the weeds listed in Appendix 1 would be present in this zone. Vine weed control could be undertaken as a targeted project in this zone. Glycine is growing rampantly along the fence line and nearby native vegetation below the powerlines, and Madeira Vine would be present along the lower bank close to the river. Care needs to be taken when planning this work, possibly by brushcutting access tracks in.

Further tree plantings could be undertaken amongst the tall planted Blue Quandong trees, and towards the downstream end of the zone (at the property boundary) where it is weed dominated. Pasture grass (broad leaf paspalum) could be brushcut prior to improve access. A mix of shrubs and trees could be planted to increase diversity, all plants should be marked with a bamboo stake so they can be nurtured until well established. A suggested tree list for revegetation plantings is included in Appendix 2.

To improve frog habitat along the river's edge, large grasses and dense weeds could be removed, being careful to retain native trees and shrubs. River side plantings could be undertaken to encourage a shady canopy in open areas or gaps between existing trees. Extreme care needs to be taken to avoid damaging frogs when brushcutting – best to undertake between May-September outside of the breeding season.

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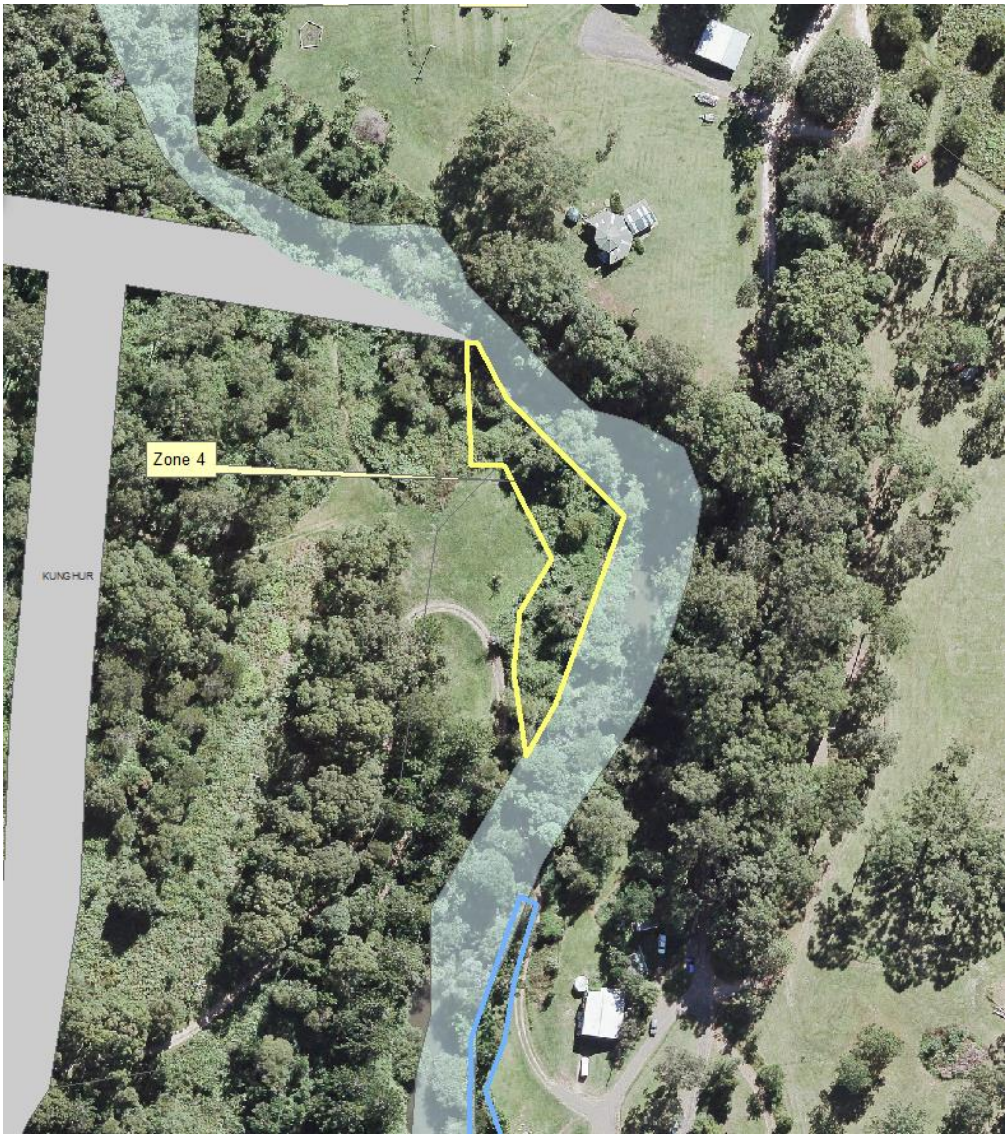
## Zone 4




Zone 4 is private property owned by Scott Poad and Sally Warren – approval is required before undertaking works in this area.

The riparian area is very weedy and includes a lot of tall Castor Oil plants. Students should not attempt to cut these down as they are toxic and sap can cause blindness. The site could be slashed as preparation for tree planting. Prior to this, any native plants should be identified and tagged to ensure they are retained. Other weeds in this zone include Lantana, Glycine, Devils tomato, White Moth Vine, Madeira vine, Polka dot plant, Silver Leaf Desmodium.

Once the dense weeds are cleared or slashed, it would make an ideal tree planting site, given it's proximity to the kitchen area, and access is good across the River. Keeping the weeds under control in this site would be a priority for several years until the trees develop a dense canopy to provide shade and thereby reduce weed growth.

## Zone 5


Zone 5 (700m long) is located at the downstream end of the property, and is in a state of regrowth following historic clearing. There is no stock on the property and therefore a wide diversity of weeds and native plants are establishing. The riparian area is very inaccessible due to the thick growth and was not properly assessed when a site inspection was made to inform this plan.

There is good regeneration of native species along the riparian area, and any works there would ideally be undertaken by professional bush regenerators. There is a lot of Madeira vine along the edge of the vegetated area, however it is less prevalent under the shady canopy. This really is the priority weed in this zone, although it would take a lot of effort and resources to get it under control. All of the weeds listed in Appendix 1 are present throughout this zone, and more (including Groundsel Bush not spotted elsewhere on the property).

There is also a lot of Camphor Laurel establishing in this zone, and these should be controlled when they reach seeding age to avoid further spread – this is most easily achieved by drilling into the trunk and injecting herbicide into the holes (glyphosate). Chemical free treatment includes ring barking trees, however it takes several years for the trees to die, and the cambium layer can regrow, meaning the tree survives. If the trees are felled and not poisoned, they readily coppice from the stem and roots and continue to grow.

In terms of actions students could undertake in this zone, tree planting is ideal along the edges of the existing slashed tracks. It is recommended that the existing tree planting area on the western edge of this zone is added to over time – it can be extended by clearing the weeds prior to planting with a slasher or brushcutter (ensuring any native trees are not removed or damaged), and marking all planted trees with a bamboo stake. As per the other planting sites on the property, the ideal is to create a dense shady canopy which minimises weed growth.

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# APPENDIX 1 – Common riparian weeds on Outward Bound land, Kunghur.

***Tradescantia fluminensis* (Common name - Wandering Jew or Trad).**
Fleshy leaved creeping plant that reproduces by rooting from nodes. Hand pull and follow up to ensure broken pieces do not spread. Pics below from
https://keyserver.lucidcentral.org/weeds/data/media/Html/tradescantia_fluminensis.htm

leaves (Photo: Sheldon Navie)

close-up of fleshy leaves with glossy upper surfaces (Photo: Sheldon Navie)

close-up of fleshy stem and flower cluster with flower from side-on (Photo: Sheldon Navie)

flower with three pointed white petals (Photo: Sheldon Navie)

***Callisia repens* (Creeping inch plant)**
Closely related to Trad/wandering Jew, is Creeping Inch Plant. Its leaves are a lot smaller, but it spreads and is controlled the same way. It is shallow rooted and careful hand weeding can result in a large clump of this plant removed. Follow up is essential to keep it from re-establishing.

***Desmodium uncinatum* (Silver Leaf Desmodium or Velcro vine)**
A creeping, hairy vine with sticky seeds (readily stick to clothing!) that smothers vegetation. Hand pull (best before flowing or seeding) being careful to avoid breaking intertwined native vegetation. Images from https://www.moretonbay.qld.gov.au/uploadedFiles/moretonbay/environment/vegetation/silverleaf-desmodium.pdf

***Neonotonia wightii* (Glycine)**
Twining vine with woody base. Fast growing vine that smothers vegetation. Hand pull being careful not to damage native vegetation. Base of plant may need to be cut and dug out if hand pulling is too difficult (eg older vines). Best to remove before seeding. Large vines could be cut and left in place to rot down, digging out the roots only.
Image from
https://www.moretonbay.qld.gov.au/uploadedFiles/moretonbay/environment/vegetation/glycine.pdf

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***Araujia serichifera* (White Moth Vine)**

This vine is fast growing and uses native vegetation for support, and poses a smothering threat. It contains a white milky latex that is irritating and can cause an allergic reaction in some people, so wearing gloves is recomended. Any milky sap has the potential to irritate eyes, and some plant sap can cause blindness.
Images from https://www.daf.qld.gov.au/__data/assets/pdf_file/0006/67740/IPA-White-Moth-Vine-PP98.pdf



***Ligustrum sinense* (Small leaved privet)**

Small-leaf privet is a densely branched, multi-stemmed evergreen shrub 3–5 m tall (occasionally growing to 7 m). The smooth bark is brownish–grey on stems and greyish-green on branches. Young branches are covered in fine, short hairs and small branches have white lenticels. Oval-shaped leaves occur in opposite pairs and are 1–7 cm long and 0.5–3.5 cm wide. The under-surface of each leaf is covered in fine hairs (including the midribs) and both leaf surfaces are mid to dull green.
Privets reproduce mainly by seed, however small leaved privet can sucker or grow from branches left on moist ground. Photos and text: http://weeds.dpi.nsw.gov.au/Weeds/Details/111
Large leaved privet is also present on the property, but is not as big a risk on riparian areas as small leaved privet





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***Bidens pilosa* (Cobblers pegs, farmers friend)**

Annual, fast growing herb with seeds that stick to clothing. Hand weed before its get too large or it can be difficult to pull out of the ground. Follow up weed in disturbed areas as it will rapidly re-establish. Images from https://weeds.brisbane.qld.gov.au/weeds/cobblers-pegs


***Ageratum conyzoides* (Blue Billy Goat Weed).**

Herbaceous (soft leaved) plant with purple flowers. Fast growing weed in riparian areas. Hand weed to reduce dominance but be aware that vast numbers of seeds are present in to soil so expect regrowth.

***Lantana camara* (Lantana - a Weed of National Signifcance – see http://www.environment.gov.au/biodiversity/invasive/weeds/publications/guidelines/wons/pubs/l-camara.pdf )**

Well known climbing plant with rough stems (or small 'thorns') and pink, yellow and white flowers (plus other cultivars of varying colours) followed by black berries with seeds. Difficult to physically remove if it has grown into the canopy of surrounding trees, in this case the roots and stems can be cut and dug up and the frame left in the canopy.. Hand pulls fairly easily, however stems and branches should be removed from the ground as they will regrow in moist areas. There is often a good crop of native seedlings amongst lantana infestations, so care needs to be taken to protect them when removing large vines.

Images from http://weeds.dpi.nsw.gov.au/Weeds/Details/78

Invasive grasses – including ***Setaria sphacelata*** **(Setaria)**, ***Paspalum mandiocanum*** **(Broad leaf Paspalum)**, ***Setaria palmifolia*** **(palm grass)**.
Gasses can become very dense and therefore restrict any native species germinating. Dense grasses can limit habitat suitability for frogs including Giant Barred Frog. Dense shade will limit grass growth, providing grasses are controlled until canopy can develop. Suppress grass growth when planting native seedlings as it can out-compete young plants. Expect other herbaceous weeds to grow in disturbed areas when grasses have been removed.

habit (Photo: Sheldon Navie)

habit (Photo: Sheldon Navie)

**Setaria grass** – a dense perennial grass up to 2m tall. Difficult to control by hand due to dense growth and tough roots. Easier to brushcut but must be done regularly to prevent it from rapidly re-establishing. Best to aim to shade it out by growing a dense canopy. Image from https://keyserver.lucidcentral.org/weeds/data/media/Html/setaria_sphacelata.htm

Low-growing habit
(Photo Sheldon Navie)

**Broad Leaf Paspalum** – very common perennial pasture/lawn grass capable of growing in low light under canopy. Can be brushcut or hand chipped. In some cases it can be useful to retrain a grassy cover if not too dense (otherwise native species will not germinate) as it helps suppress other weeds.
Image from http://coffsharbourlandcare.org.au/wp-content/uploads/2011/09/Broad-Leaf-Paspalum-Factsheet.pdf

**Palm grass** – dense, hairy perennial grass to 1.5m tall. Can be chipped or dug up, with care due to the fine hairs on the leaves and stems.
Image from http://weeds.dpi.nsw.gov.au/Weeds/Details/301#profile

***Ricinus communis* (Castor Oil).**
Castor oil plant is a tall spreading shrub. Its stems are dull, pale green tinged with red. Leaves are divided into 7-9 lobes with toothed edges. Common plant along disturbed areas in the riparian zone, where is establishes quickly and can out-compete native vegetation.
**CAUTION:** Castor oil plant is highly toxic to humans, capable of causing serious illness and death. The flowers, leaves and seeds are poisonous and eating only 2-8 seeds can be fatal. Ingestion causes a burning sensation in the throat and mouth, abdominal pain, bloody diarrhoea, fever, convulsions, and then respiratory and cardiac distress and failure. Temporary blindness may occur if the sap is squirted into the eyes.
**Caution should be taken when attempting any control and removal of this weed. Wear protective clothing, gloves and eye protection before starting control work.** Young plants easily pulled, especially at seedling stage (get to know large seedlings and hand pull when young)

Text and images from **http://weeds.dpi.nsw.gov.au/Weeds/Details/32**

***Ageratina riparia* (Mistflower)**
A common shade tolerant, low growing herbaceous weed of riparian areas. The plant produces white flowers, and is spread by seed. The plant dies back after seeding and re-shoots from the base. Plants can be hand pulled (especially when the ground is moist), or larger infestations can be dug out with a mattock - stem and crown need to be removed or it will re-grow.

***Ageratina adenophora* (Crofton weed)**

A close relative of mistflower, Crofton weed has established in areas on the riparian area and becomes a nuisance as it rapidly spreads and seeds prolifically. It grows to 2m – can be hand pulled or dug out with a mattock (as per mistflower). Seeds need light to germinate, so creating a native canopy will limit this weed.

**Solanum chrysotrichum (Giant Devils Fig)**

Fast growing plant, similar to wild tobacco but with nasty thorns on the stems and leaves. It establishes in disturbed areas and under trees where birds or bats spread the seeds. Once it seeds, it persists for a long time in an area. Small plants can be carefully hand pulled. Seedlings can be grubbed with a hoe or mattock.

Large plants can be cut with machete or saw (but will regrow if not treated with herbicide) – cut plants before they set seed! Pictures from http://tweedlandcare.org.au/wp-content/uploads/2018/02/Giant_Devils_Fig_Info_Sheet.pdf

*Young Giant devil's fig plant.*

*Giant devil's fig establishing in pastur*

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***Solanum capsicoides* (Devils tomato)**

Devils tomato are a pickly ground layer plant that can persist for many years in a site due to seeds in the soil. Control it before it sets seed by hand pulling young plants, care needs to be taken due to spines and thorns. Older plants can be chipped with a hoe or mattock. Not considered to be a major weed in the riparian area, but it is present and it spiky nature makes it one to get rid of especially if students are hand weeding an area.

***Hypoestes phyllostachya* (Polkadot plant or freckle face)**

This herbaceous plant is a garden escapee and readily spreads along riparian areas. It prefers a shady environment, and therefore should be targeted to reduce its occurrence in restoration areas. Plants can be hand pulled, and follow up control will need to be undertaken. It spreads by seed, but may regrow if roots and stems left in the ground after hand pulling. Pictures from https://keyserver.lucidcentral.org/weeds/data/media/Html/hypoestes_phyllostachya.htm

dense infestation (Photo: Sheldon Navie)

spotted leaves (Photo: Sheldon Navie)

close-up of leaf covered in pinkish spots (Photo: Sheldon Navie)

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***Cinnamomum camphora* (Camphor laurel)**

Camphor laurel is a fast growing and well recognised weed tree in the area that readily invades riparian areas. Where it growing amongst weedy areas away from waterways on the property, it could be left in place until it starts setting seed (after around 7 years of age). Until then, it can provide good habitat for birds and allows for the process of native rainforest regeneration to begin. Under mature camphors, a diversity of native species can rapidly establish once the camphor tree is killed. They can be ring barked but take a few years to die (and care needs to be taken to ensure the tree does not regrow its cambium layer over the ring barked section or it won't die). Trees can be drilled (using a 10mm drill bit – or frilled using an axe or tomahawk) and injected with herbicide to allow for a quick kill. Camphor seedlings can readily pop up in riparian work areas, and should be hand pulled to prevent them maturing. Care needs to be taken as there are many species of native laurel trees – camphor can be identified by its strong camphor smell in both the wood and crushed leaves. Pictures from http://weeds.dpi.nsw.gov.au/Weeds/Details/28

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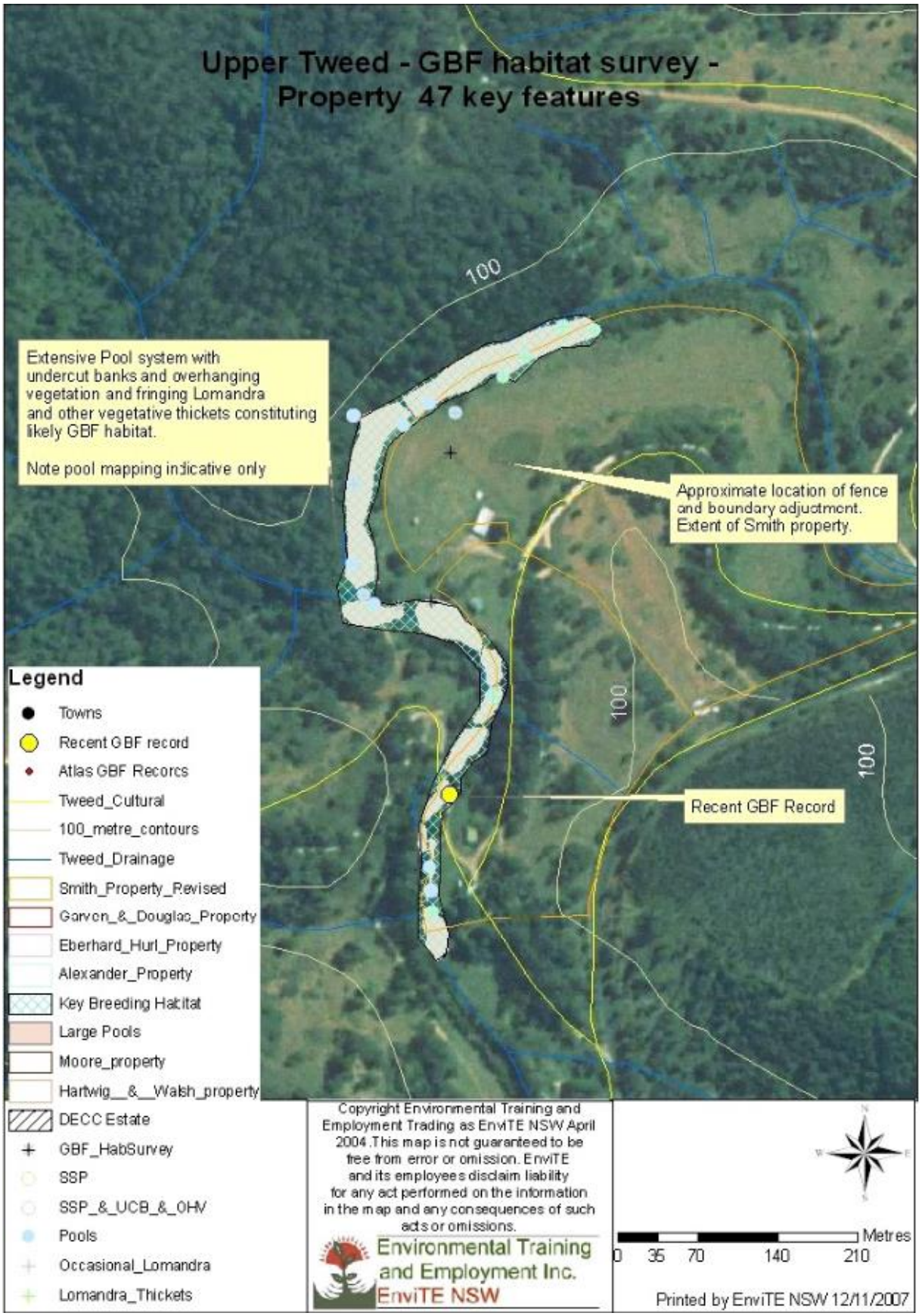
# APPENDIX 2 RECOMMENDED SPECIES FOR RIPARIAN PLANTINGS

| Scientific Name | Common Name | Location on bank | Form |
|---|---|---|---|
| *Lomandra hystrix* | Creek mat rush | Lower bank | Groundcover |
| *Syzygium smithii* | Lilly Pilly | Lower/mid/upper bank | Small tree |
| *Melaleuca viminalis* | Creek bottlebrush | Lower/mid bank | Small tree |
| *Ficus coronata* | Creek sandpaper fig | Lower/mid/upper bank | Small tree |
| *Glochidion ferdinandii* | Cheese tree | Lower/mid/upper bank | Small tree |
| *Tristaniopsis laurina* | Watergum | Lower/mid bank | Tree |
| *Cryptocarya triplinervis* | Three veined laurel | Mid/upper bank | Tree |
| *Araucaria cunninghamii* | Hoop pine | Mid/upper bank | Tree |
| *Syzygium francisii* | Giant water gum | Mid/upper bank | Tree |
| *Podocarpus elatus* | Brown pine | Mid/upper bank | Tree |
| *Diploglottis cambellii* | Small leaved tamarind | Mid/upper bank | Tree |
| *Cryptocarya obovata* | Pepperberry | Mid/upper bank | Tree |
| *Cryptocarya triplinervis* | Three veined laurel | Mid/upper bank | Tree |
| *Archontophoenix cunninghamiana* | Bangalow palm | Mid/upper bank | Tree |
| *Diploglottis australis* | Tamarind | Mid/upper bank | Tree |
| *Elaeocarpus grandis* | Blue quandong | Mid/upper bank | Tree |
| *Elaeocarpus obovatus* | Hard quandong | Mid/upper bank | Tree |
| *Streblus brunonianus* | Whalebone tree | Mid/upper bank | Tree |
| *Syzygium australe* | Brush cherry | Mid/upper bank | Tree |
| *Mallotus discolor* | Yellow kamala | Mid/upper bank | Tree |
| *Mallotus philippensis* | Red kamala | Mid/upper bank | Tree |
| *Guoia semiglauca* | Guoia | Mid/upper bank | Tree |
| *Jagera pseudorhus* | Foambark | Mid/upper bank | Tree |
| *Toona ciliata* | Red cedar | Mid/upper bank | Tree |
| *Cryptocarya glaucescens* | Jackwood | Mid/upper bank | Tree |
| *Argyrodendron trifololatum* | White booyong | Mid/upper bank | Tree |
| *Lophostemon confertus* | Brush box | Upper bank | Tree |

# APPENDIX 3 - Giant Barred Frog Habitat



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# Proposed Protocol for minimising impacts of weed management on the Giant Barred Frog *Mixophyes iteratus*- Upper Tweed (Prepared by Envite NSW 25th May 2009)

**Scope of Protocol in North East NSW**
This protocol applies to known and likely Giant Barred Frog (GBF) habitat within 30m of a watercourse in the Upper Tweed sub-catchment. Prior to commencement of riparian restoration works at each property, a survey and mapping of Giant Barred Frog habitat is required.

The survey must be undertaken by a person approved by DECC with appropriate knowledge of GBF ecology and experience in the recognition of GBF habitat.

The emphasis on determining "likely" and "unlikely" GBF habitat shall be on identifying potential breeding sites for the species, with associated vegetation.
The documented outcomes of the survey include:

- a map on which the "likely" and "unlikely" GBF habitat sections of the watercourse are clearly labelled;
- the specific criteria used to determine "likely" and "unlikely" GBF habitat; and
- Survey documents are provided to the DECC Wildlife Licensing Unit as part of the s.132c licence reporting requirements.

**Protocol**

## Bush Regeneration

- Actions be taken (detailed below) to prevent the spread of Chytrid Fungus.
- Roundup Biactive is the only herbicide permitted to be used.
- Manual weed removal allowed at all times of the year – with search for GBF presence prior to works.
- Bush regeneration works (stem injection, cut scrape & paint) be allowed at all times of the year – also with search for GBF prior to work.
- Herbicides may **not** be sprayed within **five** metres of the edge of the watercourse in the breeding season (Oct – May) note exception for planting works below.
- Between May and September additional surfactants (e.g. Protec Plus) may **not** be used.
- Between May and September, the only marker dye that can be used is Hi Light Blue Liquid. It may only be used in conjunction with herbicide sprays.

## Associated Activities

- Activities such as plantings of native species and fencing should be programmed where practicable to be undertaken between May and September inclusive. However, if this is not possible during that period the activity may proceed following a search to determine if GBF are present on the site.
- Site preparation & maintenance spraying (during the breeding season) for plantings unable to be taken at other times may only occur within & beyond 5 metres of the watercourse where there is only pasture grass <5cm high and there is no opportunity for frogs to be present i.e. rehydration sites

- The beds of watercourses must not be disturbed by vehicles.

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**Preventing spread of Chytrid Fungus**

There are many threats to frogs, particularly endangered and vulnerable species. A waterborne fungal pathogen known as chytrid fungus is a serious threat to many frog species including the Giant Barred Frog. Infection of frogs by amphibian chytrid fungus causing the disease chytridiomycosis has just been listed as a key threatening process under the Threatened Species Conservation Act (1995). It is therefore vital that attempts to halt the spread of this parasitic fungus from one site (or infected population) to another site (where there is a healthy population of frogs) are implemented.

Define site boundaries

When working along a section of continuous stream it is reasonable to consider this one site. For the purposes of this protocol within the weed control area along the riparian zones within the Upper Tweed, sections of creek of approximately .5 km are for practical purposes considered to be discrete populations. This is based on + / - maximum distances / movement along stream being recorded by Streatfield (1999) in DEH 2006) of 268 metres. Where there are a number of tributaries and work between them is to occur, each tributary may be considered a site. Where there is an isolated population of frogs and another population further up or downstream, these are to be considered two different sites as the populations may not mix. If there is doubt whether it is a new site or the same site, then the protocols should be performed to reduce the risk of infection. If work has occurred at a different site the previous day, the protocols should be performed. It is reasonable to consider doing this before each work day, as it won't take long and may save an isolated population of this threatened frog.

Hygiene

- **Footwear must be thoroughly cleaned** by scraping away mud and standing the soles in a disinfecting solution that contains Benzalkonium chloride, or 5% bleach solution followed by a rinse over the rest of the shoes. Solution should be prevented from entering waterways, being placed in a suitable storage container and being transported off site, and returned to the depot for disposal.
- **All equipment** that has been in contact with the soil or water at the site, eg knives, pot stands, **should also be cleaned and disinfected.**
- If a vehicle has been traversing a known frog site and water and mud is stuck to the tyres, these should also be scraped, rinsed and disinfected. Toilet duck can be a good way of doing this.

**Training of staff involved in the project**

Training will be given to the site supervisor prior to works being undertaken, who will then instruct other field staff. *Mixophyes iteratus* habitat features contained within this document should be read by all operators including descriptions and photos to assist in implementing these protocols and the visual definition of habitat features. All staff should familiarise themselves with the Giant Barred Frog call. EnviTE environmental staff will from time to time to check implementation of protocol procedures.

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# APPENDIX 4 - MADEIRA VINE BROCHURE

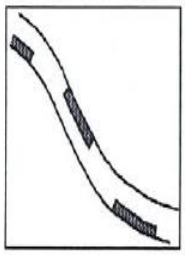
## Control Methods

**AVOID PULLING OR CUTTING THE VINE STEMS** — *this results in a rain of fertile tubers dropping to the ground*

### Climbing vines – scrape and paint

The aim is to leave the plant alive long enough to kill both the underground and aerial tubers.

Firmly scrape sections about 30cm long along the vine, exposing the inner part of the stem. Start from ground level and work on all stems as high as can be reached.



**As you scrape, immediately paint each exposed section with 100% Glyphosate** . Vines should die within 6 weeks. The vines and aerial tubers can then be left to decompose in the canopy. Most importantly, follow up this procedure for any vine stems that have been omitted.

### Sprouted tubers

Sprouted tubers on the ground, can be carefully (and painstakingly) collected and bagged, ensuring the entire tuberling is collected.

For ground regrowth, spray the tuberling leaves on a regular basis — prepare Glyphosate mixture as for **Preparation** . The addition of Brush-off ® (Metasulfuron) to glyphosate solutions is very effective — mix as for **Preparation** .

Large tubers can be poisoned in the ground by gouging a hole in the tuber and filling this with **100% Glyphosate** .

## Disposal Methods

To reduce further spread of Madeira Vine, the following methods of disposal are recommended:

- Lay Madeira Vine tubers and pieces on a tough plastic sheet in a cleared area. Cover tightly with black plastic sheeting and check periodically. (Spraying vine pieces with Glyphosate mix as for Preparation is an option).
- Decompose in a covered drum of water.
- Burn in a hot fire (seasonal).

Avoid rubbish dumping or taking contaminated soil or material to the tip — this only spreads Madeira Vine .

**Text:** adapted from
Wilsons Creek Huonbrook Landcare Group,
www.wilsonscreeklandcare.mullum.com.au

**Photos:**
John Brock

**Line Drawings:**
Wilsons Creek Huonbrook Landcare Group

**Other References:**
Big Scrub Rainforest Landcare Group (1998). *Common Weeds of Northern NSW Rainforests*, Mullumbimby

**Brochure produced by:**
Richmond Landcare Services
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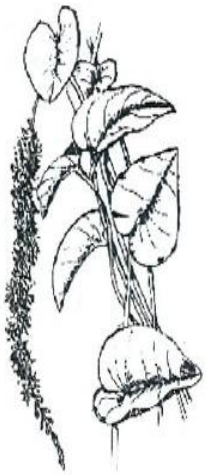

Northern Rivers CMA Catchment Management Authority

LANDCARE RICHMOND LANDCARE SERVICES

# Madeira Vine

*Anredera cordifolia*

**A guide to identify and control one of the most destructive environmental weeds in the Northern Rivers Region**

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**Madeira Vine** is native to South America. It was imported because of its attractive white flowers and strong growth. It was often planted beside outdoor latrines in Australia, as the leaves, when eaten, were believed to have a laxative effect.

Adapting to a vast range of soils and conditions, Madeira Vine has spread along waterways and through forests and is now considered to be one of the major weed threats to rainforests and waterways.

This destructive, prolific and persistent vine reduces the host trees to vineshrouded poles. Because of its weight— thick, fleshy leaves and masses of tubers, it can smash the branches of trees by its sheer weight. The stem can grow one metre per week

**Madeira Vine** has fleshy heart-shaped leaves, light green underneath and darker on top, and produces masses of perfumed creamy white flowers between March & May.

A curtain of leaves and flowers is often formed.

## Growth Habit

Madeira Vine produces numerous stems, reaching from the ground up into the canopy. Mature stems are woody with wartlike growths and can reach up to 20 metres.

Numerous potato-like tubers develop on the vine stems, and underground

## Reproduction

Madeira reproduces prolifically from multitudes of both underground and aerial tubers. These tubers are spread by water, the dumping of garden refuse, rodents and soil disturbance. They can remain fertile for up to five years.

Madeira also reproduces from parts of the stem or leaves of the vine. Thankfully, its flowers are not known to seed in Australia.

Because of its capacity for rampant growth and reproduction, it is vital that any attempt to remove the plant does not actually result in proliferation of the weed.

## Control Methods

### Over-spraying

Over-spraying with herbicide is useful where weeds have formed an impenetrable mass with a fairly complete canopy and in a difficult to access area eg. in and over lantana. The dense weed canopy protects any submerged natives.

Over-spraying is time saving and reduces the need for manual weed removal (and therefore reduces soil disturbance).

Work from the weed edge and, in areas of extensive infestations, a very gentle breeze in the right direction helps carry the herbicide further across the weed mass.

Use a diffuse light spray over the top of weeds to avoid runoff. Use a narrow setting and higher pressure to reach further into the weed patch.

### Preparation

Mix 1 part Glyphosate to 50 parts of water, plus LI 700 acidifier (as directed on label) to allow Glyphosate to penetrate the leaf surface.

The addition of Brush-off ® (Metasulfuron) to glyphosate solutions is allowed as they are compatible, and is very effective. Brush-off ® is used at 1.5 grams to 10 litres. Brush-off will not work properly without a surfactant.

Read the instructions on all labels before use

Herbicides are to be used in accordance with the label or off-label permit. The permit issued to NSW DECC (Permit No. PER9907, valid until 31/03/2012), covers control of environmental and noxious weeds in native vegetation. Use of herbicides is at user's discretion.