



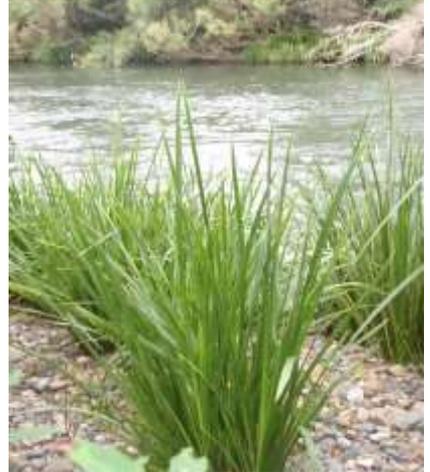
A Practical Guide to Riverbank Management for Landholders:

Native Vegetation, Weeds, Flood Debris,
Stock Management, Threatened Species

Examples from the Nymboida River, Northern NSW



What does a healthy riverbank look like?



A healthy watercourse is a creek or riverbank (riparian zone) that is covered with a diverse range of native vegetation including ground covers, rushes, shrubs and medium to tall trees.

Good continuity of native vegetation and their root systems lock the riverbank together, minimising the risk of erosion.



Healthy riverbank vegetation communities have minimal weeds. If weeds are present they need to be managed so they do not smother the growth of mature native trees or inhibit native plant regeneration.

Photos show examples of healthy riverbanks

The importance of vegetation on the riverbank

The function of healthy river bank vegetation includes erosion control and habitat for a huge diversity of native fauna both on the land and within the stream or river. These include: insects; fish; reptiles; mammals and birds.

Mature small trees overhanging the water provide extremely important habitat.

The Eastern Freshwater Cod will take birds from low branches for food. Water dragons, and even turtles, climb partially submerged tree limbs to get out of the water to sunbathe.

Platypus take cover from predators such as sea eagles. Carpet pythons and green tree snakes wait for prey, then rest in a safe location on a branch overhanging the water to digest their meal. Kingfishers perch over water, watching for prey. Insects fall from branches into the water providing a food source for fish.



Well vegetated, healthy Nymboida River bank



A healthy combination of vegetation on the riverbank provides important habitat



Overhanging branches provide protection, shelter and a vantage point for wildlife

Living on the edge: native riverbank plants



Slender mat-rush
(*Lomandra hystrix*)



Spiny-headed mat-rush
(*Lomandra longifolia*)



Weeping bottlebrush (*Callistemon viminalis*)



Water gum (*Tristaniopsis laurina*)

There is a great diversity of native plant species found within the riparian zone of gullies, creeks and rivers in the Clarence catchment.

Illustrated here are some of the most widespread and common species of the water's edge.

Once established, these plants are extremely tough. They have evolved on the banks of high energy rivers. Frost and drought hardy, they are a perfect choice for erosion control plantings and riparian rehabilitation.



Creek tea tree
(*Leptospermum brachyandrum*)

Native riverbank plants



Native quince (*Alectryon subcinereus*)



Whalebone tree (*Streblus brunoniansus*)



Sandpaper fig (*Ficus coronata*)



River oak (*Casuarina cunninghamiana*)

Stock management

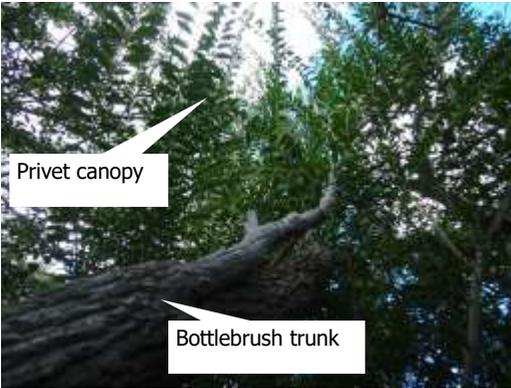
In many areas stock have grazed creek and river banks for over 100 years, so excluding them entirely without planned weed control can have serious weed growth implications. Stock impact on riverbanks depends entirely on the current state of native vegetation, the substrate of the riverbank such as sand, gravel or bedrock, the number of stock, and frequency of access to the riverbank.

Rotational or periodic grazing of riverbanks is more favourable than set stocking. The riverbank terrain, the length of river to be managed, and existing fencing, all have an impact on how stock can be managed. Fences down to the water's edge will suffer damage during floods.



Stock on this property are managed on a rotational grazing program

Why are weeds a problem?



Fast growing weed species such as Small Leaf Privet grow faster than the native trees on the water's edge.

When the flood water bends and pushes over the native bottlebrushes, tea trees and watergums, Small Leaf Privet quickly grows and fills in the canopy. With reduced light, the natives struggle to survive and will eventually die.

Strategies for controlling Small Leaf Privet on riverbanks include saving the mature (old growth) natives from being smothered and killed by the privet.



Lantana grows over and smothers native plants and makes regeneration of native vegetation very difficult.

Vine weeds, such as Cat's Claw Creeper, climb up and eventually smother the canopy of trees.

Vine weeds can also cover the ground, smothering native ground covers and



This native vegetation would be compromised under a thick privet canopy



inhibiting natural regeneration.

In areas where the native vegetation is in excellent condition, a small amount of weed control can make a huge difference to the protection of every layer or strata of native vegetation.

Some riverbank weeds



Common: Small Leaf Privet (*Ligustrum*)



Cat's Claw Creeper
(*Macfadyena unguis-cati*)
Be on alert: If you don't have much of this, get on to it early!



Common: Lantana (*Lantana camara*)



Madera Vine (*Andredera cordifolia*)
Be on alert: get on to this early!



Honey locust (*Gleditsia triacanthos*)
Be on alert: get on to this early!

Don't get these two native plants mixed up with the weed, Small Leaf Privet



Beware - the form of both natives and weeds can vary a lot in the field

Photos of native plants and weeds can be a very useful tool but out on the riverbank the form of these plants can vary so much that even the most experienced bush regenerator can be unsure. The leaf size, shape and colour can vary enormously from plant to plant and so can the overall form of the individual plant.

Don't ever assume a plant is a weed just because you know there is a lot of that particular weed around. Ask for advice or take a sample to your local weed authority, Landcare office or experienced local Landcare group member for identification.

Don't assume a prolific plant that has suddenly popped up is a weed just because you have never seen it before. Seasonal variation and disturbance on the riverbank from flood and/or weed control work can also result in some welcome native plants coming up.

Use all your senses. For example, the smell of the weeds Lantana and Camphor Laurel is distinctly different to that of their native counterparts.



Managing weeds on your riverbank: where do you start?

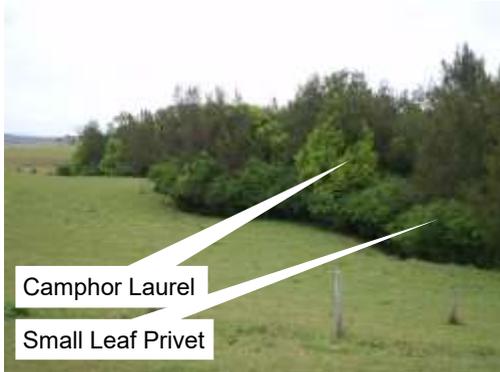
Every property needs to be assessed on a site by site basis—every site on the river (regardless of which river it is) will have different factors to consider when making decisions about where to start weed control and how to go about it. These factors include:



Track to the river's edge



Small Leaf Privet on
a very steep bank



Camphor Laurel

Small Leaf Privet

Where do you access your river most of the time? Is it the track heading to your pump? Your swimming hole? Or where you go fishing? This might be a good spot to start as you will be able to keep an eye on your progress and hand pull weed seedlings as they emerge.

The soil type and slope. Is the soil sandy, loam, clay, gravel, rock or a combination of these? The stability of the ground will help determine how many of the weeds you take out each time and what method you use. If the ground is unstable, taking a small percentage of the weeds out at a time in a staged approach would be better than taking them all out at once. This will give ground covers a chance to establish before you remove the next lot of weeds.

The type of weeds. If you have only a few of one type of weed and massive amounts of another, it would be a good strategy to focus on removing the small amount of weeds before they become established. For example, target a few Camphor Laurel trees, before tackling large numbers of Small Leaf Privet and Lantana.

Managing weeds on your riverbank: some questions to answer



What do you want to achieve? Develop a vision that best represents what your riverbank could look like. You can do this by looking around the local area for intact riverbank vegetation (see examples above and Page 1).



What is your available time and money? For a small annual investment you can achieve a great deal with a professional bush regeneration team. Government grants are another option. Contact your local Landcare Office for further information on available grants.

Do you need to replant native vegetation or will natural regeneration suffice? Clearing a lot of weeds will need diligent follow up of regrowth for both annual and perennial weeds. Weed regrowth can be disheartening but is a natural response after a weed canopy has been removed.

Seek the advice/feedback of a knowledgeable person, preferably from your area, such as a local Landcare member or Landcare Officer, or join a local Landcare group.

When you do start removing weeds, start small, slow and steady.

Give it a season to see how much follow up work is involved.

Weed control methods—woody weeds



Small Leaf Privet—hand pulled seedlings hung in a tree



Small Leaf Privet—cut and paint stump with herbicide (glyphosate)



Small Leaf Privet—for large plants, drill and inject herbicide (glyphosate)



Small Leaf Privet—for large plants, cut frill with a hatchet then paint herbicide into cut



Targeted spraying of Cat's Claw Creeper among flood debris using a back pack herbicide sprayer



Brush cutting and spraying Lantana when there are no native ground covers or seedlings

Reshooting of natives after weed control



New shoots are appearing on native vegetation (Water Gum, *Tristaniopsis laurina*) after the mid canopy of the weed Small Leaf Privet has been removed



A bottlebrush (*Callistemon viminalis*) reshooting after the privet weed canopy has been removed

Be safe when working on the river bank

- Flood debris in trees can be dangerous to work under, always look above you to check for hazards before commencing work.
- Always wear protective clothing when using herbicides.
- Protective eye wear is necessary when undertaking bush regeneration, particularly when working with lantana.
- Only use herbicides in accordance with instructions on the label.
- If hand pulling weeds, face down hill and pull **up** the bank towards you, to avoid falling backwards down the bank if the roots suddenly give way.
- Educate yourself about the risks of ticks. Bush regenerators are reporting positive benefits from wearing permethrin treated clothing.



Flood debris left in the canopy can be a hazard when working underneath, particularly in windy weather

Managing flood debris



Flood debris is a natural part of our river systems and is deposited in different locations depending on flood heights and where the backwaters or eddies are.

Managing flood debris becomes an issue when debris is dumped on tracks, roadways and on fences.

Flood debris piles can play an important function as a carbon load in the river and may be picked up and washed into the stream during subsequent river rises or floods, becoming habitat for in-stream fauna.

Riparian vegetation is not fire tolerant. Piles should not be burnt if debris is against or near native riparian vegetation.

Managing weeds is often necessary on flood debris racks.

Leaving flood debris on your riverbank will increase valuable humus and nutrients in your soil if it gets a chance to breakdown before the next flood.



The photos above show flood debris covering native vegetation



Privet seedlings germinating in flood debris



Burning of flood debris is not recommended

Threatened species of the Nymboida River system



Eastern Freshwater Cod (*Maccullochella ikei*) - nationally Endangered Species

It is important that the diversity of all the plants and animals of our river systems are managed sustainably.

Recognising if threatened species are present is important as extra care will need to be taken when undertaking weed control and making decisions about clearing for fencing or access tracks.



Triplarina imbricata



The Masked Owl (*Tyto novaehollandiae*) nests in tall eucalypt tree hollows on the riverbank



The Rufous Bettong (*Aepyprymnus rufescens*) makes a grass cone-shaped nest in stands of long grass



Brush sauropus (*Phyllanthus microcladus*)

Further reading

An aquatic ecosystem health check for the Clarence (Clarence Valley Council 2014)

Clarence Connect newsletter (WetlandCare Australia 2009)

Clarence River Floodplain & Estuary Native Plant Species

Clearing of Land-Your Legal Responsibilities (NSW Office of Environment & Heritage 2010)

Controlled activities—guidelines for riparian corridors (NSW Office of Water 2011)

Fixing fish habitat in the Clarence estuary (NSW Department of Primary Industries 2005)

Growing Lomandra from seed—a step by step guide for landholders (Bellinger Landcare 2010)

Living & working on a riverbank (NSW Department of Primary Industries)

Mid-Lower Clarence River Riparian Plants Nambucca Valley Vegetation & Planting Guide (Nambucca Valley Landcare 2012)

Orara River Rehabilitation Project Landholder Booklet (Coffs Harbour Regional Landcare 2012)

Riparian Action Strategy (Clarence Valley Council 2010)

Riparian Corridors. A.M.Ridgway, A.M. & Foley, M. 1999

River Landscapes:

Fact sheet 1—Managing riparian land

Fact sheet 2—Streambank stability

Fact sheet 3—Improving water quality

Fact sheet 4—Maintaining in-stream life

Fact sheet 5—Riparian habitat for wildlife

Fact sheet 6—Managing stock

Fact sheet 7—Managing woody debris in rivers

Fact sheet 8—Inland rivers and floodplains

Fact sheet 9—Planning for river restoration

Fact sheet 10—River flows and blue-green algae

Fact sheet 11—Managing phosphorus in catchments

Fact sheet 12—Riparian ecosystem services

Fact sheet 13—Managing riparian widths (Land & Water Australia 2002—2005)

Stock and waterways—a manager's guide (Land & Water Australia 2006)

Threatened Species of the Upper North Coast of New South Wales—Flora (NSW National Parks & Wildlife 2002)

Weeds Management Guide—Cat's claw creeper (CRC Weed Management 2008)

Weeds of the North Coast of NSW—a guide to identification and control 2013. (Coffs Harbour Regional Landcare)

Internet resources for plant identification

Royal Botanic Gardens, Sydney

<http://plantnet.rbgsyd.nsw.gov.au/search/simple.htm>

Contact us



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