

Riparian revegetation guide for the lower Macleay River



Macleay River near Bellbrook

Where Land and Water Meet

Riparian zones are where land and water meet on the margins of rivers, creeks and wetlands. This zone expands during floods and may include connecting floodplains, back swamps and channels. Temporary water bodies such as gullies or wetlands that periodically dry, are considered riparian zones as well as artificial structures such as dams and drains. Riparian zones are important features of our landscape and therefore require special management. Use this guide to choose the right species for *your* riparian zone.

Riparian
vegetation
is adapted
to the ever-
changing
nature of rivers



Macleay
Landcare
Network Inc.

Why are Riparian Zones so important?

Riparian zones maintain biodiversity in the landscape. The natural corridor of vegetation links upper catchment streams to low land rivers, estuaries and the marine environment. Their natural regimes of erosion, deposition, floods and droughts results in an enormous range of habitats. The vegetation in and along water courses play a key role in providing:

- Stream bank strength and erosion protection
- Terrestrial and aquatic habitat
- Wildlife corridors across the landscape
- Filtering of sediment and nutrient run-off from adjacent land
- Temperature and light control

Land that Requires Special Management

The interaction between water and land produces a wide variety of habitats that support a broad range of plants and animals. Riparian land is valuable for farming due to fertile soils and access to water. It can be under pressure from urban development, flooding and weed encroachment. Careful management by individuals and cooperating neighbours to address weeds, erosion and stock access is critical in the long term protection of biodiversity and economic productivity.

Before starting any revegetation work it is important to address bank or channel erosion issues. If your stream bank is unstable contact your local Landcare Office or Natural Resource Management agency for information and support.

Using this Revegetation Guide

This planting guide lists the riparian plant species that naturally occur in the fresh water reaches of the lower Macleay River catchment. The plant species have been grouped according to where they naturally occur within the catchment and where they are positioned on the river bank. Please note that species identified with one or more * require special consideration.

To maintain the genetic integrity and biodiversity of your revegetation area it is advisable to plant species that are already present in your river system. You can contact your local Natural Resource Management agency to help with plant identification. In locations where riparian vegetation is poor or absent use the guide to identify species appropriate to your stream system and source seeds or seedlings that are of local origin.

Planning your Revegetation Project

1. Be sure of your goals and level of commitment to your revegetation as it takes around 2 years for your plants to care for themselves.
2. Choose appropriate species for your stream system and position on the bank profile. Early colonising species such as River Oaks or wattles create quick

protection in exposed sites. Consider what already grows there, frosts, exposure or poor drainage at your site.

3. Determine your planting methods. Landcare has planting equipment you can borrow.
4. Place an order with your local native seedling nursery for seedlings and/ or collect local seed and grow seedlings yourself. Allow at least 3-5 months for plants to grow, or longer for long stem seedlings.
5. Plan when to plant the seedlings and be prepared to water them if necessary. Plan to plant between November and April to avoid frosts and dry Spring conditions in the Macleay valley.

Planting Seedlings with Success

Hand planting seedlings is the recommended method for river banks as it is low impact and safe. Planting tools such as Potti Putkis and Hamilton planters may be used to plant many seedlings efficiently, particularly in pre-ripped trench lines or soft moist soils. A hand auger or motorised auger can be used to deeply plant long stem tubestock.

The following steps will help you to increase the successful establishment of your hand planted seedlings:

- prepare the whole site by addressing threats or competitive factors such as grasses, weeds or rabbits.
- rake away the cover of mulch to expose the soil beneath.
- dig a hole at least twice the size of the tube or pot.
- roughen up any smooth sides of the hole, especially if an auger has been used.
- fill the hole with water and allow to drain.
- If using, add slow release fertiliser and wetting agent to bottom of hole, and mix with some soil. Ensure plant roots do not directly touch these additions.
- Plant seedlings just below the soil level, back fill with existing soil, covering the top of the potting mix.
- Replace mulch around the seedling and supplement with clean mulch if required. Keep mulch away from the base of the seedling.
- Place tree guard and/ or identification stake if using.
- Water in thoroughly using diluted Seasol to lessen transplant shock.
- Observe and maintain your seedlings regularly after planting.

Paint the end of a long and sturdy bamboo stake to help you identify where your seedlings have been planted. Put the strongest end of the stake into the ground.



Maintenance

Maintenance is essential. To achieve a reasonable survival rate for your seedlings you must allocate time and resources to water seedlings in dry times, brush cut or herbicide smothering grasses, fix fences or put into place a control program for browsing hares and rabbits. As experienced landholders say 'planting seedlings is easy, maintaining them is the challenge.'

Riparian Zone Buffer Widths

The width of a riparian zone is often determined by the adjacent land use, however best results arise from the widest zone possible. At a minimum it is recommended that a vegetated riparian zone extends horizontally at least three times the height of the stable river bank. At this width

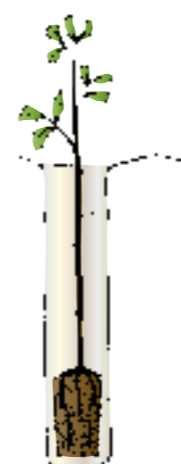
the riparian vegetation is more effective at protecting the river bank from slumping and erosion during and after floods. It is important to remember that alluvial river banks naturally erode and a wider riparian zone may be needed to accommodate natural bank retreat particularly on the outside of a river bend.

When locating a new fence, consider leaving at least a slasher width between the vegetation and the fence for maintenance purposes. Landholders who set back their fence lines to higher ground reap the benefits of lower fence maintenance costs after floods, efficient and safer stock handling, and a river side paddock they can occasionally crash graze for weed control and drought relief.

Certainly, wider riparian buffers zones have greater ecological value as the vegetation is more robust and can resist the 'edge effect' of weed invasion.

1. Revegetation Using Seedlings

When buying seedlings off the nursery bench look for plants that are green, vibrant and healthy. They should not be pale, leggy or pot bound (gently pull the plant from the pot to check the roots- they should run the length of the pot only and not wrap around).



Long Stem Tubestock

Most native riparian tree species can be grown as a long stemmed seedling. This type of seedling is grown in a special mixture of potting mix and fertiliser over a longer timeframe. Nurseries require about 12 months to grow this type of seedling so you need to plan and order early. Long stem tubestock are more expensive to buy and plant compared to standard forestry tubestock however they are more likely to survive floods and drought conditions as they are planted deeply into the soil profile where their roots take hold in the moist conditions. Roots also grow from buds along the stem and provide the plant with additional anchoring. A hand or motorised auger may be used to plant these seedlings. It is very important to pre-water the hole and back fill the hole well to ensure root contact with soil.



Photo © Jamie Locke

2. Directing Seeding

Seeds from Bottlebrush, Tea Tree, River Oak, Lomandra and Water Gum may be directly sown on site. Seeds must be taken from healthy trees and used immediately or must be stored in a cool, dark place. This method requires substantial site preparation so that the seeds are sown on a moist, warm and weed-free surface. To direct seed, scrape the soil surface to remove weeds and mulch and then rake the soil to prepare a seed bed. Small seeds can be mixed with a bulking agent such as sand and then hand broadcast. Gently tamp the surface for fine seed or rake then tamp the soil for larger seed.

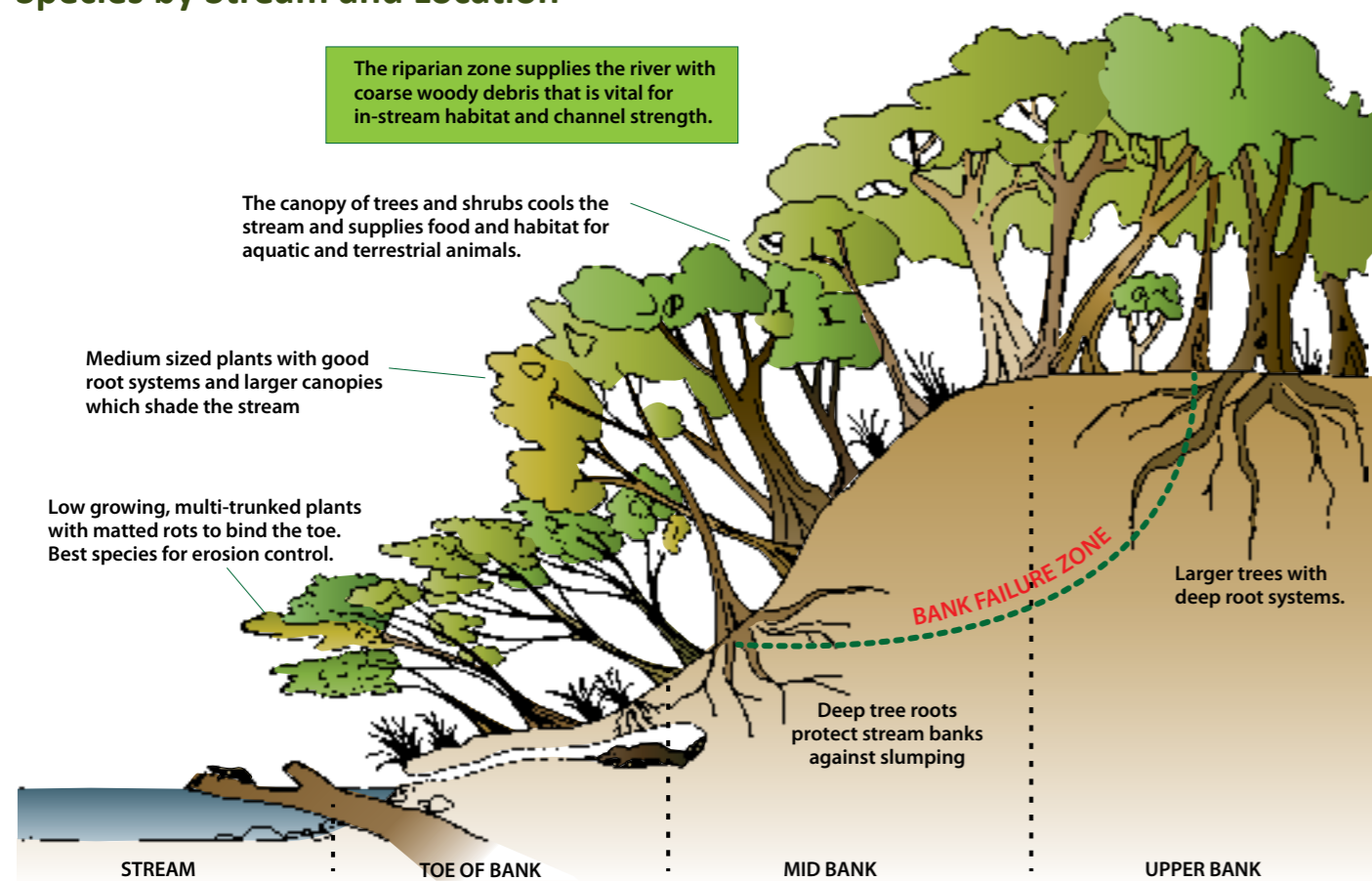
3. Division or Direct Transplant



Mature clumps of Lomandra or River Grass may be dug up, divided (with a handsaw) and directly transplanted to moist soil, sand or gravel.

Seedlings of Bottlebrush and Tea Tree can also be directly transplanted from site to site. Trim back the leaves or stem of the plant and water with diluted Seasol to reduce transplant shock.

Species by Stream and Location



Stream	Toe of Bank	Mid Bank	Upper Bank
Spacing your seedlings	0.5m- 1m apart	1- 2m apart	2m+ apart
Streams in the central part of the catchment: Macleay River, Wabro Brook, Dyke River, Georges River, Five Day Creek, Nulla Nulla	<i>Callistemon viminalis</i> ** <i>Casuarina cunninghamiana</i> <i>Lomandra hysterix</i> <i>Lomandra longifolia</i> <i>Melaleuca bracteata</i> <i>Potamophila parviflora</i>	<i>Acacia melanoxylon</i> <i>Alphitonia excelsa</i> <i>Casuarina cunninghamiana</i> <i>Ehretia acuminata</i> <i>Euroschinus falcata</i> <i>Ficus coronata</i> <i>Glochidion ferdinandi</i> <i>Hymenosporum flavum</i> <i>Mallotus philippensis</i> <i>Melaleuca bracteata</i> <i>Melia azedarach</i> <i>Strebulus brunonianus</i> <i>Syzygium australe</i>	<i>Acacia diphylla</i> <i>Acacia fimbriata</i> <i>Angophera subvelutina</i> <i>Eucalyptus amplifolia</i> <i>Eucalyptus tereticornis</i>
Streams in the eastern part of the catchment: Parabell/ Toorumbie Creek, Mungay Creek, Dungay Creek, Hickeys Creek, lower Macleay River	<i>Acmena smithii</i> (creek form) <i>Callistemon viminalis</i> ** <i>Casuarina cunninghamiana</i> <i>Casuarina glauca</i> * <i>Leptospermum brachyandrum</i> <i>Lomandra hysterix</i> <i>Lomandra longifolia</i> <i>Melaleuca bracteata</i> <i>Phragmites australis</i> * <i>Potamophila parviflora</i> <i>Tristaniopsis laurina</i>	<i>Acacia melanoxylon</i> <i>Acmena smithii</i> (creek form) <i>Alectryon subcinereus</i> <i>Alphitonia excelsa</i> <i>Aphananthe philippinensis</i> <i>Backhousia myrtifolia</i> <i>Callistemon salignus</i> * <i>Casuarina cunninghamiana</i> <i>Cryptocarya obovata</i> <i>Ehretia acuminata</i> <i>Elaeocarpus obovatus</i> <i>Ficus coronate</i> <i>Glochidion ferdinandi</i> <i>Guioa semiglaucula</i> <i>Mallotus philippensis</i> <i>Melaleuca bracteata</i> <i>Melia azedarach</i> <i>Strebulus brunonianus</i> <i>Syzygium australe</i>	<i>Acacia diphylla</i> <i>Acacia irrorata</i> <i>Acacia melanoxylon</i> <i>Angophera subvelutina</i> <i>Eucalyptus grandis</i> <i>Eucalyptus tereticornis</i> <i>Melia azedarach</i> var. <i>australasica</i>
* poorly drained sites such as Seven Oaks ** only plant on streams where it is already present			

Riverbank Plants Native to the Lower Macleay Catchment

Height refers to the maximum height in an open situation. Some species may grow taller in protected areas.

Frost resistant refers to the frost resistance of newly planted seedlings. 1 = none or very little frost resistance, 2 = some resistance (light frosts), 3 = frost resistant

Protection when young 1 = plant requires watering and protective canopy of taller plants, 2 = may require some watering and protection in exposed sites, 3 = requires no protection.

RF = abbreviation for Rainforest, ~ indicating key erosion control species

Common and Botanical Name	Description	Max height	Fast growing	Protection	Frost resistant	Other uses and comments	Wildlife value
Grey Wattle <i>Acacia diphylla</i>	Erect or spreading tree with bluish green phyllodes, pale yellow flowers and fissured, dark grey bark. Hardy.	8	Y	3	3	May be used as a screen or windbreak.	Attracts insect eating birds
Fringed Wattle <i>Acacia fimbriata</i>	A bushy shrub or small tree with a weeping habit and pale yellow flowers. Hardy.	6	Y	3	3	Useful windbreak species or screen plant.	Attracts insect eating birds
Green Wattle <i>Acacia irrorata</i>	Small, fern-leaved wattle with pale yellow flowers. Very hardy.	6	Y	3	3	Good canopy species for protecting RF plantings.	Attracts insect eating birds
Blackwood <i>Acacia melanoxylon</i>	Medium sized bushy wattle with pale yellow flowers. Very hardy	10	Y	3	3	Useful buffer tree for protecting streamside and RF plantings.	Seeds attract birds
Lilly Pilly <i>Acmena smithii</i>	Medium sized RF tree with dense habit and pink to purple fruit.	10		2	2	Some forms make useful windbreaks if given sufficient water.	Fruit attracts birds
Wild Quince <i>Alectryon subcinereus</i>	Medium sized RF tree with a dense crown. Often bushy to the ground.	8		2	2	Useful RF regeneration species. Timber suitable for small turnery.	
Red Ash <i>Alphitonia excelsa</i>	Medium sized tree with some drought tolerance. Leaves have a white underside. Hardy.	12	Y	3	3	Timber suitable for building or cabinetwork. Stock forage tree. Good RF regeneration tree.	Seeds attract birds
Rough-barked Apple <i>Angophora floribunda</i>	Medium to tall rough barked tree with narrow leaves and characteristic gnarled, or twisted growth. Hardy.	18	Y	3	3	Often retained on farms as a shade tree. It is a useful pollen tree for bees.	Provides nesting sites for birds
Broad-leaved Apple <i>Angophora subvelutina</i>	Medium to tall rough-barked tree with broad leaves and characteristic gnarled or twisted growth. Hardy.	18		3	3	Often retained on farms as a shade tree. It is a useful pollen tree for bees.	Provides nesting sites for birds
Rough-leaved Elm <i>Aphananthe philippinensis</i>	Small to medium sized RF tree with stiff Elm-like leaves and dense, dark crown. Hardy.	12		2	2	Timber hard and suitable for handles. Edible fruit. Useful RF regeneration species.	Fruit attracts birds
Grey Myrtle <i>Backhousia myrtifolia</i>	Slow growing bushy RF tree with some drought tolerance. Usually founds on steep, rocky banks. Hardy.	8		2	2	Screen plant. Timber hard and tough and suitable for handles.	Good host for orchids and ferns
Mountain Banksia <i>Banksia integrifolia</i>	Small tree with olive green leaves with a bright white under-surface. Pale yellow flowers in Autumn. Hardy.	10	Y	3	3	This banksia is used for landscaping and screen plantings.	Attracts honeyeaters
Willow Bottlebrush~ <i>Callistemon salignus</i>	Small tree with papery bark, pink new growth and white bottlebrush flowers. Very hardy.	6	Y	3	3	Good wind break species. Grows in a wide range of soils including poorly drained sites.	Flowers attract honey eaters
Weeping Bottlebrush~ <i>Callistemon viminalis</i>	Multi-stemmed tree with hard furrowed bark and red bottlebrush flowers. Very hardy.	5	Y	3	2	Excellent erosion control species. Used for direct seeding.	Flowers attract honey eaters

Common and Botanical Name	Description	Max height	Fast growing	Protection	Frost resistant	Other uses and comments	Wildlife value
River Oak~ <i>Casuarina cunninghamiana</i>	Tall, pine-like species. A colonising river species that plays a role in the natural recovery of eroding river systems by binding gravels and encouraging deposition.	20	Y	3	3	Fixes nitrogen. Good canopy species for RF regeneration. Direct seeding. Seek technical advice for management in rivers. Used for drought fodder.	Larger, Older trees used for roosting sites
Swamp Oak <i>Casuarina glauca</i>	Medium, pine-like species. Common on poorly drained sites or brackish rivers.	15	Y	3	3	Fixes nitrogen. Useful drought fodder. Direct seeding.	Larger, older trees used for roosting sites
Pepperberry <i>Cryptocarya obovata</i>	Medium to tall densely crowned RF tree with hairy new growth and dark leaves.	18		1	1	Good shade tree.	Fruit attracts birds
Koda <i>Ehretia acuminata</i>	Medium-sized RF tree. Deciduous with grey fissured bark and masses of orange fruits in Summer/ Autumn.	10		2	2	Fruits are ornamental.	Fruit attracts birds
Hard Quandong <i>Elaeocarpus obovatus</i>	Tall RF tree tolerant of wet soils. Hardy. Produces masses of small blue fruits.	15		2	2	Useful timber tree for interior work. Shade tree.	Fruit attracts birds
Cabbage Gum <i>Eucalyptus amplifolia</i>	Medium to tall Eucalypt with near-smooth, white bark usually with grey patches. Saplings have very large leaves. Hardy.	25	Y	3	3	Useful shade tree. Medium importance as a pollen source for beekeepers.	Flowers attracts birds. Habitat tree
Flooded Gum <i>Eucalyptus grandis</i>	Very tall Eucalypt with striking smooth, white bark. Often grows on alluvial floodplains.	40+	Y	3	2	Good hardwood timber for light construction. Good pollen tree.	Flowers attract birds. Habitat tree
Forest Red Gum <i>Eucalyptus tereticornis</i>	A medium to tall Eucalypt with patchy, white-greyish bark. Often grows on alluvial floodplains. Very hardy.	30	Y	3	3	Timber suitable for heavy construction and fencing. Good shade tree. Useful pollen source for bees.	Koala food tree
Ribbonwood <i>Euroschinus falcatus</i>	Medium sized RF tree with compound leaves, dark brown finely scaly bark. Black fruit produced in summer.	15	Y	2	2	Sometimes used as a secondary pioneer for rainforest regeneration.	Fruit attracts birds
Creek sandpaper Fig~ <i>Ficus coronata</i>	Small bushy tree with sandpapery leaves and hairy fruits produced on the trunk and branches. Hardy.	6		2	2	Excellent riparian species for erosion control and habitat value. Edible fruit	Fruit attracts birds
Cudgerie <i>Flindersia schottiana</i>	Tall, slender tree with pale smooth bark. Dense canopy and spray of white flowers in Summer. Fruit are woody pods with winged seeds.	20	Y	2	2	Fast growing pioneer species good for RF regeneration. Wood used for cabinet making and indoor fittings.	Fruit attracts birds
Cheese Tree <i>Glochidion ferdinandi</i>	Small to medium RF tree with spreading canopy and attractive foliage. Fruit looks like small cheeses. Hardy.	10		2	2	Excellent riparian regeneration species and small shade tree.	Fruit attracts birds
White Beech Gmelina leichhardtii	Medium semi-deciduous RF tree with greyish bark and white/ purple clustered flowers turning to bluish purple fruit.	30	Y	2	2	Good for RF regeneration. Specimen tree for gardens. Timber suitable for house construction, flooring and cabinet making.	Fruit attracts birds
Guioa <i>Guioa semiglauc</i>	Small RF tree. Leaves with silvery underside. Hardy.	10		2	2	Attractive tree for landscaping. Useful for rainforest regeneration.	Fruit attracts birds
Native Frangipani <i>Hymenosporum flavum</i>	Small RF tree producing numerous yellow and white flowers in Spring. Hardy.	10	Y	3	3	Useful species for rainforest regeneration.	Flowers attract birds

Common and Botanical Name	Description	Max height	Fast growing	Protection	Frost resistant	Other uses and comments	Wildlife value
Thin Fruited Tea Tree~ <i>Leptospermum brachyandrum</i>	Small, multi-trunked tree. Flexible and able to withstand flooding. The bark peels in Spring turning from a copper colour to white. Very Hardy.	4	Y	3	3	Excellent for erosion control. Can be used for direct seeding.	Good habitat species for shading stream edge
Spiny Mat Rush~ <i>Lomandra hystrix</i>	Small, tussocky rush forming thick clumps or continuous fringing bank vegetation. Hardy.	1		3	3	Excellent for erosion control if planted in sufficient density due to large spreading root system. Direct seeding.	Good stream edge habitat species
Spiny Mat Rush~ <i>Lomandra longifolia</i>	Small, tussocky rush forming thick clumps. Hardy. Grows in more open, drier areas than <i>L. hystrix</i> .	1		3	3	Good for erosion control if planted in sufficient density due to large spreading root system.	Good stream edge habitat species
Red Kamala <i>Mallotus philippensis</i>	Small bushy, densely crowned RF tree producing hard red capsules in Spring/ Summer. Very hardy.	8		2	2	Useful rainforest regeneration plant. Fruit can be used for dye. Wood suitable for tool handles.	Flowers attract honey eating birds
White Cloud Tree~ <i>Melaleuca bracteata</i>	A tall, bushy shrub or small tree with small linear leaves, hard furrowed bark and numerous white, brush flowers in Summer.	6		3	3	Useful screen and wind break species. Can be direct seeded.	Flowers attract honey eating birds
White Cedar <i>Melia azedarach</i>	Very hardy deciduous tree producing yellow fruits in autumn/ Winter. Drought tolerant.	15	Y	3	3	Timber used for cabinet and decorative work.	Fruit attracts birds
Common Reed <i>Phragmites australis</i>	Tall, bamboo-like reed which usually grows partly submerged on stream edges.	2	Y	3	3	Used for nutrient uptake in wetlands. Can be used as fodder for cattle.	Used as habitat by wetland birds
River Grass <i>Potamogeton parviflor</i>	Dense, tussocky grass that occurs on larger rivers. Usually growing within the stream.	1.5		3	3	Excellent erosion control species. Can be easily grown by division of mature plants.	In-stream habitat
Whalebone Tree <i>Streblus brunonianus</i>	Small to medium RF tree with glossy, toothed leaves, wiry branches and small green fruits in Summer/ Autumn. Slow growing.	8		2	2	Hardy rainforest understorey tree. Has a dense, compact form when planted in the open.	Fruit attracts birds
Brush Cherry <i>Syzygium australe</i>	Small, dense crowned RF tree with dark green leaves and red fruits from Summer to early Winter.	10		2	2	Edible fruit. Good riparian RF regeneration species.	Fruit attracts birds. Good host for ferns.
Water Gum~ <i>Tristanopsis laurina</i>	Medium sized tree with light flaky bark and yellow flowers produced in summer. Hardy.	10	Y	2	2	Useful erosion control species and some value for cabinetwork, useful nectar and pollen species. Used for direct seeding.	Roots provide habitat for stream dwelling animals.



Planting seedlings



Lomandra hystrix



Water Gum seed



Lomandra hystrix



Macleay River at Sherwood

Local Support Services		
Macleay Landcare Network Inc	19 Sea Street, West Kempsey Ph: 6562 2076 admin@macleaylandcare.org.au macleaylandcare.org.au	Restoration, revegetation, plant supplier information. Planting equipment. Project support and advice, Landcare membership, property visits, technical support and funding opportunities.
North Coast Local Land Services	83 Belgrave Street, Kempsey NSW 2440 Ph: 6563 6700 admin.northcoast@lls.nsw.gov.au www.northcoast.lls.nsw.gov.au	Information regarding riparian revegetation, river management planning, erosion control, in-stream works permit advice, weed management.
Kempsey Shire Council	22 Tozer Street, West Kempsey Ph: 6566 3200 ksc@kempsey.nsw.gov.au www.kempsey.nsw.gov.au	River, estuary and wetland management, noxious weed advice.
Local Nurseries and Suppliers		
Gone Native	Jamie and Amanda Locke Crescent Head area Ph: 0428 326 992 jamie@gonenative.com.au	Native provenance seedlings, long stem tubestock, seed collection, contract planting and site maintenance, bush regeneration. Indigenous business.
Grassy Head Nursery	Grassy Head Nursery Trust (volunteer run) Via Grassy Head caravan park & day use area Ph: 0499 166 375 Tuesday and Friday	Small range of local provenance riparian and rainforest tubestock seedlings. Also stock a broad range of coastal species.
Bush and Blossoms Environmental Services	Sonja and Gerold Bosch East Kempsey Ph Gerold: 0406 241 936 Sonja: 0410 836 890 Sonja: spaarky@hotmail.com.au Gerold: gobosch@hotmail.com.au	Natural area restoration including; bush regeneration, spraying, supply of native provenance tubestock (all sizes), contract planting/watering & ongoing site maintenance, landholder assistance with grant applications.
North Coast Natives	Alan Kaali Eungai area Ph: 0401 186 188	Native provenance tubestock seedlings.
Northern Nursery Suppliers	Graham and Liz McPherson 14-16 Nance Road Kempsey (Industrial area) Ph: 6563 1599 http://northernnurseriesupplies.com.au	Tree guards, bamboo stakes, weed mats, pots, potting mix, mulch, herbicides, fertilisers, soil amendments.
Rivendell Rainforest Nursery	John Van Pierce 1214 Gowings Hill Road, Sherwood Ph: 6566 9197 (by appointment)	Native provenance seedlings and seed collection.

Macleay Landcare would like to acknowledge the generous support that the organisations and local businesses listed above provided in the preparation of this guideline.

For additional revegetation and riparian zone management information and resources go to:

1. Local Landcare projects, events, local contractors and suppliers www.macleaylandcare.org.au
2. A comprehensive collection of resources regarding revegetation including site preparation, seed control, seed collection, propagation, direct seeding, tubestock planting www.florabank.org.au
3. Long stem tubestock growing and planting guide www.australianplants.org
4. Natural resource and property management information www.northcoast.lls.nsw.gov.au
5. Easy to use weed identification tools www.weeds.org.au



Thin Fruited Tea Tree seed

