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Regional ecosystems: **Riparian**

RE 12.3.7

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RE 12.3.7

Queensland blue gum and river oak fringing woodlands

Mention of the word 'creek' in South East Queensland conjures up images of tall trees casting dappled shade over languid water. The ground would be covered in the 'needles' of River Oak (*Casuarina cunninghamiana subsp. cunninghamiana)* and the branches and bright red flowers of Weeping Bottlebrush *(Melaleuca viminalis)* would arch out over the water. Steep banks with the kind of dark, loamy soil envied by gardeners would complete the picture. These are some of the quintessential elements of Regional Ecosystem (RE) 12.3.7.

This RE occupies a unique location within the landscape, growing alongside creeks or bordering swamps and billabongs, and it is sustained by ready access to ground water. It is most commonly seen as a narrow band of retained vegetation meandering across rural floodplains. However, it persists in built up environments as well.

RE 12.3.7 is fringing forest, which means that it runs along the edge of waterways, or riparian (littoral) areas. It is dominated by Queensland Blue Gum (*Eucalyptus tereticornis*), River Oak and Weeping Bottlebrush.

The vegetation of RE 12.3.7 plays an important role in maintaining the stability of creekbanks by binding together the soil around tree roots and thus reducing soil erosion. Fringing vegetation also provides a sheltered oasis for wildlife and water-loving plants in otherwise dry landscapes.

Regional Ecosystems, or REs for short, are used in Queensland to describe native vegetation types based on where they grow, the plant species in the tallest layer and the underlying geology. There are about 150 different REs in SEQ, all of which have a unique three-part number usually starting with '12'.

For more information on REs visit www.qld.gov.au/environment/plants-animals/plants/ecosystems

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Distribution

RE 12.3.7 is confined to stream channels and banks as well as the edges of billabongs and other depressions on alluvial plains that hold water after heavy rain. Stream channels in the SEQ region typically comprise the bed, where flow of water normally occurs, and a fringing levee (on one or both sides of the channel) that are flattish but raised slightly above the bed – these areas are generally fairly narrow and inundated by flooding. The channel is enclosed by banks which in turn are flanked by alluvial plains.

The species that are present along streams, for example River Oak, usually start to occur where gullies merge to form larger definable watercourses (stream order 2 or 3). Many of the streams on which the RE is present are perennial or have water present for periods after rain.

RE 12.3.7 is often the only retained ecosystem in agricultural areas tracing the course of rivers and streams across the landscape, seen above as the dark line of trees in the middle of the picture.

Variations and similarities

The vegetation that makes up RE 12.3.7 forms a narrow ribbon. The main type (RE 12.3.7) occurs within stream channels. There are also four sub-types, three of which are confined to the edges of billabongs and depressions on floodplains rather than stream channels.

RE 12.3.7 contains a mix of different vegetation that reflects the proximity to the stream bed and access to groundwater. The low-lying levees fringing the stream bed within the channel have a mix of tall trees of River Oak, Queensland Blue Gum and Black Tea-tree (*Melaleuca bracteata*) in places. Other tree and shrub species are present in lower densities. Examples include Broad-leaved Apple (*Angophora subvelutina*), Creek Sandpaper Fig (*Ficus coronata*), Black Bean (*Castanospermum australe*), Brown Laurel (*Cryptocarya triplinervis*) and Brush Cherry (*Syzygium australe*). The trees can be quite densely spaced and there may be a narrow fringe of Weeping Bottlebrush or less frequently, Weeping Satinash (*Syzygium floribundum*) along the edge of the stream bed. This fringing strip is usually just one tree wide and trunks and branches tend to lean out over the creek bed, casting shade over waterholes.

The vegetation changes where the stream banks start to rise. Here it tends to become more open. Queensland Blue Gum is often the main tree along the banks. Other trees that may be present include Moreton Bay Ash (*Corymbia tessellaris*), Broad-leaved and Rough-barked Apple (*Angophora floribunda*) and individuals or small clumps of rainforest species eg. Red Kamala (*Mallotus philippensis*), Black Bean, Silky Oak (*Grevillea robusta*). In the channel, River Oak often colonises gravel (cobble) beds deposited by floods. The ground layer is usually fairly open especially where there is dense shade. It is made up of Matrush (*Lomandra hystrix*) and short creeping and spreading grasses and herbs.

RE 12.3.7c is a wetland ecosystem fringing billabongs or ox-bow lakes, formed by the changing meanders of rivers. They can be prone to weed infestation by water weeds such as Water Hyacinth (Eichhornia crassipes) and Salvinia (Salvinia molesta) as shown above.

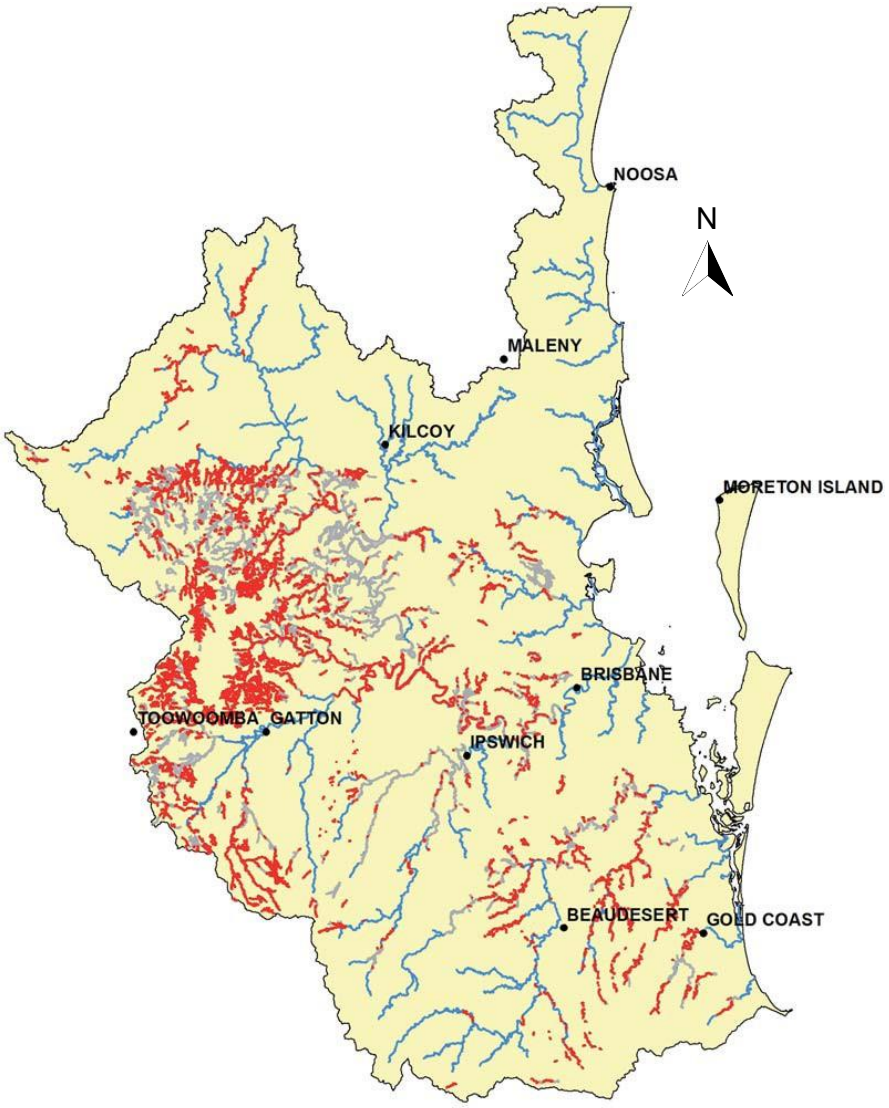
The recognised sub-types of RE 12.3.7 include:

- **RE 12.3.7a**: Black Tea-tree open-forest which grows in drainage depressions.
- **RE 12.3.7b**: Riverine wetland or fringing riverine wetland. This sub-type refers specifically to the vegetation within the bed of stream channels where the bed is wide enough to be mapped.

- **RE 12.3.7c** and **RE 12.3.7d** are referred to as palustrine wetlands and differentiate between the treed vegetation on the fringes of billabongs and ox-bow lakes (RE 12.3.7c) or around swamps (RE 12.3.7d). Queensland Blue Gum is the main species in both sub-types.

Several REs are potentially confused with RE 12.3.7:

- **RE 12.3.1** gallery rainforest which like RE 12.3.7 grows along streams. Rainforest trees (eg. Black Bean, Silky Oak) form part of RE 12.3.7 where they are often present as scattered individuals or small clumps amongst River Oak, Queensland Blue Gum etc. In contrast, in RE 12.3.1 rainforest trees are the dominant type of tree present and a mix of species form a densely closed canopy. RE 12.3.1 gallery rainforest also tends to be more predominant than RE 12.3.7 in higher rainfall parts of SEQ.
- **RE 12.3.3** Queensland Blue Gum woodland to open forest which refers to the vegetation on the alluvial plains adjacent to the banks and channel.
- **RE 12.3.8** swamps with sedges (Cyperus spp., *Schoenoplectus spp*. and *Eleocharis spp.)* The swamps that form RE 12.3.8 are naturally treeless.



Distribution map 12.3.7

The distribution and extent of RE 12.3.7 does not appear to have been substantially altered since European settlement although the condition of the vegetation has deteriorated due to the invasion of weeds, changes in land use, and flood impacts.

RE 12.3.7 can be observed along many of the streams in SEQ. The best examples are in the upper reaches at the foot of forested hills and ranges. These areas have been subject to less disturbance and weed invasion.

Pre-clearing (~180 years ago)
Today's distribution
**Map is indicative only. Due to scale, some RE occurrences may not be visible.*

Vegetation Management Act (1999) status: Least Concern
Level of Protection (extent in protected areas): Low

Regional ecosystem	Pre-clearing extent, or estimated amount ~180 years ago (hectares)	Current extent (hectares)	Percent of pre-clearing extent remaining	Amount protected in reserves (hectares)
12.3.7	104,859	53,399	51%	10,782
12.3.7a	190	36	19%	6
12.3.7b	5857	3758	64%	28
12.3.7c	335	95	28%	26
12.3.7d	22	16	73%	5

Past to present

The explorers Ludwig Leichhardt, Alan Cunningham and Major Edmund Lockyer recorded information about streams and swamps as they traversed the Moreton Bay region almost 200 years ago. They describe many species that remain familiar today. There are also some graphic accounts in their diaries of the damage to vegetation caused by floods, a reminder of the dynamic nature of riparian habitats.

The principal changes within RE 12.3.7 that are considered to have occurred since European settlement are in-fill of channels due to increased loads of fine sediments carried by run-off and the widespread presence of introduced plants.

The cleared lands surrounding RE 12.3.7 in today's landscape can often lead to increased water runoff velocities and increased sediment loads, resulting in shallower stream beds (above right). The accumulated sediment also provides suitable habitat for the establishment of many weed species.

Many occurrences of RE 12.3.7 have become subject to significant weed invasion since European settlement with introduction of new plant species to the landscape, such as this stream (right) almost exclusively lined with the introduced Chinese Elm (*Ulmus parvifolia*).

Natural values and functions

Fringing forest is a structurally diverse and biologically productive ecosystem that performs a wide range of functions at varying scales. The diversity of vegetation types (e.g. trees, herbs, grasses, sedges and vines) play a prominent role in intercepting, storing and recycling carbon, nutrients and pollutants, protecting banks from erosion, filtering and trapping sediments and regulating ground water.

Many species that grow in fringing forest are adapted to surviving floods by suckering and through specialised root systems (eg. dense shallow roots, rhizomes) that anchor plants while also binding the soil.

The vegetation provides shade, shelter and food for a broad range of fauna. RE 12.3.7 is an interface between terrestrial and aquatic habitats and contains species intimately associated with water and streams (e.g. Water Dragon, Water Rat, Platypus, turtles, frogs and waterfowl) and more mobile species that take advantage of food and shelter, particularly birds such as honeyeaters, parrots, lorikeets and kingfishers. Fringing forests are also important roosting sites for flying foxes. They are also visited by species that live in adjacent habitats to access water.

The Eastern Long-necked Turtle (Chelodina longicollis) can often be seen basking on fallen vegetation along, and within the stream edges of RE 12.3.7.

Flying foxes often colonise the vegetation along waterways of RE 12.3.7, taking advantage of the suitability of the vegetation structure, and the cooling effect of the waters below.

RE 12.3.7 is an important component of the modern SEQ landscape. The vegetation along watercourses was often retained during clearing of the surrounding lands, leaving corridors of green to provide crucial linkages and connectivity across the landscape. At the landscape scale, RE 12.3.7 provides connectivity between uplands and lowlands and between scattered remnants of vegetation along floodplains. This is of special importance for mobile species dependent on cover and shelter.

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Cats Claw Creeper (Dolichandra unguis-cati) is a major weed infesting RE 12.3.7 in SEQ, smothering the canopy trees and destroying the structure of this ecosystem.

Management

Physical and practical constraints have limited the extent to which fringing forest can be cleared for agriculture and buildings. This has resulted in the retention of an extensive linear network of fringing forest in the SEQ region. The main land uses are localised and include water extraction for irrigation, sand and gravel extraction and watering livestock.

RE 12.3.7 has features which make it susceptible to invasion by weeds. The channel is a moist environment and deep-rooted plants can access ground water. Clearing of adjacent floodplains has aided weed invasion and the linear shape of the habitat has providing a vast length of exposed edges. Seeds are transported by water, wind and by birds. A wide range of weedy species have become established, more common and widespread on channels and banks including:

- Large trees – Chinese Elm (formerly known as *Celtis sinensis*), Camphor Laurel (*Cinnamomum camphora*) and Weeping Willow (*Salix babylonica*).
- Small trees and shrubs – Lantana (*Lantana camara*), Castor Oil (*Ricinus communis*), Leucaena (*Leucaena leucocephala*) and Large-leaved Privet (*Ligustrum lucidum*).
- Vines – Cat's Claw Creeper (*Dolichandra unguis-cati*), Madeira Vine (*Anredera cordifolia*) and Balloon Vine (*Cardiospermum grandiflorum*).
- Grasses and herbs – Green Panic (*Megathyrsus maximus*).

The channels and adjacent wet areas can become choked with unwanted vegetation. Serious pests of waterways include Salvinia (*Salvinia molesta*), Hymenachne (*Hymenachne amplexicaulis*) and Para Grass (*Urochloa mutica*).

Native aquatic and semi-aquatic plants and algae become a nuisance due to excessive growth that occurs when shade is removed and where there are increased levels of nutrients and sediments.

The number of introduced species that have become established in waterways is higher in urban areas due to garden escapees and nutrient rich run-off.

Many weed species tend to establish after some form of physical disturbance such as flood damage. However, some of the more serious weeds of fringing forest invade undisturbed areas, for example Chinese Elm, Cat's Claw Creeper and Green Panic. These species have become established over extensive parts of individual streams. The species composition of the fringing forest is changing where these species have been present in high densities for a long period of time.

The control and ongoing exclusion of weeds from RE 12.3.7 is resource intensive. There has been a huge response by community groups and landholders to reversing the decline in condition through weed control, including removal of woody species, replanting and fencing of selected riparian habitat.

Cat's Claw Creeper shown here growing over Weeping Bottlebrush (Melaleuca viminalis) intertwinned with flood debris makes access for weed control difficult.

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Activities that aim to restore the ecosystem to an approximation of original condition will largely involve the removal of weeds, particularly woody weeds.

However, a reconstruction approach may be required in situations where woody native species have been removed by past disturbance. In these situations channels may have become choked with weeds and nuisance plants and in extreme cases, in-filled with silt that requires removal.

Removal of invasive trees and vines from fringing forest may require some supplementary planting. The natural regeneration of trees in RE 12.3.7 is triggered by flooding and other disturbances.

There is no pronounced change in species through time in fringing forest, such as that observed during the plant succession process in other ecological communities in the SEQ region. Consequently, planting should be relatively straightforward and all species planned for the project can be planted at the same time.

The vegetation will tend to become more complex through time as birds and floods transport seed to the site, including weeds. Ongoing weed control is therefore essential.

Fire is generally not used as a management tool on a regular basis within fringing forest. Some species present are fire sensitive and there is a risk of intense, destructive fire due to the presence of woody debris.

Fire may have a role on a one-off basis to remove dense weed growth and debris in badly degraded areas prior to restoration activities. Use of periodic cool fires may be feasible on higher stream banks to assist in maintaining an open understorey and preventing invasion by woody weeds and subsequent thickening of vegetation.

Plant species that naturally occur in RE 12.3.7 have adapted to establish quickly in the fertile alluvial soils. Young plants often survive periodic flooding events by bending with the flood waters.

An example of a watercourse where the removal of vegetation has contributing to bank instability, soil erosion and increased sediment loads in the creek.

Restoration tips

- Plan the project in detail, as some of activities that may be required such as weed control can be labour intensive and require follow up activities.
- If a reconstruction approach is required, determine appropriate species to use by observing patches that appear to be representative of fringing forest elsewhere along your stream.
- Where it is feasible, take a sub-catchment scale approach, commencing weed control at the start of infestations, gradually working downstream.
- Try to work with adjoining land managers to cover a wider area.
- Investigate what weed control techniques have been found to suit the type of vegetation that is present in your river or creek.
- If the work needs to clear sediment and debris from the stream bed, retain some snaas as these have a

Some native plants in RE 12.3.7

Trees and shrubs

Black Bean or Moreton Bay Chestnut	*Castanospermum australe*
Black Tea-tree	*Melaleuca bracteata*
Blackwood	*Acacia melanoxylon*
Broad-leaved Apple	*Angophora subvelutina*
Brush Box	*Lophostemon confertus*
Creek Satinash	*Syzygium australe*
Cheese Tree	*Glochidion ferdinandii*
Flooded Gum	*Eucalyptus grandis*
Hickory Wattle	*Acacia disparrima* subsp. *disparrima*
Kanuka Box	*Tristaniopsis laurina*
Kamala	*Mallotus philippinensis*
Maiden's Wattle	*Acacia maidenii*
Paper-barked tea-tree	*Melaleuca quinquenervia*
Queensland Blue Gum	*Eucalyptus tereticornis*
Red Cedar	*Toona ciliata*
River Oak	*Casuarina cunninghamiana* subsp. *cunninghamiana*

Rough-barked Apple	*Angophora floribunda*
Sandpaper Figs	*Ficus coronata, F. fraseri*
Silky Oak	*Grevillea robusta*
Swamp Mahogany	*Lophostemon suaveolens*
Weeping Bottlebrush	*Melaleuca viminalis*
Weeping Satinash	*Waterhousea floribunda*

Black Tea-tree

Weeping Bottlebrush

Grasses, forbs, ferns and epiphytes

Binung	*Christella dentata*
Creeping Beard Grass	*Oplismenus aemulus*
Eragrostis spartinoides	*Eragrostis spartinoides*
False Mallow	*Malvastrum coromandelianum*
Maidenhair Fern	*Adiantum aethiopicum*
Matrush	*Lomandra hystrix*
Native Glycine	*Glycine clandestina*

Pennywort	*Centella asiatica*
Phyllanthus	*Phyllanthus virgatus*
Pitted Blue Grass	*Bothriochloa decipiens*
Rough Maidenhair Fern	*Adiantum hispidulum*
Sigesbeckia	*Sigesbeckia orientalis*
Slender Flat-sedge	*Cyperus gracilis*
Vernonia	*Cyanthillium cinereum*

Vines and scramblers

Cockspur Thorn	*Maclura cochinchinensis*
Monkey Rope	*Parsonsia straminea*
Slender Grape	*Cayratia clematidea*

Tinospora	*Tinospora smilacina*
Wombat Berry	*Eustrephus latifolius*

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Information provided in the *Regional Ecosystems of South East Queensland* series provide a general guide and should not be taken to replace professional advice or a formal recommendation of land management.

Further Reading

SEQ Healthy Land & Water Ecological Restoration Framework - *www.hlw.org.au*
SEQ Land for Wildlife Notes - *www.lfwseq.org.au*
Queensland Government - *www.qld.gov.au* (search Regional Ecosystems and Planned Burn Guidelines)

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