

Regional ecosystems: Open forest & woodland



RE 12.3.3

Queensland Blue Gum woodland to open forest on alluvial plains

Regional Ecosystem (RE) 12.3.3, typified by majestic Queensland Blue Gums (*Eucalyptus tereticornis*) dotted across inland floodplains, is one of the most iconic and sought after landscapes in South East Queensland (SEQ).

These flat, grassy plains nestled in between hilly country are highly productive and extensively used to support grazing, cropping and increasingly urban settlements as the SEQ population grows. As a consequence, only small, scattered populations of Queensland Blue Gum woodlands exist over their former range, with many of the best examples now confined to watering reserves and roadside easements.

Queensland Blue Gum, the characteristic species found in RE 12.3.3, are tall trees with mottled white bark. Stands of Queensland Blue Gum are usually even aged, as germination of this species is often linked to a flood, fire or another disturbance event. Other tree species that typically grow in RE 12.3.3 include Broad-leaved Apple (*Angophora subvelutina*), Rough-barked Apple (*Angophora floribunda*), Swamp Box (*Lophostemon suaveolens*) and Moreton Bay Ash (*Corymbia tessellaris*).

Unlike many ecosystems in SEQ, most of the plant diversity in RE 12.3.3 is concentrated in a dense, grassy understorey that is highly seasonal, looking greenest in summer and browning-off in winter. There is usually no shrub or lower tree layer, especially in areas where grazing occurs.



Mature Queensland Blue Gum trees (far left) have a girth of 1.5-2 metres and often have a short stocking of dark retained bark around the base. Queensland Blue Gums (top right) have a long operculum, or 'cap' on the buds. Buds found underneath trees can help identify Queensland Blue Gums. Queensland Blue Gum trees (bottom right) have an open, spreading crown allowing sunlight to reach the grassy understorey.

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



Distribution

RE 12.3.3 only occurs on alluvial plains or creek flats that have developed over millions of years. Alluvial soils have been transported and deposited in the lower parts of the landscape, rather than developed in situ through the weathering of underlying rock.

In today's landscape, these plains may still be covered by floodwater infrequently. The main types of soils associated with RE 12.3.3 are dark cracking clays, loamy soils and texture contrast or duplex soils.

Queensland Blue Gum forests used to be common on alluvial soils across SEQ, but many have been removed to access fertile soils to support productive agricultural and horticultural industries.

Variations and similarities

In addition to the main form of RE 12.3.3, there are four recognised variations. These differences are based primarily on the depth of the alluvial soil and the relative abundance of Queensland Blue Gum and other tree species. Queensland Blue Gums prefer deep alluvial soils with access to groundwater. Where soil conditions (depth, drainage and access to groundwater) vary, other tree species better adapted to the conditions start replacing Queensland Blue Gums as the dominant species.

- **RE 12.3.3a** is limited to creek flats where the alluvial soils are higher in the catchment and slightly drier. This results in more dry-tolerant species such as Narrow-leaved Ironbark (*Eucalyptus crebra*) and Moreton Bay Ash (*Corymbia tessellaris*) growing.
- **RE 12.3.3b** is found on shallow alluvial soils towards the edges of the floodplains. Gum-topped Box (*Eucalyptus moluccana*) is more common than Queensland Blue Gum. The endangered Swamp Tea-tree (*Melaleuca irbyana*) may also occur here.
- **RE 12.3.3c** occurs on periodically water-logged soils with poor drainage and is dominated by Swamp Tea-tree.
- **RE 12.3.3d** also occurs on the margins of floodplains, similar to 12.3.3b, but differs in that the geology underlying the shallow alluvial soils is sedimentary rock. Gum-topped Box is more common than Queensland Blue Gum.



This photo shows a typical example of RE 12.3.3c, with an abundance of Swamp Tea-tee and occasional emergent Queensland Blue Gum.

Queensland Blue Gum also grows on streambanks, hillsides and ridges with fertile soils. These ecosystems have different RE codes to RE 12.3.3 because they are not on alluvial flats. Some ecosystems containing Queensland Blue Gum that are commonly confused with RE 12.3.3 are:

RE 12.3.7 which occurs within stream banks and contains dense fringing vegetation such as Weeping Bottle Brush (*Melaleuca viminalis*) and River Oak (*Casuarina cunninghamiana* subsp. *cunninghamiana*).

RE 12.3.11 which occurs in higher rainfall areas (>1000mm/year) in the eastern parts of SEQ and contains Queensland Grey Ironbark (*Eucalyptus siderophloia*), Pink Bloodwood (*Corymbia intermedia*) and Paperbark Tea-tree (*Melaleuca quinquenervia*) in swampy areas.

Distribution map 12.3.3

Historically 12.3.3 covered extensive parts of the Brisbane, Bremer, Logan and Albert Rivers and Lockyer Creek catchments west of a line approximated by Beaudesert - Ipswich – D’Aguilar Range - Kilcoy. In this area, RE 12.3.3 was generally the main type of vegetation on creek flats. There are only a few good examples of RE 12.3.3 left in SEQ with some of the larger, most intact examples being on public lands in camping and water reserves and along roadsides. RE 12.3.3 and each of its subtypes are considered ‘endangered’ under Queensland legislation. Below is an indicative map of former and current distribution of RE 12.3.3, and some places to view relatively intact examples in SEQ.

1. Brisbane Valley Highway, north of Toogoolawah

This area features some relatively mature stands of Queensland Blue Gum woodland as well as regenerating patches. Scattered ironbarks are present on the alluvial plain in places.

2. Mt Walker/Purga

This area features stands of mature Queensland Blue Gum with patches of regeneration, and good examples of 12.3.3c featuring Swamp Tea-tree in swampy depressions.

3. Bromelton, west of Beaudesert

Mature stands of Queensland Blue Gum extending across the Logan River floodplain.



■ 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: Endangered

Level of Protection (extent in protected areas): Low

	Pre-clearing extent, or estimated amount ~180 years ago (hectares)	Current extent (hectares)	Percent of pre-clearing extent remaining	Amount protected in reserves (hectares)
12.3.3	160,715	2,276	1.4%	56
12.3.3a	830	55	6.6%	0
12.3.3b	3,034	262	8.6%	0.6
12.3.3c	1,604	107	6.5%	2
12.3.3d	3,725	369	9.9%	0

Past to present

European explorers Ludwig Leichhardt, Alan Cunningham and Major Edmund Lockyer recorded how the country appeared as they travelled across the floodplains just inland of Brisbane almost 200 years ago. Their diaries and hand-drawn maps tell us that the plains were grassy and that the size and spacing of trees varied from place to place.

RE 12.3.3 is one of the most highly cleared and modified ecological communities in SEQ due to its inherent suitability for pasture, agriculture and human settlement. The few patches of older vegetation remaining are often found on road easements and watering reserves.



On the heavier soils, the country had a park-like appearance and the Queensland Blue Gum trees were widely spaced, just "one tree to the acre" according to Major Lockyer. However, much of the floodplain country is described as having a denser cover of trees.

The crowns of mature Queensland Blue Gum were relatively open, enabling sunlight to reach the ground where there was a mix of different grasses and herbaceous plants. The dominant grasses were tussock-forming species, reaching a height of 1.2 metres which made progress on foot slow and laborious. Some of the more prominent species were Kangaroo Grass (*Themeda triandra*), Queensland Blue Grass (*Dichanthium sericeum*), Scented Top (*Capillipedium spicigerum*) and Native Millet (*Panicum decompositum*).

The space between the canopy of the Queensland Blue Gum trees and the grassy understorey appears to have been open although there were patches where smaller trees of Rough-barked Apple (*Angophora floribunda*) and Broad-leaved Apple (*Angophora subvelutina*) were present. Another interesting observation is the historical presence of clumps of tall Blue-leaved Grass Trees (*Xanthorrhoea glauca*).



Queensland Blue Gum woodland has been subject to a high degree of modification since European settlement. The most obvious change is the absence of the tree overstorey in much of today's landscape. There are few patches remaining that have not been subject to some form of activity that removed trees and restricted natural regeneration to replace the trees that have been lost.

The grassy understorey of the ecosystem often remains prominent, although it has experienced some alteration in species composition due to the long history of livestock grazing.

Historically, RE 12.3.3 was highly variable with a diversity of native grasses. The spacing between trees ranged from a closely packed forest to open, grassy parkland. The grassy understorey contained many different native grasses and herbs.

Natural values and functions

Queensland Blue Gum woodland is a biologically productive ecosystem that provides food and shelter for a wide range of animals including kangaroos, wallabies, koalas, bandicoots, birds, bats, native rats and mice, reptiles and many invertebrates. Prior to non-indigenous settlement, RE 12.3.3 also supported large birds such as Emus and Bustards that are now locally extinct in SEQ.

The grassy floodplains and deep-rooted trees play a prominent role in intercepting, storing and recycling nutrients, protecting soil from erosion, reducing stream sediment loads during high intensity rainfall events and regulating ground water.

The proximity of RE 12.3.3 to seasonal or permanent water is also an important factor for fauna, whilst the open nature of the ecological community enables ease of movement.

Large mature trees also develop hollows that provide important nesting and roosting sites for a range of birds and arboreal mammals.

Many plant species are known to have declined as a consequence of altered land use, grazing and fire frequency. This is quite apparent with the reduced extent of the large Queensland Blue Gums in the landscape, but the number of groundcover species impacted or lost is potentially more significant.

For example, populations of the threatened Native Thistle (*Rhaponticum australe*) and *Picris evae* have become locally extinct in parts of eastern Australia and now survive in only in a few sites on heavy soils in the Lockyer Valley.

Much of the understorey diversity of RE 12.3.3 is threatened by overgrazing and being burnt too frequently. This has resulted in some species becoming locally extinct including the Native Thistle (*Rhaponticum australe*) (below left). Queensland Blue Gum trees produce an abundance of flowers filled with nectar and pollen, which are an important resource for bees, birds and bats (below middle). Queensland Blue Gum trees are an important source of food and shelter for many species, being a particular favourite of the koala (below right).





The understorey of RE 12.3.3 responds favourably to periodic burning and has been found to encourage a diversity of native grass species. However, too much fire or too much grazing restricts natural regeneration, resulting in single aged stands of Queensland Blue Gum with no recruitment (regenerating trees) present.

Management

Queensland Blue Gum pastures continue to play a significant role in beef and dairy production, and for sustaining hobby and commercial horse farms in the SEQ region. The durable, hardwood timber of Queensland Blue Gum was widely used when supplies were more plentiful, and there is an ongoing niche for supplying wood for construction and furniture-making.

The grassy understorey of Queensland Blue Gum and the derived pastures that persist after removal of the tree overstorey are resilient, drought resistant and respond quickly to rainfall during the warmer months of the year.

Native grasses and herbaceous plants respond differently to grazing pressure and pasture species may decrease or increase in abundance with different grazing management regimes. Kangaroo grass is an example of one of the desirable species which once dominated these areas but is now uncommon on Blue Gum flats. Under well managed country, desirable native species such as Forest Bluegrass (*Bothriochloa bladhii* subsp. *glabra*), Queensland Bluegrass (*Dichanthium sericeum*) and Black Speargrass (*Heteropogon contortus*) dominate and co-exist with introduced sown pastures such as Rhodes Grass (*Chloris gayana*), Creeping Bluegrass (*Bothriochloa insculpta*), Paspalum (*Paspalum dilatatum*) and a diverse range of forbs and legumes. Continued overgrazing and a lack of rest causes a steady degradation and less desirable species such as Pitted Buegrass (*Bothriochloa decipiens*) and Cooch (*Elymus repens*) begin to dominate.

Where land degradation has been significant, undesirable species such as Wiregrass (*Aristida* spp.) and Native Rats Tail Grass (*Sporobolus creber*) and invasive exotic weeds such as Blue Heliotrope (*Heliotropium amplexicaule*) and thistles and burrs dominate. Invasive exotic grasses such as Giant Rats Tail Grass (*Sporobolus pyramidalis* and *S. natalensis*) and African Lovegrass (*Eragrostis curvula*) and weeds like Annual Ragweed (*Ambrosia artemisiifolia*) and Lantana (*Lantana camara*) will also dominate degraded areas, significantly reducing production and increasing management costs.

Early explorers' accounts describe patches of Queensland Blue Gum woodland being periodically burnt by Traditional Owners. Burning would have benefited hunting by drawing in wildlife, such as macropods, to feed on the fresh green pick as the diverse understorey re-shot after fire, but would also have assisted with travel by removing the tall, dense grass layer for a period of time.

In today's context, fire remains highly relevant. An appropriate fire regime is desirable in maintaining and restoring the biological diversity of the understorey. A periodic burn interval of 3-6 years will encourage and maintain higher levels of species richness of native pasture species. Any fire regime should incorporate mosaic burning where possible, so that accross a given paddock or landscape, the time since last burn will vary. This variation will support a diverse suite of plants and animals that favour different fire intervals and allows longer unburnt refugia within the managed area.

Woody weeds are not a major issue in Queensland Blue Gum woodlands that are grazed and/or burnt periodically. However, total withdrawal of fire and grazing can allow the growth of introduced species such as Chinese Elm (*Ulmus parvifolia*), especially close to weedy creeks and settlements.

Restoration and regeneration

The key objective of restoring RE 12.3.3 is to establish a tree overstorey and a ground layer in which a broad mix of grass and herb species are present. Where possible natural regeneration is preferable to planting, as seedlings will be adapted to local conditions.

Queensland Blue Gum regenerates quite readily where cattle are excluded from browsing on seedlings.

The ability of an area to naturally regenerate will be determined by a number of factors including grazing, fire frequency and local seed sources. Cattle rub and trample young trees and allowing



natural regeneration in these situations would require management of cattle and fire until young trees are sufficiently robust to withstand their impacts. Even if the groundcover has been altered by grazing, a wide range of native species probably still persist. Spelling pasture during flowering and seeding (generally late summer – early autumn) has been shown to increase the abundance of grazing-sensitive native species within relatively short periods of time.

Natural regeneration of RE 12.3.3 is often triggered by flood, fire or other disturbance events, which presents as dense, even aged 'pole' forests.

Queensland Blue Gum can establish seedlings quickly, especially where ground layer competition is reduced for a period by fire, ploughing, flooding or withdrawal of stock. Trees produce seed annually that is dispersed by gravity and wind. The seed also floats enabling it to be carried by floodwater. Sometimes tree planting may be inevitable where there are no surviving mature trees.

In these situations, plants should be sourced from local provenances and species chosen to reflect the local variation in soils. Soils that have been grazed or cultivated for long periods may be compacted or hard setting, which can limit or slow restoration and ecosystem recovery. Indicators of soils that may require remediation, such as deep ripping, are patches of bare ground and the presence of burrs.

Restoration Tips

- Observe the mix of species that are present when growing conditions are good, keeping an eye out for perennial tussock grasses, the optimal type of native pasture grasses in the region. Pastures are often more diverse than you think and some of those weedy looking plants may be beneficial natives.
- Seeds and plants collected nearby tend to be tolerant of local conditions such as frost, salinity and waterlogging.
- Spelling pastures for a period after good rain in the warmer part of year enables plants to flower and produce seed.
- Periodic fire, at an appropriate interval, can help to maintain the species composition of native pasture.
- Value patches that have remained free of disturbance and grazing for long periods. These pockets of country act as refuges and seed sources for species that have disappeared from the surrounding area.
- Look at re-establishing patches of trees where the overstorey has been removed over large areas.
- Seedlings that establish around old paddock trees provide a basis for re-establishing trees.
- Trees can rapidly reduce the extent of dryland salinity.
- Selectively thinning regenerating stands of Queensland Blue Gum accelerates growth and enables more sunlight to reach the grass layer.

Some native plants of RE 12.3.3

Trees and shrubs

Broad-leaved Apple	<i>Angophora subvelutina</i>
Hickory Wattle	<i>Acacia disparrima</i> subsp. <i>disparrima</i>
Long-fruited	<i>Corymbia clarksoniana</i>
Moreton Bay Ash	<i>Corymbia tessellaris</i>
Narrow-leaved Ironbark	<i>Eucalyptus crebra</i>
Pink Bloodwood	<i>Corymbia intermedia</i>

Queensland Blue Gum	<i>Eucalyptus tereticornis</i>
Red Ash	<i>Alphitonia excelsa</i>
Rough-barked Apple	<i>Angophora floribunda</i>
Sally Wattle	<i>Acacia salicina</i>
Silver-leaved Ironbark	<i>Eucalyptus melanophloia</i>
Swamp Box	<i>Lophostemon suaveolens</i>
Swamp Tea-tree	<i>Melaleuca irbyana</i>

Grasses, forbs, ferns and epiphytes

Black Speargrass	<i>Heteropogon contortus</i>
Blady Grass	<i>Imperata cylindrica</i>
Common Rush	<i>Juncus usitatus</i>
Darling Lily	<i>Crinum flaccidum</i>
Ditch Millet	<i>Paspalum scrobiculatum</i>
Forest Bluegrass	<i>Bothriochloa bladhii</i> subsp. <i>glabra</i>
Fringe Lily	<i>Murdannia graminea</i>
Kangaroo Grass	<i>Themeda triandra</i>
Kidney Weed	<i>Dichondra repens</i>

Native Millet	<i>Panicum decompositum</i>
Native Sorghum	<i>Sarga leiocladum</i>
Perennial Lespedeza	<i>Lespedeza juncea</i>
Queensland Blue Grass	<i>Dichanthium sericeum</i>
Ryhnc	<i>Rhynchosia minima</i>
Scented Top	<i>Capillipedium spicigerum</i>
Slender Chloris	<i>Chloris divaricata</i>
Slender Rat's tail Grass	<i>Sporobolus creber</i>
Zornia	<i>Zornia dictiocarpa</i>

Vines and scramblers

Monkey Rope	<i>Parsonsia straminea</i>
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Keep in mind:

- When assisting the regeneration of RE 12.3.3, the primary focus should be on re-establishment of the canopy layer. As these trees mature, the diversity of the ground cover will naturally increase if appropriate fire and grazing practices are employed.
- The species listed in the above key species table are a general guide. Depending on site conditions, other species may also occur in 12.3.3. Before attempting any regeneration, it is a good idea to look at local sites to determine species and plant densities to guide a restoration approach.
- The sparse shrub layer in Queensland Blue Gum woodland is composed largely of wattles that regenerate after disturbance and are resilient and self-maintaining in the landscape. It is likely they will appear through natural means during restoration. Consequently, planting of these species is not usually necessary.



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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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