

Regional ecosystems: Wet open forest



RE 12.3.2

Flooded Gum tall open forest on alluvial plains

Drive through the valleys at the back of the Gold and Sunshine Coasts and the tall straight creamy-white stems of Flooded Gum or Rose Gum (*Eucalyptus grandis*) form an imposing sight. Dense clumps of trees tower above a tangled mass of smaller trees, vines, Piccabeen Palms (*Archontophoenix cunninghamiana*) and ferns.

This type of forest, where a canopy of eucalypts overtops a rainforest-type understory is often referred to as a 'wet sclerophyll forest'. Flooded Gum is one of the tallest-growing eucalypts in South East Queensland (SEQ) reaching heights in excess of 50 metres and trunk diameters of two metres. However, most of the trees this size have been removed since European settlement and the regenerating trees in the landscape today are comparatively small.

Flooded Gum forests, such as Regional Ecosystem (RE) 12.3.2, tend to be even-aged and monospecific (single species). Other sclerophyll forest trees may be present in low densities including Blackbutt (*Eucalyptus pilularis*), Brush Box (*Lophostemon confertus*), Grey Gum (*Eucalyptus propinqua*), Queensland Grey Ironbark (*Eucalyptus siderophloia*), Tallowood (*Eucalyptus microcorys*), Turpentine (*Syncarpia glomulifera* subsp. *glomulifera*) and White Mahogany (*Eucalyptus acmenoides*).

Flooded Gum regenerates from seed and requires open conditions for seedlings to germinate and develop. The young forest eventually forms a characteristically dense, diverse understory through successional phases of development over time.



RE 12.3.2 is typified by emergent Flooded Gum (*Eucalyptus grandis*) (left) and a dense, shady and biodiverse understory (far left).

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 12.3.2 is confined to the vicinity of watercourses. It grows on floodplains or forms a fringe along the channel and banks of streams in narrow valleys in hilly country. The soils are relatively well-drained loams.

Flooded Gum forests are confined to parts of SEQ where average rainfall is above 1000 mm per year. RE 12.3.2 frequently co-occurs with RE 12.3.1 gallery rainforest.

RE 12.3.2 occurs in parts of SEQ with high rainfall, and always in close proximity to a watercourse.

Variations and similarities

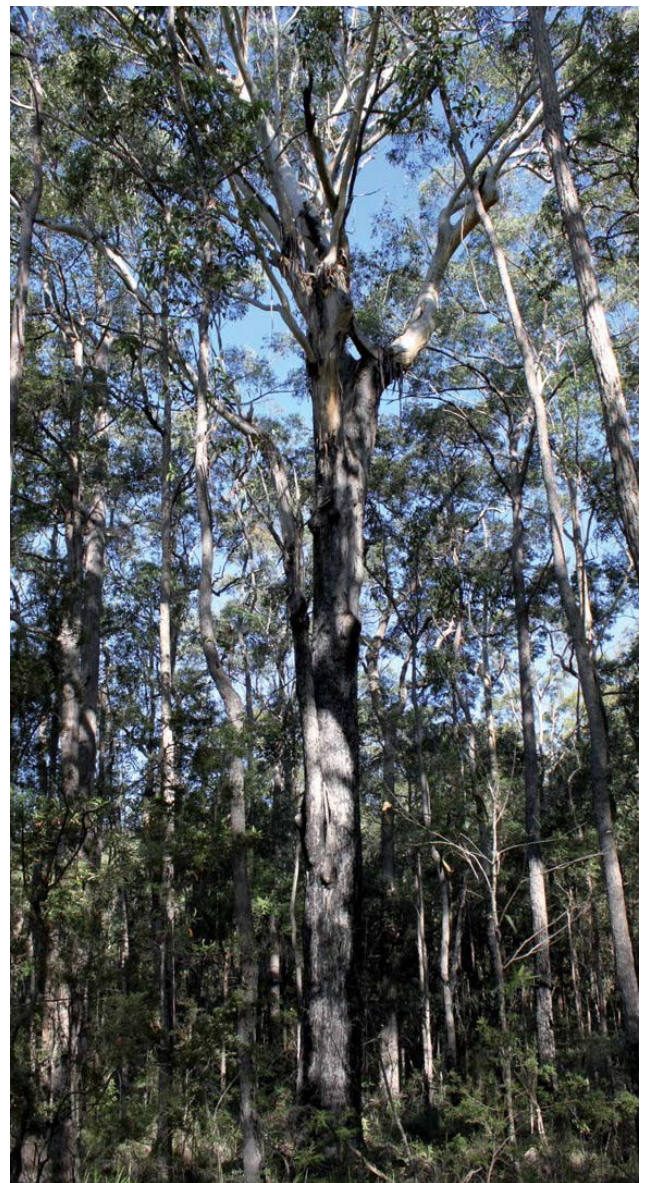
RE 12.3.2 is formally described as Flooded Gum (*Eucalyptus grandis*) +/- Tallowwood (*Eucalyptus microcorys*), Brush Box (*Lophostemon confertus*) tall open forest with vine forest understorey. This is often referred to as a wet sclerophyll forest.

Blackbutt (*Eucalyptus pilularis*) can be present in high numbers in places, especially along streams draining sedimentary rocks (particularly on the Sunshine Coast).

Regional Ecosystems that may be confused with RE 12.3.2 include:

- **RE 12.3.1** - Gallery rainforest on alluvial plains. This RE is comprised of many of the same plant species that inhabit RE 12.3.2, but the occurrence of Flooded Gum in RE 12.3.1 are few to seldom, rather than a dominant canopy species in RE 12.3.2.
- Tall forests of Flooded Gum and Sydney Blue Gum (*Eucalyptus saligna*), a closely related species, grow on the wet ranges and plateaux of SEQ. The corresponding REs include RE **12.8.8** (Tertiary basalt geology), **RE 12.11.2** (metamorphic rocks) and **RE 12.12.20** (Mesozoic to Proterozoic (old) igneous rocks).

The composition of RE 12.3.2 can be variable across the SEQ region, with a trend in the northern portion of the region for Blackbutt to grow with, or in some cases replace the usual dominance of Flooded Gum. Blackbutt (right) can be distinguished from the smooth trunk of the Flooded Gum by a retained stocking of bark that persists on the trunk until the first upper branches.



Distribution map 12.3.2

Much of the current extent of RE 12.3.2 is concentrated in the Sunshine Coast, with scattered occurrences along streams of the Gold Coast hinterland.

While some of the earlier pressures on this ecosystem were driven by timber extraction, much of the remaining patches today that are not within protected areas, are increasingly being impacted by urban growth and subdivision.

Today, approximately one third of this ecosystem's former extent remains, and it is considered 'of concern' under Queensland legislation.

1. Bellthorpe Range Road, Bellthorpe State Forest

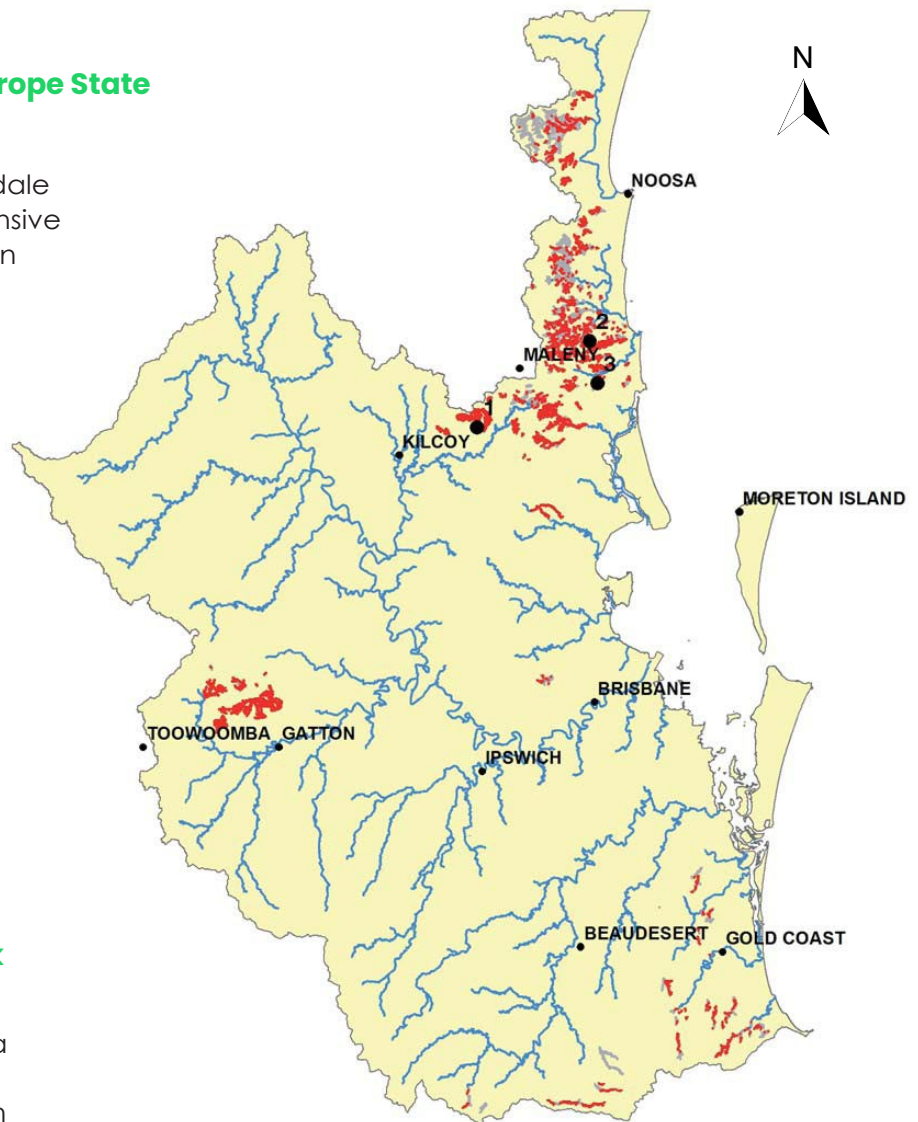
As this road winds up the Conondale Range, it passes through an extensive area of RE 12.3.2, easily viewed on both sides of the road.

2. Bruce Highway, Forest Glen

The highway passes through a remnant of RE 12.3.2 on both sides of the highway where large Flooded Gum trees have lost parts of their tops during a severe storm or cyclone many years ago. These trees give an indication of the potential height that Flooded Gum can achieve in SEQ under optimal growing conditions.

3. Steve Irwin Way, Mooloolah River National Park

The short walking track in the Jowarra Section of the park has a great example of Flooded Gum forest growing in conjunction with Gallery Rainforest.



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

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

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)
12.3.2	1,865	7,392	34%	1,984

Past to present

The observations of early European settlers indicate that there were extensive tracts of mature Flooded Gum forest in SEQ composed of trees several hundred years old.

The forests were gradually logged, burnt and converted to cultivation for sugar cane and dairy pasture.

These land uses have gradually receded, to be replaced by patches of even-aged regrowth in places.



Regrowth patches of RE 12.3.2 can be identified by the tall slender stems of flooded gum, which grow close together and are of an even height. The developing community becomes more complex as rainforest trees invade the understorey, along with ferns and vines utilising the moist, shaded conditions.

Natural values and functions

Flooded Gum forest is a biologically productive ecosystem that performs a range of different functions. These are influenced by the developmental stage of the forest. Young forests play a prominent role in rapidly converting energy and nutrients to biomass and regulating ground water. Older, more structurally complex forests store and recycle carbon, nutrients and pollutants, protect soil from rain-wash and erosion and filter and trap sediments during floods.

Patches of Flooded Gum forest provide habitat and food resources for eucalypt-dependent fauna, especially gliders and bats. Understorey species also enhance the faunal diversity. The shrubs and twiners of the moist sclerophyll understorey include seasonal flowers which attract birds and insects, while clumps of ferns and Matrush (*Lomandra* spp.) provide cover for small to medium sized ground-dwelling animals such as the Northern Brown Bandicoot and Echidna.

The wet sclerophyll type understorey provides habitat for animals that forage or dwell in rainforest. A broad range of invertebrates and fungi are associated with the decomposition cycles in the moist, shaded conditions on the forest floor. Flooded Gum forest along streams provide habitat for the endangered Giant Barred-frog (*Mixophyes iteratus*).

In mature stands of RE 12.3.2, the Flooded Gums will tower over a dense understorey of rainforest species. As the Flooded Gums senesce and die over hundreds of years, this RE can transition to RE 12.3.1 (gallery rainforest). The old, dead trees can remain present for a long period.



Management

Flooded Gum is a fast-growing eucalypt that is suited to moist conditions and its successful regeneration is dependent upon some specific requirements. The starting point is disturbance that is severe enough to kill or remove much of the woody biomass of the forest, resulting in bare soil and sunlight reaching the ground surface. The types of disturbances that are sufficiently extreme to provide these conditions are likely to be wildfire, major flooding or mechanical means.

The recovery of Flooded Gum forests after disturbance follows a pathway in which plant species composition changes over time. This process is known as succession and commences with the germination of short-lived herbs, shrubs and small trees (known as pioneers).

The fine seed of Flooded Gum needs to be carried to the site by gravity and wind after it is released from capsules held high in the canopy of nearby trees. A dense crop of seedlings needs to establish and dominate the site early as young Flooded Gum plants are intolerant of shade and competition from other native species and weeds.

Ironically, while fire may play a major role in driving the initial regeneration of the forest, Flooded Gum is less tolerant of fire than most eucalypts. This is due to lack of a lignotuber, the large underground woody mass containing food reserves that enables many species to re-shoot after sustaining damage. The thin bark also increases its susceptibility to fire damage. Older trees develop a stocking of thicker bark which helps protect them from fire damage.

As young plants grow into poles and develop a dense canopy, the moist shaded conditions on the ground floor are an ideal place for ferns and shade-tolerant rainforest plants to establish. These species survive disturbance by resprouting or germinate from seeds transported to the site by wind, birds, fruit bats and other animals. The process of plant succession through time may gradually convert Flooded Gum forest to gallery rainforest (RE 12.3.1) - examples of gallery rainforest dotted with large old living and dead Flooded Gum can often be seen along streams where there has been limited disturbance for a long period.

The fire guidelines for RE 12.3.2 indicate that fire in the management of established Flooded Gum wet sclerophyll forest is likely to be limited. This is because the understorey will generally not carry a fire, except during extremely dry weather when burning would be highly risky. However, in young, regenerating forests it may be possible to maintain a relatively open understorey by conducting occasional cool burns.

These would favour shade tolerant grasses, shrubs, twiners and ferns and limit the establishment of woody species. Hotter fires carry a risk of damaging or killing the Flooded Gum overstorey.

The high levels of fertility and moisture make Flooded Gum habitat highly suited to the growth of serious environmental weeds including shade tolerant species. Lantana is a well-known and ubiquitous weed species in this RE, but other weeds may include Camphor Laurel (*Cinnamomum camphora*), Chinese Elm (*Ulmus parvifolia*), Broad-leaved Privet (*Ligustrum lucidum*), Guava (*Psidium guajava*), Groundsel Bush (*Baccharis halimifolia*), Wild Tobacco (*Solanum mauritianum*), Easter Cassia (*Senna pendula* var. *glabrata*), Molasses Grass (*Melinis minutiflora*), Crofton Weed (*Ageratina adenophora*), Blue Billygoat Weed (*Ageratum houstonianum*), White Passionfruit (*Passiflora subpeltata*) and introduced pasture grasses and legumes.

Flooded Gum is susceptible to leaf damage and defoliation caused by lerps and psyllids. Affected canopies have a brownish appearance and damage can occur seasonally with subsequent recovery. However serious outbreaks may result in canopy dieback.

Flooded Gum forests and plantations provide timber used for flooring, general construction and furniture-making. Kiln drying improves the quality of sawn timber which is prone to warping and shrinkage. In stands and plantations managed for timber production, periodic cool burns and weedicides can maintain a relatively open weed-free understorey, thereby reducing competition for resources vital for plant growth while ensuring access for management activities is maintained.



As Flooded Gums mature, they develop a stocking of basal bark near the ground that helps protect them from fire.

Restoration and regeneration

Restoration and regeneration activities for RE 12.3.2 will range from creating new patches of forest on sites where the ecosystem formerly grew, to repairing patches that have become degraded through disturbances or by Lantana and other environmental weeds. Flooded Gum forests can be successfully re-established in the landscape by following the phases of plant succession within natural Flooded Gum forests.

There are some examples where mechanical disturbance has been found to be beneficial in site preparation. Similarly, fire has also been used to promote dense regeneration of early successional native species from seed stored in the soil. Examples include wattles (*Acacia spp.*), Forest Hopbush (*Dodonaea triquetra*), Native Indigo (*Indigofera australis*) and Dusky Coral Pea (*Kennedia rubicunda*). These plants may shade, smother and compete with Flooded Gum seedlings. Fire may also trigger germination of environmental weeds.

Flooded Gum forest can be established on newly prepared sites by direct seeding or planting tubestocks. It may be desirable to manage the early growth of Flooded Gum as a plantation and restrict competition from native plants as well as weeds until the trees reach pole height after several years. At this stage decisions can be made about how to manage the understorey with the choice of a 'moist sclerophyll' type with ferns, shade-tolerant grasses, twiners and shrubs, for example Pointed-leaf Hovea (*Hovea acutifolia*), or a 'wet sclerophyll' type in which growth of rainforest species can be encouraged, or a mosaic of both types.

The moist sclerophyll type will need the occasional cool burn. In extreme cases, the understorey can be simplified to Bracken (*Pteridium esculentum*) and Blady Grass (*Imperata cylindrica*) – however, a more diverse mix of species is desirable from a biodiversity perspective and will support a greater range of wildlife. The developing forest may also benefit from thinning to reduce competition. This will enable the remaining trees to achieve higher rates of growth.

Restoring a degraded ecosystem to an approximation of its original condition will require weed control and establishing a new generation of seedlings to replace trees that have died or are in poor condition. The latter will require creating patches of sufficient size to open the ground layer up to sunlight to enable seedlings to grow. This can be achieved by removing poor condition plants, weeds or burning. The newly created patches of bare ground and ash-bed can then be sown with Flooded Gum seed during damp weather or planted with seedlings.



Frequent fire or grazing in RE 12.3.2 will result in an open understorey with little natural regeneration or understorey diversity.



Fire and cattle incursion into RE 12.3.2 should be managed to allow for a diverse suite of understorey, and regenerating canopy species.



RE 12.3.2 can be managed to create either a 'moist sclerophyll' type forest with a bracken understorey (as shown here) or a 'wet sclerophyll' type forest with a rainforest understorey.

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 ongoing attention.
- Flooded Gum seedlings prefer open sunny spaces and a bare mineral soil. Providing these conditions may require some intense disturbance.
- Flooded Gum stands aren't very diverse so don't be put off by having a virtual monoculture at the start. A mixture of species in the understorey can make up for the lack of canopy diversity.
- If restoring a degraded patch of forest that still has some remaining canopy trees, be prepared to experiment to see how small patches of regeneration can be successfully established.
- Don't use fire when Flooded Gum trees are young as they are sensitive to fire.
- Let others know about your project, especially the successes. This will add to the pool of information to guide projects in the future.
- The genetic integrity of plant populations should be considered, by reducing the risk of hybridization and not planting species sourced from outside the local area and reducing in-breeding by maintaining or enhancing local population connectivity. The same applies to plants likely to disperse into adjacent remnants, especially species that did not occur naturally in the local area. If re-introducing species that have become locally extinct try to secure seeds and cuttings from the closest comparable populations.

Some native plants or RE 12.3.2

Trees

Blackbutt	<i>Eucalyptus pilularis</i>
Brush Box	<i>Lophostemon confertus</i>
Flooded Gum	<i>Eucalyptus grandis</i>
Grey Gum	<i>Eucalyptus propinqua</i>
Paper-barked tea-tree	<i>Melaleuca quinquenervia</i>

Pink Bloodwood	<i>Corymbia intermedia</i>
Queensland Grey Ironbark	<i>Eucalyptus siderophloia</i>
Tallowwood	<i>Eucalyptus microcorys</i>
Turpentine	<i>Syncarpia glomulifera</i> subsp. <i>glomulifera</i>

Vines, grasses, forbs and epiphytes

Apple Berry	<i>Billardiera scandens</i>
Beard Grasses	<i>Opismenus aemulus</i> , <i>O. hirtellus</i> , <i>O. undulatifolius</i>
Blady Grass	<i>Imperata cylindrica</i>
Bracken Fern	<i>Pteridium esculentum</i>
Dusky Coral Pea	<i>Kennedia rubicunda</i>
Dwarf Panic	<i>Panicum pygmaeum</i>
False Bracken Fern	<i>Calochlaena dubia</i>
Flax Lily	<i>Dianella caerulea</i>
Forest Lobelia	<i>Lobelia trigoncaulis</i>
Forest Phyllanthus	<i>Phyllanthus gunnii</i>
Forest Rice Flower	<i>Pimelea latifolia</i> subsp. <i>altior</i>
Gristle Fern	<i>Blechnum cartilagineum</i>
Headache Vine	<i>Clematis glycinoides</i>
Native Ginger	<i>Alpinia caerulea</i>
Matrushes	<i>Lomandra longifolia</i> , <i>L. spicata</i>
Ottochloa	<i>Ottochloa gracillima</i> , <i>O. nodosa</i>



Gristle fern

Prickly Rap Fern	<i>Doodia aspera</i>
Sandfly Bushes	<i>Zieria minutiflora</i> , <i>Z. smithii</i>
Slender Tick Trefoil	<i>Desmodium gunnii</i>
Twining Glycine	<i>Glycine clandestina</i> , <i>G. tabacina</i>
Twining Guinea Flower	<i>Hibbertia scandens</i>
Wiry Panic	<i>Entolasia stricta</i> , <i>Entolasia whiteana</i>

Pioneer species

Bennett's Ash	<i>Flindersia bennettiana</i>
Blackwood	<i>Acacia melanoxylon</i>
Bleeding Heart	<i>Homalanthus populifolius</i>
Blue Lilly Pilly	<i>Syzygium oleosum</i>
Bolly Gum	<i>Neolitsea dealbata</i>
Brown Kurrajong	<i>Commersonia bartramia</i>
Cabbage Tree Palm	<i>Livistona australis</i>
Celery Wood	<i>Polyscias elegans</i>
Cheese Tree	<i>Glochidion ferdinandi</i>
Corkwood	<i>Duboisia myoporoides</i>
Forest Hopbush	<i>Dodonaea triquetra</i>
Forest Pittosporum	<i>Pittosporum revolutum</i>
Forest Quinine	<i>Petalostigma triloculare</i>
Guioa	<i>Guioa semiglauc</i>
Hairy Psychotria	<i>Psychotria loniceroides</i>
Hairy Walnut	<i>Endiandra pubens</i>
Hickory Wattle	<i>Acacia disparrima</i> subsp. <i>disparrima</i>
Irish Wattle	<i>Acacia oshanesii</i>
Jackwood	<i>Cryptocarya glaucescens</i>
Kangaroo Apple	<i>Solanum aviculare</i>
Macaranga	<i>Macaranga tanarius</i>
Murrogun	<i>Cryptocarya microneura</i>
Native Indigo	<i>Indigofera australis</i>
Native Tamarind	<i>Diploglottis australis</i>
Palm Lilies	<i>Cordyline petiolaris</i> , <i>C. rubra</i>
Piccabeen Palm/ Bangalow Palm	<i>Archontophoenix cunninghamiana</i>
Pink Euodia	<i>Melicope elleryana</i>



Bleeding Heart



Palm Lily

Plum Myrtle and Small-leaved Plum Myrtle	<i>Ptilidostigma glabrum</i> , <i>P. rhytispermum</i>
Pointed-leaf Hovea	<i>Hovea acutifolia</i>
Sago flower	<i>Ozothamnus diosmifolius</i>
Scaly Treefern	<i>Cyathea cooperi</i>
Scentless Rosewood	<i>Synoum glandulosum</i>
Scrub Turpentine	<i>Rhodmanian rubescens</i>
White Ash	<i>Alphitonia petriei</i>

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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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