



REGIONAL ECOSYSTEMS OF SOUTH EAST QUEENSLAND

ISSN 2206-1118 Factsheet no. 4

RE 12.3.4

Coastal Paperbark and Swamp Mahogany open forest on coastal alluvium

The coastal lowlands of SEQ support many different types of vegetation, some of which grow in areas that are swampy. Regional Ecosystem (RE) 12.3.4 provides one such example. It contains a mix of Coastal Paperbark, also called Paperbarked Tea-Tree (*Melaleuca quinquenervia*) and Swamp Mahogany (*Eucalyptus robusta*). The Swamp Mahogany trees, with their reddish-brown, rough, tessellated bark and large, glossy, dark green leaves, contrast with the pale, thin trunks and drab grey-green foliage of the Coastal Paperbark.

Other woody species that grow in RE 12.3.4 include Swamp Box (*Lophostemon suaveolens*), Small-leaved Paperbark (*Melaleuca sieberi*) and Snow-in-Summer (*Melaleuca linariifolia*). The understorey is variable depending upon drainage. It comprises grass-like plants (sedges, rushes) and ferns at wetter sites. These are usually interspersed with shrubs especially Swamp Banksia (*Banksia robur*). In drier situations there may be a dense understorey of heath shrubs.

RE 12.3.4 forms part of the 'wallum' country of southern Queensland and

far northern New South Wales. Wallum was the name given to species of banksia by the Kabi Kabi people, the Traditional Owners of the Sunshine Coast and Wide Bay. Through time, the name wallum was widened to refer to the complex of swamps, heaths and woodlands growing on low sandy soils along the coastal strip. The common names of a number of coastal plant and animal species in SEQ celebrate the term wallum, two outstanding examples being the Wallum Banksia (*Banksia aemula*) and the Wallum Sedgefrog (*Litoria olongburensis*).



Coastal Paperbark swamps are a ubiquitous part of the SEQ landscape. RE 12.3.4 is distinguished by the additional presence of Swamp Mahogany with large, glossy green leaves (right) and red-brown tough fibrous bark (left). Mature trees often display the irregular growth around the trunk base, as pictured.

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 12.3.4 grows along drainage lines on the coastal lowlands in high rainfall parts of SEQ. The sandy or peaty soils are prone to waterlogging after heavy rainfall providing conditions suited to the dense growth of sedges, rushes and ferns.

The understorey of RE 12.3.4 is typically a dense mix of sedges, rushes and ferns, well suited to the wet, shady conditions.

Variations and Similarities

RE 12.3.4a is a sub-type of RE 12.3.4. It is described as an open woodland of Tumbledown Gum (*Eucalyptus bancroftii*) and Coastal Paperbark. It also occurs on drainage lines and floodplains in coastal areas, but is more restricted than RE 12.3.4.

Coastal Paperbark is one of the predominant trees along the coastal lowlands of SEQ and it is a major species in RE 12.3.5, RE 12.3.6 and RE 12.3.4. Some of the features that assist with distinguishing these REs, each of which grow on coastal alluvium, include:

- RE 12.3.5 consists of tall (>20m), dense, even-aged stands of Coastal Paperbark. Few other tree species are present.
- RE 12.3.4 and RE 12.3.6 usually have a more open structure with spaces between trees. The Coastal Paperbarks are relatively small (6-15m) and are intermixed with Swamp Mahogany (RE 12.3.4) or Swamp Box (RE 12.3.6).

RE 12.3.4 is classified as a palustrine wetland, or a vegetated swamp.



RE 12.3.4a is easily distinguished from RE 12.3.4 by the presence of Tumbledown Gum (*Eucalyptus bancroftii*), with distinctive mottled bark (left), and a stunted and meandering growth form (below).



RE 12.3.4*

Distribution Map - Past and Present

Much of the present extent of RE 12.3.4 is confined to the northern Sunshine Coast, Bribie Island and the adjacent mainland. It has been reduced in area over time by clearing for pine plantations and urban development, and it is considered 'of concern' under Queensland legislation.

- Pre-clearing (~180 years ago)
- Today's distribution

*Map is indicative only - Due to scale, some RE occurrences may not be visible.



1. Steve Irwin Way, Beerburrum.

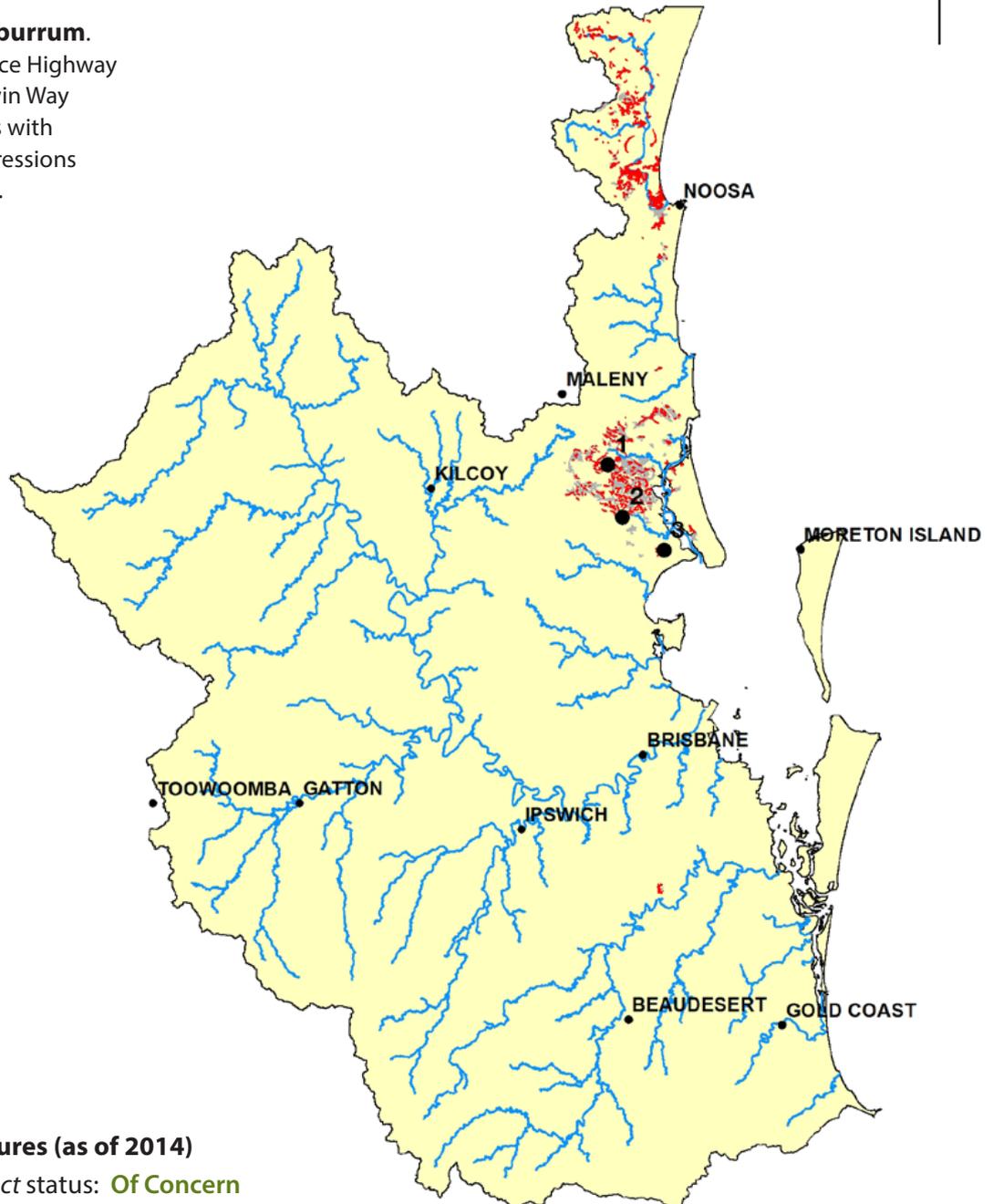
After diverging from the Bruce Highway heading north, the Steve Irwin Way traverses a number of creeks with RE 12.3.4 present in the depressions between the cultivated pine.

2. Glasshouse, just south of the township.

A stand of RE 12.3.4 with Coastal Paperbark (*Melaleuca quinquenervia*) dominance.

3. Lee Road, Ningi.

Along the northern side of Lee Road there is a representative stand of RE 12.3.4a, containing the rare Tumbledown Gum (*Eucalyptus bancroftii*).



RE 12.3.4 - Facts and Figures (as of 2014)

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

	Pre-clearing Extent, or estimated amount ~180 years ago (hectares)	Current Extent (hectares)	Percent of Pre-clearing Extent Remaining	Amount Protected in Reserves (hectares)
12.3.4	17,531	8,204	47%	4,697
12.3.4a	215	51	24%	15



Much of the former extent of RE 12.3.4 in SEQ has been replaced by exotic pine plantations, that grow well on the low fertility soils. Remaining significant patches of RE 12.3.4 are often found along drainage lines within and adjacent to pine plantations.

Past to Present

The wallum country of SEQ has a rich and complex Traditional Owner history. It was a source of diverse foods, medicines and materials as well as providing special places and totems. To the early Europeans it was a difficult place to explore and traverse due to the extensive nature of swampy country and the abundance of rivers and creeks. Settlement was confined to patches of higher ground and travel by boat was the only practical means of transport.

To the north of Brisbane, the railway line and the 'track' north to Gympie were sited along the western flank of the

wallum lands. Much of the country remained in a natural state until well into the twentieth century when plantations of exotic pine suited to the low fertility sandy soils were established.

While the wallum country has become fragmented by plantations and urbanisation, it retains many of the special features and attributes that make it one of Queensland's most biologically diverse patches of country.

RE 12.3.4 can be quite variable in appearance, with the proportion of the two distinguishing species varying greatly across the landscape. The left photo shows a Coastal Paperbark (*Melaleuca quinquenervia*) dominant example, and the right photo shows a Swamp Mahogany (*Eucalyptus robusta*) dominated site.





Management

Patches of RE 12.3.4 have a range of different sized trees present. Individual Coastal Paperbark trees tend to be slender and even-aged, while Swamp Mahogany trees are usually taller and larger than the paperbarks.

The regeneration of Coastal Paperbark is driven by fire events. High intensity fire will kill trees and trigger regeneration from seed, while the thick bark of Swamp Mahogany assists the species in surviving fire. The fire guidelines for RE 12.3.4 recommend intervals of 8-12 years (heath understorey), 12-20 years (sedge) or 6-20 years (mixed grass/shrub). Burning will be naturally constrained for much of the time by the presence of lying water. Burning during hot dry conditions carries a high risk of causing tree death and destroying the peat beds that build up in the drainage lines and swampy depressions.

The intrinsic low soil fertility and seasonal waterlogging within RE 12.3.4 help restrict the growth of environmental weeds. The more serious invasive species include Groundsel Bush (*Baccharis halimifolia*) and Slash Pine (*Pinus elliottii*). Changes to the local run-off regimes (e.g. diversion of water-flow by construction of drains and roads) and nutrification from urban run-off can cause changes to the species composition.

Bulrush or Cumbungi (*Typha orientalis*) and Common Reed (*Phragmites australis*) can become abundant in disturbed areas subject to higher levels of nutrients. Lantana (*Lantana camara*), Camphor Laurel (*Cinnamomum camphora*), Umbrella tree (*Schefflera actinophylla*), Easter Cassia (*Senna pendula* var. *glabrata*) and introduced pasture grasses invade areas that become less waterlogged due to altered drainage.

While RE 12.3.4 responds well to infrequent burning, depending on frequency, the fire interval may alter species dominance and composition - heath, sedges, ferns or mixed grass and shrubs.

Nutrification will also encourage growth of environmental weeds at the expense of native sedges, rushes and shrubs, which are intolerant of high levels of plant nutrients, especially phosphorous.

Low-lying patches of RE 12.3.4 close to the coast are likely to be growing on acid sulfate soils. Disturbance of these soils requires specific management to prevent harm to humans and the environment caused by the mobilisation of sulphuric acid.



Umbrella Tree is a species native to northern Queensland that invades the moist environment of RE 12.3.4.

Natural Values and Functions

RE 12.3.4 grows in an environment that is waterlogged for much of the time but is also periodically dry. The fertility of the alluvial soils on which RE 12.3.4 grows is also low due to the types of soil parent material present upstream in the catchments (e.g. sedimentary rocks especially sandstone and highly leached lateritic soils).

The plants that grow in RE 12.3.4 compensate for the low availability of soil nutrients and periodic waterlogging by having specialised root systems and root structures (e.g. aerial roots and fine shallow feeder roots) and biotic associations with fungi and bacteria. Consequently, the vegetation is able to play a prominent role in trapping, storing and recycling nutrients, protecting soil from erosion, reducing stream sediment loads during high intensity rainfall events and regulating ground water.

RE 12.3.4 provides food and shelter for fauna adapted to low nutrient environments especially frogs and small fish. The frogs includes a group known for their tolerance of acidic water including several threatened species such as the Wallum Froglet (*Crinia tinnula*), Wallum Rocketfrog (*Litoria freycineti*) and the Wallum Sedgefrog. RE 12.3.4 also provides habitat for the small endangered tree Swamp Stringybark (*Eucalyptus conglomerata*) which is restricted to the Sunshine Coast.

Despite the low fertility of the wallum country, the flowering rhythms of plants throughout the year and the tender shoots of the sedges and shrubs help to sustain a wide range of insects, small mammals and nectar-feeding and insectivorous birds and bats. Coastal Paperbark, for example, flowers heavily in autumn, producing nectar and honey.



Tumbledown Gum (*Eucalyptus bancroftii*) is an uncommon eucalypt, with much of its distribution in SEQ restricted to RE 12.3.4a.

RE 12.3.4 provides important habitat for a number of threatened frog species, including the Wallum froglet (*Crinia tinnula*) (below left) and the Wallum Rocketfrog (*Litoria freycineti*) (below right). Photos by Todd Burrows.



Restoration & Regeneration

The key objectives of restoring RE 12.3.4 are to establish an overstorey of mixed tree species, a ground layer in which a range of native species and life forms is present, and a low abundance of weeds. Encouraging natural regeneration is preferable to replanting, as less effort will be required and plants are adapted to the unique and harsh local drainage and nutrient conditions.

The capacity of an area to regenerate will be influenced by a number of factors including the presence of natural regeneration, extent of weeds, proximity to similar vegetation and habitat that can allow plants and animals to move into the regenerating patch through time, and the potential to manage fire and other agents of disturbance. Rapid, naturally-occurring regeneration of Coastal Paperbarks and other species representative of the RE can occur provided seed sources remain present nearby and soil

drainage and nutrients status has not been altered to any degree. The regenerating trees require a long period (e.g. at least 10 years) free from fire and other forms of disturbance to become established.

Planting of trees and understorey species will be required where there are no longer any surviving local seed sources. In these situations, plants should be sourced from local populations and species chosen to reflect the local variation in soils and drainage. Specialist nurseries in SEQ have experience in growing species typical of RE 12.3.4, for example the grass-like rushes. Disturbance of soil should be minimised in site preparation to avoid bringing highly acid subsoil unsuited to plant establishment to the soil surface and to protect layers of peat.



Restoration and management of patches of RE 12.3.4 needs to carefully consider nutrient loads from adjacent landuses, which may enable the establishment of weeds that would otherwise not survive in the nutrient poor environment.

Restoration Tips

- Plan the project in detail, as some of activities that may be required, such as restoring drainage patterns, may require a long-term approach.
- Observe the mix of species that are present when growing conditions are good, keeping an eye out for perennial sedges, rushes, shrubs and small annual plants such as lilies. The ground layer in RE 12.3.4 is often far more diverse than it appears.
- If restoring a degraded patch of woodland that still has some remaining canopy trees, be prepared to experiment to see how small patches of tree regeneration can be successfully established.
- Limit use of burning until trees, especially paperbarks (*Melaleuca* sp.), are well established.
- Minimise soil disturbance and avoid changing local drainage patterns in the construction of tracks, firebreaks etc.
- 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.
- Let others know about your project, especially the successes. This will add to the pool of information to guide other projects in the future.

Some Native Plants of RE 12.3.4

Trees and Shrubs

Black She-oak	<i>Allocasuarina littoralis</i>
Blue Tongue	<i>Melastoma malabathricum</i>
Blueberry Ash	<i>Elaeocarpus reticulatus</i>
Dwarf Banksia	<i>Banksia oblongifolia</i>
Flaky-barked Tea-tree	<i>Leptospermum trinervium</i>
Grass Tree	<i>Xanthorrhoea fulva</i>
Large-leaved Cheese Tree	<i>Glochidion sumatranum</i>
Paper-barked tea-tree	<i>Melaleuca quinquenervia</i>
Small-leaved Paperbark	<i>Melaleuca sieberi</i>
Snow-in-Summer	<i>Melaleuca linariifolia</i>

Swamp Banksia	<i>Banksia robur</i>
Swamp Box	<i>Lophostemon suaveolens</i>
Swamp Mahogany	<i>Eucalyptus robusta</i>
Swamp Pea	<i>Pultenaea myrtoides</i>
Tumbledown Gum	<i>Eucalyptus bancroftii</i>
Wallum Bottlebrush	<i>Melaleuca pachyphyllus</i>
Wallum Geebung	<i>Persoonia virgata</i>
Wallum Grasstree	<i>Xanthorrhoea fulva</i>
Wallum Hakea	<i>Hakea actites</i>

Grasses, Forbs, Ferns and Epiphytes

Blady Grass	<i>Imperata cylindrica</i>
Bungwall Fern	<i>Blechnum indicum</i>
Bracken Fern	<i>Pteridium esculentum</i>
Climbing Maidenhair Fern	<i>Lygodium microphyllum</i>
Heron Bristlebrush	<i>Chorizandra cymbaria</i>
Jointed Twigrush	<i>Baumea articulata</i>

Pale Cordrush	<i>Baloskion pallens</i>
Pouched Coral Fern	<i>Gleichenia dicarpa</i>
Soft Twigrush	<i>Baumea rubiginosa</i>
Swamp Foxtails	<i>Baloskion tetraphyllum</i>
Red-fruited Saw-sedge	<i>Gahnia sieberiana</i>
Wiry Panic	<i>Entolasia stricta</i>



Designed and produced by Healthy Land & Water, a community based, not-for-profit organisation that works to protect and restore the natural resources of South East Queensland. Visit www.hlw.org.au

Written by Peter Young, Vegworx. Edited by Deborah Metters, Paul Donatiu, Darren McPherson and Liz Gould, Healthy Land & Water. Uncredited photographs by Darren McPherson, Healthy Land & Water. Published by Healthy Land & Water through funding from the Australian Government's National Landcare Programme.

Citation: Healthy Land & Water (2016) *Regional Ecosystems of South East Queensland: RE 12.3.4*. Factsheet.

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 Ecological Restoration Framework - www.seqcatchments.com.au/seq-ecological-restoration-framework

SEQ Land for Wildlife Notes - www.lfwseq.org.au

Queensland Government - Regional Ecosystems - www.ehp.qld.gov.au/ecosystems/biodiversity/re_introduction.html

Queensland Government - Planned Burn Guidelines - www.nprsr.qld.gov.au/managing/pdf/pbg-seq.pdf



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Published February 2016,
updated 2017.