

Regional ecosystems: Coastal heath



RE 12.3.14

Coastal heath Wallum Banksia low woodland on alluvial plains usually near the coast

Wallum Banksia (*Banksia aemula*) is a large shrub or small tree that grows on infertile, sandy soils along the coastal plains and islands of South East Queensland (SEQ). It has a distinctive warty-looking reddish brown trunk, stiff-toothed leaves and large, creamy green-coloured flowers.

The seeds are retained on the tree for several years, protected from fire in woody oyster-like structures called follicles. Each seed-bearing head consists of a number of follicles surrounded by the dried remains of the flowers. These structures are common to the Banksias and their unusual appearance has been immortalised as the Banksia Men in the *Snugglepot and Cuddlepie* childrens' stories.

Wallum Banksia forms a tall shrubland or low woodland with a dense heath understorey. Other woody species may be present in the form of low stunted trees often with a mallee (multi-stemmed) habit. Species that co-occur with Wallum Banksia in Regional Ecosystem (RE) 12.3.14 include Pink Bloodwood (*Corymbia intermedia*), Red Bloodwood (*C. gummifera*), Scribbly Gum (*Eucalyptus racemosa* subsp. *racemosa*), Swamp Mahogany (*E. robusta*) and Brush Box (*Lophostemon confertus*) with Coastal Paperbark (*Melaleuca quinquenervia*) present in poorly-drained soils. The diverse shrubby understorey provides spectacular wildflower displays in late winter and spring.

RE 12.3.14 forms part of the 'wallum' country of southern Queensland and northern New South Wales. Wallum was the name given to Banksias by the Kabi Kabi, the Traditional Owners of Sunshine Coast and Wide Bay. Through time, the name wallum was widened to refer to the extensive complex of swamps, heaths and woodlands growing on low sandy soils along the coastal strip.



Wallum Banksia (*Banksia aemula*) is a distinctive and well-known part of the Australian flora and folklore. Shown here is an old flower displaying the seed follicles (top left), the serrated, whorled leaves (lower left), and the raised, dimpled bark.

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 12.3.14 grows along sandy alluvial plains on the coastal lowlands in high rainfall parts of SEQ. The soils are derived from sedimentary rocks and are relatively well-drained but due to the flat nature of the country, even small changes in elevation (micro-topography) are significant. Consequently, a slight drop in elevation, almost imperceptible to the human eye, results in a sharp change from RE 12.3.14 to wet heath (RE 12.3.13) or paperbark swamps (RE 12.3.5).

Small changes in elevation can have a great effect on the extent of RE 12.3.14. This Wallum Banksia is growing on the low edge of a patch transitioning into wet heath (RE 12.3.13), contributing to the poor condition of this plant.

Variations and similarities

RE 12.3.14a is a sub-type of RE 12.3.14. The key difference between the two types is the major canopy species. Wallum Banksia is the canopy species in 12.3.14, whereas in RE 12.3.14a, Scribbly Gum is the major canopy tree.

RE 12.3.14a also tends to grow on higher level alluvial features, for example stranded river terraces and the edges of floodplains.

Wallum Banksia and Scribbly Gum are two of the predominant coastal species in SEQ and are present within a number of REs that occur on sandy soils. These include RE 12.2.6, RE 12.2.9 and RE 12.2.10 on coastal dunes and sandplains and RE 12.5.3 that occurs on remnant Tertiary surfaces.

RE 12.3.14 and its sub-type RE 12.3.14a often occur together in the landscape. Pictured (above right) is a transition zone, with the Wallum Banksia (*Banksia aemula*) persisting as Scribbly Gums (*Eucalyptus racemosa*) begin to encroach. As the terrain gets slightly higher, the Scribbly Gums become the dominant species (right) in a typical RE 12.3.14a example.



Distribution map 12.3.14

Surviving patches of RE 12.3.14 are restricted to the alluvial plains of large coastal streams north of Caboolture. The distribution and extent of the RE in SEQ has always been small and restricted, due to particular habitat requirements. This has meant that even small reductions to patches of RE 12.3.14 (clearing for urban development or pine plantation) has caused significant impact on the amount of this RE remaining in the SEQ landscape. Today, much of the remaining patches are within reserves and this ecosystem is considered 'of concern' under Queensland legislation.

1. Great Sandy National Park, Cooloola

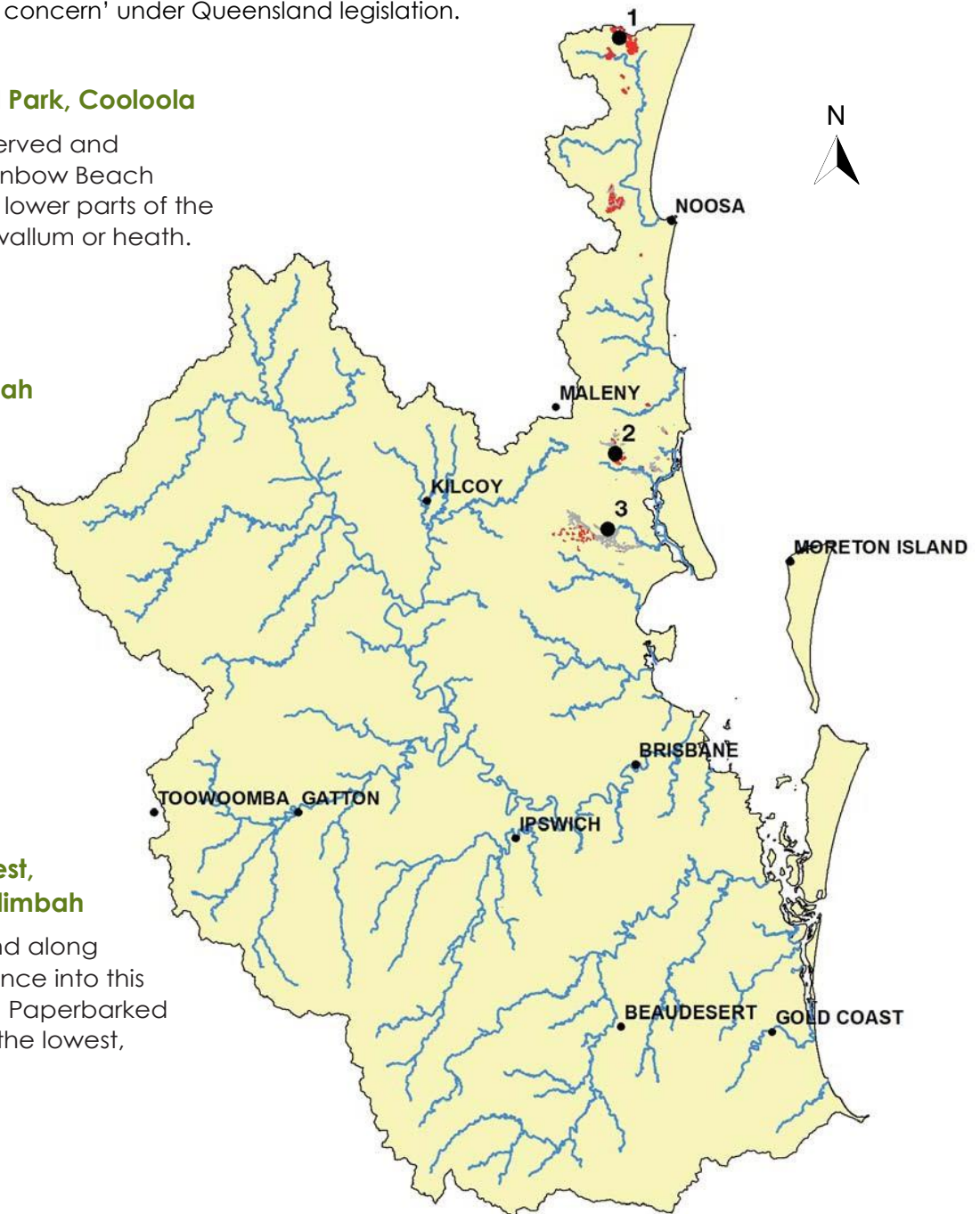
RE 12.3.14 can be observed and accessed from the Rainbow Beach Road, occurring in the lower parts of the landscape within the wallum or heath.

2. Mawson Road, Beerwah

A short walk into the state forest will show examples of RE 12.3.14 and 12.3.14a. The transition zone between these two types is evident in the slight change in elevation across the landscape.

3. Beerburrum State Forest, Bartholemew Road, Elimbah

RE 12.3.14 can be found along the gullies a short distance into this reserve, transitioning in Paperbarked Tea Tree woodland in the lowest, waterlogged areas.



■ 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: 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)
12.3.14	10,529	5,357	51%	3,013
12.3.14a	2,533	1,083	43%	933



The wallum country of SEQ, comprising a number of REs, including RE 12.3.14, used to cover much of the low lying coastal plains between Brisbane and Gympie. However, clearing for urban settlement and conversion of wallum into commercial pine plantations has resulted in a mosaic of small remnant patches with distinct boundaries.

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.

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

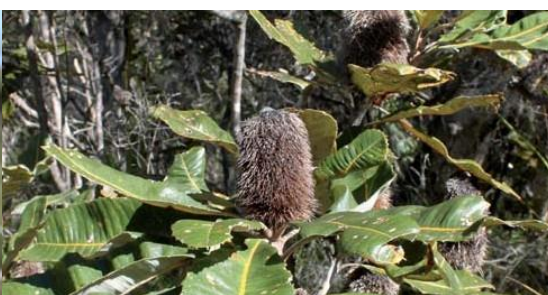
The remaining small, isolated patches of RE 12.3.14 are often subject to 'edge effects' or outside threats (e.g. weeds, fires, trampling and pest animals) along the boundaries of a patch. A common problem is introduced pine (*Pinus* spp.) 'wildlings' which self-seed in the wallum from adjacent forestry. Weed pines can irreversibly transform the wallum if left unchecked.



Natural values and function

RE 12.3.14 plays 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. Wallum plants also have the specialised ability to survive in fire prone, low nutrient environments.

Despite the low fertility of the wallum country, the flowering rhythms of plants throughout the year and the tender shoots of shrubs, sedges and grasses help to sustain a wide range of insects, small mammals and nectar-feeding and insectivorous birds and bats. Ants play a prominent role in collecting, storing and dispersing seeds, assisting new generations of obligate seeder species to germinate after fire from seeds left around nests. The seeds of plants foraged by ants have a nutrient-rich attachment known as an elaiosome – examples of plants with elaiosomes growing in RE 12.3.14 include wattles (*Acacia* spp.) and shrubs belonging to the legume family such as bush peas (*Pultenaea* spp.).



Management

The plant species that comprise RE 12.3.14 exhibit a broad range of strategies for surviving fire by reshooting or by regenerating from seed enclosed in thick woody containers held in aerial parts of the plant, and from seed stored in the soil. Smoke also plays an important role in triggering seed regeneration.

The ecosystem is highly flammable and subject to intermittent severe fire events that can be so intense that much of the above-ground plant biomass, including the stems of trees, is destroyed.

Consequently, it is not unusual to observe patches in which the taller plants, for example Wallum Banksia and Red Bloodwood, appear to be even-aged. This is due to post-fire re-shooting from basal organs known as lignotubers or by regeneration from seed released after the fire.

The understorey shrubs, grasses, sedges and small herbaceous life forms such as lilies and ground orchids also regenerate from fire by shoots or seed. Some of these species appear to die out after long periods without fire. However, they have been observed to remain present as seed or as dormant bulbs and tubers and re-appear as part of the post-fire recovery.

The fire guidelines for RE 12.3.14 recommend fire intervals of 8-20+ years with planned burns conducted from late summer to winter. An objective of the deliberate use of fire is to produce a burn mosaic which provides ongoing food and shelter for fauna as well as establishing a mosaic of patches with different fire histories – this can be very beneficial for the survival of plant and animal species.

A mosaic pattern is more likely to be achieved when there is high soil moisture. Burning during dry conditions should be avoided because of the risk of destructive, high intensity fires. The flammability of heath vegetation is such that it will generally burn even a few days after rain.

Fire is a key consideration in the management of RE 12.3.14. The heath vegetation will readily carry a fire and burning during hot weather or dry periods can result in high intensity, damaging fires. This Wallum Banksia has sustained damage from a previous hot fire but is able to survive by re-shooting and growing new stems and branches.

Repeated short intervals between fire has the potential to change the species composition of 12.3.14 by removing fire-killed plant species reliant on producing a seed bank during the period between fire. This can take 3-8 years to occur. Some obligate seeder species are relatively long-lived (eg. *Hakea actites*) and the senescence and death of individual plants belonging to these indicator-type species can be used as a guide for planning when to burn.

The soils supporting RE 12.3.14 are infertile, being low in minerals such as phosphorous and potassium. The plant species have special adaptations for accessing, recycling and manufacturing nutrients essential for plant growth. The low soil fertility helps to limit the growth of environmental weeds.

The more serious invasive species that can establish in the infertile sandy soils of 12.3.14 include Groundsel Bush (*Baccharis halimifolia*) and Slash Pine (*Pinus elliottii*). Changes to the local run-off regime (eg. diversion of water-flow by construction of drains and roads) and nitrification from urban run-off can also cause changes to the species composition resulting in the invasion by lantana (*Lantana camara*), Easter Cassia (*Senna pendula* subsp. *glabrata*), Camphor Laurel (*Cinnamomum camphora*) and introduced grasses such as Molasses Grass (*Melinis minutiflora*).



Restoration and regeneration

The key objective of restoring RE 12.3.14 is to establish an overstorey of Wallum Banksia and/or Scribbly Gum and a diverse understorey in which there is negligible weeds. Encouraging natural regeneration is preferable to replanting, as less effort will be required and plants are adapted to the locally-occurring low nutrient conditions. The capacity of an area to regenerate will be influenced by a number of factors including 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.



The ability of the tree species to survive by suckering means that they can persist at disturbed sites although they will be killed by repeated hot fires. Suckers will regrow provided disturbance such as fire or slashing is removed. Loss of understorey diversity can be restored through time especially if native species remain present.

Soil requires careful management – it may contain vital seed stores and surviving species will have special root structures (e.g. fine shallow feeder roots) and biotic associations with fungi and bacteria which need to be protected and maintained. Any external sources of plant nutrients, for example run-off, need to be removed or diverted. Rain will leach nutrients such as nitrogen from the plant root zone relatively quickly.

The occurrence of RE 12.3.14 in the landscape reflects specific elevation, soil acidity and fertility, and suitable fire intervals. It is important to explore and understand these broad requirements before undertaking restoration or regeneration, as only minor changes to these regimes can result in mortality of key species, such as this Wallum Banksia (Banksia aemula) pictured above.

Regeneration should be kept free of fire for a long period (e.g. at least 8-10 years) to enable the longer-lived structurally dominant species to become re-established.

Planting of trees and understorey species may be required where there are no longer any surviving suckers and 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 12.3.14.

An alternative to planting is broadcasting seed when conditions are suitable, for example during wet weather. This may be appropriate for understorey species in particular. Sowing needs to take into account appropriate treatment that may be required (e.g. heat) and will be more effective if the site is relatively open and free of deep ground litter.

Restoration tips

- Plan the project in detail, as some of activities that may be required such as restoring a diverse heathy understorey may require a long-term approach.
- Carefully observe the species that remain present on the site over a period of time – some are more evident when flowering, such as the Native Iris (*Patersonia* spp.) or are seasonal. It is often surprising to observe how many native species can survive on disturbed sites, albeit in low numbers.
- Limit use of burning until Wallum Banksia and other woody species are well established.
- Minimise soil disturbance and avoid changing local drainage patterns in the construction of tracks, firebreaks etc.
- Use local seed to protect the genetic resources of local wild populations of plants by reducing the risk of cross pollination with planted species sourced from outside the local area. 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 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 12.3.14

Trees

Yellow Wattle, Red Wattle	<i>Acacia flavescens</i>
Yellow Prickly Moses	<i>Acacia hubbardiana</i>
Black She-oak	<i>Allocasuarina littoralis</i>
Coastal Paperbark	<i>Melaleuca quinquenervia</i>
Dwarf Banksia	<i>Banksia oblongifolia</i>
Flaky-barked Tea-tree	<i>Leptospermum trinervium</i>
Golden Candlesticks	<i>Banksia spinulosa</i> var. <i>collina</i>
Golden Shaggy Pea	<i>Oxylobium robustum</i>
Green Five Corners	<i>Styphelia viridis</i>
Midyim	<i>Austromyrtus dulcis</i>
Parrot Pea	<i>Dillwynia</i> spp.
Pink Bloodwood	<i>Corymbia intermedia</i>
Prickly Broom Heath	<i>Monotoca scoparia</i>
Prickly Moses	<i>Acacia ulicifolia</i>
Rice Flower	<i>Pimelea linifolia</i>

Swamp Box	<i>Lophostemon suaveolens</i>
Swamp Mahogany	<i>Eucalyptus robusta</i>
Wallum Geebung	<i>Persoonia virgata</i>
Wallum Grasstree	<i>Xanthorrhoea fulva</i>
Wallum Hakea	<i>Hakea actites</i>
Wallum Phebalium	<i>Phebalium woombye</i>
Wedding Bush	<i>Ricinocarpus pinifolius</i>
Woolly Aotus	<i>Aotus lanigera</i>



Wallum Geebung

Wallum Hakea



Wallum Grasstrees

Grasses, forbs, ferns and epiphytes

Blady Grass	<i>Imperata cylindrica</i>
Bracken Fern	<i>Pteridium esculentum</i>
Curly Sedge	<i>Caustis recurvata</i>
Wanderie Grass	<i>Eriachne pallescens</i>
Feather Sedge	<i>Ptilothrix deusta</i>
Kangaroo Grass	<i>Themeda triandra</i>
Native Iris	<i>Patersonia</i> spp.
Variable Sword Sedge	<i>Lepidosperma laterale</i>
Wiry Panic	<i>Entolasia stricta</i>

Vines and scramblers

Slender Devils Twine	<i>Cassytha glabella</i>
Snake Vine	<i>Hibbertia scandens</i>

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Written by Peter Young, Vegworx. Edited by Deborah Metters, Paul Donati, Darren McPherson and Liz Gould. Uncredited photographs by Darren McPherson. This is an update to the initial publication published in 2016, made possible thanks to funding by the Australian Government's National Landcare Program.

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)



For more information:
Healthy Land & Water
 Ph: 07 3177 9100
 E: info@hlw.org.au
www.hlw.org.au



Delivering an environment
 for future generations to thrive

Healthy Land & Water
 T: 07 3177 9100 info@hlw.org.au
www.hlw.org.au