



REGIONAL ECOSYSTEMS OF SOUTH EAST QUEENSLAND

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RE 12.9-10.6

Brigalow open forest on sedimentary rocks

One of the legendary trees of outback Queensland is Brigalow (*Acacia harpophylla*). It is a medium to tall tree with dark-furrowed bark and silvery-grey foliage. Brigalow is a wattle and has bright yellow flowers.

Brigalow trees form dense stands colloquially known as 'Brigalow Scrubs', which include Regional Ecosystem (RE) 12.9-10.6. The early European settlers found the Brigalow Scrub soils to be relatively fertile but efforts to clear the country for agriculture were restricted by Brigalow's dense regrowth.

Brigalow country also became heavily invaded by the introduced Prickly Pear or Tree Pear (*Opuntia spp.*) until the successful introduction of a natural

predator, the Cactoblastis moth. The Brigalow Scrubs of inland, central and southern Queensland were eventually transformed into grazing pasture and cropland through the availability of heavy machinery which cleared large areas quickly, and synthetic herbicides that controlled the regrowth.

In parts of South East Queensland (SEQ), the relatively low rainfall and soil types are suitable for Brigalow, and scattered occurrences occur east towards Ipswich. These are notable as they are geographically separated from the main body of Brigalow Scrub west of the Great Dividing Range.

The Brigalow Scrubs of SEQ contain isolated populations of other plant

species that are also more typical of inland Queensland, for example Wilga (*Geijera parviflora*) and Plumwood (*Santalum lanceolatum*).

The shady conditions under a relatively dense canopy of Brigalow limit plant growth and the ground layer is often reduced to a sparse cover of grasses, small shrubs, herbs and sedges growing among leaf litter and fallen branches. Heavier soils with Brigalow can develop small depressions called melonholes or gilgai that are swampy after rain. Through time the understorey of Brigalow Scrub may develop a dense shrub and low tree layer composed of shade-tolerant softwood scrub species.

Brigalow is a distinctive, medium to tall tree with tough furrowed bark (right) and weeping dark green-silver foliage. Brigalow is a wattle with trademark yellow flowers appearing periodically.



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 12.9-10.6 grows in gently undulating to hilly country receiving an average rainfall of 700-900 mm per year. The soils are grey and brown cracking clays derived from soft, easily weathered sedimentary rocks. Much of the occurrence of Brigalow in SEQ is associated with two geological formations, the Walloon Coal Measures and the Marburg Formation.

RE 12.9-10.6 once covered two large areas of SEQ, along the southern ranges of the Lockyer Valley and in the Fassifern Valley centred around Kalbar. In today's landscape, small isolated patches can still be found dotted across these landscapes, with scattered Brigalow across distant hills providing some indication of the previous extent of this ecosystem.

Variations and Similarities

In SEQ, Brigalow Scrubs are confined to two major types of geology; sedimentary rocks and Cainozoic igneous (young basalt) rocks. The corresponding Regional Ecosystems are:

- RE 12.8.23 - Brigalow open forest on Cainozoic igneous (young basalt) rocks.
- RE 12.9-10.6 - Brigalow open forest on sedimentary rocks.

On sedimentary rocks, Brigalow Scrubs co-occur with RE 12.9-10.15 semi-evergreen vine thicket. The two REs often intergrade on hillslopes where large Brigalow trees overtop a dense understorey of softwood scrub species. Gum-topped Box (*Eucalyptus moluccana*) open forest (RE 12.9-10.3) and Swamp Tea-tree (*Melaleuca irbyana*) low open forest (RE 12.9-10.11) also occur in close proximity to Brigalow Scrub.

Belah (*Casuarina cristata*) can grow with or replace Brigalow, especially on lighter soils, and Black Tea-tree (*Melaleuca bracteata*) is often present along watercourses and in swampy depressions.

Patches of RE 12.9-10.6 with an established canopy of Brigalow can develop a midstorey or understorey of semi-evergreen vine scrub species, similar to RE 12.9-10.15 (as shown here). These two REs will often coexist with each other, with species assemblages across the landscape fluctuating in favour of one, or the other, in a mosaic.



RE 12.9-10.6*

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

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

Distribution Map - Past and Present

In SEQ, RE 12.9-10.6 is confined to the Rosewood-Haigslea district, parts of the Fassifern and Lockyer Valleys and upper Cooyar Creek. The occurrences were limited in extent and have been heavily fragmented overtime. In today's landscape, only small patches of RE 12.9-10.6 persist, primarily on private land. As a result RE 12.9-10.6 is considered 'endangered' under Queensland legislation.

1. Glamorganvale Road, Glamorganvale.

The range crossing between the towns of Glamorganvale and Lowood has remnant RE 12.9-10.6 capping the nearby peaks and along the road edges.

2. Rosewood Arboretum, Rosewood.

Plants representative of the Rosewoods Scrubs, including Brigalow, are represented in the Rosewood Arboretum on Matthew Street. This place allows intimate access to these species which can often be restricted to private properties.

3. Kalbar. Although much of the Brigalow Scrub has been cleared over time, the properties and minor roads around the town of Kalbar are a great place to view some of the remnant patches of RE 12.9-10.6 persisting in the landscape, as well as isolated Brigalow trees, indicative of the previous extent of the scrubs.



RE 12.9-10.6 - Facts and Figures (as of 2014)

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)
12.9-10.6	31,615	757	2%	7



Past to Present

Brigalow Scrubs are highlighted in the diaries of the early European explorers of southern Queensland because they proved slow and difficult to traverse, necessitating detours. The patches are also well documented in the early land survey records. The Brigalow Scrubs of SEQ were whittled away through time by clearing and fire. However, clumps of Brigalow have continued to survive due to the capacity of the species to reproduce vegetatively from root suckers. There is limited information about some of the species that would have grown with Brigalow in SEQ (e.g. grasses,

RE 12.9-10.6 is quite a resilient and tough ecosystem and will persist where it is not directly targeted for clearing, such as roadside remnants (above). Although these linear remnants are thin, they can be an important refuge for Brigalow Scrub species in an otherwise cleared landscape. They are also an important genetic resource for restoration projects.

sedges) and it is likely that some of these species have become quite rare or locally extinct.



The Bearded Dragon (*Pogona barbata*) is well suited to the Brigalow Scrubs, able to take advantage of the boom and bust cycles of wet and dry, by conserving energy, laying motionless for much of the day. The furrowed bark of the Brigalow also provides an excellent climbing surface and camouflage opportunity if required.

Natural Values and Functions

Brigalow is adapted to growing on heavy clay soils that are prone to extremes of wet and dry and which frequently have sodic or saline subsoils. Consequently, Brigalow Scrubs play a significant role in intercepting, storing and recycling energy, carbon and nutrients in environments that are unsuited to many of the locally occurring tree species. Brigalow also plays a role in regulating ground water and lowering water tables in areas that are prone to rising salinity.

Remnant patches are utilised by a wide range of animals for shelter and for seeking food. They are rich in birds and reptiles and provide habitat for several listed species. Geckoes, dragons and skinks live and forage around fallen timber and in the grooves and furrows of the tree bark.

Mistletoes on Brigalow and Belah trees are an important food source for birds and bats. The threatened Glossy Black Cockatoo is a seasonal visitor that feeds on the seed produced by Belah, while another threatened bird, the ground-dwelling Black-breasted Button Quail is a sedentary species that survives in Brigalow Scrubs with a shrubby understorey of softwood scrub species.

Management

Brigalow Scrubs tend to be even-aged due to the role of major disturbance events in initiating regeneration. Much of the observed regeneration of Brigalow is from suckering from lateral roots following disturbance to the soil or hot fires. While suckering is commonplace, Brigalow intermittently produces large crops of seed which will also trigger a wave of regeneration if conditions are suitable. In areas managed for pasture, Brigalow suckers are controlled by ploughing or herbicide.

Retained patches of Brigalow are susceptible to weed invasion. The more serious environmental weeds in SEQ include Climbing Asparagus Fern (*Asparagus africanus*), Tree Pear, Lantana (*Lantana camara*), Creeping Lantana (*Lantana montevidensis*), African Boxthorn (*Lycium ferocissimum*), Dutchman's Pipe (*Aristolochia spp.*), Cat's Claw Creeper (*Dolichandra unguis-cati*) and Chinese Elm (*Ulmus parviflora*).

The introduced pasture grass Green Panic or Guinea Grass (*Megathyrus maximus*) is also a major pest of remnant Brigalow patches. It can establish in shade and increases the risk of fire encroachment when conditions are dry. Fire promotes establishment of weedy species in Brigalow patches, and fire may also result in death and injury to established Brigalow and Belah trees. Consequently, the use of fire breaks and cool season hazard reduction burns are recommended around retained patches. These areas would also benefit from fencing to exclude livestock to limit the risk of damage from trampling and further introduction of weeds.



Brigalow (*Acacia harpophylla*) in RE 12.9-10.6 is often even aged and of similar height. This is a result of broad scale past disturbances such as clearing or fire, after which the Brigalow re-grew from underground root suckers.

Two of the worst weeds that can infest RE 12.9-10.6 are Cat's Claw Creeper (below left) and Climbing Asparagus Fern (below right). If left untreated, these weeds will eventually smother and destroy the Brigalow canopy.

Despite a successful biological control program, Prickly Pear or Tree Pear can still infest Brigalow Scrubs today.





Restoration & Regeneration

Activities that aim to restore the ecosystem to an approximation of original condition will require different approaches depending upon the condition of the site. For example, a degraded patch that retains Brigalow and Belah trees is likely to require intensive weed control.

Regenerating a grassy paddock that once used to be Brigalow Scrub will need a carefully planned and staged project over a long period of time. If some Brigalow Scrub plants are still present, albeit in a suppressed state, they can be very helpful in restoration projects. Any surviving trees and regrowth can be used as a basic framework or skeleton for the project. Brigalow or Belah regrowth could be encouraged in the vicinity of surviving trees through light disturbance of the ground using a blade or plough. This may require careful experimentation. Regrowth can be very dense and will require thinning or the intense competition will suppress growth and development.

Planting will be necessary where Brigalow or Belah trees no longer occur or where it is not feasible to produce suckers. Where planting is required, a look out for Brigalow flowering and seeding will be necessary well in advance, given the irregular nature of flowering and seed production. Belah is a more regular seed producer than Brigalow. Seed viability is limited (around 12 months) so the seed should be planted soon after it matures.

Weed control will be necessary until the developing canopy is dense enough to provide shade. However, there will always be a potential for birds and wind to carry new weed species to the site and early control of infestations will save a lot of work later on.

Severe infestations of Climbing Asparagus and other vines in retained Brigalow patches are very labour intensive to control. A systematic approach may be the most effective in these situations, gradually working away from the starting point in small stages. A suitable starting point could be an area where risk or rate of re-infestation is judged to be relatively low, for example the edge of the infestation.

The flowering and seeding cycles of Brigalow (*Acacia harpophylla*) are not well understood, and can be intermittent over many years. If you wish to undertake a restoration project, it is important to be ready to respond to a seeding event, and to protect young trees from fire and grazing pressure until they are established (above).

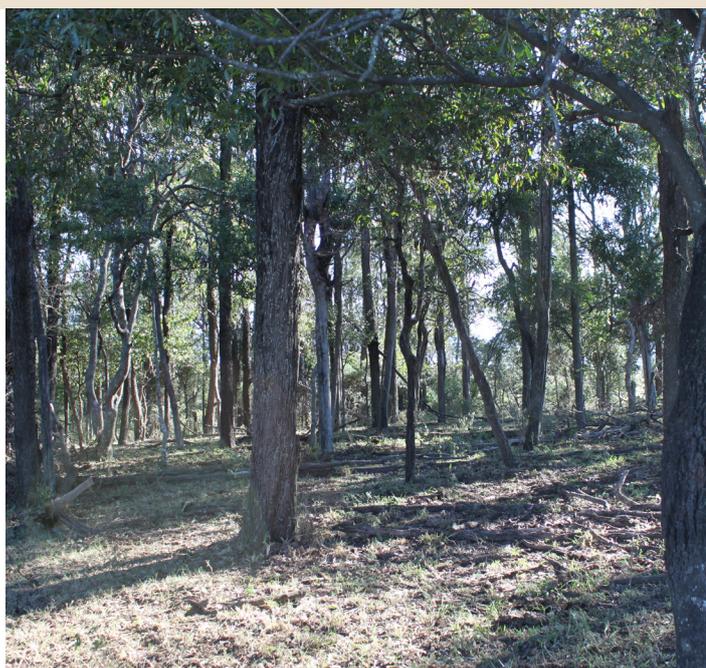
Fire and grazing are not recommended in Brigalow Scrub restoration projects apart from initial phases where they may be useful in reducing grass cover. Consequently, fencing and fire breaks are recommended where there is a risk of damage. Browsing from macropods and possums may also be an issue and tree guards may be required around palatable plants.



Restoration of a degraded patch or RE 12.9-10.6 like the example above, requires a long term commitment. Control of pasture grasses will be critical to allow for natural regeneration or replanting of canopy species.

Restoration Tips

- Plan the project thoroughly as ecological restoration of Brigalow Scrub is likely to require intensive effort. There is not a lot of expertise to draw on in SEQ and the project is likely to throw up some interesting challenges along the way!
- Become familiar with the local Brigalow Scrub flora by observing the species surviving in nearby patches and learn to differentiate the native flora from the weeds. Bear in mind that some of those prickly or insignificant-looking plants are likely to be native species.
- Observe and record progress and share your findings with others.
- If your project is going to need lots of planting, try growing your own from locally collected seed and cuttings!
- Control or limit use of fire and grazing to avoid damage to the regeneration



Grazing RE 12.9-10.6 has obvious impacts on the understorey and the recruitment of canopy species, as shown at these two sites above. However the withdrawal of grazing will need careful management to control the increased fire risk from the unchecked growth of pasture grasses or weedy vines.

Some Native Plants of RE 12.9-10.6

Grasses, Forbs, Ferns, Epiphytes

Australian Millet	<i>Panicum decompositum</i>
Berry Saltbushes	<i>Einadia hastata</i> and <i>Rhagodia spinescens</i>
Blue Burr Daisy	<i>Calotis cuneata</i>
Blue Trumpet	<i>Brunoniella australis</i>
Brigalow Grass	<i>Paspalidium caespitosum</i>
Bristle Cloak Fern	<i>Cheilanthes distans</i>
Chaff Flower	<i>Nyssanthes diffusa</i>
Channelled Boat-lip Orchid	<i>Cymbidium canaliculatum</i>
Dwarf Plectranthus	<i>Plectranthus parviflorus</i>
Eastern Cottonbush	<i>Maireana microphylla</i>
Hooky Grass	<i>Ancistrachne uncinulata</i>
Mulga Fern	<i>Cheilanthes sieberi</i>
Native Nightshade	<i>Solanum spp.</i>

New Zealand Spinach	<i>Tetragonia tetragonoides</i>
Rough Maidenhair Fern	<i>Adiantum hispidulum</i>
Saltbush	<i>Atriplex spp.</i> and <i>Enchylaena tomentosa</i>
Sedge	<i>Cyperus spp.</i> (e.g. <i>Cyperus bifax</i> , <i>C. fulvus</i> , <i>C. gracilis</i>)
Slender Chloris	<i>Chloris divaricata</i>
Slender Rat's Tail Grass	<i>Sporobolus creber</i>
Small Burr-grass	<i>Tragus australianus</i>
Small Plectranthus	<i>Plectranthus parviflorus</i>
Stout Bamboo Grass	<i>Austrostipa ramosissima</i>
Square-stemmed Broom	<i>Spartothamnella juncea</i>
Tropical Speedwell	<i>Evolvulus alsinoides</i>
Winter Apple	<i>Eremophila debilis</i>

Trees and Shrubs

Belah	<i>Casuarina cristata</i>
Bellfruit Tree	<i>Codonocarpus attenuatus</i>
Bitter Bark	<i>Alstonia constricta</i>
Black-fruited Thornbush	<i>Pittosporum viscidum</i>
Brigalow	<i>Acacia harpophylla</i>
Broad-leaved Cherry	<i>Exocarpos latifolius</i>
Brush Whitewood	<i>Atalaya salicifolia</i>
Crows Ash	<i>Flindersia australis</i>
Currant Bush	<i>Carissa ovata</i>
Diamond-leaved Pittosporum	<i>Pittosporum rhombifolium</i>
Erythroxylum	<i>Erythroxylum subcapricornicum</i>
Grey Olearia	<i>Olearia canescens</i>
Hard Alectryon	<i>Alectryon subdentatus</i>
Leopard Ash	<i>Flindersia collina</i>
Long-leaved Mock Olive	<i>Notelaea longifolia</i>
Muttonwood	<i>Rapanea variabilis</i>
Narrow-leaved Bottle Tree	<i>Brachychiton rupestris</i>
Narrow-leaved Croton	<i>Croton phebalioides</i>
Native Caper	<i>Capparis arborea</i>
Native Holly	<i>Alchornea ilicifolia</i>
Native Olive	<i>Notelaea microcarpa</i>
Native Senna	<i>Senna spp.</i>
Peach Bush	<i>Ehretia membranifolia</i>
Native Witch Hazel	<i>Turraea pubescens</i>
Plumwood or Sandalwood	<i>Santalum lanceolatum</i>
Prickly Pine	<i>Bursaria incana</i>

Python Tree	<i>Gossia bidwillii</i>
Queensland Ebony	<i>Diospyros geminata</i>
Red Ash	<i>Alphitonia excelsa</i>
Red Kamala	<i>Mallotus philippensis</i>
Red Olive Plum	<i>Elaeodendron australe</i>
Rose Almond	<i>Owenia venosa</i>
Sally Wattle	<i>Acacia salicina</i>
Scrub Boonaree	<i>Alectryon diversifolius</i>
Scrub Ironbark	<i>Bridelea exaltata</i>
Scrub Poison Tree	<i>Excoecaria dallachyana</i>
Scrub Wilga	<i>Geijera salicifolia</i>
Shiny-leaved Canthium	<i>Psydrax odorata form buxifolia</i>
Small-leaved Abutilon	<i>Abutilon oxycarpum</i>
Small-leaved Canthium	<i>Everistia vacciniifolia</i>
Small-leaved Coondoo	<i>Planchonella cotinifolia</i>
Small-leaved Ebony	<i>Diospyros humilis</i>
Strychnine Tree	<i>Strychnos psilosperma</i>
White Tamarind	<i>Elattostachys xylocarpa</i>
Wilga	<i>Geijera parviflora</i>

Vines and Scramblers

Forest Grape	<i>Clematicissus opaca</i>
Native Jasmine	<i>Jasminum didymum</i> subsp. <i>racemosum</i>
Wombat Berry	<i>Eustrephus latifolius</i>
Wonga Vine	<i>Pandorea pandorana</i>



Brigalow Scrubs are now dark patches in the landscape.

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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 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



Australian Government



National Landcare Programme



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