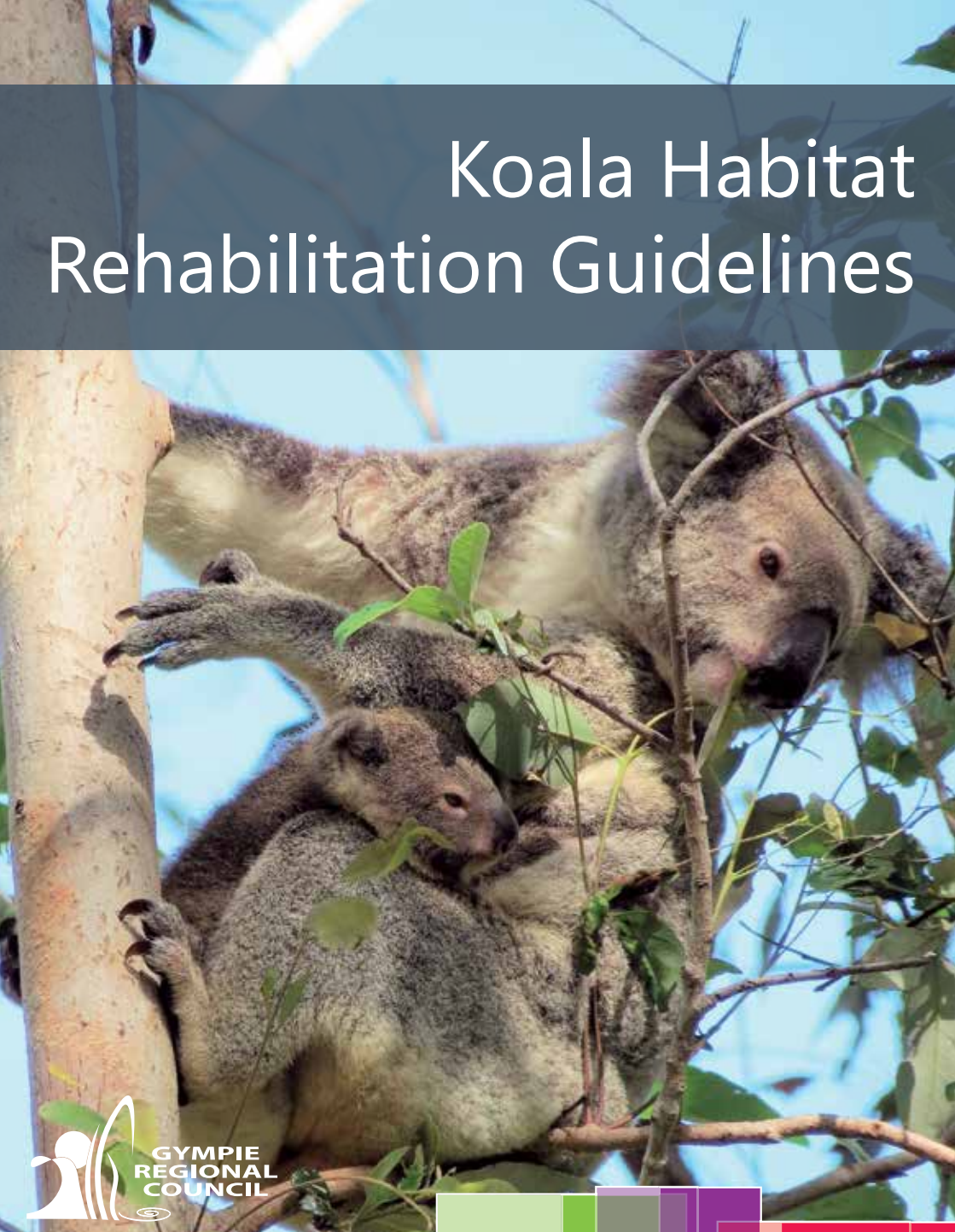
Koala Habitat Rehabilitation Guidelines



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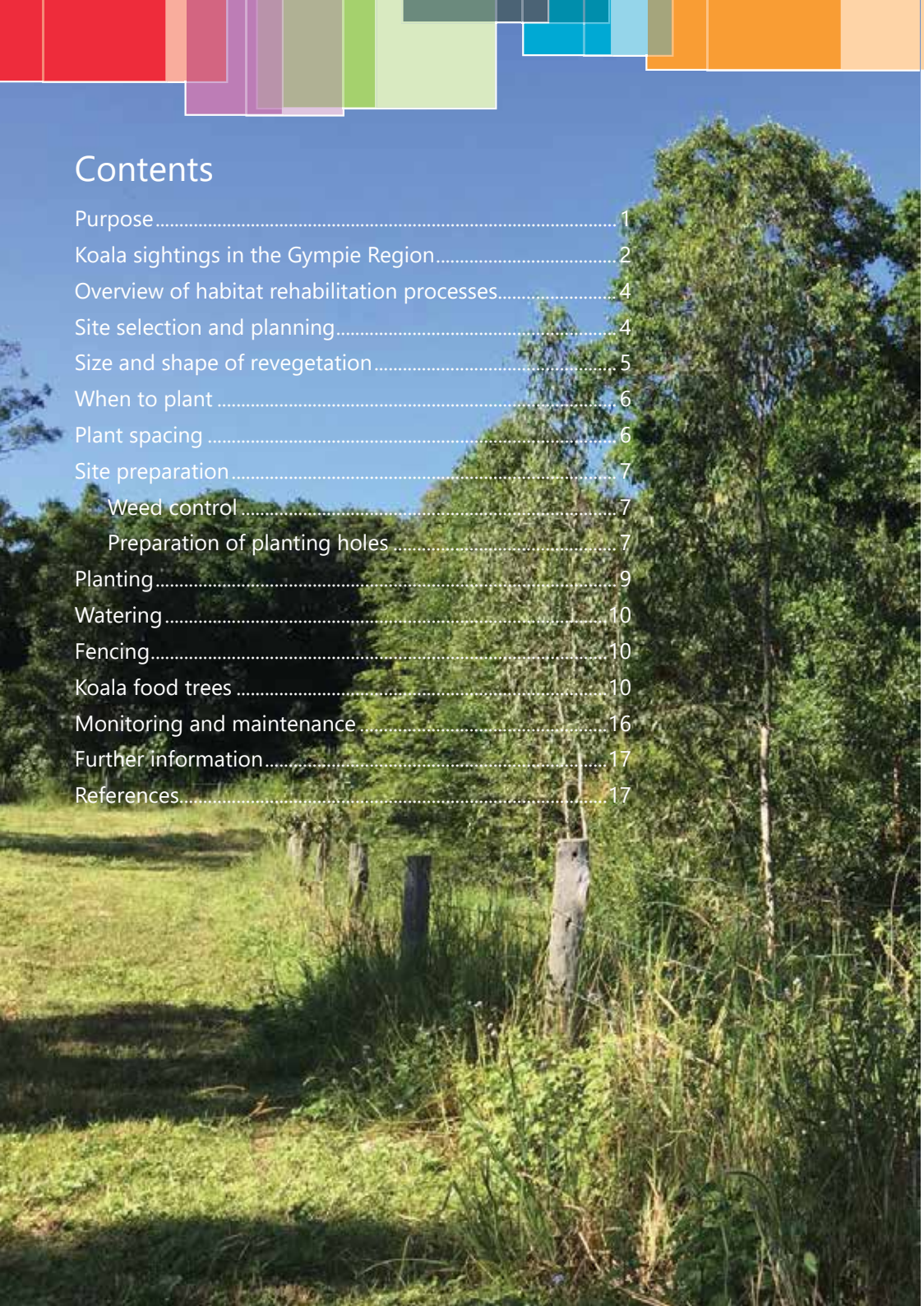

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Purpose

The aim of this document is to provide specific and locally relevant guidelines which will assist landholders, groups and land developers to rehabilitate koala habitat. These guidelines have been created with input from local community groups engaged in koala conservation activities. Rehabilitation of koala habitat also provides a range of environmental benefits and assists numerous other native species which share habitat with the koala.

Background

Koalas (*Phascolarctos cinereus*) are one of Australia's most iconic and loved native animals. Koalas were once common throughout Eucalypt dominated forests and woodlands from north Queensland to South Australia. Sadly, the range of koalas has now contracted significantly due to the loss of large areas of habitat and other threatening processes. (In Queensland, their range has contracted by approximately 30 per cent.) Stress to koala populations has also made koalas more susceptible to disease such as chlamydia. Koalas are listed by both the Queensland and Commonwealth Governments as a 'vulnerable' species due to the severe decline in koala numbers.

In order to better understand the health of the koala population within the Gympie Region, Gympie Regional Council engaged specialist ecologists to undertake koala surveys across the region and to produce a detailed koala habitat map covering the entire council area. This study found that the Gympie Region supports koala populations throughout the whole shire, from large bushland areas to highly fragmented patches in both rural and urban areas.

The koala habitat mapping undertaken revealed that koala habitat is diminishing in quantity and quality due to fragmentation of bushland areas and the presence of koalas in isolated remnant patches. A significant amount of remaining koala habitat within the Gympie Region is within private land, with private landholders having an important role to play in koala conservation.

Koala sightings in the Gympie Region

Koala Action Gympie Region (KAGR), a local community group, has been collecting koala sighting data from the public for the Gympie Region since 2015.

The presence of koalas can be identified in your area in several different ways. Nothing beats the direct observation of a koala in the wild, however you can also listen out during breeding season (August to January) for the deep grunting call of male koalas often accompanied by the high-pitched squealing of the attendant female or baby.

Check for long scratch marks and small pock marks on the bark of koala food trees, and for scats (koala poo) under the trees.

Scratches and pock marks

Koala scat

Wildwatch Gympie app

Council has developed a web application called "Wildwatch Gympie" to report koala (and other wildlife) sightings in the Gympie Region.

Members of the public are encouraged to use the web app and log koala sightings as they occur.

The web app is available at *www.gympie.qld.gov.au/wildwatch*.

Overview of habitat rehabilitation processes

While the specific aim may be to restore habitat for koalas, the broader aim of general habitat rehabilitation is to restore cleared or degraded areas of land to resemble the pre-existing vegetation community that occurred before disturbance, using nearby remnant bushland areas as a guide to vegetation species and structure.

Revegetation (i.e. the direct planting of trees, shrubs and ground covers) is a common practice used for habitat rehabilitation where the site has been historically cleared, there is minimal native vegetation and a low possibility of natural regeneration occurring from seeds in the soil or nearby remnant native vegetation. The following sections detail some important factors to consider before and during a revegetation project to ensure the best chance of successfully recreating koala habitat.

Site selection and planning

Before commencing revegetation planting, consider the proximity to surrounding/adjoining koala habitat and think strategically. This will help determine the design of the revegetation area with regards to location, shape, composition and size. Rehabilitation of koala habitat will be most efficient and effective if established adjacent to areas of existing koala habitat (if present). Attempting to create koala habitat in the middle of an open paddock is more difficult and is ultimately not likely to contribute to koala conservation if planted in isolation.

Revegetation planting to restore koala habitat is most effective when it involves one or more of the following:

- Expanding existing patches of koala habitat;
- Creating connectivity between existing koala habitat patches (corridor planting); and/or
- Creating corridors of koala habitat along watercourses.

Only plant an area that can realistically be maintained. Remember that planting is only the first step, and although koala food trees are generally fast-growing, all revegetation sites will need ongoing management to ensure establishment.

Consider site constraints such as the soil type, topography, slope and/or aspect, presence of livestock, exposure to drying winds, likely occurrence of frost and floods and site access for ongoing maintenance.

Consideration also needs to be given to the mature size of koala habitat trees! Koalas prefer Eucalypts and associated species, some of which have a mature height of over 30m. Ensure that adequate separation is available from infrastructure such as power lines and your neighbour's house.

When planning revegetation of koala habitat, there is a considerable amount of information available to assist landholders regarding their local soil types, historical vegetation communities (pre-clearing regional ecosystems), the Gympie Regional Council koala habitat mapping and much more. Much of this information is available for free online or you could consider seeking assistance from one of the local community groups such as Gympie and District Landcare.

Size and shape of revegetation

Shape is important, because bushland with a small perimeter or edge length relative to its area has greater resilience against threatening processes.

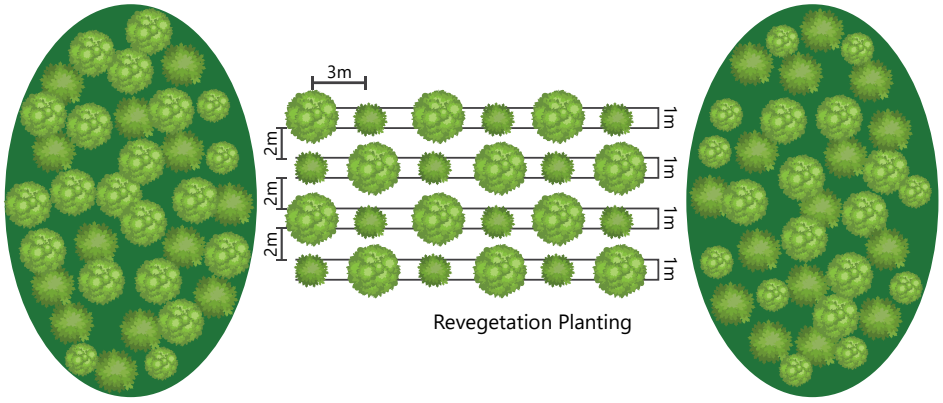
For example, an area of bushland that is round or square will be less prone to weed invasion than a long and narrow strip, which has a greater area accessible to the invasion of weeds.

When to plant

Planting should preferably be carried out after rain when the soil is moist although success can be achieved at any time of the year. Try to avoid planting in seasons where extremes of weather could be expected (e.g. frosts, floods). February to April is traditionally recognised as a good time to plant in the Gympie Region.

Plant spacing

Spacing of individual plants should replicate the habitat that is being reinstated. It is beneficial to initially plant trees close together (up to 1,000 stems per hectare or approximately 3m apart) to minimise weeds and establish a microclimate and then selectively thin out weaker plants over time (ensuring that vigorous trees or trees with active signs of use by koalas are retained). Wider spacing of trees usually results in slower establishment and more opportunity for weeds and does not consider natural attrition that may occur over time. Smaller plants (e.g. shrubs, ground covers and grasses) should be planted between the koala food trees to recreate ground habitat for other species and give koalas shelter as they move from tree to tree.



Example of revegetation planting model connecting existing patches of koala habitat

The simplest planting model is to plant trees in rows using the width of a mower/slasher as a guide for ease of controlling weeds between plants. Once the trees are established, mowing between rows will be reduced and smaller plants can be planted in between rows.

Site preparation

Good preparation of a planting site is important for successful revegetation. It can also make the job a lot easier and reduce the amount of maintenance needed after planting. Site preparation needs to be well-planned and carried out to maximise plant growth and involves the following activities.

1 Weed control

Young plants are susceptible to competition for moisture and nutrients from weeds, particularly grass. A weed free area should be created for each tree at the preparation phase prior to planting and maintained around each plant until most trees are over 3m high. The weed free area should be at least 1m wide at planting and can be increased to 2-3m wide as the trees grow.

Weeds can be controlled with herbicide, manual removal, slashing or a combination of all methods. If using herbicide, it is essential to read the manufacturer's instructions prior to applying any chemicals and to follow all safety and application instructions. Mulching will assist to keep weed control to a minimum.

2 Preparation of planting holes

There are several methods that can be used to create holes for planting tubestock:

- Long-nosed pick – suitable for most soil types, except very sandy soils. Creates a rough sided hole with a pointed bottom for accumulating water and encouraging good taproot development;

- Mattocks and shovels – suitable for most soil types. In heavier soils, shape the base of the hole to form a hollow (a flat-bottomed hole may be detrimental to good root development, causing taproots to assume an L-shape);
- Post-hole digger or auger – useful for larger scale plantings saving labour and time, generally fitted to a tractor. Best used on lighter soils. In clay or heavy soils, the sides of the hole must be roughed up prior to planting to overcome potential 'glazing' of the sides of the hole which may prove impenetrable to plant roots, causing them to grow around in circles;
- Mechanical cultivation – useful for large scale planting on compacted soils. Care needs to be taken that this is not done when soil conditions are too wet as you can cause additional problems of soil compaction. Care should be taken if mechanically 'ripping' soil as rip lines can scour out during flood events if not planned and carried out properly.

'Wet' planting is another useful method for planting tubestock. This methodology essentially involves planting tubestock into water-filled ground, where the planting medium has attained a 'soupy' like consistency. The advantage of this method is that rather than having to dig out a hole for planting, the ground is broken up utilising any of the methods described above and super saturated with water. Trees are then planted into the resultant soup rather than backfilling around them with dry soil and then watering-in from above. Gympie and District Landcare promotes the use of specifically designed water-spears to create planting holes with a high-pressure concentrated water jet to achieve this method quickly and efficiently.

Planting

The following are a few simple steps that can be undertaken to improve the survival rate of your plants if planting using more traditional methods.

1	To prepare the site, remove or control grass and weeds. Dig the hole slightly deeper than the plant container and twice as wide.
2	Fill the hole with water and allow it to drain. Do this step the day before if the soil is a heavy clay.
3	Dunk the potted plant in a bucket of water until the bubbles stop.
4	To remove the plant, invert the container and tap the top edge of the tube to release the plant to avoid damage to the roots.
5	Place the plant in the hole. Replace the soil and firm around the plant, creating a shallow saucer approximately 1m in diameter. Ensure the potting mix is covered by 2-3cm of soil.
6	Mulch with organic mulch to a depth of 10cm (avoid placing mulch up to the stem of the plant) or use specialised mulch mats. Water thoroughly. Follow up with watering and weeding.
7	Use of individual wire mesh tree guards or temporary electric fencing may also be required when establishing trees in areas where they can be accessed by livestock, or where there are populations of wallabies/ kangaroos or feral deer.

Watering

Successful plant establishment is dependent upon adequate moisture levels and nutrients being present. If planting conditions are dry, application of water within pre-dug planting holes prior to planting (up to a week beforehand) with at least 20 litres per hole will assist the plants in getting off to a good start. Additional watering of at least four litres per plant immediately after planting will help settle the soil around the plant and ensure good contact between the plant roots and the soil. Additional watering may be necessary and will depend on the season. Less frequent deep watering is much more beneficial than repeated superficial watering. Over-watering encourages plants to develop shallow root systems making them more susceptible to dry conditions.

Fencing

If the revegetated koala habitat requires fencing to prevent livestock from grazing on trees, ensure that it is constructed to be 'wildlife friendly' (i.e. designed to allow safe movement of wildlife) and includes the following:

- If barbed wire must be used, install plain wire for at least the top and the bottom strands;
- Provide a 50cm gap between ground level and the first rail or strand; and
- Provide 30cm gaps between the rails or remaining strands.

Be aware that exclusion fencing ('dog-wire' mesh) impedes a koala's safe movement and can be hazardous for them if they attempt to climb through or over. In this case, provide timber posts for the koala to climb over.

Koala food trees

Koalas are fussy eaters and are very specific in their dietary requirements. Koalas prefer to eat only a small percentage of the approximately 600 species of Eucalypts found in Australia. Eucalypt leaves contain very strong chemical compounds that are poisonous to most animals.

The leaves are also very tough and low in nutritional value. Within a given area only a few of the available eucalyptus species will be a preferred food species (primary koala habitat trees), while others, including some non-eucalypts, may be incorporated into the diet as a supplementary food source and/or utilised for other purposes (secondary koala habitat trees).

The koala tree species that are best suited to an individual site will depend on the underlying soil, geology and location. Gympie and District Landcare have produced a fact sheet on planting koala habitat in the Gympie Region which contains a list of suitable tree species for revegetation of koala habitat (see Further Information).

The Gympie Region can be broadly separated into three 'zones' which are characterised by similar vegetation type, geology and climatic conditions. These zones have been depicted in the map below which has been prepared to assist in selection of appropriate koala trees within the Gympie Region.

The following table summarises the primary and secondary koala habitat trees which are suited to the diverse environments of the Gympie Region with reference to the zones depicted in the preceding map. Primary koala habitat trees include those favoured by koalas for food. Secondary koala habitat trees are used by koalas for a variety of purposes including food, shelter and sleeping.

It is recommended that any revegetation of koala habitat incorporates a range of species from both primary and secondary koala habitat trees which are suitable for individual sites. These can be interspersed with other locally occurring native tree and shrub species to provide habitat complexity for other native species. Your local landcare nursery can provide further advice that is specific to your site.

Species Name	Common Name	Notes	Example Localities	Zone
Primary Koala Habitat Trees				
Eucalyptus major	Grey Gum	Low ridges	Goomeri, Widgee, Tuchekoi, Tansey, Mothar Mountain, Tamaree	Western, Central
Eucalyptus microcorys	Tallowwood	Fertile well drained slopes and gullies	Mothar Mountain, The Palms, Pie Creek, North Deep Creek, Goomboorian, Toolara	Central, Eastern
Eucalyptus propinqua	Small-fruited Grey Gum	Mid-lower slopes & valleys	Imbil, Kandanga, Southside, North Deep Creek, Mothar Mountain, Goomboorian	Central
Eucalyptus racemosa	Scribbly Gum	Deep sandy soils on coastal lowlands - can occur in hinterland	Tin Can Bay, Cooloola, Toolara, Rainbow Beach, Goomboorian	Central, Eastern
Eucalyptus robusta	Swamp Mahogany	Swampy areas on coastal lowlands	Cooloola, Cooloola Cove, Toolara, Goomboorian	Central, Eastern
Eucalyptus tereticornis	Blue/Forest Red Gum	Alluvial flats - also on some fertile slopes	Widespread throughout region – particularly Mary Valley	Eastern, Central, Western

Species Name	Common Name	Notes	Example Localities	Zone
Secondary Koala Habitat Trees				
Corymbia citriodora ssp. variegata	Spotted Gum	Ridges and slopes	Woolooga, Curra, Tuchekoi, Wolvi, North Deep Creek	Central
Corymbia intermedia	Pink Bloodwood	A wide range of soils and conditions	Widespread throughout all parts of region	Eastern, Central, Western
Eucalyptus acmenoides	Yellow Stringybark	Slopes and ridges with sandy or stony soils	Widespread through central and western parts of region	Central, Western
Eucalyptus bancroftii	Tumbledown Gum	Sandy soils in coastal areas (dry heath)	Cooloola, Rainbow Beach, Tin Can Bay, Coondoo	Eastern
Eucalyptus crebra	Narrow-leaved Ironbark	Hilly terrain at lower altitudes (dry areas). Also commonly occurs on fertile flats in western areas (e.g. Lower Wonga, Kilkivan, Widgee). Considered primary koala habitat tree species in these situations.	Widespread throughout central and western parts of region	Western, Central
Eucalyptus grandis	Flooded Gum/Rose Gum	Fertile soils along creeks/gullies and rainforest margins	Mothar Mountain, Tandur, Mary's Creek, Goomboorian, Mary River and tributaries	Central
Eucalyptus longirostrata	Grey Gum	Hilly loam to clay soils	Widespread throughout western parts of region.	Western
Eucalyptus moluccana	Gum-topped Box	Alluvial/clay soils (not close to waterways)	Widespread throughout central and western parts of region	Western, Central
Eucalyptus pilularis	Black butt	Ridges	Cooloola NP, Toolara SF, Kandanga SF	Eastern, Western
Eucalyptus resinifera	Red Mahogany/ Messmate	Sandy or well drained acidic soils (good soil moisture)	Kandanga, Toolara, Cooloola	Central, Eastern
Lophostemon confertus	Brush box	A wide range of soils and conditions	Widespread throughout all parts of the region	Eastern, Central, Western

Monitoring and maintenance

Once a koala habitat revegetation site has been planted it will need to be maintained and monitored for the best results. It is important to document which species were planted and the date they were planted. This will enable you to monitor the success and/or failure of species and allow you to make modifications for future revegetation sites. Take regular site photos from a fixed photo point to monitor the changes within the site e.g. habitat developing, seasonal changes, impacts from fire, flood or drought. Monitor weeds and control them as required. Weed control should be undertaken for at least the first year to reduce competition with establishing plants. In the first year, water plants if they are stressed or during prolonged dry periods and replace dead plants if required.

Gympie is prone to frosts on flood plains and low-lying areas which can significantly damage young trees. While Eucalypts are generally less sensitive to frost than other species, there are various strategies which can be used to reduce frost damage depending on the situation. Gympie and District Landcare can provide advice specific to your situation if frost damage is an issue.

Koalas have been observed browsing on food trees planted as recently as three years ago. If koalas are in your area, they may well make an appearance in your newly planted koala habitat in a relatively short amount of time, making your hard work all worth it.

Further information

Planting for Koala Habitat in the Gympie Region – Gympie Landcare *https://gympielandcare.org.au/wp-content/uploads/Planting-for-Koala-Habitat-in-the-Gympie-Region.pdf*

Gympie Regional Council – Koala Habitat Mapping ("Critical habitat mapping") available from *https://maps.gympie.qld.gov.au/IntraMaps90/?project=PublicWeb&module=Town%20Planning*

Gympie Regional Council Koala Conservation Management Plan 2018 *https://www.gympie.qld.gov.au/native-animals*

Koala Action Gympie Region *https://www.kagr.org.au/habitat/*

References

Much of the information within this document was adapted from the excellent series of notes produced by Land for Wildlife (South-East Queensland) available from *https://www.lfwseq.org.au/notes/*

Land for Wildlife Queensland (2011) Note V3: Revegetation Principles (used with permission).

Land for Wildlife Queensland (2011) Note V4: Revegetation Practicalities (used with permission).

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