

Regional ecosystems: Melaleuca Forest



RE 12.9 – 10.11

Swamp Tea-tree low open forest or thicket on sedimental rocks

The Paperbarks or Tea-trees (*Melaleuca* spp.) are a large group of Australian plants that grow along watercourses and on soils that are waterlogged for periods after large falls of rain. Three of the more common species in South East Queensland (SEQ) include Coastal Paperbark, or Paperbarked Tea-tree (*Melaleuca quinquenervia*), which is mainly coastal, Weeping Bottlebrush (*Melaleuca viminalis*) and Black Tea-tree (*Melaleuca bracteata*) that grow along streams further inland.

Within SEQ there are other *Melaleuca* species that have localised distributions. An example is Swamp Tea-tree (*Melaleuca irbyana*). Swamp Tea-tree forms dense thickets amongst eucalypt woodland and open forest on poorly drained country. The highly distinctive patches of vegetation in which Swamp Tea-tree is the dominant tree is described as Regional Ecosystem (RE) 12.9-10.11.

The structure and species composition of 12.9-10.11 is quite variable. There is generally an even-aged layer of Swamp Tea-trees about 6-12m high with a sparse to scattered presence of taller Eucalyptus trees including Gum-topped Box (*Eucalyptus moluccana*), Narrow-leaved Ironbark (*Eucalyptus crebra*), Silver-leaved Ironbark (*Eucalyptus melanophloia*), Queensland Blue Gum (*Eucalyptus tereticornis*) and Spotted Gum (*Corymbia citriodora* subsp. *variegata*).

The shaded understorey beneath Swamp Tea-trees is open and there is a moderately dense ground layer of grasses, sedges and forbs strewn with woody litter. There are frequently depressions that fill with water and these are colonised by annual forbs and sedges as they dry out. RE 12.9-10.11 sometimes grows adjacent to Brigalow (*Acacia harpophylla*) vegetation (RE 12.9-10.6) and the odd Brigalow Forest species may be found growing in the Swamp Tea-tree ecosystems in these situations.



Swamp Tea-tree (*Melaleuca irbyana*) is the distinguishing tree in RE 12.9- 10.11, with very fine, weeping foliage and a covering of paper-like 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 12.9-10.11 grows on gently undulating plains and lower hill slopes in eastern-inland parts of SEQ. The soils are dark cracking clays derived from fine-grained sedimentary rocks (most occurrences are associated with the geological unit known as the Marburg Formation). The soils have impeded drainage which results in waterlogging. The soil surface has a gilgai or melonhole microrelief and water lies in depressions for periods after rain. Subsoils are often saline.

During drier periods, the cracking clays associated with RE 12.9-10.11 are clearly evident. The cracks will close up with the next rainfall, retaining water, and creating favourable conditions for Swamp Tea-trees.



Variations and similarities

RE 12.9-10.11a is recognised subtype that distinguishes an ecosystem in which the Eucalyptus overstorey is scattered (mid-dense) rather than sparse (RE 12.9-10.11). The Swamp Tea-trees tend to be more open or patchy in RE 12.9.10.11a than in RE 12.9-10.11.

Swamp Tea-tree also grows on alluvial plains as well as on sedimentary rocks (as in RE 12.9-10.11). When it grows on alluvial plains, it is described as either:

- **RE 12.3.3b** - Eucalyptus woodland / open Forest with a sparse to mid-dense understorey of Swamp Tea-tree on alluvial plains.
- **RE 12.3.3c** - Swamp Tea-tree low open forest or thicket with a sparse cover of taller trees on alluvial plains.

The relative abundance of Swamp Tea-tree to other Eucalypt species can help determine if the ecosystem is RE 12.9-10.11 or the subtype RE 12.9-10.11a. Factors such as waterlogged soil, absence of fire and grazing exclusion will favour the Swamp Tea-tree over time to form exclusive thickets (lower left), whereas a drier or elevated soil, frequent fire, or consistent grazing will gradually favour eucalypt species (above left).

Distribution map 12.9 – 10.11

Swamp Tea-tree has a limited geographical distribution being restricted to a few widely scattered localities in north-eastern New South Wales and Southern Queensland. In SEQ RE 12.9-10.11 occurs patchily in an arc from Jimboomba to north of Marburg. The extent of the ecological community has been further reduced over time by clearing, resulting in it being listed as 'endangered' under Queensland legislation.

1. University Of Queensland Campus, Gatton

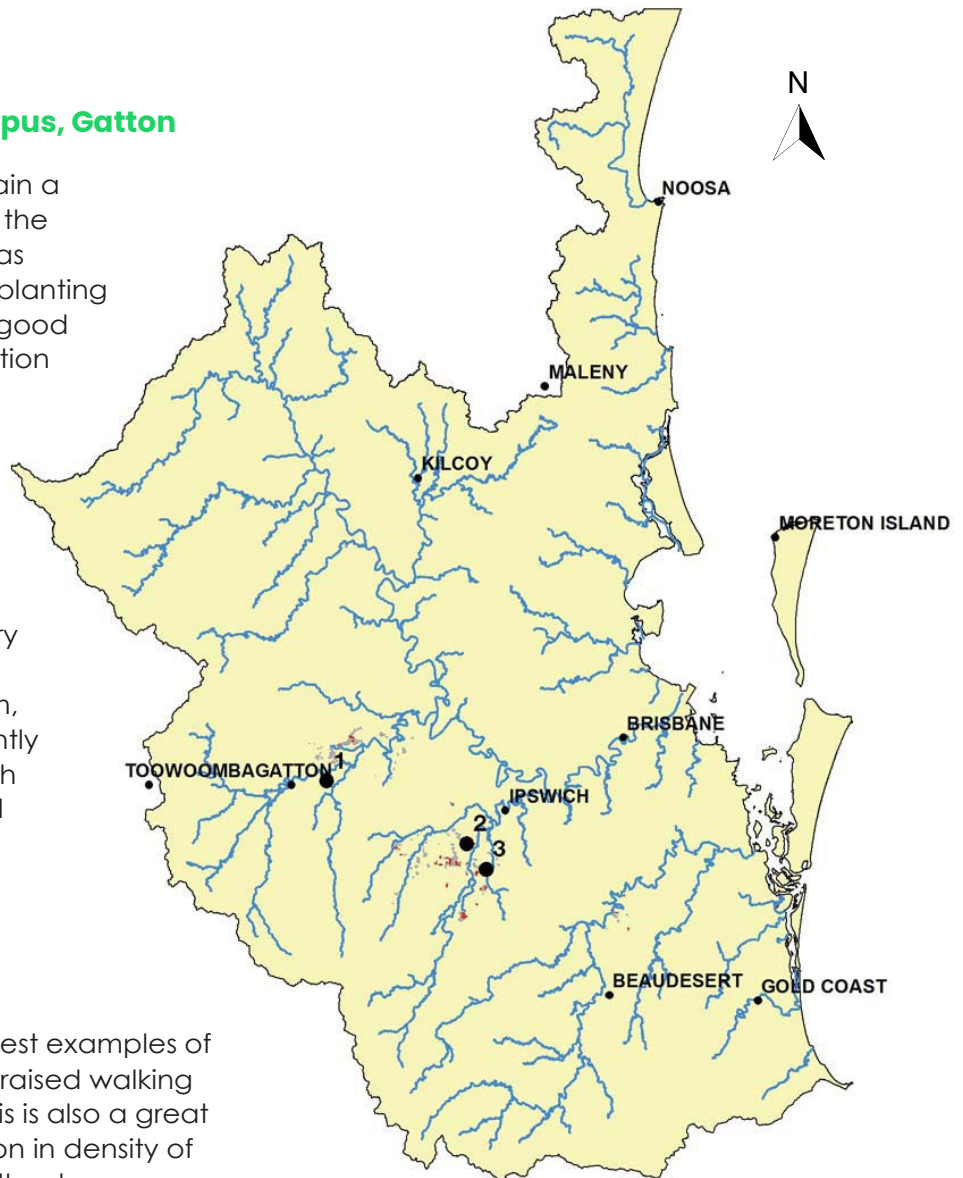
The grounds of the university contain a remnant patch of RE 12.9-10.11 at the south-eastern corner. This patch has recently received supplementary planting to increase its extent, providing a good opportunity to observe the restoration process.

2. Warrill Park Lawn Cemetery, Willowbank

The southern edge of the cemetery grounds contains a largely intact remnant of this regional ecosystem, with the transition into predominantly woodland tree species to the south of the patch, as the elevation and dryness increase.

3. Purga Nature Reserve, Purga

This reserve preserves one of the best examples of RE 12.9-10.11 in SEQ, and includes raised walking paths and interpretive signage. This is also a great opportunity to observe the variation in density of Swamp Tea-tree proportional to other tree species in this Regional Ecosystem across the reserve.



■ 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: 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)
12.9-10.11	2,409	229	10%	0
12.9-10.11a	5,215	361	7%	6

Past to present

The plains and low rolling country of inland SEQ has played a significant part in indigenous and non-indigenous economies and cultures.

The flat nature of the country facilitated movement of people and goods. Travel on foot, horse and later by motor vehicle was made easier by the vegetation which was often relatively open. However, denser patches of vegetation growing on undulating plains and low hills were commented on by the early European explorers of the country inland of Moreton Bay.



Swamp Tea-tree's papery bark (left), leaves and fruit (right).

The pioneering surveyors of the region provided more details in their sketches and plans. The thicker stands of trees nestling amongst the scattered woodlands of ironbarks (*Eucalyptus crebra*, *Eucalyptus melanophloia*), Spotted Gum (*Corymbia citriodora* subsp. *variegata*) and Queensland Blue Gum (*Eucalyptus terteticornis*) comprised clumps of softwood scrub (*semi-evergreen vine thicket*), Brigalow (*Acacia harpophylla*) and, less commonly, Swamp Tea-tree (*Melaleuca irbyana*).

Swamp Tea-tree is a member of the paperbarks and has thick, pale, flaky bark and tends to form even-aged monocultures. Swamp Tea-tree appears to have been restricted to poorly drained clay soils well away from the coast. It also formed dense, shady thickets overtopped by a sparse cover of taller eucalypts. Swamp Tea-tree has a strong capacity to recover from disturbance by resprouting as well as by regeneration from seed. This has helped scattered patches to survive.

Natural values and functions

The plants growing in RE 12.9-10.11 have the specialised ability to survive on heavy, poorly drained soils in fire-prone environments. These conditions limit the plant species that can grow successfully. Maintaining a healthy ecosystem of RE 12.9-10.11 in these situations reduces the potential risk of dryland salinity.

The dense foliage, fallen timber, and thick leaf litter of Swamp Tea-tree forests provide shelter and nesting sites for woodland birds and reptiles. Frogs occupy ephemeral pools of water that gather in gilgais and depressions. Melaleuca species are renowned for their heavy flowering which attracts birds and insects including native bees. Swamp Tea-tree produces small white or cream-coloured flower spikes during spring and summer.

RE 12.9-10.11 supports a diversity of species of mistletoe. Another special feature of Swamp Tea-tree forests is the abundance of the epiphytic Thumb-nail or Tongue Orchids (*Dockrillia linguiformis*) that spread over the upper trunks and branches of Swamp Tea-tree.

Tongue Orchid (*Dockrillia linguiformis*) has a strong association with Swamp Tea-tree (*Melaleuca irbyana*), often growing on the lower, shaded limbs (left). An open understory makes RE 12.9-10.11 ideal habitat for macropods, such as this Eastern Grey Kangaroo (right).





Management

The occurrences of RE 12.9-10.11 are associated with soils possessing characteristics that potentially limit plant growth, such as prolonged waterlogging, cycles of swelling and shrinking of the heavy clays and the presence of saline subsoils. Swamp Tea-tree and the other species that form this ecological community are adapted to survive these conditions.

RE 12.9-10.11 is also subject to periodic fire. Swamp Tea-tree can recover from fire or mechanical damage by resprouting. Consequently the thickets of Swamp Tea-tree appear to have a strong capacity to survive recurrent disturbances. The low cover of taller Eucalyptus trees evident at some sites may reflect past thinning or clearing. Where this has occurred, it is possible that the intense competition and shade from Swamp Tea-trees has inhibited the regeneration of other plants.

The fire guidelines for RE 12.9-10.11 recommend periodic burning conducted at intervals of 6-20 years. The fires can be planned to coincide with burning of adjacent Eucalyptus forest and woodland. The optimal times are late summer to mid-winter when conditions are moist, which will encourage patchy or mosaic burns. Adjacent eucalypt ecosystems may require more regular fire than the 12.9-10.11 patches, and it may be necessary to chip a fireline or construct a narrow break to prevent unwanted fire incursions.

The fire responses and regeneration requirements of Swamp Tea-tree remain poorly understood and approaches to burning may need to be revised as the effects of burning become better understood. Hardy pasture weeds and weeds of open disturbed ground will invade and modify the ecological community especially if there has been some soil disturbance and thinning of the tree cover.

Mother-of-Millions weed (above right). An isolated patch of Swamp Tea-tree that is heavily grazed, preventing regeneration of other plants (right).

Pasture grasses, such as Rhodes Grass (*Chloris gayana*) (pictured above) and Green Panic (*Megathyrsus maximus*) can significantly increase fuel loads and fire intensity in RE 12.9-10.11. Fire breaks should be considered to better manage fire intensity and assist the ecosystem's resilience and regenerative capacity.

Serious environmental weeds recorded from RE 12.9-10.11 include Creeping Lantana (*Lantana montevidensis*) and Mother-of-Millions (*Bryophyllum delagoense*) (pictured below) and other *Bryophyllum* species. Lantana (*Lantana camara*) and Leucaena (*Leucaena leucocephala*) are other major weeds that pose a risk. Examples of introduced grasses and broadleaved weeds that commonly occur within the ecological community include Green Panic (*Megathyrus maximus*), Awnless Barnyard Grass (*Echinochloa colona*), Sida (*Sida spp.*) and Common Verbena (*Verbena officinalis*).





Restoration and regeneration

The main focus of restoration of Swamp Tea-tree forests will be the protection around the edges of remnant patches isolated and fragmented by clearing. The capacity of an area to successfully regenerate will be influenced by the cover of weeds, proximity of the site to similar vegetation that can allow plants and animals to move into the regenerating patch through time, and the potential to manage fire and other disturbances.

The ability of *Melaleuca irbyana* to recover from damage by resprouting can lead to regeneration at sites after disturbances such as regular fire or periodic slashing are removed. The species has also been observed to regenerate from seed released from small capsules carried in the upper branches.

Regeneration activities should aim to minimise soil disturbance and exclude fire until Swamp Tea-tree and other woody species have become established. Dense regrowth of Swamp Tea-tree will tend to thin naturally through time due to competition for resources, particularly during dry times.

Planting of Swamp Tea-tree may be required if the population is very small or if the Swamp Tea-trees have been entirely cleared, but used to grow at the site. In these situations, plants should be sourced from local populations if possible. A couple of local eucalypt species may also be planted to provide shade and shelter for young Swamp Tea-tree plants.

Stock control and fencing is an important consideration in the restoration and regeneration of RE 12.9-10.11, particularly to establish a diverse and resilient suite of groundcover species as the restoration matures.



Mature swamp Tea-trees (*Melaleuca irbyana*) are tolerant of occasional cool burns, but fire should be excluded for a period to allow for the establishment of newly seeded or re-shooting trees.

Restoration Tips

- Observe the mix of species that remain present on the site proposed for restoration when growing conditions are good, keeping an eye out for resprouting individuals and seedlings of Swamp Tea-tree and native grasses, shrubs and forbs.
- If restoring a degraded patch that still has some remaining large trees, be prepared to experiment to see how small patches of tree regeneration can be successfully established.
- Limit use of burning until the long-lived woody species are well established. Observe and record what happens after fire to add to the pool of information about managing this ecosystem.
- 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.



In some cases, only a few mature Swamp Tea-trees will remain in a landscape indicating the former extent of RE 12.9-10.11.

In these instances, planting and stock controls will be required to increase the size of the Swamp Tea-tree forest and its resilience over time.



RE 12.9-10.11 can co-occur in SEQ with RE 12.9-10.6 - Brigalow (Acacia harpophylla) forest.

When undertaking a restoration project, remnant trees, such as the Brigalow (right) in this photo, should be used to help guide restoration and species composition.

Some native plants of RE 12.9 – 10.11

Trees and shrubs

Belah	<i>Casuarina cristata</i>
Brigalow	<i>Acacia harpophylla</i>
Narrow-leaved Ironbark	<i>Eucalyptus crebra</i>
Moreton Bay Ash	<i>Corymbia tessellaris</i>
Queensland Blue Gum	<i>Eucalyptus tereticornis</i>
Silver-leaved Ironbark	<i>Eucalyptus melanophloia</i>
Spotted Gum	<i>Corymbia citriodora</i> subsp. <i>variegata</i>
Swamp Tea-tree	<i>Melaleuca irbyana</i>

Grasses, forbs, ferns and epiphytes

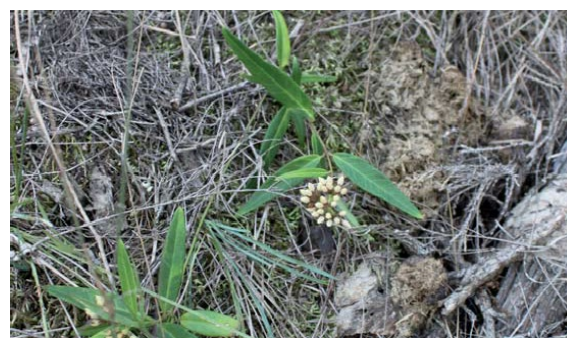
Barbed Wire Grass	<i>Cymbopogon refractus</i>
Berry Saltbush	<i>Einadia hastata</i>
Blue Trumpet	<i>Brunoniella australis</i>
Bluebell	<i>Wahlenbergia</i> spp.
Dinebra	<i>Dinebra decipiens</i>
Dianella or Flax Lily	<i>Dianella</i> spp.
Golden Beard Grass	<i>Chrysopogon fallax</i>
Kidney Weed	<i>Dichondra repens</i>
Lomandra	<i>Lomandra</i> spp.
Love Grass	<i>Eragrostis</i> spp.
Marsdenia	<i>Marsdenia</i> spp.
Mistletoe	<i>Amyema</i> spp.
Mulga Fern	<i>Cheilanthes sieberi</i>
Native Jasmine	<i>Jasminum</i> spp.
Native Panic	<i>Panicum</i> spp.
Pennywort	<i>Centella asiatica</i>
Pitted Blue Grass	<i>Bothriochloa decipiens</i>
Portulaca	<i>Portulaca bicolor</i>
Slender Chloris	<i>Chloris divaricata</i>
Slender Flat Sedge	<i>Cyperus gracilis</i>
Spreading Panic Grass	<i>Paspalidium distans</i>
Thumb-nail Orchid	<i>Dockrillia linguiformis</i>
Variable Glycine	<i>Glycine tabacina</i>
Winter Apple	<i>Eremophila debilis</i>
Wire Grasses	<i>Aristida</i> spp.



Brigalow flowers (*Acacia harpophylla*)



Barbed Wire Grass (*Cymbopogon refractus*)



Marsdenia

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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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