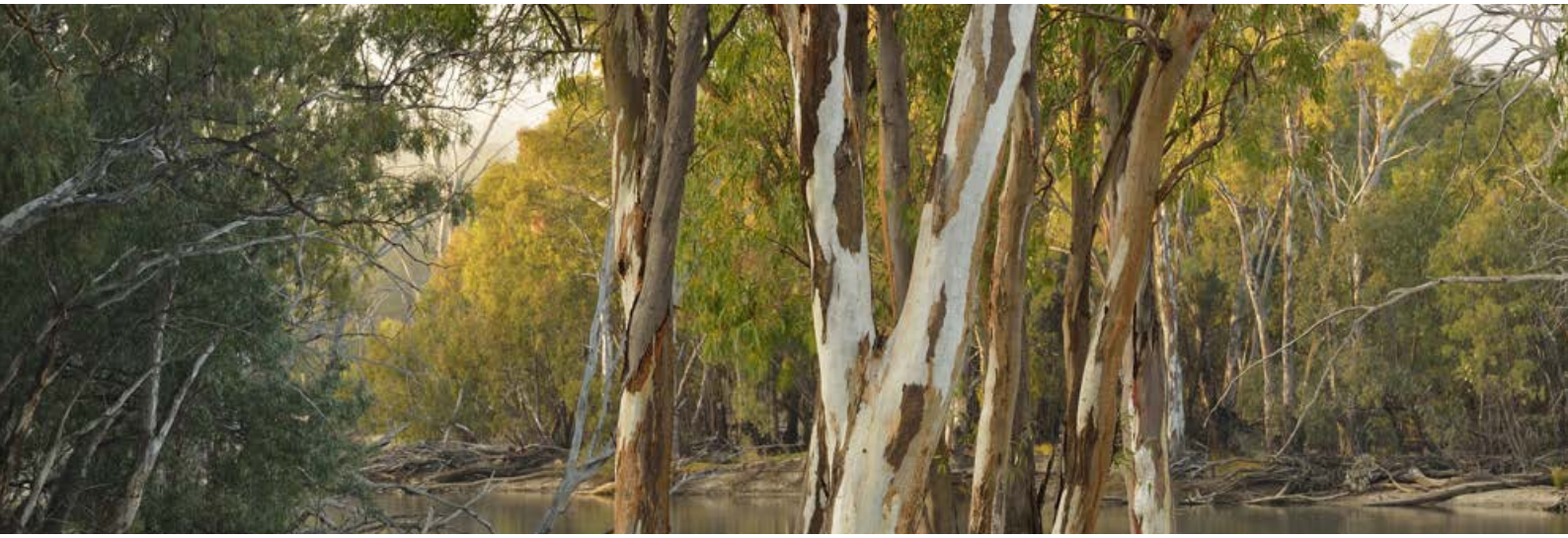

River red gums

Water for the environment

Species name: River red gum

Traditional names: Biyala, Yarraan, Itara, Binyal, Yarra, Murungal

Scientific name: *Eucalyptus camaldulensis*

The river red gum earns its common name from the colour of its timber. After rain or when cut, milled, and finished, the timber has a deep rich, red hue.

Botanist Frederick Dehnhardt was the first to formally describe and name the eucalyptus species camaldulensis, which is in reference to a private estate garden (L'Hortus Camaldulensis di Napoli) near the Camaldoli monastery in Naples, where Dehnhardt was chief gardener.

The river red gum is an iconic tree species of the Australian landscape. For anyone who has grown up along our inland rivers, this majestic tree has provided the backdrop for a myriad of childhood memories. We have climbed its branches, collected leaves and gumnuts, played, and rested in its shade.

River red gum forests and connected wetlands are biodiversity hotspots – home to a long list of native plants and animals. They provide important ecosystem services for surrounding landscapes, communities and farms.

Department of Climate Change, Energy, the Environment and Water

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Where they are found

River red gums are found along rivers and creeks, near wetlands, and scattered across floodplains. The river red gum is the most widely distributed eucalypt species in mainland Australia. It has a range of subspecies; however, the subspecies camaldulensis is the dominant eucalypt along the Murray–Darling river system waterways, where it can form large forests.

The Barmah–Millewa forest, which straddles the New South Wales–Victoria border, is home to the largest stand of river red gum in Australia (and the world). This forest began to form more than 65,000 years ago when a major geological event began lifting the land between Deniliquin and Echuca to form what is now known as the Cadell Fault. The Bangerang name for the fault is Dunggudja nanit (pronounced dung-good-jah nah-nit) which translates to the great earthquake.

The fault line (measuring up to 15 m high in parts and around 80 km long) disrupted the original course of the River Murray. The river pooled and spread, forming an inland delta before forging a new path north and south.

With regular inundation from the river, forest and floodplain wetlands evolved on the delta to support the unique array of Australian wildlife that rely on them to this day.

How often they need water

River red gums require access to groundwater or regular inundation to remain healthy. While they can tolerate periods of drought, the trees show signs of stress when flows occur too infrequently or do not last long enough to adequately recharge groundwater reserves.

Before the installation of dams and weirs, overbank flows in winter and spring regularly connected the river to the floodplains, recharging groundwater supplies and revitalising river red gum forests and wetlands. Since river regulation, these flows have become less frequent and shorter in duration as the rain that once flowed unimpeded through the river system is now captured in dams.

Rainfall alone is not enough to maintain healthy river red gum forest ecosystems.

Responding to flows

River red gums are flexible in their use of available water. When a flood or managed flow occurs, the tree produces more roots in the top 1–2 m of soil, allowing it to maximise its response when water becomes available. When drought conditions return, the tree re-adjusts. Winter flows have been shown to provide an important opportunity for river red gums to increase their root mass before spring flows occur during the peak growth period.

At Barmah–Millewa and other floodplain forests along the Murray, many of the trees have pushed their roots deep into old, so-called 'palaeochannels', created thousands of years ago when river flows were much greater than today. The palaeochannels, now covered with more recent clays, are filled with coarse sand and gravel that hold water between their pores and act as a very effective reservoir. The palaeochannels provide the trees with a reliable water source, even during droughts.

Research has shown that river red gums use a range of devices to cope with periods of drought. In the research paper led by Dr Tanya Doody (CSIRO), *Quantifying water requirements for riparian river red gums*, a range of water-saving responses are outlined.

River red gums:

- reduce transpiration through their leaves by closing their leaf pores (stomates)
- reduce the amount of sapwood they need to maintain
- shed leaves to further reduce water loss through transpiration
- recharge tree water reserves after sunset to minimise transpiration losses
- adjust transpiration rates to match the average interval between flow events.

Scientists have used a range of techniques to measure the river red gum's response to flows including:

- monitoring of tree diameter and forest density
- use of sap flow sensors
- evaporation meters
- imaging to monitor leaf area.

These are coupled with rainfall readings, soil moisture data and flow information to calculate the tree's response to floods and managed flows.

Lifespan and effects of watering

River red gums can live for several hundred years. When conditions are favourable, river red gums can grow rapidly. As the trees age, their ability to grow quickly decreases, making it difficult to estimate the age of older trees.

While river red gums rely on regular inundation for survival, seedlings and young saplings can only withstand around 6 weeks of immersion. The natural flow regime (before river regulation) suppressed the invasive tendency of river red gum saplings. Today, flows of sufficient size and duration occur less frequently, which has led to river red gum incursions on previously open grasslands and wetlands.

Well-watered trees can reach 45 m in height. The spread of the river red gum's canopy can equal its height. Very large trees can have a trunk circumference of more than 11 m or a diameter of more than 3 m.

Why they are important

The river red gum provides important habitat for various species, including superb parrots, which nest in the hollows of mature trees, and insects that shelter under its bark. The arching canopy provides shelter for various mammals, while some waterbirds also nest in the branches. The river red gum is a host for native mistletoes and parasitic dwarf cherry. Fallen river red gums also provide important instream habitat (or 'snags') for native fish such as Murray cod and golden perch.

The river red gum is known as an ecosystem engineer:

- providing habitat for a range of species (when standing or fallen)
- producing food for insects, birds and other wildlife
- contributing carbon and nutrients to the forest floor and aquatic food webs
- reducing soil temperatures and retaining soil moisture through shade and self-mulching
- forming islands of trees that can influence the movement of water
- lowering the water table in water-logged areas
- shedding nectar that feeds soil micro-organisms, some insects and birds.

River red gums are important cultural species providing shelter, materials, food and medicine for Aboriginal people.

Since colonisation, river red gums have provided a source of building materials, railway sleepers, firewood and charcoal. From the early 1850s, river red gum was in high demand for heavy construction works for the rapidly expanding city of Melbourne, and was used for the construction of piers at Port Melbourne and the expansion of the railway networks in Victoria and southern New South Wales.

How Aboriginal people use them

River red gums are an important species for Aboriginal people providing:

- materials for canoes, shields and digging sticks
- medicine for burns and diarrhoea
- habitat for target hunting species
- resources for building shelter
- materials for use in fishing including leaves to de-oxygenise water, and branches to craft spears
- leaves and branches for ceremonial purposes as important totem species
- parasitic plants such as mistletoes and dwarf cherry produce fruit that have been sources of food for thousands of years.

The role of fire

The historic role of fire in controlling river red gum forests is unclear and scientifically unproven.

Drought, floods, river regulation, fire, grazing and timber harvesting are known to be the major influences on the structure and expansion/ contraction of river red gum forests.

The journals of early settlers have been used to suggest that Aboriginal people used fire routinely to control river red gums. However, few of these anecdotes relate specifically to floodplain river red gum environments. It is also known that Aboriginal people lit fires in response to the presence of intruders.

In the 2014 publication *Flooded Forest and Desert Creek: Ecology and History of the River Red Gum* by Dr Matthew J Colloff, the author states:

> '[The available evidence] does not rule out a role for Aboriginal burning in the ecology of the river red gum forest, but neither does it support fire as a major controlling factor.
>
> What the historical sources reveal is something more ecologically plausible than the role of fire management in structuring river red gum forests. It is that the extensive reed beds were one of the most valuable assets for Aboriginal people along the inland rivers. The array of resources they provided made them well worth looking after and they were likely to have been carefully managed using a combination of fire, sustainable harvesting and flooding.
>
> Fire management will create new forms of forests, not recreate past ecosystems … ultimately, water and floods drive the forests. Fire merely plays over the surface of the patterns that the floods create.'

Water for the environment

Dams and weirs have provided a more reliable source of water for people but disrupted the natural winter–spring flooding cycle needed for healthy rivers and wetlands. Growing demand for river water has also seen an overall reduction in the water available to support these floodplain habitats, including our iconic river red gum forests and wetlands.

Water for the environment is being used to support long-term river red gum forest health by providing the right amount of water at the right time for them to grow, flower and set seed. By targeting river red gum, we can, in turn, support the other plants and animals that rely on them for survival.

Water for the environment is vital to help maintain a healthy, productive, and resilient river system for the benefit of plants, animals, and people.

Cover photo: River red gums on the Murrumbidgee. (Gavin Hansford/DCCEEW); Page 2: River red gums in the Murrumbidgee valley. (Paul Childs/DCCEEW); Page 3: A flowering river red gum. (Nicola Brookhouse/DCCEEW); Page 5: Scarred tree on Gulpa Creek, Murray Valley National Park, Southern NSW. (Natasha Childs/DCCEEW).

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