River Red Gums at Bryan Swamp and other sites in SW Victoria and in South Australia:

Photographs & measurement of significant ancient trees

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Hamilton, Victoria

2022

Cover Picture:

A giant River Red Gum (*Eucalyptus camaldulensis*) on Dwyers Creek, 400 m downstream from the bridge near the Mirranatwa-Dunkeld Rd and junction with the Victoria Point Rd (Photo in October 2006).

This ancient tree has a girth of 13.1 m and diameter (at 1.3 m above ground) of 4.0 m, one of the largest in Victoria. The tree was measured by Lionel Elmore in 1962 and a re-measurement in 2006 shows that it may have grown in diameter by an average of 6.6 mm per year.

Author:

Rod Bird (Patrick Rodney Bird PhD, OAM, 1942-)

River Red Gums at Bryan Swamp and other sites in SW Victoria and in South Australia: Photographs & measurement of significant ancient trees

First Edition

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Second Edition

This edition in February 2022 adds several significant River Red Gums (*Eucalyptus camaldulensis*), including the Fyans Creek Tree on the outwash plain north of Halls Gap and others at Bordertown and Wyperfeld National Park (including 'Old Be-al') not previously visited by me.

One result of the acquisition of more information on giant trees has been changes in the speculative ranking of the 25 largest trees that I have surveyed in Victoria and South Australia.

The major addition in this edition is information on the diameter growth rates of River Red Gums in the Woohlpooer State Forest (west of the Gariwerd National Park), at Bordertown and planted trees on the Dundas Tableland. That data is needed if one is to provide some objective basis for estimating the age of our veteran River Red Gums.

More photographs of our charismatic River Red Gums have been included in this edition to draw attention to their aesthetic significance in our rural landscapes and their historic and environmental values. The effect of the additions in this edition has been to increase the number of pages from 54 to 87.

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I am indebted to the many landholders who gave me their time and access to the trees on their properties. In particular, these included Andrew Beveridge (Mirranatwa); Basil, Pat & Michael Moran (Nangeela); Clive & Catherine Carlyle (Fyans Ck); Ian Luhrs (Mooralla); Mick & Susannah Pern (Balmoral); Mick & Rosey Leeming (Balmoral); Nature Glenelg Trust (Dunkeld); Ross & Lorraine Clayton (Casterton). Many others offered information about trees on their farms.

Roger Edwards, retired forester from Cavendish, kindly gave me access to a significant mass of his data on the diameter growth from 1976 to 2002 of River Red Gums in the Woohlpooer State Forest and information on the history of that forest.

Kym Knight (South Australian Society of Arboriculture) kindly provided information on 10 giant trees from South Australia and 4 photographs.

Trevor Thomas from Bordertown introduced me to the charismatic ancient River Red Gums in the Bordertown-Mundulla area of SA and provided significant information on their history and growth.

The photograph of 'Old Be-al' in Wyperfeld National Park in the 1960s was taken by Jean Blackburn and published in 1965 by the Field Naturalists Club of Victoria in conjunction with members of the Committee of Management of Wyperfeld National Park. Michael Fendley helped me locate this tree and he and Andrew Gell gave me other information about it.

Other photographs in this report were taken by the author, except where indicated otherwise in the photo captions.

About the author

Rod Bird was a research scientist based at the Pastoral and Veterinary Institute, Hamilton from 1973-2007. He has a background in animal science, having obtained a PhD in sulphur metabolism of ruminants from the University of WA in 1972.

Rod conducted research in Victoria on beef cattle/pasture production from 1973-1983. From 1983 he conducted research on windbreak structure, shelter characteristics and effects on agricultural production, farm forestry (some 300 woodlots/belts with 50 species of timber trees on farms in SW Victoria), salinity and revegetation (direct-seeding techniques).

Rod has had a long-term interest in conservation and natural history and has published several papers on the flora, fauna and natural history of the region. He has been an active member of the Hamilton Field Naturalists Club since 1973, conducting surveys of birds, mammals and flora, working to control invasive weeds and restoration of indigenous flora on public reserves. He is also an advocate for the restoration of many of the wetlands that have been drained in the region.

In June 2009 an Order of Australia Medal was awarded to Rod '*for service to the environment through farm forestry and revegetation programs'*

Photos on the back cover

'Big Red', Mullinger Swp	Bilston Tree, Brimboal	'Morwell', Fyans Ck
'Glenbrae', Casterton	'Lawford Pk'; Nangeela	'Bowacka', Mirranatwa
'Long Point', Dunkeld	Lodge Rd, Gariwerd NP	Outlet Ck, Bryan Swp

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River Red Gums at Bryan Swamp and other sites in SW Victoria and in South Australia

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Introduction

A motivation for this study was the survey that a farmer and naturalist, Lionel Elmore, had made in 1962 of large trees in the Bryan Swamp-Victoria Valley area near Hamilton. If those trees could be found and re-measured, some estimate of average annual diameter growth could be made. This would enable some estimate of the age of ancient RRGs to be made, since the counting of growth rings in River Red Gum (RRG) is not a reliable approach (Photo 51). Another motivation was the publicity associated with the Bilston Tree off Glenmia Rd, Brimboal (Lahey 1987): a tourism sign erected in the mid-1990s on the Casterton-Chetwynd Rd proclaimed this tree to be the world's largest Red Gum! Where does it actually rank? What do we mean by 'size' and how do we assess it?

But first, what do you want to know about the RRG? A traveller in Australia cannot fail to note the River Red Gum (*Eucalyptus camaldulensis*), the eucalypt with the widest geographical range of all. These majestic trees grow as various sub-species (Eldridge *et al*. 1993, Doran 2000, Colloff 2014). throughout much of the continent, excepting the SW and NE corners and Tasmania (Boland *et al*. 1984). An excellent account of the ecology of the species is given by Colloff (2014).

The timber is moderately hard, very durable and resistant to termites and has been used for heavy construction purposes (railway sleepers, street paving, bridges and wharfs), poles for sheds and house construction, fencing posts, firewood (a major use) and furniture (Bird 2000).

Some provenances of River Red Gum (RRG) are tolerant of high soil salinity (Marcar & Crawford 2004; Jackson & Bird 2008). The species has been widely planted in Mediterranean countries and in many arid and semi-arid lands. Sub-tropical sub-species of the RRG have also been used in SE Asia, India, Brazil and Mexico (Doran 2000).

Usually associated with rivers, particularly along the Murray and Darling River systems, or apparently dry drainage lines in outback Australia, the species also features large in the agricultural landscape of SW Victoria and SE South Australia. Most would be familiar with the water colour paintings of Hans Heysen, where RRGs dominated parts of the landscape on the flanks of the Adelaide hills.

Despite ring-barking and cutting for railway sleepers, posts, poles and firewood, hundreds of thousands of mature age RRGs remain on farms. Many are senescent, at the end of a life that stretched over 500 years or more. Losses occur from natural causes (storms, drought, disease, insects, possums), clearing for cropping, effects of livestock or cultivation, competition with Blue Gum (*Eucalyptus globulus*) plantations, timber-cutting, salinity or fire operations. There has been little regeneration on farms and, unless action is taken now, a time will come when our agricultural landscapes will be bereft of these charismatic giants or their juvenile replacements.

The species regenerates readily on road reserves and fenced off areas on farms adjacent to RRGs. In SE Australia it has a significant representation in National Parks in Victoria (e.g. Grampians/Gariwerd, Little Desert, Wyperfeld, Hattah, Barmah), South Australia (e.g. Mt Remarkable and Flinders Range) and New South Wales (e.g. Mutawintji) and many other reserves.

In the 1990s Jim Burston (Primary Industries SA), Greening Australia and others raised awareness of the threat to RRGs in the agricultural landscape (Anon. 1994). Then an initiative from with ABC's Mt Gambier-based 5MG, to locate the largest Red Gum in the south-east of South Australia (Anon. 1996), to publicise the importance of the species and highlight the need protect old trees and plant new trees. A similar initiative was launched later in Hamilton, to encourage Western District landholders to observe and value their trees (Anon. 1998). In recent times (2018 & 2022) the Cavendish Red Gum Festival has re-focussed attention on RRGs in the landscape.

A draft of the first edition was produced for the 50th Anniversary of the Hamilton Field Naturalists Club (HFNC) in 2008 and a summary was published in the Australian Forest Grower (Bird 2009). As often happens 'way leads to way' and this story has inevitably also rambled along other tracks that touch on various aspects of this important commercial and environmental species.

Scope of the study and methods used

This report covers the following records of River Red Gum (RRG):

- A photographic record of RRGs at Bryan Swamp and Dwyers Ck in 1962 and recently (2002, 2006, 2007, 2019 & 2022), with associated measurements of height and/or girth and estimates of diameter growth over 40 years since the HFNC (principally Lionel Elmore) visited the area in 1962. Many younger trees were also measured to aid future growth studies.
- Measurements and photographs from other significant RRGs in Victoria (Grampians/Gariwerd NP, Mirranatwa, Dunkeld, Wannon, Mooralla, Balmoral, Fyans Creek, Brimboal, Nangeela, Casterton, Edenhope, Guildford and Wyperfeld).
- Measurements and/or photographs from other significant RRGs in South Australia (Bordertown, Comaum, Mullinger Swamp, Wirrabara, Orroroo and Flinders Ranges).
- Reports of other significant RRGs in South Australia (the measurements cited may have been made using protocols different from mine and some caution must be applied when making comparisons).
- Photographic records of other significant RRGs in the landscape of south-eastern Australia, including Aborigine scar trees and trees that have layered to produce new rooted stems.

Tree positions (latitude & longitude) were recorded with GPS Aust. Geodetic 1984 logic, except for most records made after 2011, when WGS 84 logic was used (from my GPS instrument, Aust. 84 data can be translated to WGS 84 by subtracting 5.5 secs from latitude and adding 4.8 sec to longitude).

Large, loose pieces of bark were dislodged before running the tape around the tree to measure girth. Girth over bark was measured at 1.3 m above ground on the uphill side to determine diameter 'at breast height' (DBH) (Photo 52). Any loose litter at the base was scraped away. Large, old trees are sometimes found on a mound a few metres wider than their base, created over time from trapped wind-blown sand/soil, shed bark, leaves and branches. The mound may be raised 0.2-0.5 m above the plain. I have taken the top of the mound to be ground level, accepting that over time the point of DBH will be higher on the trunk.

Tree height was measured with a *Suunto clinometer*, sighting from 60-80 m away (D) on about the same level as the tree base, and reading the % height scale to the green top and to the base of the tree (ground level). These values were combined (the latter reading being either + or -, depending on the slope from D) and multiplied by D to get the height of the tree (± 1-2 m, recorded to nearest 0.5 m).

River Red Gums photographed and/or measured by Lionel Elmore or Rod Bird

RRGs at Bryan Swamp, Dwyers Creek, Mirranatwa and Gariwerd NP

1. Bryan Swp RRG1 – large old tree on fence line at Outlet Creek – girth at 1.2 m above ground was 8.93 m or 8.83 m at 1.3 m above ground on 2 Mar. 2002. Height was 18.5 m (Photo 1). The tree was measured by Elmore on 25 Mar. 1962 (Photo 2) – girth 26'10" (8.18 m) at 4 ft (1.2 m). The diameter growth is therefore 2.94–2.60 = 0.24 m, or 6 mm per year since 1962. (GPS 37-34-24/142-14-31).
2. Bryan Swp RRG2 – hollow-base tree on NW bank, N of Outlet Creek – girth at 1.3 m was 8.75 m and height 22 m on 2 Mar. 2002 and girth 9.2 m in Feb. 2022 (Photos 10, 39). (GPS 37-34-04/142-14-26). The DBG growth over 20 years was 14.3 cm or 7.1 mm/yr.
3. Bryan Swp RRG3 – big tree, largest of a pair on edge of swamp N of Outlet Creek – girth at 1.3 m was 7.70 m (or 7.90 m at 1.2 m) & height 29 m, on 2 Mar. 2002 (Photos 6-8). This tree was 24'7" (7.37 m) at 1.2 m above ground on 25 Mar. 1962 (Photos 3-5). The diameter growth was 2.515–2.346 = 0.165 m, or 4.1 mm/year since 1962. (GPS 37-33-59/142-14-26).
4. Bryan Swp RRG4 – smaller tree of the pair (Photos 6, 7) – girth at 1.3 m was 5.84 m and height 28 m, on 24 Nov. 2002. (GPS 37-33-59/142-14-26).
5. Bryan Swp RRG5 – tree near fence NW of Outlet – girth at 1.3 m was 7.30 m and height 28.5 m on 2 Mar. 2002 (Photo 9). (GPS 37-33-32/142-14-28).
6. Bryan Swp RRG6 – solid tree with a fork at 3-4 m, NW bank near gate – girth at 1.3 m was 6.55 m and height 30.5 m on 2 Mar. 2002 (Photo 11). (GPS 37-33-28/142-14-31).
7. Bryan Swp RRG7 – a spreading tree near fence below high bank, N of gate – girth at 1.3 m was 6.43 m and height 20.5 m on 2 Mar. 2002 (Photos 12, 13, 16). (GPS37-33-22/142-14-46).
8. Bryan Swp RRG8 – scar tree near W fence, N of Outlet Ck – girth at 1.3 m was 6.08 m on 24 Nov. 2002. (GPS 37-33-56/142-14-24). (Photos 37, 44).

9. Bryan Swp RRG9 – smooth-barked, youngish tree N of Outlet Creek, central – girth at 1.3 m was 4.93 m and height 30 m on 24 Nov. 2002 (Photo 14). (GPS 37-33-47/142-14-24).
10. Bryan Swp RRG10 – a medium-sized old tree further N, with a girth at 1.3 m of 6.29 m on 24 Nov. 2002. (GPS 37-33-44/142-14-25).
11. Bryan Swp RRG11 – a medium-sized tree with a girth at 1.3 m of 6.17 m on 24 Nov. 2002. (GPS 37-33-43/142-14-26).
12. Bryan Swp RRG12 – a medium-sized young tree near the swamp with a girth at 1.3 m of 3.22 m and height 19 m on 28 Nov. 2002 (Photo 15). (GPS 37-33-31/142-14-35).
13. Bryan Swp RRG13 – a young tree on edge of swamp with a girth at 1.3 m of 1.05 m and height 15 m on 24 Nov. 2002 (Photo 17). (GPS 37-33-40/142-14-30).
14. Bryan Swp RRG14 – on the bend to the NW at the neck – girth at 1.3 m was 6.85 m and height 26 m on 24 Nov. 2002 (Photo 19). (GPS 37-33-14/142-15-02).
15. Bryan Swp RRG15 – a dead, fallen tree of girth 4.5 m. (GPS 37-33-33/142-14-33).
16. Bryan Swp RRG16 – a hollow log of girth about 8 m – this may be the 'canoe tree' photographed by Murray Gunn in 1962 (Photo 21), reported in HFNC minutes of 12 Apr. 1962 – girth was 28 ft (8.4 m) at 4 ft (1.2 m) and height over 100 ft (30 m). (GPS 37-33-37/142-14-30).
17. Bryan Swp RRG17 – the tree was almost dead – its girth at 1.3 m was 5.55 m in 2002. (GPS 37-33-52/142-14-28).
18. Bryan Swp RRG18 – dead tree 100 m N of Outlet Creek (Photo 23), perhaps Elmore's burl tree (Photo 22) – girth at 1.2 m was 26'3" (8.0 m) on 25 Mar. 1962. (GPS 37-34-14/142-14-34).
19. Bryan Swp RRG19 – a big tree on W boundary – girth at 1.3 m was 6.4 m and height 30 m on 25 Jan. 2007 (Photo 25). This is Elmore's tree (Photo 24) in 1967. (GPS 37-33-29/142-14-29).
20. Bryan Swp RRG2 – Nth from Outlet Ck – girth at 1.3 m was 9.2 m on 05 Feb 2022. (GPS 37-34-04/142-14-28) (Photo 39). This tree was measured in 2002 (see No. 2).
21. Bryan Swp RRG20 – Nth from Outlet Ck – girth at 1.3 m was 5.2 m on 05 Feb 2022. (GPS 37-34-04/142-14-28) (Photo 40).
22. Bryan Swp RRG21 – Nth from Outlet Ck – girth 5.4 m on 05 Feb 2022. (GPS 37-34-04/142-14-28.5) (Photo 41).
23. Dwyer Ck RRG1 – 500 m S from a bridge near the Vic Valley Rd junction. Elmore measured the tree in Jul. 1962 (Photo 45) – girth at 4 ft (1.2 m) was 40 ft (12.19 m). Donald McArthur directed me to this tree – girth at 4 ft (1.2 m) was 13.1 m, or 12.7 m at 1.3 m, and height 28.5 m on 15 Oct. 2006. The diameter growth is 417–388 cm = 6.6 mm per year since 1962. The tree has a hollow base, perhaps a 'canoe tree' (Photos 46-48). (GPS 37-59-50/142-19-22).
24. Dwyer Ck RRG 2, between RRG1 and the bridge – girth at 1.5 m (just above a bulge) was 6.8 m on 28 Sept. 2019. There is evidence of old axe wounds from failed ring-barking many years ago). (GPS 36-29-40/142-19-31).
25. Victora Point Rd RRG1 on N side of road – girth at 1.3 m was 7.90 m and height 25.5 m on 24 Nov. 2002. (Photo 53). (GPS 37-30-08/142-18-53).
26. Victoria Point Rd RRG2 tree on S side of road – girth at 1.3 m was 7.06 m and height 34.5 m on 24 Nov. 2002 (Photo 54). (GPS 37-30-03/142-19-02).
27. Gariwerd RRG1, Lodge Rd – girth at 1.3 m was 7.07 m and height 51 m in May 1998 (Photo 55). The tree was burned in a wildfire in Jan. 2006 (Photo 56). (GPS 37-10-19/142-20-51). The tree was burned again in 2013 (Photos 57-59), the hole in the butt widened to 3 m at ground level and 1.5 m at 1.3 m height. It extended about7 m vertically. A sad end to a great tree.
28. Gariwerd RRG2, Lodge Rd – girth at 1.3 m was 8.3 m and height 35 m in May 1998 (Photo 60). (GPS 37-10-21/142-20-55).
29. Gariwerd RRG3, Lodge Rd – girth at 1.3 m was 7.25 m and height 36.5 m on 1 May 2008 (Photo 61). (GPS 37-13-39/142-24-14).
30. Gariwerd RRG4, Lodge Rd – girth at 1.3 m was 5.84 m and height 32 m on 1 May 2008 (Photo 62). (GPS 37-13-22/142-24-10).
31. 'Mirranatwa RRG1 on 'Bowacka' (A Beveridge) – girth at 1.3 m was 9.87 m and height 37 m in May 2008. The tree has a large crown and many dropped branches. There is a small dead area ~ 1 m high x 0.3 m at the base (Photo 64). (GPS 37-23-50/142-22-57).
32. Mirranatwa RRG2 on 'Lambing Flat' (A Beveridge), near Vowels Ck – girth at 1.3 m was 9.05 m and height 31.5 m on 6 May 2008. The tree is forked at ~3.5 m, multi-branched and the canopy has a span of 34 m. There has been no branch drop and the base is without defect. It is a magnificent tree (Photo 65). (GPS 37-25-45/142-20-47).
33. Mirranatwa RRG3 on 'Bowacka' (A Beveridge) – girth at 1.3 m was 8.72 m and height 27 m on 6 May 2008 (Photo 66). (GPS 37-23-55/142-23-13).

34. Mirranatwa RRG4 on 'Beverlea' (A Beveridge), Dwyers Ck – girth at 1.3 m was 7.62 m and height 36 m on 6 May 2008 (Photo 67). (GPS 37-24-30/142-25-18).
35. Mirranatwa RRG5 near 'Lambing Flat', Vowels Ck – girth at 1.3 m was 4.15 m and height 36.5 m on 6 May 2008. The tree is branched at about 17 m – a beautiful young, straight tree with no major defect (Photo 68). (GPS 37-24-58/142-20-38).

RRGs at other sites in Victoria and South Australia

36. Dulcian', Mooralla RRG (I Luhrs) – girth at 1.3 m was 7.48 m and height 28 m on 28 Mar. 2001. The tree was too large for sleeper cutters in 1936 or for Ian's autologger in 1960. The 30-cm-deep cut on 25% of the bole has apparently not affected the tree (Photo 63).
37. Wannon River RRG, several km below Nigretta – girth at 1.3 m was 7.8 m and height 26 m on 27 Apr. 2003. A fine tree on the east bank of the river. (GPS 37-38-57/141-53-15).
38. Long Point, Dunkeld – girth 9.5 m and height 21 m on 12 Apr. 2022 (GPS 37-37-27/142-21-27). (Photo 153). In 1856 Eugene von Guerard may have painted the view to Mt Abrupt from this tree.
39. Balmoral, Gashs Lane area (M Pern) – 60 RRGs (Photos 155-157) planted in 1994 in April 2022 had a mean girth at 1.3 m height of 129 cm (SD 33 cm). (GPS 37-17-20/141-45-29).
40. Brimboal RRG1, Bilston's Tree, Glenmia Rd – girth at 1.3 m was 7.7 m and height 36 m in Feb. 1998 – there is a huge volume of wood in the solid butt (Photo 69). (GPS 37-22-44/141-19-28).
41. Brimboal SF, RRG2 – girth at 1.3 m was 9.65 m and height 26.5 m, on 25 Jan. 2003 (Photo 70). (GPS 37-23-06/141-19-31).
42. Casterton RRG1 (R & L Clayton, 'Glenbrae') – girth at 1.3 m was 8.2 m and height 29.5 m (including almost 8 m of top that died in the last year or so) on 1 Feb. 2011. The bole has some dead wood and inner decay (Photo 71). (GPS 37-38-15/141-19-42).
43. Casterton RRG2 (R & L Clayton, 'Glenbrae') – a healthy tree with a span of 42 m. Girth at 1.3 m was 6.2 m and height 23.5 m on 1 Feb. 2011. The bole is intact but asymmetric, with a large concavity on the western side and branch-free to 6 m (Photo 74). (GPS 37-38-12/141-19-53).
44. Casterton RRG3 (R & L Clayton, 'Glenbrae') – a healthy tree with a branch-free bole of 12 m that escaped the sleeper cutters in the 1960s, perhaps due to a defective heart. Girth m at 1.3 m was 7.1 m and height 36 m on 1 Feb. 2011 (Photo 73). (GPS 37-38-12/141-20-10).
45. Casterton RRG4 (R & L Clayton, 'Glenbrae') – a tree of great age and character (Photo 72). The butt has been hollowed out and grossly distorted, rendering the measurement of girth (12 m at 1.3 m), as approximate. The height was 25 m. (GPS 37-38-15/141-20-26).
46. Comaum Forest Reserve RRG1 remnant tree in 2nd rotation pine plantation – girth m at 1.3 m was 6.75 m with height 32.5 m on 15 June 2008. The tree had a solid base but was unhealthy, with one of the 2 major branches dead (Photo 75). (GPS 37-11-13/140-54-06).
47. Comaum Forest Reserve RRG2 – a splendid, spreading tree among a dozen or so trees in a paddock adjacent to W & F station – girth at 1.3 m was 6.45 m and height 26.5 m on 15 June 2008. The tree is forked at 5 m with a very sound base (Photo 76). (GPS 37-11-60/140-53-53).
48. Comaum Forest Reserve RRG3 – a tree in a remnant low-lying block of native vegetation – girth at 1.3 m was 5.75 m and height 26.5 m on 15 June 2008. The tree has a small dead strip on the south side (Photo 77). (GPS 37-12-51/140-56-25).
49. Nangeela RRG (M Moran, 'Lawford Park') – girth 9.2 m at 1.3 m and height 43.5 m, on 7 May 2008; 10 m to the first branch. A magnificent, healthy tree with a massive bole showing no sign of defect (Photo 78). (GPS 37-27-59/141-17-06).
50. Edenhope RRG – a healthy paddock tree with a spread of ~40 m, ~5 km W on Apsley Rd and 1 km N off a side road – girth at 1.3 m was 4.57 m with height 20.5 m, on 12 Jan. 2008 (Photo 79). (GPS 36-59-08/141-14-18).
51. Mullinger Swp RRG1, SA – 'Big Red' in a paddock 100 m W of swamp – girth at 1.3 m was 12.12 m and height 42 m, on 12 Jan. 2008. The butt is hollowed out to ~ 7 m height (Photo 80). This ancient RRG may have the largest mass of any in Australia. (GPS 36-50-60/140-58-04).
52. Mullinger Swp RRG2, SA: solid tree near fence W of swamp – girth m at 1.3 m was 9.7 m and height 42 m on 12 Jan. 2008 (Photo 81). (GPS 36-50-57/140-58-05).
53. Mullinger Swp RRG3, SA – tree with dead basal patch, in the reserve near parking area – girth at 1.3 m was 9.4 m with height 38 m on 12 Jan. 2008 (Photo 83). (GPS 36-51-03/140-58-05).
54. Mullinger Swp RRG4, SA – a paddock tree with v. large basal bulge ~20 m W of swamp – girth at 1.3 m was11.53 m with height 33 m on 12 Jan. 2008 (Photo 84). (GPS 36-51-06/140-58-02).
55. Mullinger Swp RRG5, SA – lovely, sound tree in a paddock ~500 m W of swamp – girth at 1.3 m was7.72 m with height 30.5 m, on 12 Jan. 2008 (Photo 82). (GPS 36-51-05/140-57-43).
56. Mullinger Swp RRG6, SA – paddock tree with a small basal hollow ~400 m W from swamp – girth at 1.3 m was 8.64 m, height 33 m on 12 Jan. 2008 (Photo 87). (GPS 36-51-02/141-57-46).

57. Mullinger Swp RRG7, SA – paddock tree with a base bulge ~100 W of swamp – girth at 1.3 m was 8.7 m with height 33 m on 12 Jan. 2008 (Photo 86). (GPS 36-51-05/140-58-01).
58. Mullinger Swp RRG8, SA – tree by the track in the reserve ~ 200 m S of parking area – girth at 1.3 m was 8.6 m with height 30 m, on 12 Jan. 2008 (Photo 89). (GPS 36-51-10/140-58-00).
59. Mullinger Swp RRG9, SA – tree E of the track in the reserve ~ 150 m S of parking area – girth at 1.3 m was 7.2 m with height 30 m, on 12 Jan. 2008 (Photo 88). (GPS 36-51-06/140-58-04).
60. Mullinger Swp RRG10, SA – tree just S of the parking area near swamp – girth at 1.3 m was 8.2 m with height 29 m, on 12 Jan. 2008 (Photo 85). (GPS 36-51-05/140-58-05).
61. Wyperfeld NP RRG2 (Be-al look-alike) – girth at ~ 1.3 m was 5.25 m, just below great branches. The height was 18.5 m & span 41 m in Feb. 2011 (Photo 91). (GPS 35-33-52/142-03-27).
62. Wyperfeld National Park RRG1 (Old Be-al) – girth at 1.3 m was 6.15 m, height 24 m and span 36 m (E-W) and 25 m (N-S) on 26 Sept. 2021 (Photos 92-94). Two or three 'new' trees are growing from layering of old branches. (GPS 35-32-05/142-02-01).
63. Wyperfeld National Park RRG3 (Wirrengren Red Gum) – girth at 1.3 m was 6.8 m, height 25.5 m and span 27 m on 28 Sept. 2021 (Photos 96, 97). This is a splendid tree growing on the sandy edge of the Wirrengren Plain, the terminal lake for flood water from the Wimmera River via Outlet Creek. The last flood was in 1945. The tree does not appear to have any health issues (GPS 35-20-33/141-52-19).
64. Fyans Creek, Nth of Halls Gap on 'Morwell' (C & C Carlyle) – a magnificent RRG in good health near the creek. It has a substantial hollow at the base (Photos 98, 99). Girth at 1.3 m was 13.75 m and height 35 m. (GPS 37-04-25/142-36-05). There are no RRG saplings within a radius of about 15 m from the giant; beyond that there are many young and a few older trees
65. Guildford Tree (Ballaarat St) – girth 'at the base' and height has been reported as 12.8 m and 25.9 m (The Age, 2004), or 9.35 m and 30 m, with a spread of 34 m (National Trust 2004). I recorded a girth at 1.3 m (over a burl) of 11.8 m and height 32.5 m on 21 Apr. 2011 (Photo 100). A large burl exaggerates the girth reading. The girth above it (at 1.8 m) was 8.5 m. The girth at 1.3 m, minus the effect of the burl, was estimated to be 9.2 m. (GPS 37-09-01/144-09-43).
66. Bordertown area, Thomson Waterhole RRG5 – a short tree with half of the bole remaining (Photo 101). The girth was estimated to be 12 m on 29 Oct. 2019. (GPS 36-20-20/140-41-34).
67. Bordertown area, Thomson Waterhole RRG2 – a large tree (Photo 102) with a girth at 1.3 m of 6.95 m and height 21 m on 29 Oct. 2019. (GPS 36-20-16.6/140-41-38.6).
68. Bordertown area, Thomson Waterhole RRG6 – a tall, thin, solid tree (Photo 103) 20 m west from RRG5. Girth at 1.3 m was 6.3 m and height 33 m on 29 Oct. 2019.
69. Bordertown area, Jimmies Waterhole, Mundulla RRG7 – Girth 7.8 m at 1.3 m and height about 34 m in Feb. 2021 (measurements by Trevor Thomas). (Photo 104).
70. Bordertown area, Thomson Waterhole RRG1 – old tree with a huge bulge (Photo 144). Girth below the bulge (at 0.6 m) was 10.0 m and 7.4 m above the bulge (girth at 1.3 m estimated to be approx. 8.7 m) on 29 Oct. 2019. (GPS 36-20-16.5/140-41-40.3).
71. Bordertown area, Thomson Waterhole RRG3 – tree with a huge branch near the base (Photo 143). Girth at 1.3 m over the rise was 10.05 m in Oct. 2019. (GPS 36-20-19.5/140-41-40.7).
72. Bordertown area, Thomson Waterhole RRG4 – a large tree with a girth at 1.3 m of 7.45 m and a height of 27 m. (GPS 36-20-20/140-41-37). 29 Oct. 2019.
73. Wirrabara SF, SA,'King Tree' RRG – girth 9.42 m and height 36.5 m (from a sign seen in Jan. 2001, Photo 105). Girth at 1.3 m was 9.55 m and height 37 m on 7 Dec. 2009 (Photos 105, 106).
74. Wirrabara SF, Ippinichie Ck campground, SA 'ghost' RRG – a half circle of sawn stump that measures 4 m across, a girth (at 1 m) of 12.5 m (Photo 107). Because of its size, this tree must have been difficult to cut down (possibly in the 1940s). (GPS 33-04-04/138-13-46).
75. Orroroo RRG, Pekina Ck, SA – girth at 0.61 m stated to be 10.9 m in Feb. 1998 (Photo 108). Girth at 1.3 m was 9.9 m & height 19 m in 22 Sept. 2008. (GPS 32-43-46/138-36-25)
76. Cazneaux RRG near Wilpena Pound, SA – girth of 5 m and ~18 m tall in Sept. 2001. This tree is old and worn, with a huge base, tapering rapidly to a modest girth (Photo 109). Large RRGs in arid lands are rarely found away from watercourses.

Other reports of River Red Gums in Victoria & South Australia

(Some reports do not indicate the height where the girth measurement was made).

77. 'Bolac Plains' RRG (R Jamieson) – tree on black-soil plains ~1 km from Salt Ck. Bill Middleton regarded this tree as 'exceptional' in that landscape, although not of great size.
78. Bochara RRG (M Bawden) – girth at 1.3 m reported in May 1998 as 7.85 m, height 'not great'.
79. Balmoral RRG (M Broers) – girth at 1.3 m reported in 1998 as 9.05 m, height 30-40 m. The tree was hollowed out at the base by fire and was once used as a 'birthing tree' by Aborigines.

80. East of Dunkeld RRG, 'Mereweather' (W & H Funk) – girth at 1.3 m reported in 1998 as 8.8 m and height 29-32 m. This tree – and a few others nearby – are on the volcanic plain.
81. Gunbower Ck RRG – girth 'at the narrowest point' was 8.22 m in May 1998 (G Nicholson).
82. Comaum Forest RRG near Struan, SA – girth reported in *Bush Chronicle* 1996 as 10.5 m.
83. Poocher Swamp RRG, SA – girth reported in *Bush Chronicle* 1996 as 10.5 m.
84. Penola RRG, SA (ID March) – girth reported in *Bush Chronicle* 1996 as 10.46 m.
85. Mundulla RRG, SA (L Rogers) – girth reported in *Bush Chronicle* 1996 as 10.46 m.
86. Casterton RRG (F Haddrick) – girth reported in *Bush Chronicle* 1996 as 10.05 m.
87. Dergholm RRG (W Crozier) – girth reported in *Bush Chronicle* 1996 as 9.7 m.
88. North of Edenhope RRG (G & W Robertson) – girth at ground level was 42 feet (12.8 m). This short RRG has a great span. It is the only one left in the 360-acre paddock in Buloke country.
89. Charleston RRG, SA – girth at 1.0 m was reported in *The Courier* 2007 (and www.treesa.biz) as 12.3 m, height 41.3 m, in Oct. 2007. The tree stands in a paddock on the Charleston-Torrens Rd, near Charleston. It has a crown width of about 30 m and has a hollow base (Photo 112 – DSCN 0686 by Kym Knight, SA Soc. Arboriculture).
90. Mt Crawford area RRG1, Wirra Wirra Rd, SA – girth at 1 m reported in www.treesa.biz to be 10.6 m, height 32.4 m, in Mar. 2008. The tree has a crown width of about 30 m.
91. Mt Crawford area RRG2, SA – girth at 1 m reported in www.treesa.biz as 13 m, height 31.5 m, in March 2008. This impressive tree is in private property. It has a hollow trunk.
92. Mt Crawford area RRG3, SA – girth at 1 m reported in www.treesa.biz as 12.5 m, height 38.2 m, in March 2008. The tree has a crown width of 35 m and a flared trunk. It grows in a grazed front paddock at Mt Crawford.
93. Mt Crawford area RRG4, SA – girth at 1 m reported in www.treesa.biz as 7.82 m, height 43.5 m, in March 2008. This is a large, spreading tree (crown width 40 m) in a grazed paddock.
94. Mt Crawford area RRG5, SA – girth at 1 m reported in www.treesa.biz as 10 m, height 35.1 m, in March 2008. The tree has a storm-damaged crown of about 20 m width and a hollow, fluted trunk. It occurs on a creek in private property behind Forest Headquarters.
95. Melrose RRG6, SA – girth at 1 m reported in www.treesa.biz as 9.8 m, height 38.5 m, in April 2005. A magnificent tree with a crown width of about 25 m in a paddock near Mt Remarkable.
96. Mt Remarkable, SA RRG 7 – Kym Knight (SA Soc. Arboriculture) –girth at 1 m reported as 14.45 m; a magnificent, multi-branched specimen (Photo 111 – NKN 8344 by Kym Knights).
97. Charleston Buttressed Tree, SA RRG8 – Kym Knight (SA Soc. Arboriculture) – girth at 1 m reported as 15.5 m; a magnificent tree in a paddock (Photo 110 – DSCN 1685 by Kym Knights).
98. Herbigs Tree, SA RRG9 – Kym Knight (SA Soc. Arboriculture) – girth at 1.4 m reported as 15.1 m; an ancient tree on the Register of National Estate (Photo 113 – NKN 1331 by Kym Knights). The tree lost its top about 150 years ago and has a small crown. The butt stands now on 6 'legs'.
99. Barmah-Millewa Forest, Murray R (Ranken 2011) – 2 trees, 13.5 & 11.5 m girth, presumably at 1.3 m. The larger tree is multi-stemmed with huge trunks; the other tree is hollowed out.
100. Bordertown, Moot-yang-gunyah on Tatiara Creek (Trevor Thomas 2022) – measurement of girth at 1.3 m height of 9 RRGs that germinated along the creek after the 1906 flood. The girth values were 3.1, 3.87, 1.22, 2.74, 4.93, 4.77, 3.58, 6.3 & 4.42 m. The diameter growth over the period of 116 years therefore ranged from 3.3 to 17.3 mm/yr and average of 10.6 mm. (Photos 114-116).
101. Bordertown, Moot-yang-gunyah on Tatiara Creek (Trevor Thomas 2022) – the old RRG (Photo 115) with a girth of 5.55 m at 1.3 m height in Feb. 2022.
102. Bordertown, Moot-yang-gunyah on Tatiara Creek (Trevor Thomas 2022) – measurement of girth at 1.3 m height of 4.42 m (Photo 118).
103. Bordertown, Moot-yang-gunyah on Tatiara Creek (Trevor Thomas 2022) – measurement of girth at 1.3 m height of 6.3 m (Photo 117).

Growth rate and age of River Red Gums

Several factors prompted me to measure and document some of the notable RRGs of SE Australia. One was a study by Erica Nathan (1998a,b) who looked at the history of RRG milling in the Dundas Tableland area and a possible connection with increased soil salinity. Erica concluded, in part, that the RRGs milled from Budd's and Reeve's blocks near Vasey in the 1920s had regenerated post-pastoral settlement in 1840. Trees of 90 cm diameter milled in the 1920s were postulated to be 50-100 years old, based on sawlog records and an estimate of annual diameter growth that appears to have been 9-18 mm. The validity of that estimate is a critical factor in the calculation of age.

Roger Edwards (Forest Officer at Cavendish) measured the diameter growth of RRGs in the 3,500 ha Woohlpooer State Forest over a 25-year period from 1977 (Photo 52). There were 5 x 1 ha plots, 4 of

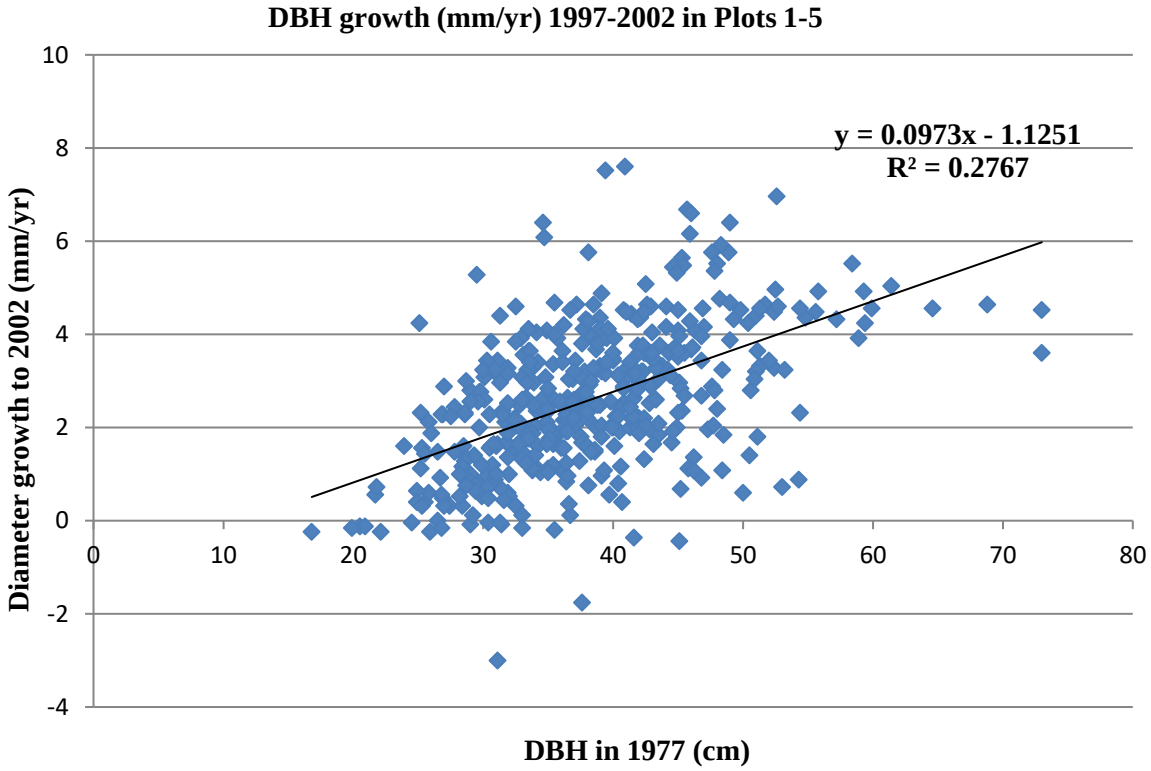
which were thinned in 1977. The aim was to determine a sustainable harvesting strategy based on growth rates in diameter and thus basal area. The diameter at breast height (DBH) of the trees in 1977 varied from 15 to 75 cm. Roger kindly allowed me to analyse those data (Table 1**)**.

From Table 1, the overall mean diameter growth rate was 2.6 mm/yr but there was clearly significant variability. Research on the growth of RRGs in the Millewa State Forest (see Colloff 2014) indicates that much of the variation is due to the size of the individual trees. That can be examined by looking at the diameter growth in various DBH classes. However, the simplest way of looking at that is to graph the diameter growth of the trees against initial DBH. This is presented for trees in Plots 1-5.

Table 1. Woohlpooer RRG plots – base data and mean diameter growth (mm/yr) from 1977-2002

	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plots 1-4	Plots 1-5
Stocking (trees/ha) in 1976	149	130	172	124	162		
Trees/ha after thinning in 1977	67	79	77	74	162		
Number of trees assessed per plot	67	78	76	71	152	293	445
Mean DBH in 1977(cm)	38.45	40.00	39.45	41.90	35.05	39.96	38.28
Mean DBH in 2002 (cm)	46.68	48.27	47.52	48.27	39.14	47.71	44.78
Diameter growth per year (mm)	3.29	3.31	3.23	2.55	1.64	3.10	2.60
Std Deviation growth (mm/yr)	1.08	1.50	1.42	1.43	1.28	1.40	1.53

Figure 1



About 28% of the variance is accounted for by the regression relationship, which was statistically highly significant ($p<0.001$). Other possible causes of the variability include competition among trees, position in the landscape, access to groundwater and impacts of fire, pests and disease.

DBH growth (mm/yr) = 0.097 initial DBH – 1.125 (N= 445, $R^2 = 0.28$, sd regr = 1.53 mm, $p<0.001$)

Table 2. DBH growth rates predicted from the regression model for RRGs of various DBH.

	Diameter Classes for RRGs from Plots 1-5				
Initial DBH	20 cm	30 cm	40 cm	50 cm	60 cm
Diameter growth/yr (mm)	0.82	1.79	2.77	3.74	4.71

The effect of initial diameter on subsequent diameter growth is substantial. That effect was also shown by allocating the trees to 5 DBH classes (Table 3). The results can be compared with those in Table 2 where it can be seen that either approach gives similar results: for example, trees of DBH 30 and 50 cm differ by about 50% in their subsequent growth rate.

Table 3. DBH growth rate of RRGs from Plots 1-5 partitioned into DBH classes

	Diameter Classes for RRGs from Plots 1-5				
Initial DBH	16-25 cm	26-35 cm	36-45 cm	46-55 cm	56-75 cm
Number of trees in the class	17	164	192	59	13
Diameter growth/year (mm)	0.76	1.93	2.87	3.64	4.56

The Woohlpooer RRG forest had been selected for farming by W. Carter in the 1860s and ring-barked to leave about 10-15 trees/ha. It was abandoned in the 1890s and, then in the absence of sheep, '*a vast crop of regeneration*' occurred by 1913 when it was bought by the State as 'Reserved Forest'. The stand was thinned and in 1925 grazing was again introduced, preventing further regeneration. We might assume that most of the trees assessed in this project were 75-110 years old in 2002. We can use the growth rates measured from 1977-2002 to predict the ages of the trees in the various diameter classes (Table 4), comparing the predicted ages with the historical statement of likely age.

Table 4. Prediction of the age of River Red Gums at Woohlpooer

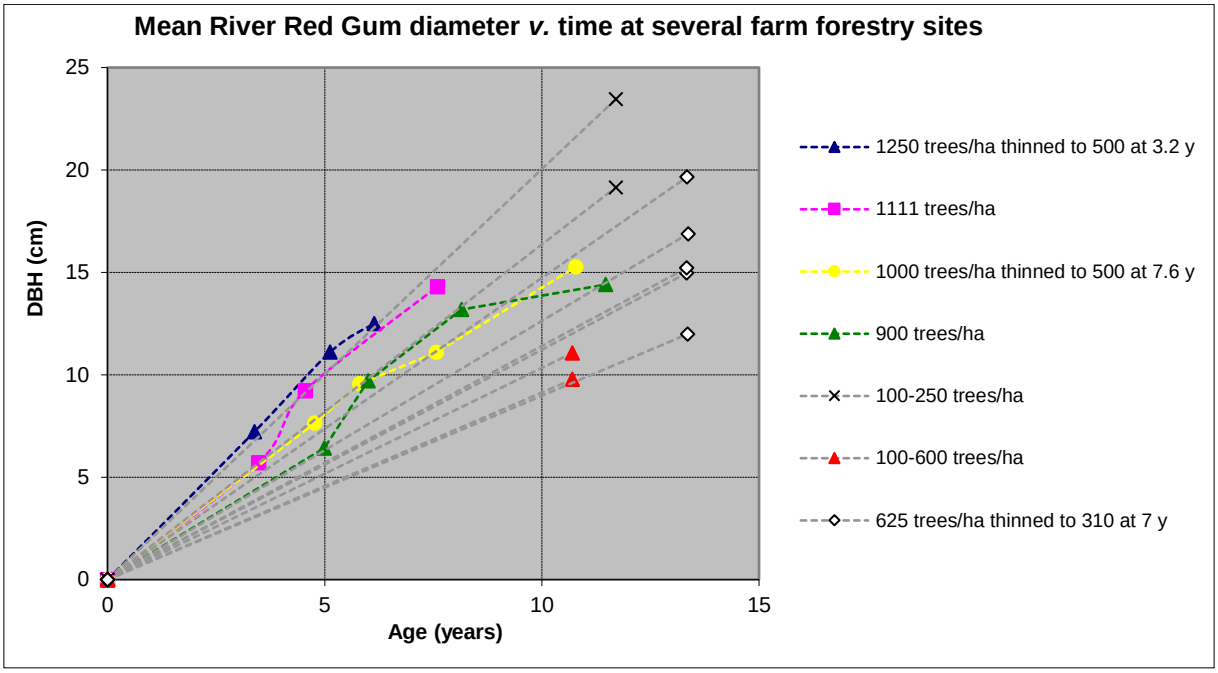
Mode of prediction of age	Predicted DBH growth and age	DBH range in 2002 (cm) 20	30	40	50	60
From regression model (Plots 1-5)	DBH growth (mm/yr)	0.82	1.79	2.77	3.74	4.71
	predicted age (years)	245	165	145	135	125
From diameter classes (Plots 1-5)	DBH growth (mm/yr)	0.76	1.93	2.87	3.64	4.56
	predicted age (years)	260	170	140	140	130
From overall average (Plots 1-5)	DBH growth (mm/yr)	2.6	2.6	2.6	2.6	2.6
	predicted age (years)	75	115	155	190	230
From Bryan Swamp/Dwyers Ck	DBH growth (mm/yr)	6	6	6	6	6
	predicted age (years)	35	50	65	85	100

From Table 4, comparing the predicted age of the RRGs with the presumed historic ages, there is a large discrepancy, particularly for the small diameter trees. In seeking a reason for this, one major factor to consider is the rainfall. The mean annual rainfall data for Cavendish (23 km to the SW) for the period 1977-2002 was 47-62 mm less than in the 3 previous 25-year periods and a fourth period of 17 years. One would expect slower growth for young trees with that rainfall deficit but that probably does not account for all of the difference between predicted and actual age for the small trees.

The conclusion must be that any estimate of the age of RRGs by assuming an average annual diameter growth is going to be very approximate. We do not know what the rainfall was in the centuries before 1800, or what other influences there were on the growth of the trees (e.g. impact of competition, fire, flood, pest and disease). The major complicating factor is probably competition: RRGs often germinate in densities of several seedlings per m^2 with intense competition in that long phase (perhaps many decades) so that growth may be very slow before most trees die and a few become dominant.

The growth of spaced RRGs on cleared paddocks that have received substantial amounts of fertiliser could far exceed that of trees in the primal condition. In 2001, 4 RRGs at 'Dulcian', Mooralla that germinated from 1960-75 had a DBH of 41 cm (35 years), 34 cm (25 years), 20 cm (25 years) & 64 cm (40 years). The annual growth rates were therefore 8-16 mm/year.

There is data for the early growth of RRGs planted on farms at relatively low densities. On the Dundas Tableland there were no differences in diameter growth over the first 8 years for trees stocked at 25-625 trees/ha in a parallel row design with 10 spacings. The range for the 2 sites was 9 to 12 mm/yr (Bird *et. al* 1996). On another 7 sites where 13 RRG woodlots were planted in 1993 the mean annual diameter growth varied from 9-20 mm (overall mean 13.7 mm, sd 4.0 mm) over periods 6-13 years for a range of stocking densities (see Figure below).



Survival and growth of RRGs is also affected by the salinity of the soil (Jackson & Bird 2008).

Further data was obtained from RRGs planted in 1994 at 6 m spacing in 2 rows 6 m apart adjacent to Drooping Sheoak provenance plots on what was then Mick Pern's property, near Balmoral on the Dundas Tableland (Photos 155-157). The site is on a mid-side of a valley in the dissected plateau and when planted there was evidence of salinity in parts of that area. These trees were assessed in April 2022 and have flourished. The average DBH at 1.3 m height for 60 trees (those with no obstructive branches at around the 1.3 m level) was 41.2 cm (range 38-218 cm) and the mean annual growth in DBH was 14.7 mm (sd 3.8 mm). Possible explanations for the good growth of these RRGs is that they were fairly widely spaced and the likelihood that they had access to groundwater, had some shelter from their position in the landscape, and the soil was moderately fertile. These data further indicate that growth rates on farms are likely to be substantially greater than in the original woodland/forest condition. The data also indicates a large variability (25% coefficient of variation).

Three old trees that Lionel Elmore had measured in 1962 at Bryan Swamp and Dwyers Ck were located and DBHs re-measured in 2002 and 2006, respectively: values of diameter growth over 40 years (Bryan RRG1 & RRG3) were 4 & 6 mm/yr, and over 44 years (Dwyers Ck RRG) 6.6 mm/yr. Another tree at Bryan Swamp (RRG2) was re-measured in 2022 and the DBH growth was 7.1 m/yr.

The DBH of the old RRG on Dwyers Ck (Photo 46) is 4.0 m and, using that measure, this is one of the largest and oldest in Australia. Taking 6 mm as an average annual growth rate, the tree could be 670 years old. The tree has a large hollow at the base on the western side; the wood there has decayed sufficiently to allow a person entry to the cavernous butt, as it did for Lionel Elmore and his ladder in 1966 when he collected a sample of wood high in the bole for C-dating. An owl roosts inside now.

The naturalist Norman Wakefield (1967), writing in his 'Nature Notes' column of The Age, described the Dwyers Ck tree as the largest Red Gum he had seen. His article is interesting from two angles. First, Wakefield mentions that Elmore had arranged for carbon-dating of wood taken from the centre of the trunk, at the top of the hollow in the butt. The result was 170 ± 80 years. One might question the accuracy of the method then and/or if the sample was contaminated by 'new' carbon? Elmore noted later (hand-written on a copy of Wakefield's article) that the sample was taken at 14 ft from the ground, from the wall of a circular cavity more than 1 ½ ft in diameter – i.e. not from the inner part of the tree, which had rotted away. Therefore, one must also estimate the age of that inner core and add it to any age obtained for the sample. Elmore suggested that the tree was at least 300 years old; it could be much more if allowance is made for the sample being contaminated with 'new' carbon.

In regard to the Dwyers Ck tree, Wakefield noted the response of MR Jacobs (Director General of the then Forestry and Timber Bureau) in 1967 to a letter from ED Gill (National Museum of Victoria), who

was interested in the carbon-dating result. Jacobs explained that big, old trees tend to 'belly out' when the centre fails, largely as a result of tangential compression that makes each sheath of cell expand in diameter. Thus, girth measurements taken near ground level on large old trees may have no close relation to tree growth. Jacobs cited his work at Mathoura (15 inch rainfall) where RRGs had a '*girth increment of at least ¾ inch annually'* (i.e. at least 6 mm annual growth in diameter) and '*I would guess that growth conditions on the plains in West Victoria would be much more favourable than at Mathoura and I would expect girth increments of two to three inches annually on healthy trees...this could easily give girths of twenty feet in a hundred years'*. Jacobs mentions girth, not diameter – a tree with a DBH of 50 cm would grow to 52.4 cm DBH if the annual growth in girth was 3 inches (7.62 cm). The annual diameter growth thus calculated is 24 mm – a value 9 times that found by Edwards. Jacob's appears to have over-estimated the growth of RRGs on the plains of western Victoria – his estimate of growth at Mathoura of 6 mm diameter growth/year would seem to be a more realistic value for trees on the plains before clearing, pasture improvement and advent of fertilisers.

Colloff (2014) mentions other studies on RRGs from the Murray River where the growth rate of trees of various diameter classes were assessed:

≤ 10 cm (1 mm/yr), 10-20 cm (1.7 mm), 20-30 cm (3.5 mm), 30-40 cm (4.2 mm), 40-65 cm (4 mm).

Other studies on the Murray River RRG forests found annual growth of 7.5 mm, falling to 2.5 mm or zero under drier conditions (low rainfall or lack of flooding).

An additional uncertainty arises when measuring old, hollow trees because Jacob's (1955) argument is that the 'growth' data from such trees (e.g. Bryan Swamp or Dwyers Ck) may reflect an expansion of girth that is not true growth. The trees could be growing at an even slower rate than calculated.

In 2022, Trevor Thomas used old photographs of trees on Tatiara Creek near Bordertown, SA, to identify 9 seedlings that had apparently germinated following a flood in 1906 (Photos 114, 115). By measuring those trees he was able to estimate their average annual diameter growth rates over 116 years, which varied from 3.3-17.3 mm (average 10.6 mm/yr, sd 4.0 mm). This appears to be the best long-term data available. How relevant it is to the task of estimating the growth of old RRGs in less well-watered areas on open grassland or woodland is still open to question.

The limited diameter growth data from the Bryan Swamp/Dwyers Ck RRGs (6 mm/yr), together with the data collected at Woohlpooer State Forest by Roger Edwards (2.6 mm/yr) and that from the Murray River area (2.5-7.5 mm/yr) and Bordertown (10.6 mm/yr) provide a basis for an estimate of the age of RRGs that were taken by sawmillers on the Dundas Tableland in the 1920s. The alternative growth rates are mostly less than half those assumed by Erica Nathan (1998) who concluded that most of the mature RRGs on the Dundas Tableland germinated after settlement in 1840 and the change in land use. An alternative assessment, assuming a mean growth rate of 6 mm/yr, suggests that Erica Nathan's milled 90 cm diameter trees were 150 years old and would have germinated pre-settlement. For 10 mm/yr, those trees would probably have arisen before settlement but, if we consider an unlikely 15 mm/yr, those trees would be 60 years old and could have germinated post-settlement.

I have taken GPS positions, measurements and photographs of 75 RRGs in Victoria and South Australia. Some of those trees might be located and re-measured in 20-40 years time. That would provide additional information as to the growth rates of RRGs in various environments.

Giant River Red Gums

As stated in the introduction, a motivation for this study of RRGs was the desire to know how various celebrated RRGs ranked in size. A trigger was seeing a sign on the Casterton-Chetwynd Rd that proclaimed the Bilston Tree (Photo 69) to be '*The world's largest red gum'*. The tree is 3 km to the west on Glenmia Rd. Was it really the largest? What was the claim based on?

Apart from height, girth, canopy span, or total wood volume, an unspecified factor here was the bulk of timber that could be profitably sawn from the Bilston Tree. It was found in 1987 to be solid to the core – unusual for a RRG of that age – and with an unbranched bole with little taper for some 11 m. Estimates in 1971 suggested that 9,100 super feet of timber could be sawn from the tree (21.5 m^3 of timber?) but fortunately this leaning tree had been spared by sawmiller Lance Phyear and in 1962 a Forest Reserve of 1 ha was created on the farm then owned by T Bilston.

The Bilston Tree (Photo 69) is much publicised (e.g. Lahey 1987). In 1998 it was not exceptionally tall, 36 m compared with 51 m for the Lodge Rd Tree (Photo 55-57 in the Grampians, nor of great girth (7.7 m girth at 1.3 m above ground), compared with 13.1 m for the Dwyers Ck tree (Photo 45-47) in the Victoria Valley. However, the Bilston tree is unbranched for ~11 m and has an enormous bulk of timber. It may have the most merchantable timber, although the Forest Lodge tree has a bulk (using the cone formula $1/3\ \pi\ r^2\ h$) of about 67 m^3 compared with 56 m^3 for the Bilston Tree and a massive 164 m^3 for 'Big Red' at Mullinger Swamp near Kybybolite (Photo 80).

The girth of 'Big Red' (Photo 80) in Jan. 2008 was 12.12 m (3.86 m DBH). At 42 m it is much taller than the Dwyers Creek tree (28.5 m) and has a much greater volume of timber. The Dwyers Creek tree (Photos 45-47) is much branched, with a short bole (girth 12.7 m and DBH 4.04 m). It is larger than the Orroroo Tree in SA (Photo 108) which has a girth of 9.9 m (3.15 m DBH), a short bole and a height of only 19 m. The Dwyers Ck tree ranks about 6th.

Another measure is Smalian's formula (Volume = $h\ (A_b + A_t)/2$, where A_b is the area of the butt end and A_t is the area of the top end of the major sawlog section). The calculated volume is 40 m^3 for the Bilston Tree and 45 m^3 for the Forest Lodge Tree. For these calculations I had to estimate the trunk diameter at the first major branch – I scaled these from the photographs. The Bilston Tree is slightly larger at the base and has much less taper, thereby achieving a volume approaching that of the much taller Forest Lodge tree. This leaning tree is magnificent, but not the world's largest RRG!

The giant RRG off Lodge Rd in the Gariwerd/Grampians NP (Photos 55-59) was 51 m tall – among the tallest RRGs in Australia – and had a girth of 7.07 m (2.25 m DBH) in 1998. At that time it had an apparently solid, straight bole of about 19 m without a branch. The fire of Jan. 2006 burned a 1.7 m cavity at the base and the leaves on its top. Regrettably, another fire several years later burned fiercely in the accumulation of bark and litter and wattles that had grown around its base (Photo 57). That has further damaged the tree, reducing its height and creating a thin shell in the bole with a cavity several metres high. This RRG was a magnificent tree and, in its unspoiled state, ranked in the top 6.

If one uses Smalian's formula for 'Big Red' at Mullinger Swamp, where the major fork is at ~10 m, the volume of merchantable timber could have been ~73 m^3. Even allowing for a smaller size before rot developed in the heartwood pipe, 'Big Red' may have had the greatest volume of merchantable timber of any living RRG. If one considers the total amount of wood in the huge branches above the fork, it may also have had the greatest total wood volume of any living RRG. Now, in its old age (perhaps 650 years?), the hollow extends about 7 m vertically and occupies the greater part of the butt (the tree was once a convenient 'change room' for bathers at Mullinger Swamp).

'Big Red' (3.86 m DBH), has a claim as the largest RRG, on account of its great height and diameter, although 2 trees in SA, at Mt Remarkable (Photo 111, 4.6 m diam.) and the Charleston Buttressed Tree (Photo 110, 4.93 m diam.) have a larger girth when measured at 1 m above ground. Comparing those two with Big Red is problematic, since the heights are not specified, nor were their girths measured at 1.3 m. The Fyans Creek tree (Photos 98, 99), with a DBH 4.38 m is another magnificent contender; perhaps it ranks 2nd. Collectively they appear to be the 4 biggest RRGs assessed.

A 5th contender (at 4.3 m diam., presumably measured at 1.3 m height) is the RRG reported by Ranken (2011) in the Barmah-Millewa Forest. Before the river was regulated, and water diverted, the trees may have had greater access to water and certainly more sunlight and higher temperatures for growth. The logging industry in those forests – and the use of the timber by the paddle-boat steamers in the early days – must have removed many large trees that would be giants today.

In SA, a RRG at Mt Crawford (diameter 4.1 m at 1m height and 31.5 m tall) ranks about 8th; another at Mt Crawford (diameter 3.9 m at 1m height and 38 m tall) ranks about 10th. A tree at Charleston, with a hollow base (Photo 112), ranks about 9th, with a diameter of 3.9 m at 1 m and height 41 m. Also in SA, just over the border with Vic, another tree at Mullinger Swamp (Photo 81) ranks about 11th with a DBH of 3.1 m and height 42 m.

A tree on Andrew Beveridge's farm 'Bowacka' at Mirranatwa (Photo 64) was 37 m tall with a DBH of 3.1 m. That tree ranks about 12th. Another tree (Photo 65) has a DBH of 2.9 m and is 31.5 m tall. Both are healthy specimens with sound boles and the prospect of a long life. Other impressive trees occur in the area (Photos 66-68).

The Nangeela RRG (Photo 78) on Michael Moran's farm is 43.6 m tall, with a DBH of 2.93 m. This is a marvellous tree with no visible defect in the bole and it probably ranks about 13th in size. The Morans remove fallen branches from near the bole, to protect it from any fire. Where cropping is now practiced on the Dundas Tableland, there are places where branches were smashed off the trees and piled around the trunks to allow cropping operations close to the tree. A stubble fire could kill them.

There are many grand trees on the Kanawinka Sandplain of far western Victoria, although pine and Blue Gum plantations have, in recent years, occupied much of the land-system. The tall Casterton RRG3 (36 m and DBH 2.3 m) on Ross & Lorraine Clayton's property is a superb tree, branch-free to 8 m (Photo 73). However, most of the RRG that had tall, straight boles like this tree fell to sleeper cutters, leaving old trees of 'character' standing. One such tree, pictured (Photo 71), has a girth that would approximate to 12 m if it were intact. On the basis of girth, that makes it one of the largest recorded but, as can be seen, the tree is now quite short and the bole is hollowed out.

The King Tree at Wirrabara State Forest (Photos 105, 106) had a DBH of 3.0 m and was 37 m tall in 2009. Perhaps as a result of some dry years the top branches had died. The trees rank is about 14th.

Many towns or shires claim to have the largest Red Gum in Australia. Guildford (near the Loddon River, between Daylesford and Castlemaine) has a lovely, large Red Gum in the town (Photo 100). This tree is listed as a significant tree on the register of the National Trust of Australia and described in 2004 as '*...one of the largest River Red Gums in Victoria'*, with a girth 9.35 m ('at the base') & height 30 m. Another view of its size: '*...thought to be the largest of the species in Victoria'* with a 12.8 m girth and height of 26 m (The Age 2004). In 2011 I found it to have a girth of 8.5 m at 1.8 m (above the burl) and 11.8 m at 1.3 m (over the large basal burl). Excluding the effect of the burl, the girth is approximately 9.5 m. The tree ranks about 15th in the list of the top 25 RRGs.

Herbigs Tree in SA (Photo 113) was once immense (it had a diameter of about 4.8 m at 1.4 m) but has lost most of its top and is now near collapse. It is on the register of the National Estate.

No measurement was made by Elmore of the huge, hollow-butt tree (Photo 21) at Bryan Swamp. This 'canoe' tree was merely a log on the ground when we visited in 2002. Based on a scaling of figures in Photo 3, using a height of 1.2 m for Michael Gunn, the DBH of the tree in Photo 21 would be 2.5 m, much smaller than the giant at Dwyers Creek (Photo 46).

The forest of RRGs in the flats of the Grampians/Gariwerd NP in the Moora Moora and Lodge Rd area contains many magnificent trees (Photos 60-62), although most of the large trees have been burned out at the base as a consequence of frequent fires and lack of protection.

A mention must be made of the giant RRGs in the Wyperfeld NP. Garnet (1965) described Old Be-al near Outlet Ck as '*surely one of the most magnificent River Red Gums in the land'* (Photo 90). This great, spreading tree with foliage hanging to the ground escaped the fire of 1959 but not the fire of 1982 that damaged it. It lives on but has also suffered badly from lack of water. Seeds from Old Be-al were collected in the 1970s, germinated in 1997 and planted in the camping area by the Friends of Wyperfeld (Fendley 1997). In Sept. 2021 it was in fair condition despite having a dozen or more large fire-killed dead branches (Photos 92-94) and having lost its magnificent curtain of foliage near the ground. The tree had a height of 24 m, a girth of 6.15 m at 1.3 m (DBH 1.95 m) and a span of 36 m (E-W) and 25 m (N-S). It does not rank in the top 25 largest RRGs, nor does the impressive RRG on the NW corner of the Wirrengren Plain (Photos 96-97), but they are magnificent giants in that hot, dry environment.

A lovely younger tree of girth 5.25 m at 1.3 m, height 18.6 m and massive span of 41 m (Photo 91) on a dune slope 400 m SW from Lake Brambruk may one day be a worthy rival for Old Be-al.

Water last flowed down Outlet Ck from Lake Albacutya to Brambruk in 1975 (Photo 95). Lack of water has affected many great trees in the Wimmera and Mallee of Victoria, including those on the sandy banks of Lake Mournpoul in Hattah NP. I remember the incredible sunrise and sunset skies over the clear waters of the lake in 1976 (Photo 127). The lake was subsequently deprived of water from the Murray River and seedlings germinated in the lake so that in 2010, when water returned for the first time since the early 1990s, the wide ring of trees is now standing in water (Photos 128, 129). Those on the bank mostly appear to have recovered and have a healthy canopy again. What will be the fate of the saplings in the lake?

One objective of this study was to give an approximate ranking of size of our existing giant RRGs. Dean Nicolle (2018) has approached the problem using a combination of girth, height and span. My approach was based on girth, with some regard to height but little regard to taper or span. Inevitably, then, our rankings will differ, but also because some of our measurements differed slightly and the lists of contenders are a little different. I have tentatively ranked 25 of the largest Red Gums, those with a girth measurement exceeding 6.5 m, from about 70 possible contenders.

In the list below, the DBH label refers to diameter at 1.3 m, a forestry standard height of measurement. Some of the other girth records have a different base height and, if lower than 1.3 m from the ground, the girth measurement will invariably be substantially greater due to butt swell near the ground. Where there is a gross swelling of the butt at the 1.3 m level, the girth there in the absence of the swelling can be estimated as the mean of readings taken the same distance above and below.

A listing of 25 of the largest River Red Gums in Victoria and South Australia

1. Mt Remarkable, SA RRG: Kym Knight (SASA) reported a tree of diam. 4.6 m (at 1 m), a magnificent, multi-branched specimen (Photo 111 – NKN 8344 by Kym Knights).
2. Fyans Creek Tree, Nth of Halls Gap (C & C Carlyle): 35 m tall and 4.38 m DBH (Photos 98 & 99). The tree has a substantial hollow at the base and pronounced taper.
3. Charleston Buttressed Tree, SA: Kym Knight (SASA) reported a tree of 4.93 m diam. (at 1 m), a magnificent specimen in a grazed paddock (Photo 110 – DSCN 1685 by Kym Knights)
4. Mullinger Swamp, Kybybolite SA 'Big Red' RRG1: 42 m tall and 3.86 m DBH in Jan. 2008, with a hollow base. Ranked first on volume of timber (once perhaps 73 m^3) (Photo 80).
5. Barmah-Millewa Forest, Barmah Choke, Murray R (Ranken 2011) – 13.5 m girth (4.3 m DBH)
6. Dwyers Creek RRG, Victoria Valley: 28.5 m tall and 4.0 m DBH in Oct. 2006 – the largest girth recorded in SW Vic but base partly hollowed out (Photos 45-47).
7. Gariwerd RRG1 at Forest Lodge: 51 m tall and 2.25 m DBH in May 1998 – the tallest tree recorded and also a substantial volume of merchantable timber (45 m^3) (Photo 48).
8. Mt Crawford area, SA, RRG2: reported in www.treesa.biz as 31.5 m tall and diam. 4.1 m (at 1 m) in March 2008; an impressive tree with a hollow trunk; tree with a hollow trunk.
9. Charleston Tree, SA: 41.3 m tall and 3.92 m diam. (at 1 m) in Oct. 2007. The tree has a hollow base. For comparative purposes I estimated, from a photograph and data supplied in the website, that the DBH was approx. 3.6 m.
10. Mt Crawford area RRG3, SA: reported in www.treesa.biz as 38.2 m tall and diam. 3.9 m (at 1 m) in March 2008; a large tree with a flared trunk and a crown width of 35 m.
11. Mullinger Swamp RRG2, SA: 42.2 m tall and 3.1 m DBH in Jan. 2008, solid (Photo 81).
12. Mirranatwa RRG1 on 'Bowacka' (A Beveridge): 36.8 m tall & 3.12 m DBH in May 2008. A healthy tree but with a small dead spot at the base (Photo 64).
13. Nangeela RRG (M Moran): 43.6 m tall and 2.93 m DBH in May 2008 with ~10 m to the first branch. A magnificent, healthy tree with a sound base (Photo 78).
14. Wirrabara SF King Tree: 36.5 m tall & 3.0 m DBH in Jan. 2001. The trunk is apparently solid (Photos 105 & 106).
15. Guildford RRG: 32.5 m tall & 3.75 m DBH in Apr. 2011 (but exaggerated by a large burl – the diameter above the burl (at 1.8 m) was 2.7 m). This is a picturesque tree (Photo 100).
16. Mt Crawford area RRG4, SA: reported in www.treesa.biz as 43.5 m tall and diam. 2.5 m (at 1 m) in March 2008; a large, spreading tree (crown width 40 m).
17. Mullinger Swamp RRG3, SA: tree near the fence in the reserve near parking area, height 38 m & 2.99 m DBH in Jan. 2008 (Photo 83).
18. Mirranatwa RRG2 on 'Lambing Flat' (A Beveridge): 31.5 m tall & 2.88 m DBH in May 2008. Multi-branched at 3.5 m, 34 m spread, sound base. A magnificent tree (Photo 65).
19. Brimboal RRG1, Bilston's Tree, Glenmia Rd: 36 m tall & 2.45 m DBH in Feb. 1998 – a massive volume of merchantable timber (40 m^3) in what appears to be a solid butt (Photo 69).
20. SA Herbigs Tree: Kym Knight (SASA) reported a tree of 4.8 m diam. (at 1.4 m) with a small branched trunk above. Base rotted, standing on 5 or 6 'legs' (Photo 113 – Kym Knight).
21. Casterton RRG4 (R & L Clayton, 'Glenbrae'): a tree of great character (Photo 72). The butt is hollowed out and grossly distorted. DBH 3.8 m and height 25 m. (GPS 37-38-15/141-20-26).
22. Wirrabara SF, Ippinichie Ck, SA 'ghost' RRG: a half circle of sawn stump 4 m diameter (at 1 m) (Photo 107). This tree was possibly logged in the 1940s). (GPS 33-04-04/138-13-46).

23. Balmoral RRG (Broers): reported in May 1998 to be 30-40 m tall & DBH 2.88 m. The tree was hollowed out at the base by fire.
24. Comaum Forest RRG, SA: reported in 1996 to have a diameter of 3.34 m.
25. Orroroo RRG, SA: 19 m tall & DBH 3.15 m in Sep. 2008. The tree has a very short, apparently solid bole (Photo 108).

Several points need to be made that relate to the above assessment:

- the judgement on 'size' depends on what one is assessing. Is it height, diameter of the bole, volume of extractable sawlog timber, total mass of wood, or spread of canopy? If diameter is the sole measure, some trees of great DBH taper sharply, markedly affecting their mass. That factor would make ranking the Mt Remarkable Tree (Photo 111) or Fyans Creek tree (Photo 99) above 'Big Red' at Mullinger Swamp (Photo 80) a very dubious proposition.
- where I have not been able to verify or obtain full measurements for trees recorded by others I have ranked those trees below those that I have measured that seem to be of equal size. One problem has been the various heights where girth was measured.
- there must be trees among the hundreds of thousands across western Victoria and South Australia – and in the great forests of Nyah, Vinifera, Gunbower and Barmah on the Murray River – that are larger than some listed here. A few different contenders have been listed by Nicolle (2018) while others are waiting for someone to report them (e.g. Ranken 2011).
- All who report such giant RRGs should state the height (or heights) at which girth is measured (and that must include 1.3 m), otherwise it is very difficult to make valid comparisons.

Other River Red Gums of environmental and cultural significance

A number of images of interesting River Red Gums are presented throughout this little book. These fall into the following loose categories: picturesque trees in the pastoral landscape, fire-affected trees, layered trees and Aborigine scar trees.

Picturesque trees in the pastoral landscape

Largely as a result of sleeper-cutting industry of the mid-1850s to 1960s, the majority of RRGs that we have left in the agricultural landscape are multi-branched trees or very old trees with defective hearts that were not suitable for milling. Few young trees are found on open paddocks (e.g. Photos 142, 153) because seedlings that spring up are eaten by livestock. That is not the case on roadsides, watercourses, reserves and fenced-off areas near RRGs on paddocks that are not grazed by livestock.

Some mature RRGs of good form in parts of the 'Red Gum country' could have been logged but the sleeper-cutters were either denied access or the trees were too far from a railway. Elsewhere, on streamsides and lake banks, many ancient RRGs have also survived the milling saga, e.g. at Lake Mournpoul (Photos 127-129) or swamps near Bordertown (Photos 143-149).

Some areas around wetlands, such as Bryan Swamp, do not appear to have been heavily logged. However, very few of the photos from Bryan Swamp show trees that would have been sought by millers so it is likely that any RRG of 'good form' would have been milled. Elsewhere, as at Long Point, Dunkeld, mature RRGs also survive because of their 'poor form' (Photos 151-154).

Some RRGs have assumed a rather fantastic shape over their lifetime, as a result of natural causes (e.g. Photo 144 at Thomsons Waterhole near Bordertown). Others, such as Herbigs Tree (Photo 113), are redolent of fortitude over hundreds of years. Then there are individuals shaped superficially by cankers that may have arisen as a result of changes to the environment (e.g. Photo 150).

River Red Gums as havens for wildlife

All ancient RRGs offer wildlife many hollows that have developed over time. At least 300 species of birds, reptiles, small mammals and frogs depend upon these hollows for shelter and nesting places (Lindenmayer 2007). Tree Martins, thornbills and pardalotes can use the tiny pipes, parrots and cockatoos use larger hollows but the Powerful Owl needs a very large cavity indeed. Our endangered SE Red-tailed Black-cockatoo relies heavily on the RRGs for large nest hollows. Fairy Martins will build community nests in protected niches formed on the trunk as a result of branch drop (Photo 148). Microbats, possums, gliders, Yellow-footed Antechinus and Brush-tailed Phascogale are but some of our mammals that depend upon RRGs for sanctuary.

Fire-affected River Red Gums

It is a regrettable fact that a major cause of loss of remnant RRGs from the pastoral landscape is due to fires started by agricultural machinery. In particular, modern grain harvesters operate at a level where bearings are subject to overheating and causing ignition to the crop stubble. Trees that catch fire are invariably cut down or bulldozed by the CFA crews. The danger for the tree is made worse where fallen or cut branches are stacked around the base.

There is an alternative to removing trees that catch fire, but that would require a change in mindset and provision of necessary equipment to extinguish such fires in the trees. An example of where that has worked is the Bryan Swamp fire in November 2006 (Photos 34-38). The fire entered the reserve from a paddock near the west bank where the farmer had been burning carcasses several weeks earlier; the fire burned 102 mature RRGs, severely affecting about 30. Action by DSE that was acknowledged as unprecedented prevented most of the affected RRGs on the reserve being bulldozed – the CFA crew and DSE staff worked hard to save the fire-affected trees on the reserve (MacDonald & Evans 2007). Unfortunately, that example seems to have been a one-off case. While bulldozers are always available no provision is made for a 'cherry-picker' to attend such fires and assist in extinguishing fires in the upper levels of these significant trees that are so essential to wildlife.

The fires in 2006 and 2013 that ruined the grand tree near the old Forest Lodge site in the Gariwerd/Grampians National Park (Photos 55-60) has provided an object lesson in what is needed to protect such iconic trees from wildfire and controlled burns. During the first fire the base of the tree was apparently not clear of flammable debris. The result was a small breach in the bark and sapwood at ground level. Seven years later, a growth of wattles immediately around the base of the tree and more debris provided the fuel for the interior of the bole to ignite. The fire then also ran to the top of the tree, killing sectors of the trunk. The consequence is that the tree, possibly the tallest RRG in Australia and one with a huge branch-free stem, is dying, ruined by neglect.

Layered River Red Gums

Apart from sheer size, there are many other unusual trees in the region, including those on the old-time Mt. Sturgeon Station, 3 km W of Dunkeld and ~150 m N off the Cavendish Rd (Photos 119-121) where new root systems established where branches touched the soil. Close up, this is a magnificent tree with a branch spread of about 45 m (Kenyon 1997).

This phenomenon of layering (see Colloff 2014) also occurred at Brimboal (Photos 125-126). The tree is located about 100 m west of the Bilston Tree (Photo 69). A visitor to the Bilston Tree should not miss seeing this interesting arched tree. As seen in the photographs, the original stump has died but the tree lives on, new roots developing where a branch touched the ground (Kenyon 1997).

Another spectacular case of layering is to be seen on a farm near Balmoral (M Pern). Sleeper cutters operated there in the 1950s or 60s. In one case a tree on the bank of a creek was felled and sleepers were cut from the 6-m butt log. Subsequently in that winter, the top rooted from the cut end that had lodged deep into the wet earth beside the creek (Photos 122-124). The tree now has great branches projecting vertically from the large log on the ground.

More recently Old Be-al in the Wyperfeld National Park has developed 'new' life from layering of branches that touched the soil. Andrew Gell (2016) inspected the tree and reported that the tree was '*in bad shape, but from the lower limbs now since dead there are 3 apparently healthy junior Be-als that have rooted'.* In September of 2021 this new growth was beginning to fill some of the space where the low branches had been removed by the fire of 1982 (Photo 94).

Occasionally one may espy an example of branch grafting in RRGs. One illustrated here (Photo 32) is at Bryan Swamp; another can be seen near the Fyans Creek RRG.

Aborigine Scar trees – shields and canoes

A number of RRGs are illustrated that show the effects of removal of bark to use as shields, carry vessels or canoes (Photos 20, 21, 37, 130-140). Excellent descriptions of the history, manufacture and use of the bark canoe by Aborigines is given by Edwards (1972) and Curr (1883).

The RRG was favoured for use wherever the species grew, although other species, such as Messmate Stringy-bark (*E. obliqua*), were used where RRGs were few. The construction of such fragile but useful

vessels ended in the early 1900s; an example may be seen in the National Museum of Victoria and another in the South Australian Museum in Adelaide. The scar trees that remain are often located near rivers or lakes but have been found up to 30 km distant from any waterway.

Great care was taken in the selection of a tree from which the bark was cut. The ideal was a wide trunk with some curvature that helped to obtain uplifted prow and bow when the bark was dried. The shape of the sheet was marked out on the trunk, often high up, chopped along with a tomahawk and then prised away from the sapwood/hardwood core. This was best done when the sap flow was greatest, in the spring-summer period. On the ground, little fires were placed inside the sheath to dry out the bark and curl the sides up. In some areas the bark was placed on a canoe-shaped pit excavated in the ground, and the bark weighted with stones during the drying to achieve the desired shape. Elsewhere, stake props were used along the outside to achieve the curled shape.

The canoes varied from 2 to 6 m in length, the short canoes carrying 1 or 2 people and the larger 7 or 8. The craft had a useful life of about 2 years. Early settlers by the Murray River used such canoes extensively to ferry sheep, bales of wool and supplies cross the river, and to travel along the river.

Various RRGs were regarded as sacred by Aborigines (e.g. Photos 147 & 149 at Poocher Swamp, Bordertown). As well, many large, hollow RRGs were used for shelter and birthing places.

Concluding notes

This study is partly a celebration of the beauty and utility of our majestic RRGs – and a plea for current and future generations to appreciate these veterans, manage them in a way that will see them standing until nature has its way, and establish replacements for them when they are gone.

Judging from remnant blocks, the large RRGs in the pre-settlement landscape were probably spaced, on average, no closer than 20-30 m (9-16 trees/ha). There are thousands of RRGs on farms from Chatsworth to Apsley in Victoria, perhaps some of greater size than listed here, but tall trees unbranched for 6 or more metres were prized by sleeper cutters in the 1920s and later (particularly in the 1950s and 1960s) and many thousands were logged. We are left with trees with 'character'.

Many tens of thousands of RRGs were also ring-barked by settlers (see Bird 1986; Bird 2011), on the assumption that they competed with pasture. The ring-barking attempts were not always successful, as we saw at Dwyers Creek (Photos 49, 50). Being deep-rooted, there is little evidence that widely spaced mature RRGs reduce pasture production, although high stocking of young trees does have a negative impact (Bird *et al*. 1994). With 7-year-old RRGs at 2 sites, comparing treatments of 35 & 60 trees/ha with 175 & 225 trees/ha, pasture production was reduced by15% by the higher stocking. The effect for *Pinus radiata* was a 20% reduction, while the reduction for *E. viminalis* (not as deep-rooted) was 60%. As the trees grow those differences would increase, assuming no thinning of the stand.

The shading and shelter effects on animals and pasture may balance any negative impacts of root competition on pasture (Bird *et al*. 1992). As well, the trees have the capacity (via leaf-drip and leaf and twig drop) to recycle nutrients leached beyond the root zone of grasses and other ground-cover plants (Murray & Mitchell 1962; Bird *et al*. 1992). In the absence of artificial fertilisers, and where nutrients are exported from the landscape (in wool, mutton, beef, grain), trees contribute to the sustainability of the whole system by replacing lost nutrients.

A fire in Nov. 2006 killed or severely damaged a dozen of the venerable trees at Bryan Swamp (Photos 34-38). Dozens more would have been lost had not the forester in charge departed from the usual practice of bulldozing the trees, instead the fire crews worked to extinguish fires in the trees. Significant trees (such as the Gariwerd Forest Lodge tree) should have fallen limbs and litter shifted away from their base to prevent fire from hollowing out the trunks and thus shortening their life.

Many of these majestic trees will be alive and standing in 100 years time but perhaps not in 200 years. Fire and the action (or inaction) of fire fighters may determine the fate of some, as will clearing, but windstorm, lightning strike, defoliation (by herbicides, insects and possums) and drought will also have an impact. On present trends, an annual loss of 0.1-0.5% can be expected.

These venerable RRGs that grace the pastoral landscapes in far SW Victoria and SE Australia also provide refuge for hollow-dependant species such as the endangered SE Red-tailed Black-cockatoo,

Powerful Owl (and other owls), parrots, lorikeets, martins, treecreepers and many other species, including small mammals such as Brush-tailed Possum, Ring-tailed Possum, Sugar Glider, Brush-tailed Phascogale, Yellow-footed and Agile Antechinus and insectivorous bats.

Climate change may have an impact on the longevity of these trees; they may not be able to cope with higher temperature and less rainfall and soil moisture. In some cases the long-term effects of drainage of wetlands and depleted groundwater resulting from extraction for irrigation or by plantations will aggravate the situation. We need to take care that we safeguard the trees that we have now.

In Victoria, a pastoral landscape of veteran RRGs can be seen by travelling the roads a short distance from Dunkeld (e.g. Photos 151-154) or on the Glenelg Highway west of Hamilton where there is a fine stand of old trees at Bochara and west of the Wannon River. A drive to Balmoral or Harrow will also reveal thousands of these charismatic, deep-rooted trees of the 'Red Gum Country'. The Henty Highway, especially between Montana La and Woohlpooer, also provides spectacular views.

This little publication is also a plea to landholders to replace those RRGs in the pastoral landscapes that are lost as a result of natural causes, clearing for cropping, pine and Blue Gum plantations, and timber-cutting or fire operations. There are few young RRGs on the grazed or cropped paddocks now and if no action is taken that great pastoral landscape will be bereft of these magnificent trees in another 100 years when many of the old trees will have died.

The age of the giant RRGs is uncertain. The information from Woohlpooer has provided a base for DBH growth of 2.6 mm/year but that is probably a minimum value. Over the lifetime of a 4.5 m diameter RRG the estimate of age would be 1700 years. That seems to be far too great.

An estimate using a value of around 4-6 mm/yr from trees in the largest diameter class at Woohlpooer (consistent with data from the Murray River forests and the limited data from Bryan Swamp and Dwyers Ck) would provide a more conservative estimate of age of the ancient RRGs of DBH 4.5 m. For an average diameter growth of 4 mm/yr a tree of 4.5 m DBH would be 1125 years old. For 6 mm/yr the largest living RRGs with a DBH of 4.5 m may be about 750 years old.

There is also an argument, from Tatiara Creek near Bordertown, that we should consider 10 mm/yr as the average. That would give an average age of 450 years for a 4.5 m diameter tree. Then there is current data from trees planted on the Dundas Tableland that have a mean DBH growth of 15 mm/yr. Is it likely that RRGs grew at that rate pre-settlement? If so, giants of 4.5 m DBH would be only 300 years old. That seems to be too little.

We know that there is a great variation among individuals, even at the same site (e.g. see Photos 156-157). We also know that, for any given ancient tree, we have little idea of the conditions that it was exposed too in its early life – maybe it was one of many hundreds of seedlings in a small patch that competed intensely for water, light and nutrients and it was the sole survivor after many decades. What set-backs did it receive after that? Or was it favoured by a good position in the landscape and had no problems with competition, fire, drought, insects or disease?

Perhaps the age of our veteran RRGs will always be a mystery. Carbon-dating appears to be the only technique that can potentially give some certainty but perhaps the difficulty of obtaining wood samples from near the inner core that is not affected by decomposing organisms will remain a problem. Would sampling just outside the problematic core provide a better estimate of the age of that wood? One would need to add an estimate of age for the core, based on its diameter and assumed annual growth rate, in order to cover the entire life span of the tree,

Today perhaps all that we can reasonably suppose is that our giant RRGs are likely to be about 750 years old, but just maybe some gnarled old giants could have lived to a greater age, even as much as 1500 years.

Photographs of River Red Gums

The following pages are devoted to photographs of the many RRGs that have been measured, as well as many others that have distinctive, charismatic form or illustrate impacts of fire or manipulation by Aborigines and other colonisers of this land.

Photo 1 (right)
Bryan Swamp RRG1 on Outlet Creek, on the west side of the swamp.

RRG1 was 18.6 m tall and girth 8.83 m @ 1.3 m or 8.93 m @ 1.2 m above ground when measured by Rod Bird. Diane Luhrs is standing near the tree.

Comparing 2002 and 1962 data, diameter growth over 40 years = 2.84 – 2.60 = 0.24 m = 0.6 cm or 6 cm per year.

(GPS Aust84, 37-24.0/142-14-31.3)

[Photo Mar. 2002]

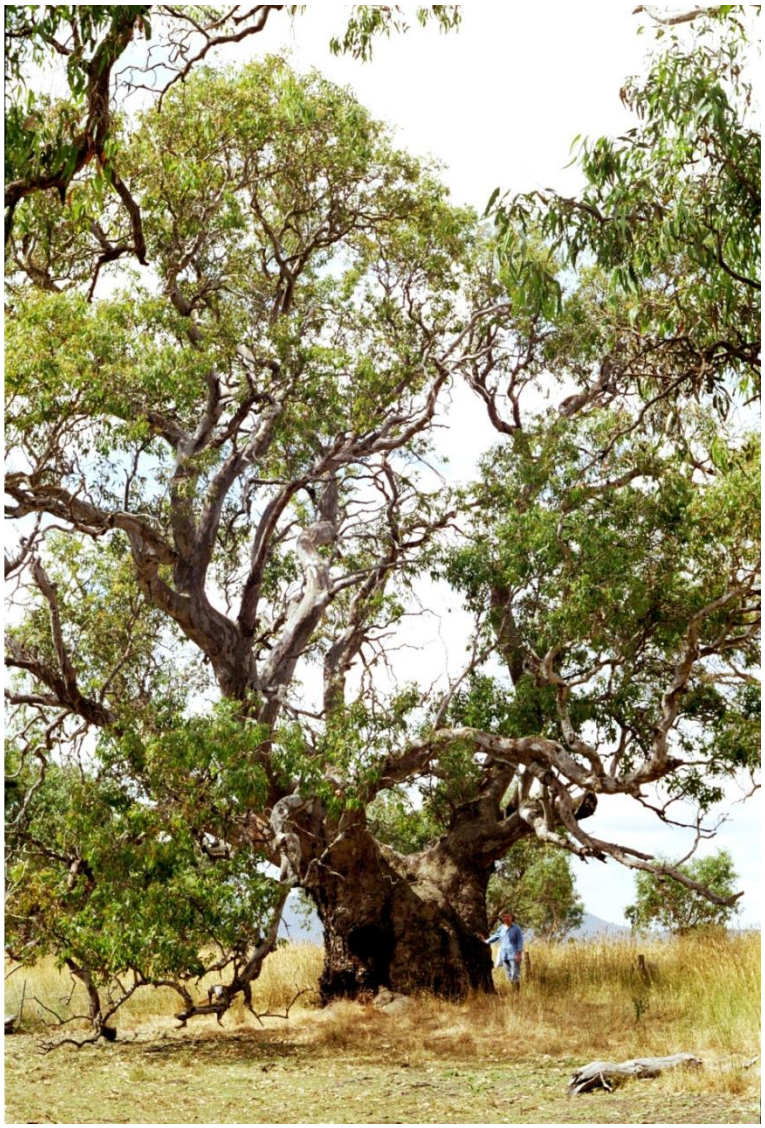


Photo 2 (below)
Bryan Swamp RRG1 at The Outlet, on the west side of the swamp.

Murray & Michael Gunn are standing by the tree.

RRG1 girth measured 26’ 10” (8.18 m) @ 4’ (1.2 m) above ground, diameter 2.60 m, on 25 Mar. 1962.

[Photo Mar. 1962 by Lionel Elmore]

Photo* 3 *(left)
Bryan Swamp RRG4 & 3 – another view of the two trees in **1962, with Michael Gunn.**

When measured by Rod Bird in March 2002, RRG3 was 28.8 m tall and girth 7.90 m (@ 1.2 m) or 7.70 m (@1.3 m). The diameter was 2.515 m (@ 1.2 m) or 2.45 m (@1.3 m).

The diameter growth was 2.515-2.35 = 16.5 cm in 40 years = 0.4 cm/year

[Photo Mar. 1962 by Lionel Elmore]

Photo 4 (below)
Bryan Swamp RRG4 & 3 on the west edge of the swamp, north of Outlet Ck.

Murray & Michael Gunn stand near the trees.

RRG3 girth was 24'7" (7.37 m) @ 4' (1.2 m) above ground, measured in Mar. 1962.

(GPS Aust84, 37-33-59/142-14-26)

[Photo Mar. 1962 by Lionel Elmore]

Photo 5 (right)
Bryan Swamp RRG4 & 3 on the NW edge of the swamp.

The bank appears to be carrying a dense growth of Austral Bracken. Lionel Elmore & Michael Gunn are near the trees. The swamp is dry.

[Photo Mar. 1962 by Murray Gunn]

Photo 6 (below)
Bryan Swamp RRG4 & 3 on the west edge of the swamp, north of Outlet Ck.

Looking towards the swamp. Note the growth of Blackwood since 1962 (most of these were burned in Nov. 2006) and the presence of Phalaris.

[Photo Mar. 2002]

Photo 7 (right)
Bryan Swamp RRG3 & 4 on west edge of the swamp, north of Outlet Ck.

Looking west, away from the swamp. Diane Luhrs is near the tree. Blackwoods stand behind.

RRG3 was 28.8 m tall with a girth 7.70 m @ 1.3 m above ground or 7.90 m @ 1.2 m above ground.

RRG4 was 28 m tall and girth 5.84 m @ 1.3 m above ground.

(GPS Aust84 37-33-58.9/142-14-25.5)

[Photo Mar. 2002]

Photo 8 (above)
Another view of Bryan Swamp RRG3 & 4 on the western edge of the swamp, north of Outlet Ck.
[Photo Mar. 2002]

Photo 9 (right)
Bryan Swamp RRG5, on the NW bank of the swamp, north of Outlet Ck, near the paddock.

RRG5 was 28.4 m tall with a girth of 7.3 m @ 1.3 m above ground. Diane Luhrs is standing by the tree.

(GPS Aust84,
37-33-32/142-14-28)

[Photo Mar. 2002]

Photo 10 (below)
Bryan Swamp RRG2 on west bank of the swamp, north of Outlet Ck.

RRG2 has a hollow butt and was 22 m tall, with a girth of 8.75 m @ 1.3 m above ground

(GPS Aust84,
37-34-04/142-14-26)

[Photo Mar. 2002]

Photo 11 (right)
Bryan Swamp RRG6 on NW bank of Bryan Swamp, north of Outlet Ck near a gate into a paddock.

RRG6 is solid and forked at about 4 m. It was 30.6 m tall with girth 6.55 m @ 1.3 m above ground.

(GPS Aust84, 37-33-28/142-14-31)

[Photo Mar. 2002]

Photo 12 (below)
Bryan Swamp RRG7 on NW bank, north of Outlet Ck near a fence, below a high bank.

RRG7 was 20.4 m tall and 6.43 m girth @ 1.3 m above ground.

(GPS Aust84, 37-33-22/142-14-46)

Photo 13 (above)
Bryan Swamp RRG7 viewed from the bank on NW side of the swamp, looking over the swamp to the Serra Range.

RRG7 was 20.4 m tall and 6.43 m girth @ 1.3 m above ground.

(GPS Aust84,
37-33-22 /142-14-46)

[Photo Mar. 2002]

Photo 14 (right)
Bryan Swamp RRG9, a younger, smooth-barked tree on NW bank of the swamp, north of Outlet Ck.

RRG9 was 30.0 m tall and 4.93 m girth @ 1.3 m above ground.

(GPS Aust84,
37-33-47 /142-14-24)

[Photo Nov. 2002]

Photo 15 (right)
Bryan Swamp RRG12, a medium sized tree on edge of the swamp, north of Outlet Ck.

RRG12 was 18.8 m tall with a girth of 3.22 m @ 1.3 m above ground.

HFNC group on excursion.

(GPS Aust84,
37-33-31/142-14-35)

[Photo Nov. 2002]

Photo 16 (below)
Bryan Swamp RRG7 with the swamp and Serra Range beyond.

The swamp had water at this time.

[Photo April 2002]

Photo 17 (right)
Bryan Swamp RRG13, a young tree on NW edge of the swamp, north of Outlet Ck.

RRG13 was 15.2 m tall with a girth of 1.05 m @ 1.3 m above ground.

(GPS Aust84,
37-33-40/142-14-30)

[Photo Nov. 2002]

Photo 18 (below)
Bryan Swamp and Serra Range.

[Photo Mar. 2002]

Photo 19 (right)
Bryan Swamp RRG14, a big old tree on the NW bank, north of Outlet Ck, on the bend of the swamp.

RRG14 was 26 m tall with a girth of 6.85 m @ 1.3 m above ground.

(GPS Aust84,
37-33-14 /142-15-02)

[Photo Nov. 2002]

Photo 20 (below)
Bryan Swamp RRG1 on the bank of Outlet Creek (as in Photo 1).

Note the Bulrush in the creek. The dead tree bears a scar from removal of bark for a shield.

[Photo Mar. 2002]

The tree fell in about 2015.

Photo 21 (right)
Bryan Swamp RRG16 on the NW bank, north of Outlet Ck.

This "canoe" tree was no longer standing when we visited in 2002 (a large log still remains at GPS Aust84, 37-33-37/142-14-30).

Based on a scaling of figures in Photo 4, Michael Gunn may have been 1.2 m tall and, using that value, the DBH of this tree would be 2.5 m.

[Photo Mar. 1962 by Murray Gunn]

Photo 22 (below)
Bryan Swamp RRG18, a large tree with burl, north of Outlet Ck on the west side of the swamp.

In Mar. 1962 the tree had a girth of 26'3" (8.0 m) @ 4' (1.2 m) above ground.

Michael Gunn stands at this tree, which was not standing in 2002. A large old trunk was found some 200 m north of Outlet creek, near the edge of the swamp. The tree appears to have toppled years ago.

[Photo Mar. 1962 by Lionel Elmore]

Photo 23 (above)
Bryan SwampRRG18 with burl, N of Outlet on W side of the Swamp
Presumably this was the tree in Photo 22 – the trees beyond have also gone.
(GPS Aust84 37-34-14/142-14-34) [Photo Jan. 2007 by Diane Luhrs]

Photo 24 (left)
Bryan Swamp RRG19, along the NW bank.

[Photo Aug. 1967 by Lionel Elmore]

We were unable to identify this tree in 2002 but located it in Jan. 2007 (see Photo 25).

Photo 25 (left)
Bryan Swamp RRG19 – Elmore's tree in Photo 24.

RRG19 was 30.2 m tall, with a girth of 6.4 m @ 1.3 m above ground on 25 Jan. 2007.

The area was burned by a wildfire on 30 Nov. 2006 started 1 km to the NW (Photo 40) from a site where sheep carcasses had been burned 8 weeks earlier.

Rod Bird stands near the tree.

(GPS Aust84,
37-33-29/142-14-29)

[Photo Jan. 2007 by Diane Luhrs]

Photo 26 (below)
Bryan Swamp and Serra Range

This tree could not be found in 2007.

[Photo Nov. 1961 by Lionel Elmore]

Photo 27 (below)
RRGs on an arm of Bryan Swamp
The scene is near the Ibis Rookery, near Outlet Creek. The Victoria Range can be glimpsed beyond. Murray Gunn and son Michael are in the foreground.[Photo by Lionel Elmore in Mar. 1962]

Photo 28 (below)
Bryan Swamp & Australian White Ibis fledglings on the rookery. This sparked interest in the area.
[Photo in Nov 1961 by Lionel Elmore]

Photo 29 (left)
Outlet Creek, off Bryan Swamp.

[Photo Mar. 2002]

Photo 30 (left)
RRGs and logs at Outlet Ck, off Bryan Swamp.

[Photo Mar. 2002]

Photo 31 (left)
Detail of log at Outlet Ck, off Bryan Swamp.

[Photo 2 Mar. 2002]

Photo 32 (left)
A natural graft on a RRG at Bryan Swamp.

[Photo Nov. 1961 by Lionel Elmore]

Photo 33 left)
Large RRGs near Bryan Swamp.

[Photo Mar. 1962 by Murray Gunn]

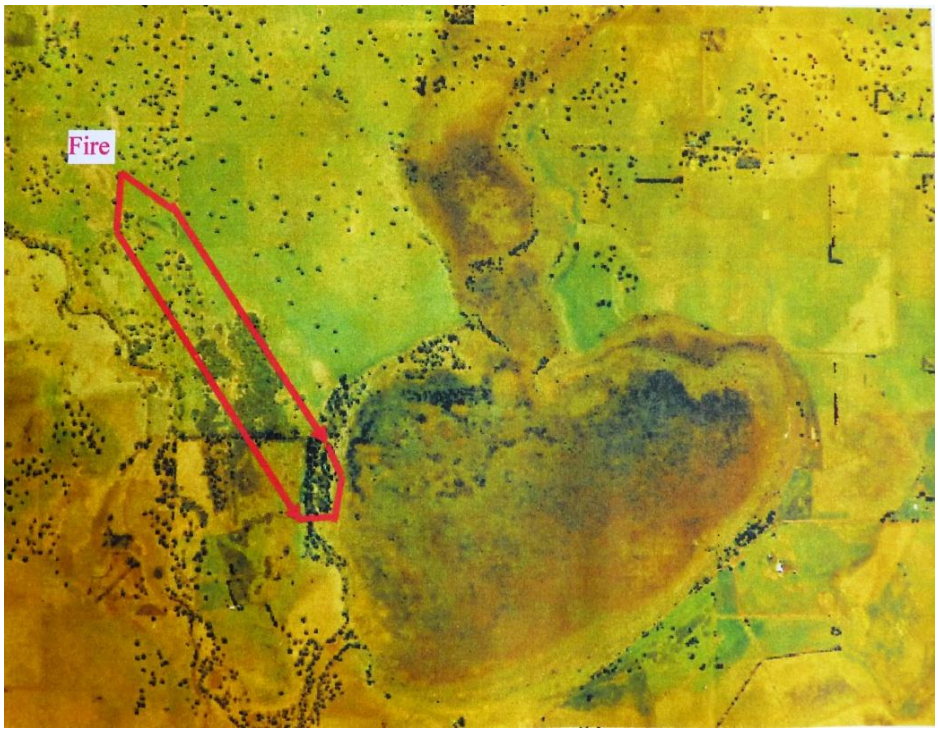


Photo 34 (left, below)
Fire of 30 Nov. 2006 near Bryan Swamp.
The source of the fire and area of land affected is shown in the aerial photo.

The fire entered the reserve on the west bank and burned ~ 102 mature RRGs, severely affecting about 30.
Of those, 7 burned down, about 25 were badly burned at the base and a few fell later.

Action by DSE prevented the affected RRGs on the reserve being bulldozed – the CFA bulldozed fire-affected trees on the farmland.

The fire burned a small area of swamp.

Photo 35 (below)
Aftermath of the fire of 30 Nov. 2006 at Bryan Swamp.
About a dozen large dead and living trees were destroyed in the 300-ha fire of 30 Nov. 2006 – started on farmland to the west where dead sheep were burned 8 weeks earlier. DSE made an effort to preserve these grand old trees (MacDonald & Evans 2007). The usual custom of DSE & CFA has been to bulldoze trees lit by fire.
The issue of needless loss of such biodiversity assets was pressed by HFNC earlier in 2005 and in 2006.
(GPS Aust84, 37-33-47/142-14-27) [Photo 25 Jan. 2007 by Diane Luhrs]

Photo 36 (below)
The Nov. 2006 fire threatened the peat in Bryan Swamp – graded breaks were made to contain the fire.
This was at the top of the burned area, below the trees shown in Photos 11 & 24. Further south, fire spotted onto the swamp near Outlet Ck, and breaks were bulldozed around that area on the swamp. These very wide graded lines, prepared after DSE negotiated with CFA to save the trees from the bulldozers, were scheduled to be rehabilitated in autumn 2007. [Photo 25 Jan. 2007 by Diane Luhrs]

Photo 37 (left)
Bryan Swamp RRG8 – Aborigine scar tree.
This tree is 100 m Nth from the "twins" shown in Photos 3-8. It had possibly 3 large "shields" removed from the trunk. This tree was badly burned at the base in the fire of 30 Nov. 2006, hollowing out the butt. It may collapse in the next severe storm. Blackwoods nearby were killed by the fire.

(GPS Aust84,
37-33-56/142-14-24)

[Photo 25 Jan. 2007 by Diane Luhrs]

Photo 38 (below)
Bryan Swamp survivor of the 2006 fire.
Apart from scorched lower canopy, this magnificent, mature tree survived relatively unscathed.

[Photo 25 Jan. 2007 by Diane Luhrs]

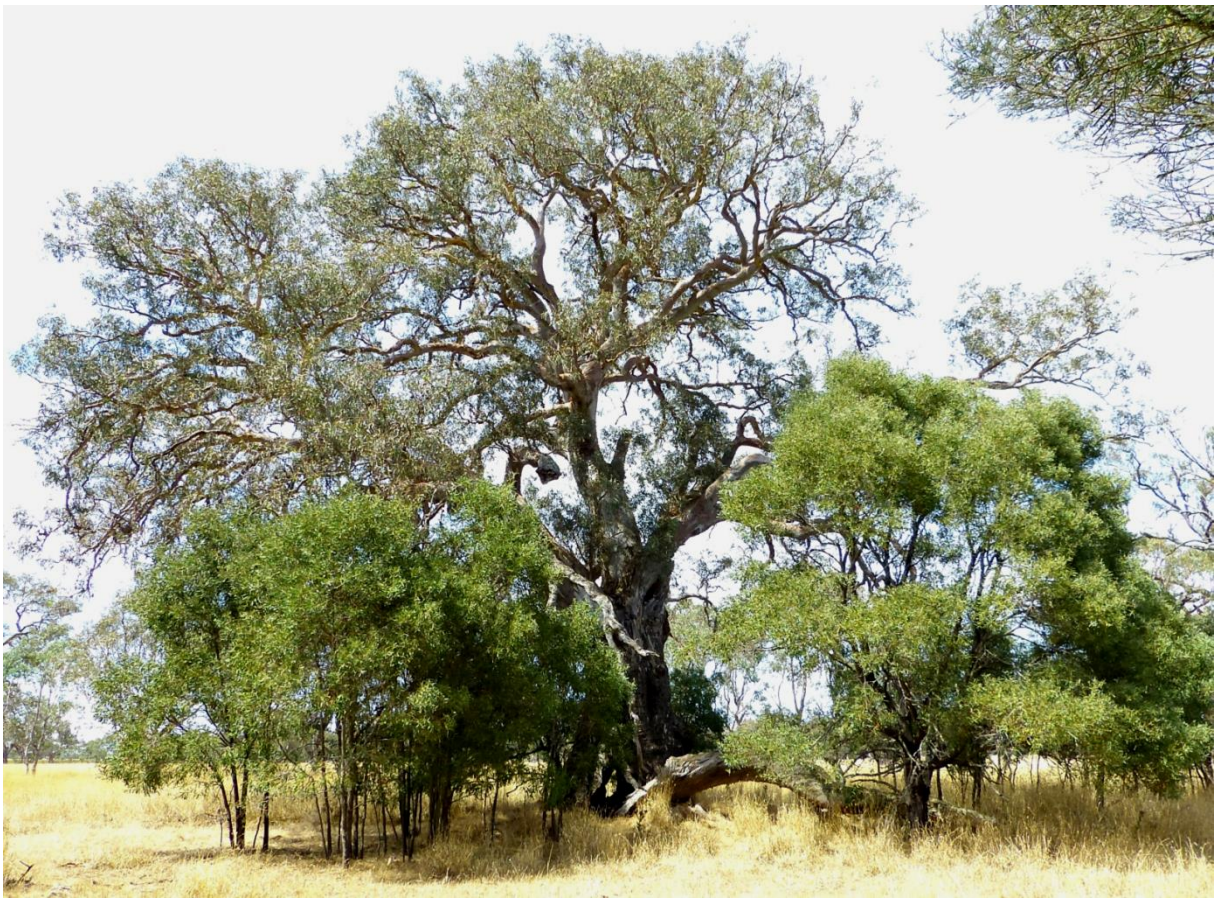


Photo 39 (above)
Bryan Swamp RRG2
(see also Photo 10 from 2002 and DBH data).

Girth now 9.2 m at@ 1.3 m on 05 Feb. 2022.

DBH growth in 20 years is 14.3 cm or an annual growth of 7.1 mm.

(GPS Aust84 37-34-03/142-14-25)

[Photo 05 Feb. 2022]

Photo 40 (left)
Bryan Swamp RRG20, Nth from Outlet Ck.

Girth 5.2 m @ 1.3.m on 05 Feb. 2022.

(GPS Aust84 37-34-04/142-14-28).

[Photo 05 Feb. 2022]

Photo 41 (above)
Bryan Swamp RRG21, Nth from Outlet Ck.
Girth 5.4 m @ 1.3.m on 05 Feb. 2022.

(GPS Aust84 37-34-04.4/142-14-28.5).

[Photo 05 Feb. 2022]

Photo 42 (right)
Bryan Swamp RRG22, Nth from Outlet Ck.

(GPS Aust84 37-34-04.4/142-14-28.5).

[Photo 05 Feb. 2022]

Photo 43 (left)
Bryan Swamp RRG23, a casualty of the 2006 fire.

(GPS Aust84 37-34-1.9/142-14-27.3).

[Photo 05 Feb. 2022]

Photo 44 (left)
Bryan Swamp RRG8, recovery from the 2006 fire.

See also Photo 37.

(GPS Aust84 37-33-56.4.4/142-14-23.4).

[Photo 05 Feb. 2022]

Photo 45 (right)
Dwyers Ck RRG1, Victoria Valley.

RRG1 was 40’ (12.19 m) in girth @ at 4’ (1.2 m) above ground when measured by Elmore in July 1962.

HFNC members stand on the N side of the tree. Dwyers Ck runs behind the tree. A smoke haze arose from a peat fire in Marneys Swamp behind the trees, a few km to the SW.

[Photo July 1962 by Lionel Elmore]

Photo 46 (left)
Dwyers Ck RRG1, ~500 m downstream from the bridge near the Mirranatwa-Dunkeld Rd and junction with Victoria Point Rd, Vic. Valley.

The tree measured 13.1 m girth @ at 4’ (1.2 m) above ground, and 12.7 m at 1.3 m above ground, on 16 Oct 2006. It was 28.5 m tall.

The tree had grown in diameter by an average of 6.6 mm/yr since 1962, consistent with values for two big, old trees measured at Bryan Swamp.

This tree has a large hollow at the base on the western side.

(GPS Aust84, 37-59-50/142-19-22)

[Photo Oct. 2006]

Photo 47 (left)
Dwyers Ck RRG1, ~500 m downstream from the bridge near the Mirranatwa-Dunkeld Rd and junction with Victoria Point Rd.

This tree has a large hollow at the base on the western side.

The tree is ~ 7 m to the east of Dwyers Creek. This creek is a steep-sided, eroded gutter at this point. It drains water from the Grampians higher in the Mirranatwa area through to Bryan Swamp.

(GPS Aust84, 37-59-50/142-19-22)

[Photo Oct 2006]

Photo 48 (right)
Dwyers Ck RRG1, ~500 m downstream from the bridge near the Mirranatwa-Dunkeld Rd and junction with Victoria Point Rd, Vic. Valley.

Scale is provided by the 15-cm diameter measuring tape case at the base of the tree.

The DBH is 404 cm and one might speculate, using 6 mm as an average annual growth rate, that the tree could be around 670 years old.

Roger Edwards, Forest Officer at Cavendish, has found that River Red Gums in a block at Woohlpooer (some are now possibly 110 years old) have grown at about 2.6 mm/yr over a 25-year period from 1977.

If that growth rate was the pattern for the trees at a younger age in the Victoria Valley then the Dwyers Ck tree may be nearer 1400 years old – an unlikely proposition.

(GPS Aust84, 37-59-50/142-19-22)

[Photo Oct. 2006]

Photo 49 (above) & Photo 50 (above, right)
Failed ring-barking of RRGs at Dwyers Ck, Victoria Valley
Trevor Thomas indicates one failed attempt (left) and found other trees that had survived. The bark had grown over the cut, leaving a slight trench. That can be seen in the photo above (right). [Photo Sept. 2019]

Photo 51 (above)
Rings on a cut surface of a River Red Gum log at Dwyers Ck
There appear to be about 100 rings but that may not indicate100 years, since rings may not form every year with this species. [Photo Sept. 2019]

Photo 52 (right)
Roger Edwards in Woohlpooer State Forest with RRGs in the unthinned 1-ha plot where DBH was monitored from 1977-2002.

The DBH range of the trees in 1977 was 20-70 cm; they had an average diameter growth of 2.6 mm/yr over the next 25 years. [Photo Oct. 2019].

Photo 53 (right)
Victoria Point Rd, RRG1 on the north side.

The tree was 25.6 m tall and had a girth of 7.9 m @ 1.3 m above ground.

(GPS Aust84, 37-30-08/142-18-53)

[Photo Nov. 2002]

Photo 54 (left)
Victoria Point Rd, RRG2 on the south side.

The tree was 34.4 m tall with a girth of 7.06 m @ 1.3 m above ground. John Cayley stands by the tree.

(GPS Aust84, 37-30-03/142-19-02)

[Photo Nov. 2002]

Photo 55 (right)
Gariwerd/Grampians National Park RRG1, Glenelg River Rd.

A mighty tree 51 m tall and with a girth of 7.07 m @ 1.3 m above ground when measured in 1998.

The first 17 m of trunk is unbranched and the bole appeared to be solid in 1998. That appearance proved to be incorrect when a fire in Jan. 2006 gained access to the butt and hollowed out the decayed wood there.

The tree is seen here almost a year after it was burned by a wildfire that, with back-burning added, burned 100,000 ha of the Grampians National Park and 50,000 ha of farmland. In contrast to many RRGs on farmland, large trees in the forest are often damaged at the base by fire. More care is needed to prevent this in prescribed burns and wildfire mop-ups.

Because of its size and the presence of Black Wattles and other shrubs and trees in the woodland it was not possible in 1998 to photograph the entire tree unobstructed.

[Photo Jan. 2007]

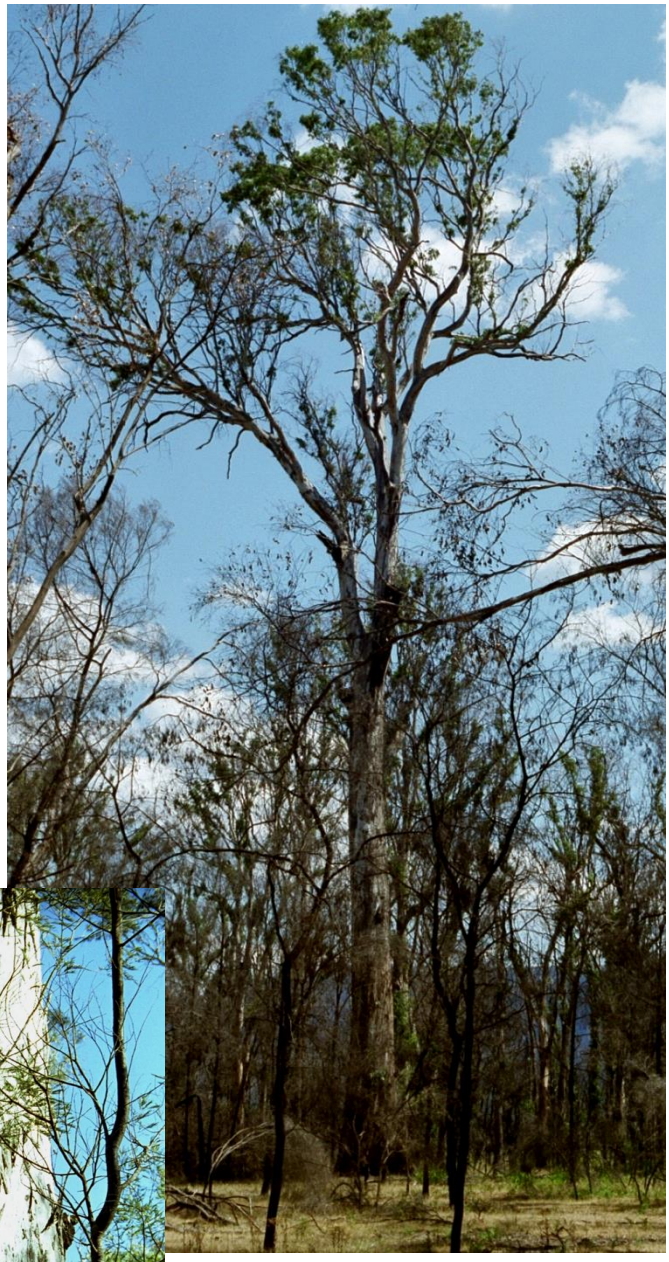


Photo 56 (left)
Gariwerd NP RRG1, Glenelg River Rd.

Photo showing the bole of this tree – Rod Bird and Diane Luhrs provide the scale.

Regrettably, the fire of Jan. 2006 burned out a cavity of about 1.7 m high and wide in the base, starting from the small scar indicated in the photo (base, right).

Four branches were also burned off high in the tree. The life of this magnificent giant has perhaps been much reduced.

By May 2008 the tree had regained a little of its former healthy canopy.

(GPS Aust84, 37-10-19.1/142-20-51.2)

[Photo May 1998]

Photo 57 (above)
Gariwerd NP RRG1, Glenelg R Rd.
Burned out bole from 2013 fire.
[Photo 28Sept. 2019]

Photo 58 (right)
Gariwerd NP RRG1, Glenelg R Rd.
The tree has lost its top and other branches in the 2013 fire. [Photo 28Sept. 2019]

Since 1998 (Photo 56) a cavity was opened by fire in 2006 and further extended by another fire in 2013.

These fires were a peril to the tree because wattles had grown at the base and there was an accumulation of litter there that resulted in the fire getting a hold on the decayed wood inside the bole. The result has been the burning out of most of the inside of the lower 6 m of the bole and the loss of much of the peripheral structural wood.

Sadly, this great tree may soon topple in a storm.

Photo 59 (above)
Gariwerd NP RRG1, Glenelg R Rd. The fire in 2013 further opened up the bole of the tree and it is unlikely to survive future storms. [Photo 28 Sept. 2019 with Trevor Thomas]

Photo 60 (above)
Gariwerd NP RRG2, Lodge Rd.
Girth 8.3 m @ 1.3 m & height 35.0 m in May 1998. This tree was badly burned in the fire of Jan. 2006, with half of the bole lost and only sparse foliage now.
(GPS Aust84, 37-10-21/142-20-55) [Photo Jan. 2008]

Photo61 (above)
Gariwerd NP RRG3, Lodge Rd.
Girth 7.25 m & height 36.6 m @ 1.3 m on 1 May 2008.
(GPS Aust84, 37-13-39/142-24-14) [Photo May 2008]

Photo 62 (above)
Gariwerd NP RRG4, Lodge Rd.
Girth 5.84 m & height 32.0 m on 1 May 2008.
(GPS Aust84, 37-13-22/142-24-10)
[Photo May 2008]

Photo 63 (above)
'Dulcian' RRG, Mooralla. Girth 7.48 m @ 1.3 m and height 27.8 m. Luckily, this giant was too large for the sleeper cutters in 1936, or Ian Luhrs' autologger in 1960.
[Photo Mar. 2001]

Photo 64 (left)
Mirranatwa RRG1 on 'Bowacka' (Andrew Beveridge).

Girth 9.87 m (at 1.3 m) & height 36.8 m on 10 May 2008.

This impressive giant has a massive bole with a great branch at ~5 m and fork at ~10 m.

The tree has a small defect (dead wood) near the base. Several huge branches have been dropped over the years.

(GPS Aust84, 37-23-59/142-22-57)

[Photo May 2008]

Photo 65 (right)
Mirranatwa RRG2 on 'Lambing Flat'
(Andrew Beveridge).

Girth 9.05 m (at 1.3 m) & height 31.5 m on 6 May 2008.

This magnificent RRG has a massive bole and a dense canopy spread over ~ 34 m. The tree is forked at 3.5 m.

The tree has no apparent defect in the bole and no sign of large branch drop over the years.

(GPS Aust84, 37-25-45/142-20-47)

[Photo May 2008]

Photo 66 (left)
Mirranatwa RRG3 on 'Bowacka' (Andrew Beveridge).

Girth 8.72 m (at 1.3 m) & height 27 m, 6 May 2008.

This picturesque RRG has dropped many branches. The bole appears to be solid and the first large branch is at ~8 m.

(GPS Aust84, 37-23-55/142-23-13)
[Photo May 2008]

Photo 67 (above)
Mirranatwa RRG4 on 'Beverlea' (Andrew Beveridge).

Girth 7.62 m (at 1.3 m) & height 36 m on 6 May 2008. The bole is sound and the first large branch is at ~8 m.

(GPS Aust84, 37-24-30/142-25-18)
[Photo May 2008]

Photo 68 (left)
Mirranatwa RRG5 near Vowels Creek, east of 'Lambing Flat'.

Girth 4.15 m (at 1.3 m) & height 36.5 m on 6 May 2008.

The bole of this superb, erect, 'middle-aged' RRG is sound and the first large branch is at ~17 m – a tree prized by any sawmill operator.

(GPS Aust84, 37-24-58/142-20-38)
[Photo May 2008]

Photo 69 (right)
Bilston Tree Brimboal RRG1
Glenmia Rd.

This tree was 36 m tall, with a girth of 7.7 m @ 1.3 m above ground, in May 1998. The first great branch is 11 m above ground.

The tree was said to be 7.26 m in girth and 44 m tall in 1987 (Lahey 1987). The height estimate may have been in error; there is no sign of a lost top.

The signboard at the site notes that the tree was 134 ft high (41 m) and contained 9100 SF of timber. That data may relate to estimates made in 1971. The 'super feet' estimate translates to 21.5 cubic metres of mill timber from the bole.

A core test showed in 1987 that the trunk was solid, unlike others that begin to rot out after about 400 years, possibly half the age of this tree.

The tag 'World Largest Red Gum' is a misnomer. Shirley Neylon (once from 'Glenmia') and Eddie Donehue (Wando Bridge) assert that the tree was preserved as the 'largest millable tree'. Forester Peter Musgrove reported in 1987 '*you might find a taller river red or one with a bigger girth, but there is none with such bulk as this'*.

In 1962, Dewar Goode (then from Koonongwootong) with Lance Phyear ('Pyramid Sawmills', Casterton), landholder T. Bilston and Forests Commission combined to conserve the tree in a 1-acre Forest Reserve. The land around now belongs to Eric Pettingil.

(GPS Aust84, 37-22-44/141-19-28)
[Photo Feb. 1998]

Photo 70 (right)
Brimboal SF RRG2

Girth 9.65 m @ 1.3 m above ground & height 26.4 m on 25 Jan. 2003.

This grand tree, a km south of the Bilston Tree in the Brimboal SF, probably escaped the sleeper cutters in the 1960s because of its poor form.

(GPS Aust84, 37-23-06/141-19-31)
[Photo Jan. 2008]

Photo 71 (left)
Casterton 'Glenbrae' RRG1 with Ross Clayton.

Girth 8.2 m (at 1.3 m) and height 29.7 m (22 m to the green top).

(GPS Aust84, 37-38-15/141-19-42).

[Photo Feb. 2011]

Photo 72 (right)
Casterton 'Glenbrae' RRG4 with Ross Clayton. Another enormous ancient RRG on the Kanawinka sand plain, still clinging to life.

Girth about 12 m (at 1.3 m), height 25 m. The bole is hollowed out, with a little more than half of the original 'circle' remaining.

(GPS Aust84, 37-38-15/141-20-26)

[Photo Feb. 2011]

***Photo 73* (*right*)**
Casterton 'Glenbrae' RRG3 with Ross Clayton.

Girth 7.12 m (at 1.3 m), height 36.1 m & clear bole to 12 m.

(GPS Aust84, 37-38-12/141-20-10)

[Photo Feb. 2011]

Photo 74 (below)
Casterton 'Glenbrae' RRG2 with Ross Clayton.

Girth 6.2 m (at 1.3 m), height 23.6 m & span 42 m.

(GPS Aust84, 37-38-12/141-19-53)

[Photo Feb. 2011]

Photo 75 (left)
Comaum Forest Reserve, SA (RRG remnant in a pine plantation, east of Penola-Edenhope Rd).

Girth 6.75 m (at 1.3 m) & height 32.4 m.

(GPS Aust84, 37-11-13/140-54-06)
[Photo June 2008]

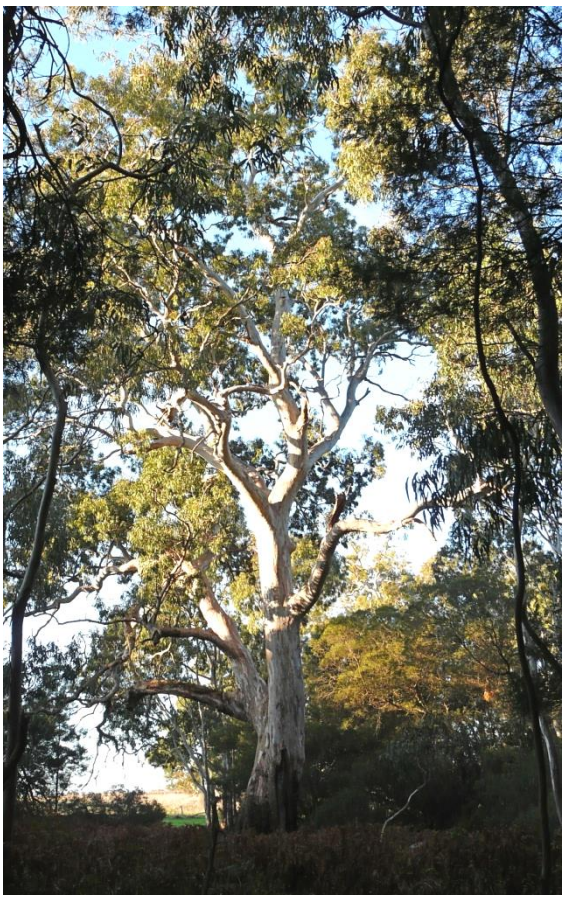


Photo 76 (above)
Comaum Forest Reserve, SA (remnant RRG block east from Nambour Rd).

Girth 5.75 m (at 1.3 m) & height 26.4 m.

(GPS Aust84, 37-12-51/140-56-25)

[Photo June 2008]

Photo 77 (left)
Comaum Forest Reserve, SA (small block adjacent to Woods & Forests compound near corner of Poolaijelo Rd/Penola Rd).

Girth 6.45 m (at 1.3 m) & height 26.4 m.

(GPS Aust84, 37-11-60/140-53-53)

[Photo June 2008]

Photo 78 (left)
Nangeela RRG1 at 'Lawford Park' (M. Moran).

Girth 9.2 m (at 1.3 m) & height 43.6 m on 7 May 2008. The bole appears to be solid.

This healthy tree is larger and more impressive than Bilston's Tree.

Basil, Pat & son Michael have cleared away large fallen branches to reduce any damage from wildfire. Michael & Pat provide the scale in this picture.

(GPS Aust84, 37-27-59/141-17-06)

[Photo on 7 May 2008]

Photo 79 (below)
Edenhope RRG1, N of Apsley Rd

Girth 4.57 m (at 1.3 m) & height 20.5 m on 12 Jan. 2008.

This magnificent tree with a canopy spread of 40 m provides a striking contrast to the Nangeela RRG.

(GPS Aust84, 36-59-08/141-14-18)

[Photo Jan. 2008]

Photo 80 (right)
RRG1, 'Big Red', 100 m west of Mullinger Swamp, Kybybolite, SA.

Girth 12.12 m at 1.3 m (DBH 3.86 m) & height 42 m.

Possibly our largest RRG and one of the oldest.

(GPS Aust84, 36-50-60/140-58-04) [Photo Jan. 2008]

Photo 81 (below, right)
RRG2, the 2nd largest tree at Mullinger Swamp.

Girth 9.7 m at 1.3 m (DBH 3.1 m) & height 42.2 m.

This tree appears to be solid at the base.

(GPS Aust84, 36-50-57/140-58-05) [Photo Jan. 2008]

Photo 82 (below, left)
RRG5, ~500 m west of Mullinger Swamp.

Girth 7.62 m (at 1.3 m), height 30.5 m.
(GPS Aust84, 36-51-05/140-57-43) [Photo Jan. 2008]

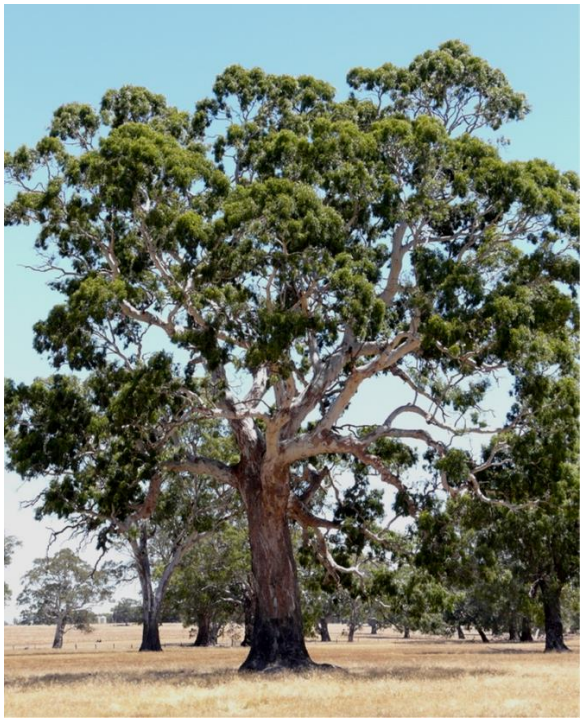


Photo 83 (below)
RRG3 on fence line, west bank of Mullinger Swamp.
Girth 9.4 m (at 1.3 m) & height 38.3 m. The tree has a dead patch on the north side of the bole.
(GPS Aust84, 36-51-03/140-58-05). [Photo Jan. 2008]

Photo 85 (above)
RRG10 by car park, west of Mullinger Swamp.
Girth 8.2 m (at 1.3 m), height 28.7 m. (GPS Aust84, 36-51-05/140-58-05). [Photo Jan. 2008]

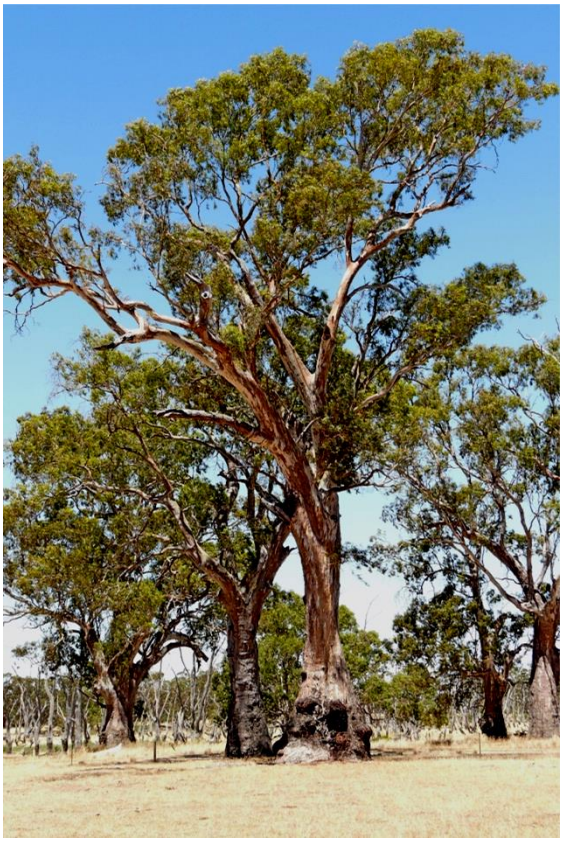


Photo 84 (above)
RRG4 with huge basal trunk 20 m west of Mullinger Swamp boundary.
Girth 11.5 m (at 1.3 m) & height 32.9 m. (GPS Aust84, 36-51-06/140-58-02). [Photo Jan. 2008]

Photo 86 (above)
RRG7 ~100 m west of Mullinger Swamp.
Girth 8.7 m (at 1.3 m) & height 32.9 m.
(GPS Aust84, 36-51-05/140-58-01)
[Photo Jan. 2008]

Photo 87 (above)
RRG6 ~400 m west of Mullinger Swamp.
Girth 8.64 m (at 1.3 m) & height 33.0 m.
(GPS Aust 84, 36-51-02/141-57-46)
[Photo Jan. 2008]

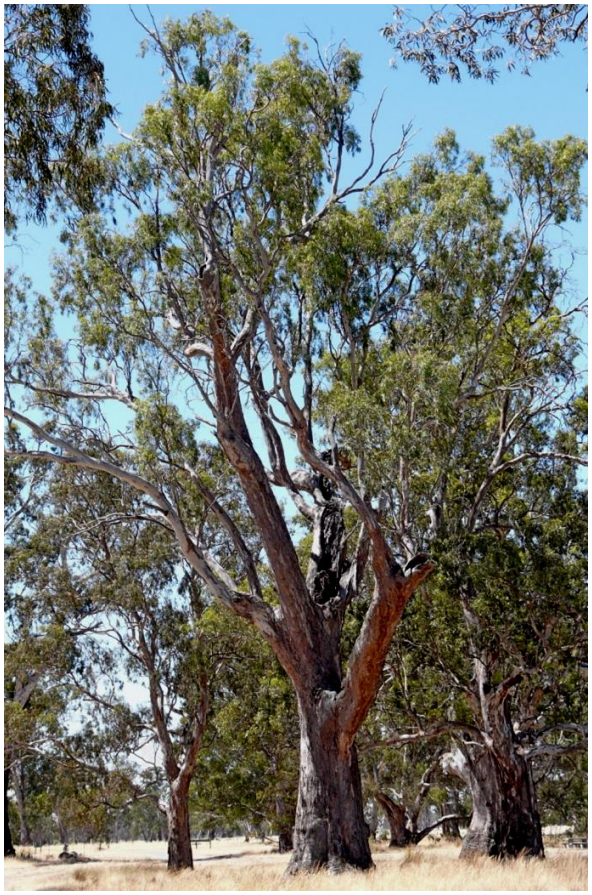


Photo 88 (above)
RRG9 on the west bank of Mullinger Swamp.
Girth 7.2 m (at 1.3 m) & height 29.9 m.
(GPS Aust84, 36-51-06/140-58-04). [Photo Jan. 2008]

Photo 89 (above)
RRG8 on the W bank of Mullinger Swamp. The bed of the 500-m-wide swamp stretches east. The lack of water in the swamp and standing dead trees are evidence of many dry years in recent times.
Girth 8.6 m (at 1.3 m) & height 30.0 m. (GPS Aust84, 36-51-10/140-58-00). [Photo Jan. 2008].

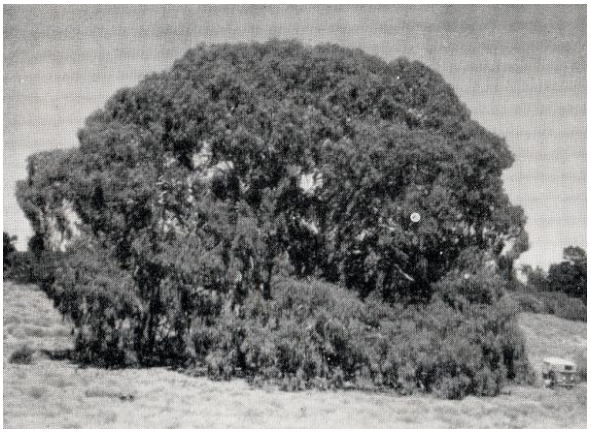


Photo 90 (above)
Old Be-al in Wyperfeld National Park in 1964.
Scaling from the LandRover in the photo, an estimate of height and width is 24 m x 35 m. Sadly, this mighty tree was damaged by fire in 1982.
[Photo by Jean Blackburn]

Photo 91 (above)
Old Be-al Look-alike RRG, Wyperfeld NP.
Girth 5.25 m (taken below the huge branches, at ~ 1.3 m from the original surface), height 18.6 m & span 41 m.
(GPS Aust84, 35-33-52/142-03-27)
[Photo Feb. 2011]

Photo 92 (above)
Old Be-al viewed from the north (compare Photo 90).
The fire of 1982 caused much damage. Span 36 m.
[Photo 28 Sept. 2021]

Photo93 (above)
Old Be-al viewed from the west side. Span 25 m.
[Photo 28 Sept. 2021]

Photo 94 (left)
Old Be-al viewed from the south.
The mass of foliage on the lower left contains 3 layered saplings.

The height of this RRG was 24 m and the girth at 1.3 m above ground was 6.15 m. on 26 Sept. 2021.

(GPS 35-32-05/142-02-01)

[Photo in Sept. 2021]

Photo 95 (above) **Lake Brambruk RRGs, Wyperfeld NP**
A foot of water remained after filling in 1975.
No water has reached the lake from Outlet Ck since 1975. The following dry periods and lack of flows from Outlet Ck has affected many of the trees. [Photo Sept. 1977].

Photos 96 & 97 (above)
Wirrengren RRG at Wirrengren Plain, Wyperfeld NP.
This healthy tree grows on the sandy fringe of an ancient lake bed. The lake has not received any water from Outlet Creek since 1945. The RRG had a DBH of 2.2 m (6.8 m girth), height of 26 m and span of 27 m. (GPS 35-20-33/141-52-19]. [Photo 28 Sept. 2021].

Photos 98 &99
Fyans Creek Tree, about 10 km Nth of Halls Gap, Victoria.

This magnificent tree on the Carlyle property, on the bank of Fyans Ck, had a DBH 4.38 m (girth 11.8 m) & height of 35 m on 23 Nov. 2021.

The tree is not particularly tall and does not carry a huge amount of wood above 8 m but it is probably one of the 5 largest RRGs in Australia.

The butt has been hollowed out but the tree is healthy despite an infestation of *Uraba lugens* (Gum Skeletonizer).

The tree has managed to exclude sapling regeneration within a radius of about 15 m from its trunk.

(GPS 37-04-25/142-36-05)

[Photo 23 Nov. 2021]

Photo 100 (above)
The Guildford Tree in Ballaraat St, Guildford, Victoria.

Girth 11.8 m (at 1.3 m) & height 32.5 m on 21 Apr 2011. Note – the large burl near the base has exaggerated the girth reading.

The girth above the burl, at 1.8 m, was 8.5 m.

Scaling from the photo, excluding the effect of the burl, the girth is about 9.5 m and the DBH about 3 m. That may be the appropriate measure to use when comparing the size of this magnificent tree with others.

(GPS Aust84, 37-09-01/144-09-43)

[Photo April 2011]

Photo 101 (above)
RRG5 at Thomson Swamp, Bordertown.
DBH of 4 m (girth 12.5 m). (GPS 36-20-20/140-41-34). [Photo Oct. 2019]

Photo 102 (above)
RRG2 at Thomson Swamp, Bordertown.
Girth 6.95 m and height 21 m. (GPS 36-20-17/140-41-39). [Photo 29 Oct. 2019]

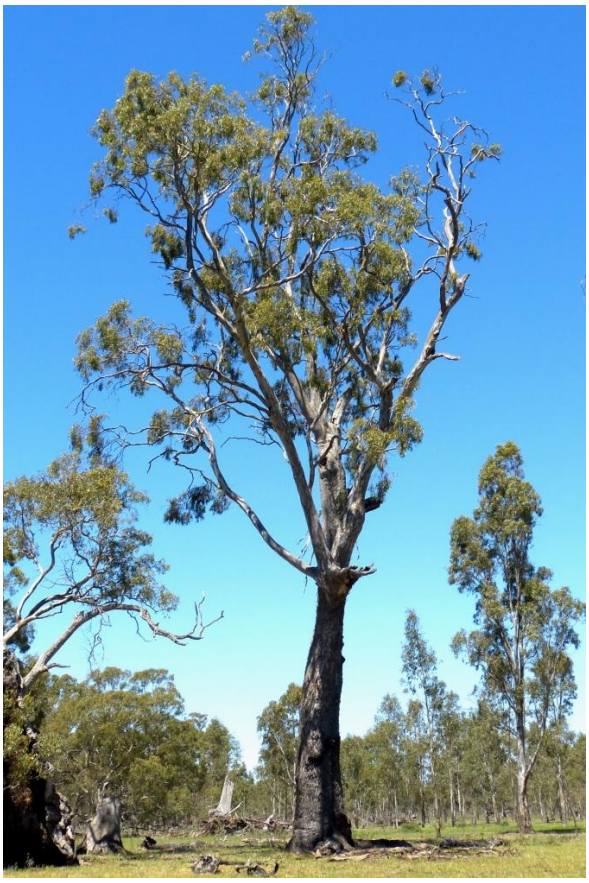


Photo 103 (above)
RRG6 at Thomson Swamp, Bordertown.
Girth 6.3 m and height 33 m. (GPS 36-20-20/140-41-40). [Photo 29 Oct. 2019]

Photo 104 (above)
RRG7 at Moot-yang-gunya Swamp, Bordertown.
Girth 7.8 m at 1.3 m and height about 34 m (T Thomas). [Photo 28 Oct. 2019]

Photo 105 (above, left)
King Tree at Wirrabara State Forest, SA.

A sign gave the height as 36.5 m, DBH as 3.0 m and age about 400 years. [Photo Jan. 2001]

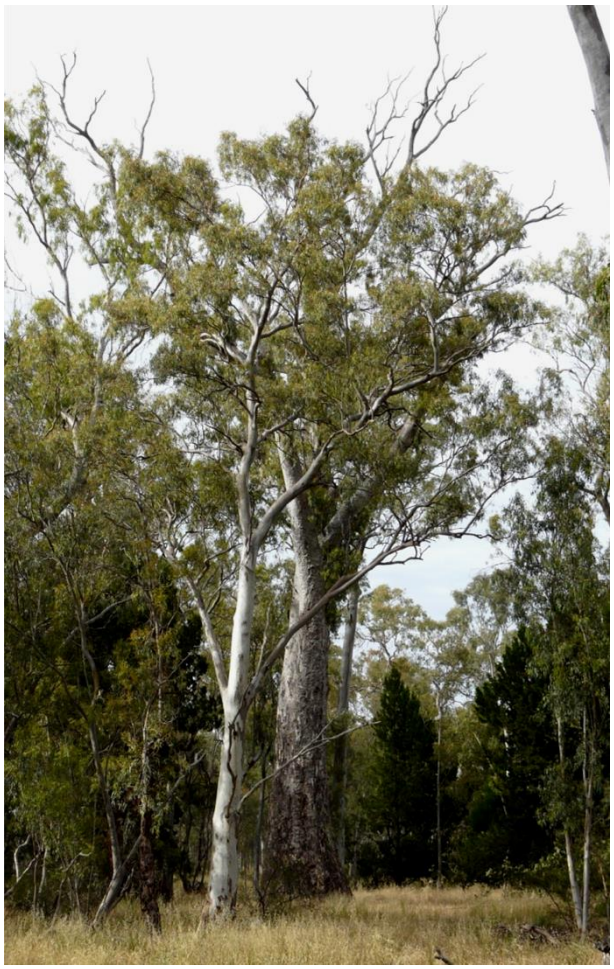


Photo 106 (above)
King Tree at Wirrabara Forest, SA.

The girth was 9.55 m (DBH 3.04 m) & height 37.0 m measured on 7 Dec 2009. The top branches were dead; the dry years had taken their toll.

[Photo Dec. 2009]

Photo 107 (left)
Ippinichie campground, Wirrabara Forest Park, SA.

A former giant RRG that may have been cut down in the 1940s.

The half-rim of stump has a diameter (at about 1 m height) of 4 m.

(GPS Aust84, 33-04-04/138-13-46)

[Photo Dec. 2009]

Photo 108 (right)
Orroroo Red Gum, Pekina Ck, SA.

This tree was 19 m tall with a girth of 9.9 m @ 1.3 m above ground, 22 Sept. 2008.

There has been dieback of terminal branches but the tree was otherwise healthy.

(GPS Aust84, 32-43-46/138-36-25)

[Photo Feb. 1998]

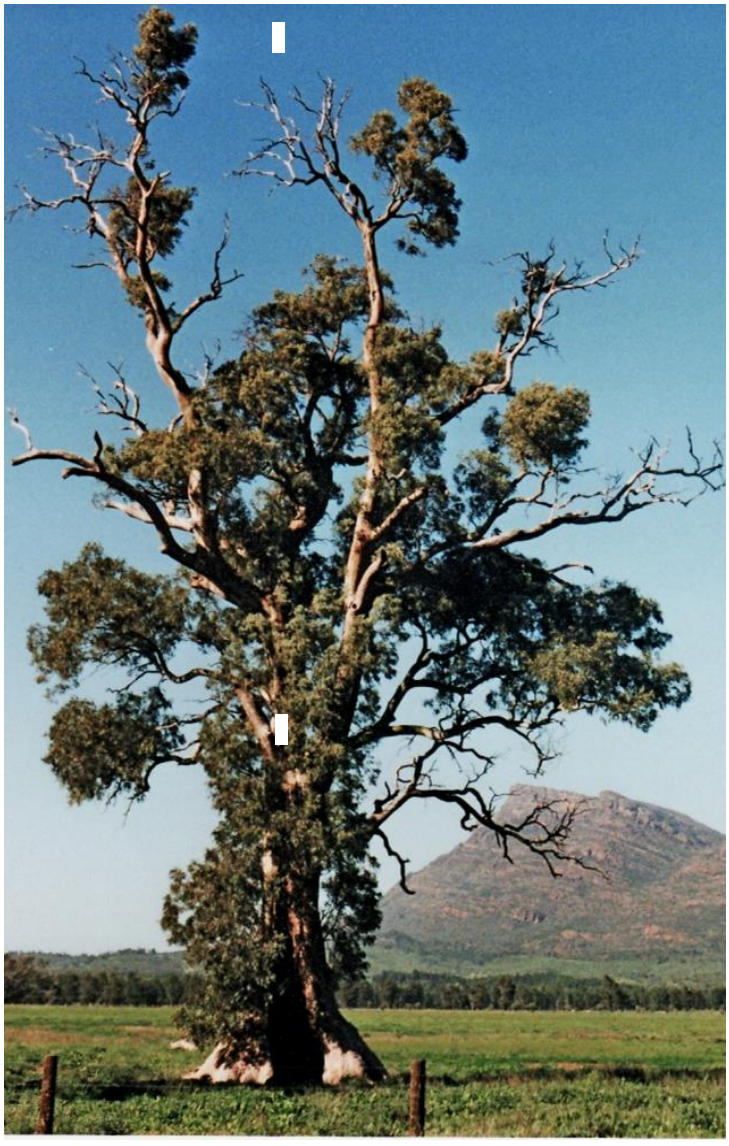


Photo 109 (left)
The Cazneaux Tree, Northern Flinders Ranges, SA.

The tree has a girth of about 5 m at 1.3 m above ground and height of about 18 m.

This tree is a relative giant in this arid environment and is probably sustained by access to groundwater.

[Photo Sept. 2001]

Photo 110 (above)
Charleston, South Australia, buttressed tree. Girth 15.5 m (at 1 m).
[Photo by Kym Knight, SASA]

Photo 111 (above)
Mt Remarkable, South Australia. Girth 14.45 m (at 1 m).
[Photo by Kym Knight, SASA]

Photo 112 (right)
Charleston Tree, Charleston-Torrens Rd, South Australia.

Girth 12.3 m (at 1 m) & height 41.3 m.

[Photo DSCN 0686 in Oct 2007 by Kym Knight, SASA]

Photo 113 (left)
Herbigs Tree, SA.

This curiously hollowed out tree was once the first shelter for a family establishing a farm in the area.

Girth 15.1 m (at 1.4 m).

[Photo by Kym Knight, SASA]

Photo 114 (above)
Tatiara Creek RRGs, Moot-yang-gunyah Swamp, Bordertown, SA.
The RRGs in this photo, taken in 1910, were identified by Trevor Thomas of Bordertown. The area flooded in 1906, producing RRG seedlings on the bank of Tatiara creek. Some of those small saplings can be seen in the photo (see also Photo 115 from 2022, below). [Photo by Les Peters, Adelaide]

Photo 115 (above)
Tatiara Creek RRGs, Moot-yang-gunyah Swamp, Bordertown, SA.
RRGs (right bank) that germinated after the 1906 flood on Tatiara Creek (see Photo 116 for DBH data). The tree (left) had a girth of 5.55 m at 1.3 m height in March 2022. The second tree from the right on the high bank is the one on the right in Photo 114. [Photo in 2022 by Trevor Thomas]

Photo 116 (above)
Tatiara Creek RRGs, Moot-yang-gunyah Swamp, Bordertown, SA.
RRGs that germinated after the 1906 flood on Tatiara Creek (looking downstream to where Photo 115 was taken). The girth of 9 RRGs were measured at 1.3 m height in Feb. 2022 by Trevor Thomas: 4.93, 3.1, 3.87, 1.22, 2.74, 4.77, 3.58, 6.3 & 4.42 m. The average annual increase in diameter over 116 years was 10.6 mm. [Photo by Trevor Thomas, Bordertown in March 2022]

Photo 117 (above)
Tatiara Creek RRGs, Moot-yang-gunyah Swamp, Bordertown, SA.
This photo shows the big, old tree on the high bank that may be seen in Photos 114 & 115.
The girth of this tree was 6.36 m in March 2022. This old-looking tree has the same girth as one that was considered to have germinated in 1906. [Photo by Trevor Thomas, Bordertown in March 2022]

Photo 118 (above)
Tatiara Creek RRGs, Moot-yang-gunyah Swamp, Bordertown, SA.
The girth of this tree was 4.42 m in March 2022. [Photo by Trevor Thomas, Bordertown in March 2022]

Photo 119(right)
An interesting River Red Gum on old Mt Sturgeon Station (Dunkeld Pastoral Company).

This great spreading tree has rooted at various points from branches resting on the ground.

This RRG is located on the sand-sheeted basalt plain ~3 km NW of Dunkeld, ~150 m N from the Cavendish Rd.

[Photo Oct. 1999]

Photo 120 (right)
Another view of the Mt Sturgeon Station River Red Gum.

[Photo Oct. 1999]

Photo 121 (right)
View of the Mt Sturgeon Station tree from the other side.

There are at least 2 rooting points visible in this photograph.

[Photo Oct. 1999]

Photo 122 (right)
A fantastic "cutting-grown" RRG off Gashs Lane, Balmoral, on the property of Mick Pern.

After falling the tree for sleepers in a wet winter in the 1950s, the head of the tree developed roots and began a new life.

The original stump can be seen on the edge of the water in the creek. The space between the stump and the prostrate trunk represents two sleeper lengths from the cut butt log.

[Photo Jan. 2005]

Photo 123 (right)
RRG on the property of Mick Pern, off Gashs Lane, Balmoral

Another view of the tree, showing the full length of the original head and the new branches.

[Photo Jan. 2005]

Photo 124 (right)
RRG on the property of Mick Pern, off Gashs Lane, Gringegalgona.

A closer view of the River Red Gum in the above photographs, showing the root development from the cut trunk that embedded itself in the earth when the tree was cut down.

[Photo Jan. 2005]

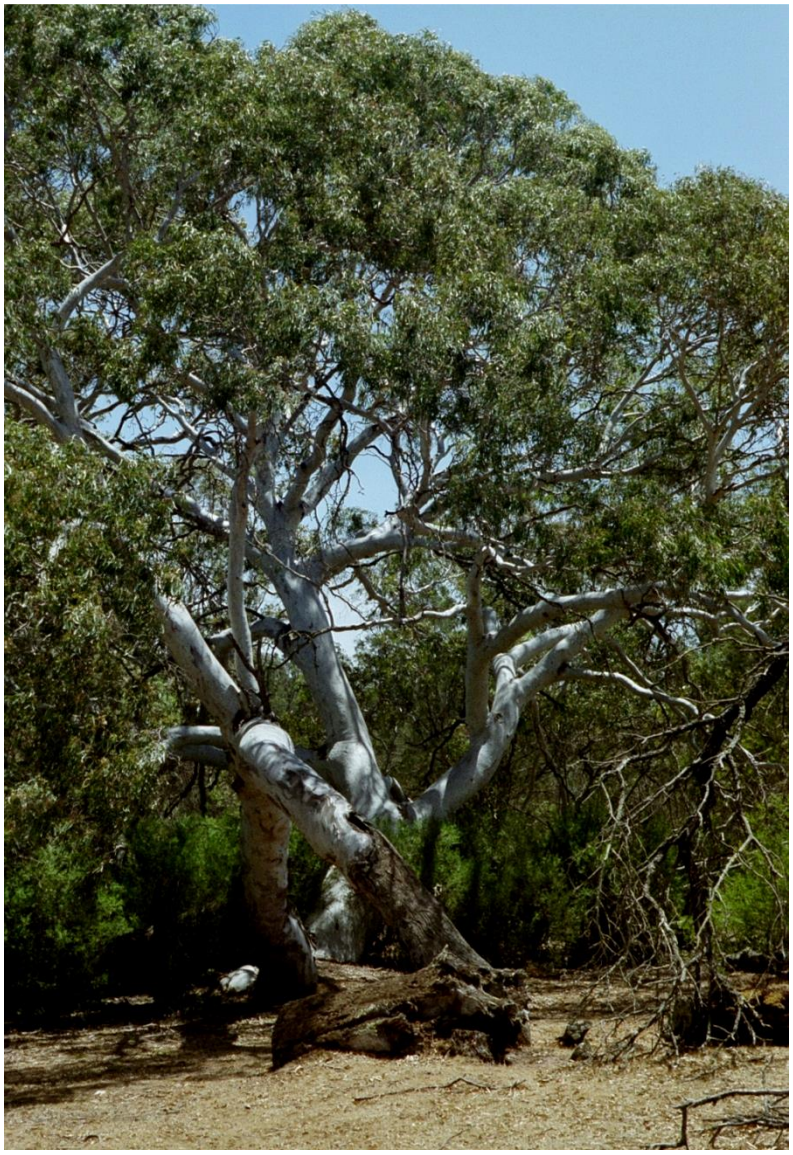


Photo 125 (above)
Layered River Red Gum near the Bilston Tree at Glenmia Rd, Brimboal.

This tree appears to have begun life a long time ago from the stem on the left, now dead. The tree has leaned over and touched the ground, right. It then grew new roots there, reversed the sap flow and sent up a large branch. The story so far can be seen in the picture above.

[Photo Jan. 2007]

Photo 126 (left)
River Red Gum at Brimboal.

The tree also grew another very vigorous trunk and 2 major branches to the right. That can be seen in the picture at left. It is a fascinating spectacle and a source of much wonder.

[Photo Jan. 2007]

Photo 127 (right)
RRGs at sunset by Lake Mournpoul, Hattah NP

[Photo Sept. 1976]

Photo 128 (right)
Lake Mournpoul – a dry lake fringed with saplings, but stressed RRGs on sandy banks

[Photo Oct. 2008]

Photo 129 (right)
Lake Hattah – fringed with young RRGs in the now water-filled lake. What is their fate?

[Photo Dec. 2010]

Photo 130 (above)
Shield tree at Lake Hattah.
[Photo Oct. 2008].

Photo 131 (above)
Shield tree, Bradys Swamp, N bank, Gariwerd NP.
(GPS Aust84, 37-35-11/142-27-00)
[Photo Apr. 2010]

Photo 132 (above)
Shield tree, Glenelg River, Youpayang Block, Dergholm State Park. (GPS Aust84, 37-20-22/141-13-44). [Photo Apr. 2010]

Photo 133 (above)
Shield tree, Kinchega National Park, NSW.
[Photo Aug. 1996]

Photo 134 (above)
Shield tree at Burke's Pool, Coopers Creek, SA.
[Photo June 2006]

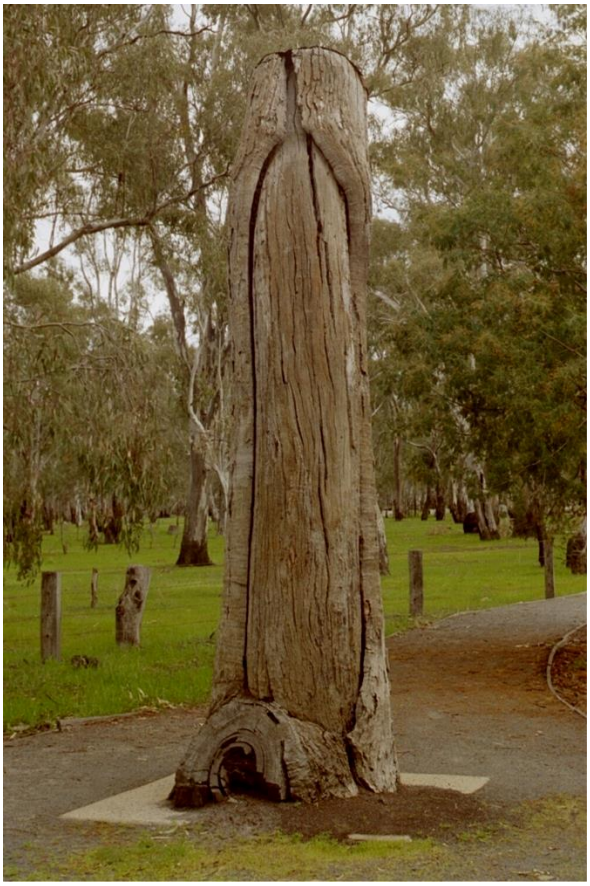


Photo 135 (above)
Canoe tree at Gunbower NP, Murray River.
This dead tree was removed from its original position along the river and set up near the Interpretive Centre.
[Photo Sept. 2005]

Photo 136 (above)
Old, dead canoe tree at Gunbower NP, Murray River.
[Photo Sept. 2005]

Photo 137 (right)
Canoe tree on the Fleurieu Peninsula, SA.
Unhappily, when seen again in Jan. 2009, the tree had recently been ring-barked by environmental vandals or racists.
[Photo Feb. 1994].

Photo 138 (above)
Picturesque RRGs on the Wannon River, at The Rapids Flora Reserve near Bulart.
In times long past, bark has been cut from the large tree to construct a small canoe. [Photo Sept. 2006].

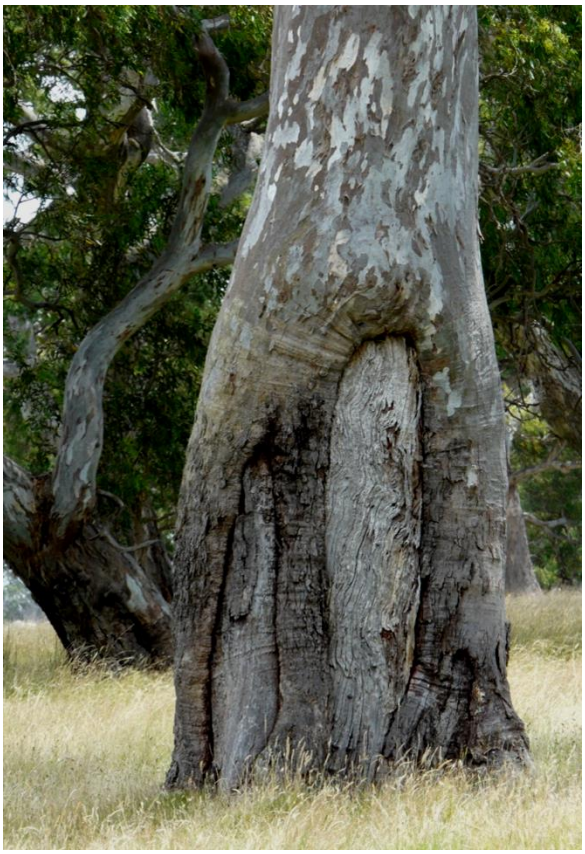


Photo 139 (above)
Shield tree in a paddock at Bochara, 10 km west of Hamilton, on Claytons Rd.
[Photo Jan. 2011]

Photo 140 (above)
Shield tree in a paddock at Dwyers Creek, Victoria Valley.
[Photo Sep. 2019]

Photo 141 (left)
RRGs high on the bank of the Murray River, Gol Gol.

RRGs along the river were once heavily exploited to fuel the paddle steamers and provide sleepers for railways and timber for bridges.

For growth in this arid environment the RRGs depend upon floods and groundwater. The best conditions pertain in the Barmah-Millewa forests that are periodically flooded.

[Photo March 2021]

Photo 142 (right)
RRGs on a farm at Nigretta, near Hamilton

Most of the trees left after the sleeper-cutting industry passed were those with short boles and major forks.

[Photo Oct. 2019]

Photo 143 (below)
Picturesque old RRG3 at Thomsons Waterhole, Bordertown.

Girth at 1.3 m over the rise was10 m.
(GPS 36-20-19/140-41-41)
[Photo Oct. 2019]

Photo 144 (right)
RRG1, another picturesque old tree at Thomsons Waterhole, Bordertown.

Girth at 0.6 m was 10 m or 7.4 m above the bulge.

(GPS 36-20-17/140-41-40)
[Photo Oct. 2019]

Photo 145 (left)
RRGs at Jimmies Waterhole, Bordertown.

[Photo Oct. 2019]

Photo 146 (left)
RRGs on Tatiara Ck at Poocher Swamp, Bordertown.

Pinkies Tree is in the mid background.

This area is known for its 'runaway holes', where streams disappear into limestone cavities.

[Photo 28 Oct. 2019]

Photo 147 (left)
Pinkies Tree at Poocher Swamp, Bordertown.

A family once made a home for a while in the hollowed out bole.

A welcoming smoking ceremony is being performed. The tree has cultural significance for Indigenous Australians.

[Photo 28 Oct. 2019]

Photo 148 (above)
Fairy Martins nests in the shelter of a spout on a RRG at Jimmies Waterhole.

Photo 149 (above, left)
Pinkies Tree at Poocher Swamp.

The RRG has almost reached the end of life – a possum guard has been fitted to the trunk to prevent browsing of new shoots.

[Photo 28 Oct. 2019]

Photo 150 (left)
RRG on Buckingham Rd, Mundulla, with a curious pattern of stem cankers.

A Grey Box (*E. microcarpa*) is adjacent.

Other RRGs are suffering from Mundulla Yellows. That condition may, perhaps, be caused by lime leaching from the road that has been surfaced with crushed limestone. An elevated soil pH may then affect the health of the trees.

[Photo 28 Oct. 2019]

Photo 151 (above)
Mature RRGs at Nature Glenelg Trust's Long Point reserve at Dunkeld. These grow on the basalt flow adjacent to the Wannon River and sandstone landscape of Gariwerd NP. The Dunkeld sawmill cut trees from this block (note a stump to the right of the central tree) but the 'poor form' of many saved them. The current tree spacing gives some indication as to the spacing pre-settlement. [Photo 10 Apr. 2022]

Photo 152 (above)
Picturesque RRGs at Nature Glenelg Trust's Long Point Restoration Reserve. The trees show characteristic branch-drop. The process provides hollows for wildlife in the trees and on the ground. The fallen branches can endanger the tree from fire if left too close to the trunk. [Photo 10 Apr. 2022]

Photo 153 (above)
Picturesque RRGs at Long Point. Will they be there in 100 years? Clearing and farm practice since settlement has, until now, mostly prevented replacements.

[Photo 10 Apr. 2022].

Photo 154 (left)
A RRG at Long Point with a huge base and 3 great 'buttress' roots.

There is a small hollow at the base of the bole.

Bill Weatherly contends that the colonial artist Eugene von Guerard may have sat beneath this tree in 1856 while he painted '*Mt Abrupt, The Grampians, Victoria*' (Art Gallery of NSW).

The girth of this tree was 9.5 m at 1.3 m above ground, and height 23.5m, on 12 Apr. 2022

(GPS 37-37-27/142-21-27)
[Photo 10 Apr. 2022].

***Photo 155* (*above*)**
RRGs planted in 1994 at Gashs Ln, Balmoral, on a property of M Pern (now owned by M & R Leeming).

The planting is on a dissected laterised Dundas Tableland valley mid-slope, on an area that had signs of salinity. The trees were planted 6 m apart in 2 rows 6 m apart, down-slope from blocks of *Allocasuarina verticillata* (Drooping Sheoak), *E. polyanthemos* (Red Box) and *Casuarina glauca* (Swamp Sheoak.

The belt of RRGs starts top left of the scene. (GPS 37-17-20/142-45-29). [Photo 10 Apr. 2022]

***Photos 156 & 157* (*above*)**
RRGs planted in 1994 at Gashs Ln, Balmoral.
Photo left – looking from the centre of the belt to the top.
Photo right – looking from the centre of the belt to the bottom. [Photo 10 April 2022]

The mean DBH of 60 trees in April 2022 was 41.2 cm (range 12-69 cm, SD 10.6 cm) and the average annual diameter growth over 28 years was 14.7 mm (SD 3.8 mm).

***Photo 158* (*above*)**
'Big Red' at Mullinger Swamp in 2022, visited by members of Hamilton Field Naturalists Club
Compare this scene with that in Photo 80, taken in 2008. This tree was then in a bare, grazed farm paddock but has since been fenced off and there has been a prolific regeneration of RRGs. It may be that this began following the wet summer of January 2011.

This magnificent tree now has a girth of 12.3 m at 1.3 m above ground; about 18 cm more than in 2008. That translates to a DBH of 391.5 cm, a gain of 57 mm in 14 years. The mean annual DBH growth is 4.07 mm. If we extrapolated that to a lifetime (3915 mm/4.1 mm) then this tree could be 950 years old! That is, of course, pure speculation because, apart from the effect of possible errors in measurement in this short period, we know little about its growth history. It is more likely to be 600-700 years old. Since 2008 the tree has suffered some dieback at the top but is otherwise healthy. [Photo 22 May 2022]

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