

Fire is the key to survival of Avenue Cassinia

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Background

Avenue Cassinia (*Cassinia tegulata*) is a nationally threatened species occurring in south-eastern Australia. The species has a limited range, in the South East region of South Australia to western Victoria. With a preference for interdunal wetland habitats, Avenue Cassinia has undergone significant reductions in both area of occupancy and population size as a direct result of extensive drainage and land clearance (Thompson and Haywood 2017). Other major threats to the species' long-term survival include climate change, population isolation (limiting recruitment and decreasing genetic diversity), herbivore pressure, environmental weeds, loss of Indigenous use of fire as a land management tool and overall lack of species knowledge.

Currently, Avenue Cassinia occurs mainly along roadsides with all populations in South Australia except one experiencing rapid decline and with no recruitment observed; two populations have become extinct since 2009 (Dickson 2016). A new population was created on private land by planting purpose-grown seedlings in 2010-2011. This *ex situ* population, of over 60 plants, remained in good condition to 2017; however, recruitment was also not observed at this site. While planting tubestock is one method to increase the total population of a species, the benefits of fire were also considered.

In 2017, Nature Glenelg Trust (NGT), finalised a Translocation Plan for Avenue Cassinia that outlined the steps which would be taken to bolster the number of extant populations by growing and planting tubestock. In May of that year, NGT undertook a small ecological burn at the *ex situ* private land population as part of the broader translocation program.

This work formed part of the Restoring Under-represented Ecological Communities project, which was supported by Natural Resources South East (DEW) and the Australian Government.

Species information

Avenue Cassinia is listed as Critically Endangered under the Commonwealth legislation, Endangered in South Australia and Threatened in Victoria. The species appears closely associated with seasonally inundated flats of *Melaleuca brevifolia*/*Gahnia filum* Shrubland and has a distribution in the upper South East of SA and western Victoria (near Edenhope) (Thompson and Haywood 2017).

Avenue Cassinia is a small to medium-sized shrub from the daisy (*Asteraceae*) family. It has an upright habit, grey-green to yellowish green, hairy, needle-like leaves, fissured brown bark and off-white to cream flowers at the end of branches (Figure 1). Flowers are honey-scented, but leaves and stems are odourless and not sticky (DEH 2006).

It is thought that the lack of recruitment and decline of certain populations may be a result of lack of appropriate disturbance. While germination trials by the South Australia Seed Conservation Centre provided variable results, anecdotal evidence suggests that Avenue Cassinia may be disturbance and/or fire responsive (Thompson and Haywood 2017). Little information on fire response, age to flowering and recruitment post-fire is available. A Translocation Plan was prepared for this species to address population declines through planting of tubestock and to trial mosaic burning (Thompson and Haywood 2017).



Figure 1. *Cassinia tegulata* in flower at Avenue (SA).
Photo: Bryan Haywood

Ecological burn site and method

The ecological burn took place on a private property called Bull Island west of Avenue, SA, where a new Avenue Cassinia population was created in 2010-2011. The initial works included fencing and planting 80 Avenue Cassinia seedlings, through the State Herbarium of South Australia's Millennium Seed Bank partnership with Kew Gardens, UK.

The total fenced area is 2,200 m² and the burn took place over 550 m². At the time of the burn vegetation on site was dominated by dense sedges and grasses including *Lepidosperma* sp., *Phalaris* sp., *Holcus* sp. and *Gahnia* sp. with a small number of mature Avenue Cassinia plants at the edge (Figure 2). This specific area was selected for the burn to facilitate germination of wind-blown seed and to simplify post-fire weed control amongst otherwise dense shoulder-height vegetation.



Figure 2. A. Pre-burn 15 May 2017. B. Post-burn 13 September 2017. Photos: Bryan Haywood

The burn was conducted on 15 May 2017 at 15:45 hours with a slight breeze from the south-east, during clear and cool weather conditions (Figure 3). The burn area did not have an existing fire break, so a reduced fuel zone was created by burning the north-western side first, taking into consideration wind direction. Strips were then lit across the treatment area, in a south-west to north-east direction, moving from west to east until the entire area was burnt. The burn area deliberately incorporated five mature *Cassinia tegulata* shrubs to investigate the species' fire response. The burn was completed and all flames extinguished within 65 minutes.

Results

The burn successfully opened up the dense grass/sedge habitat and allowed new seedlings and clusters of regeneration to be marked. The five mature plants were all scorched, with four of the five dead post-fire. More than 100 germinants (<4 cm) were observed four months post-fire. The following autumn, less than 12 months post-fire, flowering was observed in three new plants ranging from 10-40 cm in height (Figure 4). The bulk of new plants at this time were <40 cm and not flowering.

On 14 September 2018 the population count at this site had increased to 239 plants; 205 individuals were <50 cm and 34 individuals were >50 cm. Eight individuals were flowering at the time of survey; two were <50 cm and six were >50 cm.



Figure 3. Avenue Cassinia on fire at Bull Island, Avenue (SA). Photo: Bryan Haywood

Follow-up site management

The introduced grasses on site responded vigorously, as expected, to the fire in the following 6-12 months, and were controlled by spraying a grass selective herbicide. The cut and swab herbicide application was also used on the few Dog Rose (*Rosa rubiginosa*) present that were not affected by the burn.



Figure 4. Seedling *C. tegulata* in flower. Photo: Sam Rothe

Conclusion and recommendations

The season and intensity of the burn resulted in encouraging germination of Avenue Cassinia. Post-fire grass control was essential to the survivorship of the new recruits. The burn was completed with minimal resourcing – one 800 L fire unit and two fire crew personnel. Nature Glenelg Trust is in the planning stages to implement a larger burn at a roadside crown land population in the near future, with assistance from Department for Environment and Water (SA).

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References

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