**ROCKY HALL CEMETERY VEGETATION, 2023**

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# BACKGROUND

In 2001 I undertook a survey of rural cemeteries in the Shire for Bega Valley Shire Council, to look at their biodiversity value. It had been realised around that time among the scientific community that cemeteries can be significant sites for conservation of native plants, particularly grasses and herbs typically found in native grasslands or grassy woodlands. The reasons for this are twofold. Firstly, they have not been subjected to cultivation, fertiliser application or pasture improvement, all of which cause replacement of native plants with introduced pasture grasses and legumes. Also, the absence of regular grazing means that species which are particularly tasty to livestock have not been selectively grazed out over the years.

Secondly, cemeteries have generally been managed in such a way as to keep grass density down, either by mowing, burning or occasional crash grazing. As more research was done on managing native grasslands, it became apparent that at least on the more fertile soils in higher rainfall coastal and tablelands areas it is important to keep grass bulk controlled to some extent. Kangaroo grass *(Themeda triandra),* which tends to be the dominant native grass in ungrazed higher rainfall areas, accumulates a thatch of dead leaf material around the base of the plant which blankets the ground around each tussock and makes it hard for small herbs to survive. Native herbs rely on there being plenty of bare ground between the individual grass plants (the inter- tussock spaces). Grazing can achieve this, but also can result in the loss of some palatable species, so burning or slashing is preferable. Because cemeteries have generally been managed like this for many years, they can represent the last refuges of some native plants which have been largely eradicated from private property. Because these plants prefer the sort of habitat that has largely been cleared for agriculture or heavily modified by grazing (better soils, relatively flat, light tree cover) they are very unlikely to be found in National Parks and other reserves. Travelling Stock Reserves (which are often more lightly or intermittently grazed than farms), churchyards, showground reserves and road verges can provide other refuges, depending on their past management. I also surveyed most of these areas in Bega Valley Shire, and it appeared in 2001 that small rural cemeteries carried the best examples of native grassy vegetation, with the greatest number of native plant species and fewer weeds.

In recognition of the fact that there has been extensive clearing for farming of coastal grassy woodlands, such as those of the Bega Valley, and that remaining areas have been much modified and face a number of on-going threats (further clearing, overgrazing, weeds, tree dieback and general lack of management), such woodlands have been listed as Endangered Ecological Communities (EECs) under both NSW and Commonwealth legislation. The local EEC is called Lowland Grassy Woodland. Further up the coast there are also listings of similar communities, Illawarra Lowlands Grassy Woodland and Hunter Floodplain Red Gum Woodland. These are generally characterized by being on more fertile soils derived from alluvium or volcanic soil types (granite or basalt), having Forest Red Gum (*Eucalyptus tereticornis*) as one of the main trees, and having a dense and diverse groundcover of grasses and herbs, with not many shrub species.

A woodland is defined as a treed community in which the tree crowns do not overlap. One of the modifications to remaining areas of Lowland Grassy Woodland is that tree density has changed, either by clearing so that few or no trees remain, or by allowing a lot of tree regrowth to occur so they have become forest. The latter may have a detrimental effect on the groundcover species diversity by creating too much shade for some sun-loving grasses and herbs. Given the way treed remnants thicken up with young trees and shrubs such as Blackthorn (*Bursaria spinosa*) if unmanaged, it is very likely that it was Aboriginal burning practices which kept the Valley vegetation as woodland and allowed the plants and animals dependent on it to persist over thousands of years.

There are small populations of a few typically tableland trees scattered in the Bega, Yowrie and Towamba Valleys, such as the Snow Gum (*E. pauciflora*) in the Rocky Hall cemetery and nearby roadsides and Yellow Box (*Eucalyptus melliodora*) in the Candelo and Bemboka areas. This suggests that during the last ice age, some 10,000 years ago, when sea levels had fallen considerably and the coastline was much further east, the climate of the coastal valleys was more like that currently found on the tablelands. Many of the grassy woodland herbs also have closer affinities with tablelands vegetation than with the plant communities in the surrounding coastal forests.

Where the trees have been removed but the native grass and herb diversity is still high, the vegetation is said to be “secondary grassland”, that is a grassland created by human intervention. The rural cemeteries are often examples of secondary grassland. “Native pasture” refers to areas where the dominant grasses are native, usually kangaroo grass or weeping grass (*Microlaena stipoides*) in the Bega Valley, but there is a low diversity of native herbs due to past management. Much of the native grassy vegetation on private property in the district falls into this category.

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My surveys of the cemeteries consisted of wandering around and recording as many species as I could find several times in spring of 2000 and summer of 2001. A reasonably complete species list was been compiled from these visits, but a few may have been missed. Some native lilies and orchids which appear from underground tubers only at certain times of year may fail to appear at all in some years if conditions are too dry. Or they may appear, but only be identifiable for a very short period while flowering.

Other areas on private property in the Towamba Valley were subsequently surveyed by Paul McPherson (from Burragate) and Josh Dorrough (from Wyndham), both botanists. They found quite a few properties in the Rocky Hall area which still had good quality grassy woodland vegetation on them, presumably because farming activity in this area has been less intensive than in the lower parts of the Towamba and Bega valleys.

In 2000-01 I found Rocky Hall cemetery to be one of the best in the region, though relatively small. Weeds were in low abundance, and there was a fair diversity of native herbs amongst the kangaroo grass which dominated the site. Most native herbs were apparently present only in low numbers, though some such as *Pimelea glauca* were quite abundant.

The survey found 16 regionally significant species in Rocky Hall cemetery. In general they are significant because they are confined to grassy ecosystems of farming areas, and are therefore much depleted, and now uncommon within the Shire. Many of them have a restricted distribution even within the agricultural areas, being found only in the best quality remnants. Examples are:

* Snow gum (*Eucalyptus pauciflora*), a single sapling was present in 2000-01, now quite well grown and with some young plants coming up around it, this species is restricted to the drier and more westerly parts of the coastal valleys (Candelo, Rocky Hall and Yowrie areas), though common on the tablelands.
* Bulbine lily (*Bulbine glauca*) was found to be scattered, mostly in the area downhill from the gate. Unlike other cemeteries, not confined to a narrow unmown strip around the edges. This attractive yellow-flowered lily is almost entirely confined to ungrazed remnant vegetation, on roadsides and in most rural cemeteries.
* Yellow buttons (*Chrysocephalum apiculatum*) was found to be uncommon and mostly in the far lower corner of the cemetery. It is also present in several of the rural cemeteries and some other remnants, but generally uncommon in the region.
* Blue rice flower (*Pimelea glauca*), was scattered, sometimes thickly, in the lower half of the cemetery.. Very uncommon in the region; also in in a couple of spots round Candelo.
* Lespedeza (*Lespedeza juncea*), common on the far side of the cemetery, mostly in the lower half. Known from Bemboka, Wyndham and Candelo cemeteries; otherwise very uncommon.
* Creamy candles (*Stackhousia monogyna*) is not uncommon in grassy forests on the coast, but the Rocky Hall and Towamba cemeteries were the only sites found which carry the erect tablelands form of the plant, which is quite distinct from the more sprawling coastal form.
* Polygala (*Polygala japonica*) is uncommon in the region, and possibly declining (the few occurrences on my Brogo property have disappeared since the millenium drought). It was found in low numbers in Rocky Hall, Cobargo and Wyndham cemeteries.

As a cemetery with relatively low usage for burials, Rocky Hall continues to be managed reasonably sympathetically to its biodiversity values, in that only the area around the graves gets mown with any regularity. When checked in 2023 the remainder of the area appered not to have been mown for some time. However, as mentioned above, a complete lack of biomass reduction is not necessarily all that favorable for species diversity either.

Grassy remnants need active management, particularly weed control, to remain in the condition they were in 20 years ago. “Lock it up and leave it” simply does not work as a management strategy for this vegetation community. Experience with the cemeteries that have had fire as part of their management (albeit sporadically since 2000) has shown that it is probably the best way to maintain native species diversity and minimize weed invasion.

Rocky Hall cemetery was burnt at my instigation in 2000, and again in August 2014. This is too long an interval between fires for Kangaroo Grass, and it has not been burnt since, as the 2020 fire which did burn a lot of the Rocky Hall area did not reach the cemetery. An attempt to burn it in the 2023 spring was foiled by the dry conditions, getting only as far as slashing around the fences and the trees to protect them from the fire.

Obviously cemeteries do need to be mown, for the safety and convenience of its human users. However this could be limited for most of the year to the areas immediately around the graves, with the remainder being allowed to flower and set seed, as generally happens in Rocky Hall cemetery. It could then be burnt or mown once a year, after seed has been shed, to help maintain populations of native plants. This latter stage appears to have been omitted at Rocky Hall, with the result that native herb diversity may have decreased and weeds have increased. There would also need to be some targeted weed control work during the period when it was not being mown, to prevent weeds from also taking advantage of this period to produce seed.

Fauna also uses cemeteries to some extent and would also benefit from this type of management. Seed-eating birds such as finches certainly would, and the State-listed threatened species the Diamond Firetail has been recorded in the vicinity.

Smaller animals like reptiles and invertebrates (insects, spiders etc) would have more cover from predators and breed up to provide food for insectivorous or carnivorous birds.

Paul McPherson has undertaken monitoring of the vegetation condition in Rocky Hall cemetery, using a single 50 metre transect, along which he monitored the species present in six one by one metre plots at specific locations along the tape. This started in spring 2013 and was repeated in 2015, 2017 and 2019. I repeated his plots in August 2023.

Paul’s results showed the greatest species diversity in 2015 and 2017, suggesting that species diversity had increased after the 2014 burn. The number of species in each plot in 2013, at 13 years after the 2000 burn, was about half what it was in 2015 and 2017. In 2019 species number declined again at 5 years post-fire, and by 2023, with dry conditions and a dense thatch of dead grass which had built up in the 3 wet years from 2020 and then died off during the dry 2023 winter, species numbers declined to about the same as they had been in 2013.

Paul’s conclusions, like mine, were that regular burning would be beneficial for the vegetation condition and that a fire interval of 3-5 years would be optimal. I have actually found on my own property that annual burning of Kangaroo Grass grassland is generally not deleterious, and can result in an increase in native herbs that are adapted to frequent fire, such as the native legumes, native bluebells (*Wahlenbergia*) and the daisy Yellow Buttons which can resprout. However, some species do tend to disappear under such frequent burning, such as Bulbine Lily.

Paul also recommended exclusion of cattle, which do get into the cemetery from time to time, and control of rabbits, as well as weed control as needed (e.g. Blackberry, Fireweed).