

Management Plan for Wingham Bight Cemetery and surrounding Crown Lands to conserve the Pale Yellow Doubletail (*Diuris flavescens*)



Version 8, August 2019

1. Background

The Wingham Bight Cemetery provides habitat for a small population of the Pale Yellow Doubletail (*Diuris flavescens*), a ground orchid belonging to the Doubletail, or Donkey Orchid, group.

The Pale Yellow Doubletail is listed as Critically Endangered under both the NSW *Biodiversity Conservation Act 2016* and the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*. The orchid is currently only known from 951 plants and is endemic to the Wherrol Flat-Caffreys Flat-Killawarra-Wingham-Burrell Creek-Tinonee area.

The orchid was discovered at the Wingham Bight Cemetery in 1994, and was taxonomically described from this site (i.e. the cemetery is the 'type' location for this species). At this time the population was listed as being 50-150 plants, however during the most recent census in 2018, only 15 flowering plants were counted. This may indicate either a gradual decline in the population since its discovery, or it may reflect a seasonal fluctuation as 2018 was a dry year, which may have reduced flowering. It is also acknowledged that not all plants flower each year. As a result, based on previous annual counts and the application of a 70% flowering rate, a total of 73 plants are estimated to occur at the cemetery (see below for mapped locations), which represents around 8% of the total known population.

To ensure the needs of both the cemetery and the ongoing survival of this plant are met, this management plan has been developed to outline how the cemetery is to be managed. The management plan will also be used as the basis of a licence application to the NSW Department of Planning, Industry and Environment (DPIE) under Part 2 of the *Biodiversity Conservation Act* for works undertaken in the cemetery that have the potential to impact on this threatened plant species.



2. Property subject to the Management Plan

Property	Tenure	Zoning
Lot 1 DP 1155351	Private Land managed by MCC as Cemetery	RU4 - Primary Production Small Lots
Lot 7015 DP 1001487	Crown Land managed by MCC as Cemetery	RU4 - Primary Production Small Lots
Lot 269 DP 753202	Crown Land managed by MCC	E2 - Environmental Conservation
Lot 7001 DP 1001488	Crown Land managed by MCC	E2 - Environmental Conservation
Lot 7002 DP 1027058	Crown Land managed by MCC	E2 - Environmental Conservation
Lot 7003 DP 1027058	Crown Land managed by MCC	E2 - Environmental Conservation
Lot 7004 DP 1001486	Crown Land managed by DPIE - Lands	E2 - Environmental Conservation
Lot 7301 DP 1156555	Crown Land managed by MCC	E2 - Environmental Conservation



3. Management Issues and Threats

The Pale Yellow Doubletail is a small herb with two leaves to 17cm long, at the base of the plant. In spring the plant produces a 20cm flowering stem with up to six flowers. The mustard-yellow and brown flowers overlap vertically and are about 16 mm across. They have the typical yellow 'donkey ear' sepals bent back at the top, and narrow, darker sepals crossed below the flower forming the 'doubletail'. An upper sepal projects over the flower like a veranda and has two brown markings, while the lower tongue-like petal has a slight ridged fold down its centre.

The orchid grows on well-drained loam or heavy clay soils in and around remnants of grassy woodland, or sclerophyll forest, in which the groundcover is dominated by Kangaroo Grass (*Themeda australis*) and Blady Grass (*Imperata cylindrica*). Flowering typically occurs during September and October, though may commence in late August.

Diuris flavescens is not known to occur in any conservation reserves in New South Wales. There are a number of threats to the survival of the Pale Yellow Doubletail at the Wingham Bight Cemetery if not managed appropriately. They include in order of severity:

1. Invasion of exotic grasses

The orchid grows in areas of mown Kangaroo Grass. Parts of the site known to be previously occupied by the orchid are now dominated by Buffalo Grass (*Stenotaphrum secundatum*), Qld Blue Couch and Kikuyu. For this reason it is considered that the conversion of the dominant groundcover from Kangaroo Grass to exotic grass is a major threat to the orchid, due to the increased competition/denser growth habit of the exotic grasses.

2. Damage by new graves and shrinking habitat

The site is an active cemetery and each year a small number of new graves are established, thus gradually reducing the amount of available habitat for the orchid. The digging of the graves also has the potential to impact on the orchids through their direct removal and the disturbance and compaction of the soil caused by machinery, particularly during wet weather. Moist soil is more prone to compaction which can damage underground orchid tubers prone to crushing. Other associated impacts include topsoil importation, which can harbour additional weed seeds and soil pathogens, and the ongoing use of the existing grave soil stockpile.

3. Mowing during flowering/seeding and lack of recruitment

The mowing of the orchid in flower has the potential to significantly reduce the recruitment capability of the orchid, thus reducing the population over time. In earlier years, the orchid has been known to have been mown during this flowering period, thus removing the capacity for it to flower and set seed, and produce progeny (seedlings).

4. Rubbish dumping and inappropriate access to the reserve

Illegal rubbish dumping including garden plants has the potential to impact on the orchid's habitat. The garden plants are a source of weed invasion which out compete the orchid by changing its habitat preferences. The creation of informal tracks and illegal vehicular access to forested areas of the reserve can also impact on the orchid, as well as straying cattle from the neighbouring dairy farm.

5. Weed invasion

As well as the invasion of exotic grasses within the cemetery area, a number of environmental weeds including Lantana (*Lantana camara*) and Running Fishbone Fern (*Nephrolepis cordifolia*), also have the potential to impact on the orchid. These species were previously present within the forested areas of the reserve, but have since been removed through the delivery of an ongoing bush regeneration program.

6. Small population size

The low number of plants (15 in spring 2018) of the orchid found in the area is a threat to the long-term survival of the population as their small number makes them very vulnerable to any loss of individuals and makes the population susceptible to in-breeding and genetic decline resulting from a lack of genetic diversity.

7. Surrounding habitat unsuitable

During the last ten years, the Pale Yellow Doubletail has only been recorded from the mown area of the cemetery, however it was originally known to occur within the adjacent forest on Crown Land. The absence of these plants may be due to seasonal fluctuations or could be an indication that the previous weed invasion (now under control) in the surrounding forest was rendering the habitat less suitable for the orchids. The absence of the orchid in the forest could also be a result of successional changes affecting the forest (i.e. infrequent fire meaning the understorey is possibly too dense and shady); while other parts of the forest seem to have been burnt too frequently, resulting in a very dense understorey of Blady Grass (*Imperata cylindrica*) which seems to create too much shade and competition for the orchids.

8. Risk of genetic hybridisation

In any effort to pollinate the orchid and produce seed for artificial propagation there is a risk that the orchid could accidentally be hybridised with another yellow orchid on the site (e.g. the Tiger Orchid – *Diuris sulphurea*). No natural hybrids have been observed between these two species on the site, but artificial or natural cross-pollination could occur and cause a genetic risk to the orchid.

9. Unknown population status and dynamics

The botanists who discovered the orchid in 1993 (Dennis Sinclair and John Riley) stated that about 150 plants were known when it was first discovered. However, the official description of the species states that 50 plants were known. Population monitoring conducted over the years indicate that there are approximately 73 plants (based on previous counts and a 70% flowering rate). There is also evidence to suggest that the species responds to seasonal fluctuations and there is a strong correlation between the number of orchids flowering and the amount of rainfall.

10. Inappropriate fire regime

Both too frequent burning and too infrequent burning are a risk to the orchid, because fires alter the vegetation and its suitability for the orchid. Forest which is not burnt enough tends to become shrubby and shady and not suitable for the orchid. Forest which is burnt too frequently becomes thick at ground level with a tall dense sward of Blady Grass, which is also not favourable for the orchid.

11. Risk of intentional damage or collection

There is a risk that people may intentionally damage or remove the orchid if they are aware of their location.

12. Risk of damage caused by weed spraying around graves

Weeds and grass around the edges of the graves is sprayed to keep the appearance of the cemetery neat, and there is a risk that this work could kill the orchids if done whilst they are in active growth, or if residual herbicides are used.

4. Management Actions

Over the last nine years, since the original Management Plan was prepared in 2010 Council has implemented a number of the recommended management actions (see status update in Table 1) and allocated funding through its Environmental Levy to the implementation of an ongoing bush regeneration program in the adjoining forest areas.

Seed has also been collected and stored in the Millenium Seedbank Project at Mt Annan Botanic Gardens as insurance against extinction in the wild. Artificial propagation has also been successful and it is expected seedlings will be produced over the next few years for establishment at a number of additional sites.

The Bight Cemetery has also been identified as a priority management site for the Pale Ywllow Doubletail under DPIE's Saving Our Species Program. Through this program funding has been allocated over the last three years to the implementation of a number of management actions aimed at reducing the threats to this species. This has included an annual census count of individuals and the weeding of exotic vegetation to encourage the preferred habitat for this species.

Regular monitoring of species abundance, extent and condition on the site is also being conducted to determine population trends through time. The extent and severity of threats are also being monitored to assess the effectiveness of management actions.

Regular meetings between Council staff, DPIE's Saving our Species project officers and local experts are held to discuss the results of the monitoring program and to coordinate site management actions. Management actions will be adapted, added or removed over time in response to monitoring results, based on maximising the project's effectiveness.

Table 1: Management Actions

Threat	Responses/Actions	Responsibility	Priority/Timing	Status
1. Invasion of Exotic Grasses	1a. Monitor spread and invasion of exotic grasses (carefully map the extent and invasion front).	DPIE – SOS & MCC	High Priority Annual	Completed/Ongoing
	1b. Carefully hand-remove runners along the invasion front to slow its spread.	DPIE – SOS & MCC	High Priority Every 1-2 years	Completed/Ongoing
	1c. Trial the careful hand-application of Glyphosate® along the growth-front to slow its spread, outside the active growing/flowering/seeding season of the orchid and when grass growth is high in Nov-Dec.	DPIE – SOS & MCC	Moderate	Completed
2. Damage by New Graves & Shrinking Habitat	2a. Map the orchid and planned graves to determine if orchids are at threat of destruction by any pre-booked graves.	MCC	High Priority	Completed/Ongoing
	2b. Ensure any new un-booked grave sites do not harm, impact or encroach on any known locations of the orchid by referring to the map.	MCC	High Priority	Ongoing
	2c. Ensure contractors digging graves are aware of the location of the orchids and implement measures to minimise any impact during works including washing down any machinery before entering the site to remove soil and weed seeds and restricting/controlling machinery use during wet periods.	MCC	High Priority	Contractor protocol in development

Threat	Responses/Actions	Responsibility	Priority/Timing	Status
	2d. Investigate removal of the grave soil pile from the site and undertake only during the dormant period of the orchid (November to April) and only during dry weather.	MCC	Moderate Priority	To be reviewed
	2e. Mark orchids at threat from graves with sub-soil metal (stainless steel) rings enabling them to be located at any time of the year.	DPIE - SOS	High Priority	To be undertaken during the next census
	2f. Relocate orchids, which are to be destroyed by new pre-booked graves, to other areas within the cemetery reserve before graves are dug (refer to Translocation Guidelines).	DPIE- SOS or Botanic Gardens	High Priority As required	Not yet required
	2g. Mark an expanded area to be mown around the existing mown cemetery to expand the area of available habitat for the orchid.	MCC	Moderate Priority	Completed
	2h. Arrange for contractors to expand the mowing area.	MCC	Moderate Priority	No longer required as weed control has achieved intent
	2i. Establish expanded colonies at other locations (Burrell Creek and Tinonee) as a backup to this population.	DPIE - SOS	Moderate Priority	Ongoing
	2j. Establish ex situ population or seed bank in appropriate botanic gardens.	Botanic Gardens	Moderate Priority	Completed
	2k. Burn surrounding forest in segments with one segment burnt every 2 years.	MCC, DPIE – Lands & RFS	High Priority	Delayed

Threat	Responses/Actions	Responsibility	Priority/Timing	Status
3. Mowing during Flowering/Seeding & Lack of Recruitment	3a. Avoid mowing the orchid between September and November each year.	MCC	High Priority Annually	System in place
	3b. Hand mow around orchids when located in flower in early October.	DPIE - SOS	High Priority Annually	Ongoing during annual census
	3c. Monitor pollination success to determine if hand pollination is necessary.	DPIE - SOS as part of annual census	Moderate Priority Annually	Not required as natural pollination occurring
4. Rubbish Dumping & Inappropriate Access	4a. Close track on Wingham side of cemetery to stop illegal rubbish dumping.	MCC	Moderate Priority	Completed
	4b. Arrange for removal of existing rubbish from area where illegal rubbish dumping has occurred outside of the cemetery.	MCC	Moderate Priority	Completed
	4c. Bush regeneration work to rehabilitate area and remove weeds.	DPIE – SOS & MCC	Moderate Priority	Ongoing
	4d. Avoid any unnecessary machinery entering the cemetery reserve during the orchid's growing season (April to November).	MCC	Moderate Priority Annually	Ongoing
	4e. Engage with neighbouring landholders to reduce reserve encroachments e.g. rubbish dumping, illegal vehicular access, uncontrolled stock. (Do not mention the orchid.)	MCC & DPIE - Lands	Low Priority	To be undertaken in conjunction with the preparation of the Management Plan for Community Land

Threat	Responses/Actions	Responsibility	Priority/Timing	Status
	4f. Undertake weed spraying around the margins of graves during December-February only (when orchid is dormant and unlikely to be damaged by spray drift.)	MCC	Annually	Ongoing
5. Weed Invasion	5a. Undertake regular weed control within Crown Land surrounding Wingham Bight Cemetery to control Lantana and other environmental weeds.	DPIE - SOS & MCC	Moderate Priority	Ongoing
	5b. Establish a monitoring program (photo points and quadrats) to monitor the condition of the vegetation in the surrounding Crown Land, and to identify potential weed threats to the orchid's habitat.	DPIE - SOS & MCC	Low Priority Annual	Ongoing
6. Small Population Size	6a. Cease mowing during the flowering season to allow plants to flower, set seed and produce seedlings.	MCC	High Priority Annual	Ongoing
	6b. Investigate and trial methods for successful establishment of propagated progeny onto the site (i.e. early season growing seedlings vs late summer dormant 2 nd year tubers).	Botanic Gardens	Moderate Priority	Completed – seedlings established initially but did not survive (maybe due to extended dry weather)
	6c. Produce progeny via artificial propagation off-site (Mt Annan) and introduce progeny into the cemetery to increase the population size.	Botanic Gardens	High Priority	Completed

Threat	Responses/Actions	Responsibility	Priority/Timing	Status
	6d. Collect and store one seed pod per season per plant or whole population in long-term cryo-storage as insurance against loss of plants.	Botanic Gardens	High Priority Annual	Completed but not from this site
7. Surrounding Habitat Unsuitable	7a. Arrange for burning of surrounding forested Crown Lands over the next 8-10 years to stimulate flowering of orchids.	MCC, DPIE – Lands & RFS	Moderate Priority One block to be burnt every 2 years	Delayed
	7b. Follow-up fires with spring surveys to determine if the orchid exists in any of the surrounding forest, and plot locations if found.	DPIE - SOS & MCC	Moderate Priority Spring after each burn	Not yet required
	7c. Follow-up fires with weed control (within first 6 months of fire) to prevent re-invasion of Lantana.	DPIE - SOS & MCC	Moderate Priority After each burn	Not yet required
8. Risk of Genetic Hybridisation	8a. Pollination only to be undertaken by DPIE licensed personnel trained in the identification of both <i>Diuris flavescens</i> and <i>Diuris sulphurea</i> .	DPIE - SOS	High Priority Annual	No longer relevant as natural pollination occurring
	8b. Avoid artificial pollination if natural pollination is producing good levels of pollination and seed-set (> 60%).	DPIE - SOS	High Priority Annual	Completed
9. Unknown Population Status and Dynamics	9a. Conduct regular monitoring each spring (first few days of October) to determine the number of flowering plants of <i>Diuris flavescens</i> within the cemetery and in surrounding forest.	DPIE - SOS & MCC	High Priority Annual	Ongoing

Threat	Responses/Actions	Responsibility	Priority/Timing	Status
	9b. Conduct regular annual (or every 2 years) surveys to determine the % of flowers which are pollinated by insects and producing seed pods, to determine and monitor the success rate of natural pollinators.	DPIE - SOS & MCC	Moderate Priority Annual or every 2 years	Incomplete
10. Risk of intentional damage or collection	11a. Do not widely circulate information about the orchid in this location, conspicuously mark plants or signpost their presence.	ALL	High Priority	Ongoing
	11b. Keep location of orchid secure – only those that need to know.	ALL	High Priority	Ongoing