VEG NORTH

Bushland Rehabilitation

Darwin International Airport
Rapid Creek Reserve

Weed Management
2019

CONTENTS

Cover photo: Flowering *Nymphaea violacea* in a drainage line which used to be heavily infested with weeds; following strategic weed management the drainage line is now gradually being colonised by native wetland species (see reference on page 4)

INTRODUCTION

The Rapid Creek Reserve is a 17.7 hectare parcel of land located on the north-eastern boundary of Darwin International Airport (DIA) and immediately south of Rapid Creek and its associated wetlands. The reserve encompasses the Gurambai Trail and is highly valued by the Darwin community. The area is outlined in Figure 1. The reserve is managed separately to the remainder of DIA's land which is covered by the *Darwin International Airport Weed Management Plan* (Little Falcon Consulting 2018b).

In the three decades since privatisation DIA has undertaken land management activities in the reserve to address weed issues. Weed management is undertaken in line with the *Rapid Creek Management Plan* and in particular its strategy to 'Implement a weed control programme for gradual removal of all weed species from remnant vegetation, based on regeneration/revegetation techniques' (Clouston 1994). Strategic weed management and targeted revegetation has led to the level of weed infestations being drastically reduced in the reserve. As careful weed management continues further areas are being gradually rehabilitated with regenerating native vegetation.

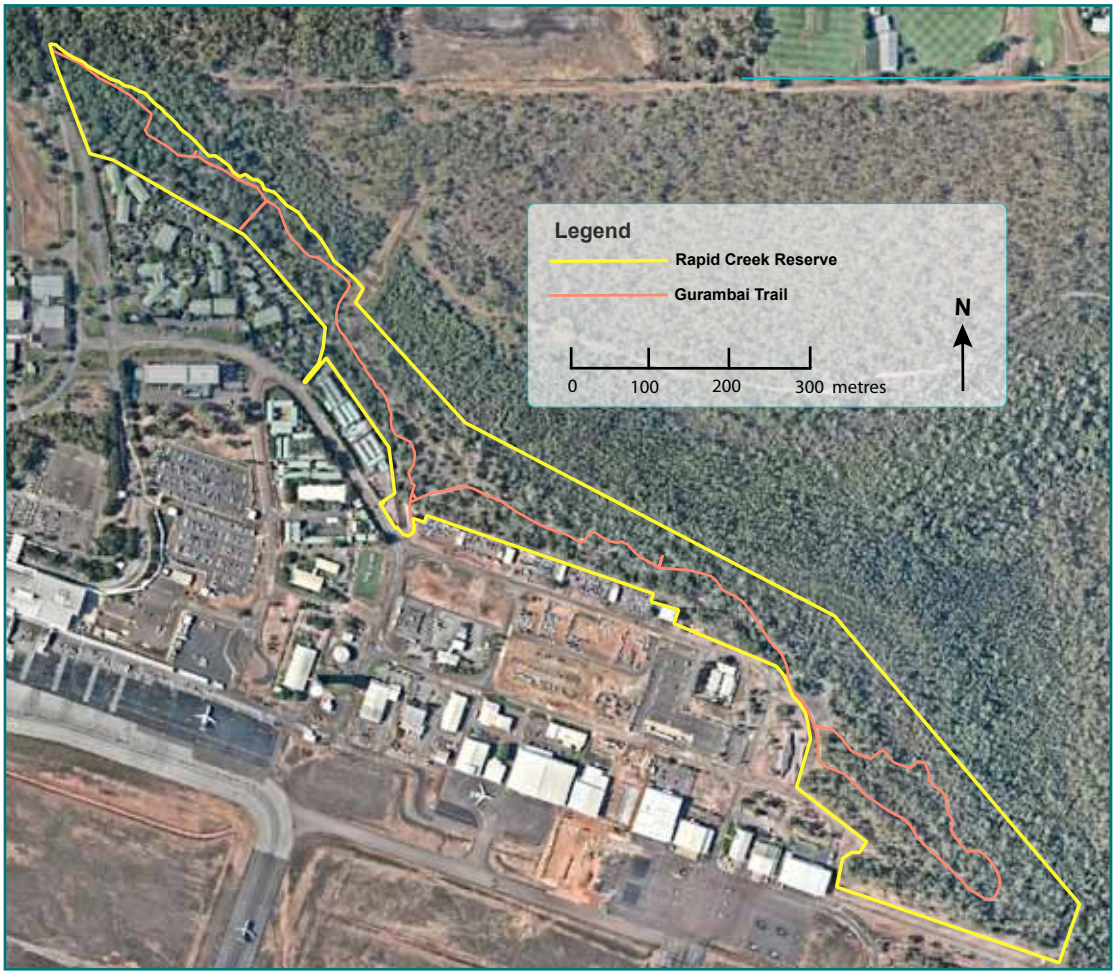

Figure 1: Image showing Rapid Creek Reserve

WEED MANAGEMENT

Land management within the Rapid Creek Reserve has aimed to control all weed species with a priority focus on declared species. Eradication of all weeds is being aimed for over time. An over arching aim is to reinstate native vegetation using the mapped remnant vegetation communities as a guide (see Figure 2).

In relation to the reserve Wildman Land Management (2008) states 'weed infestation in most areas has decreased from extensive dense stands of High and Low Priority weeds to manageable patches of medium to low density infestations'. The situation has improved even further with Little Falcon Consulting (2018a) recording very minimal outbreaks of weeds in relation to fire management.

Monitoring

Being in an urban area and adjacent to an operating international airport, there will always be the risk of new weed incursions brought in by wind, water, animals, vehicles, machinery and people. Ongoing monitoring is carried out to identify new outbreaks and control them, and if possible control the source of infestation. Monitoring of most areas is conducted by foot survey three times a year, whenever possible in conjunction with other activities. Areas of known infestations are monitored more frequently. Wetland areas that become inundated are surveyed by foot once a year in the late dry season when water has receded. This ongoing monitoring informs the weed management required each year.

Management

The management approach has been to reduce the seed bank by attempting to not allow weeds to set seed. Understanding weed species' life cycles is crucial to successful management. If plants are not allowed to reproduce eradication becomes more feasible. For some species this can lead to eradication within a couple of years, for others the seed bank can remain viable for many more years and ongoing surveillance is crucial.

Weed management is predominantly carried out with herbicide using foliar spraying and cut stump methodologies. Current herbicides utilised are: glyphosate; 2,4-D; dicamba; triclopyr and picloram; and metsulfuron methyl. All work is carried out in accordance with the product labels, the *Northern Territory Weed Management Handbook* (Department of Environment and Natural Resources 2018) and the *Agricultural and Veterinary Chemicals (Control of Use) Act* and *Regulations*. Equipment utilised for herbicide application includes: 500 litre slip-on spray unit with 100 metre remote controlled hose reel and petrol engine; 100 litre 12 volt spray unit; and 15 litre backpack sprayers.

Mowed areas in the reserve consist of native and non-native species of grass. These areas function as firebreaks and/or recreational areas. Slashing activities are carried out regularly, using a ride-on mower and brushcutters, to ensure non-native species do not produce mature seed that could spread into neighbouring native vegetation.

Some hand pulling of weeds is also conducted. This includes weeding around newly planted seedlings that may be susceptible to herbicide damage. It also includes weeding very isolated outbreaks of some species.

Vegetation communities

Woodland areas in the upper reserve which are dominated by eucalyptus communities have been managed to a point where weeds are now only sparsely occurring. Little Falcon Consulting (2018a) notes 'This site is comprised of healthy plant communities with very low levels of established introduced plants in comparison to elsewhere across the DIA site'. *Stylosanthes viscosa* (sticky stylo) is the most common weed in the woodland area now, it is gradually being reduced. There are very occasional outbreaks of *Cenchrus pedicellatus* (annual mission grass), *Cenchrus polystachios* (mission grass) and *Andropogon* gayanus (gamba grass) that need close monitoring.

The monsoon forest in the riparian areas of the lower reserve is also relatively weed free. The woody weed *Caryota mitis* (fishtail palm) has been the most prevalent weed and it is almost under control now. This important riparian vegetation is particularly at risk from uncontrolled fires from the north. Little Falcon Consulting (2018a) states '... it is important to note that this site is adjacent (lies to the south) of an area (located on Defence Department land north of Rapid Creek) that is affected by very high density introduced grasses that is regularly used by "campers" and as such remains a high risk area for unplanned fires. Currently this area is not being managed effectively and remains a risk for providing the entry point for high intensity unplanned fire.'

The transitional vegetation communities between the drier woodland communities and the wetter riparian communities were heavily infested with weeds. With a combination of intensive weed management and targeted revegetation these areas are now becoming much less weed infested. Vine weeds such as *Centrosema molle* (centro) and *Passiflora foetida* (wild passion fruit) were particularly prevalent in these areas as were the *Cenchrus* species (mission grasses).

Drainage lines have been heavily infested with weeds in the past. Wildman Land Management (2008) states 'There is clear evidence that weed introduction and spread at DIA is facilitated largely through seed dispersal along Rapid Creek, associated drains and drainage lines.' Management has aimed to gradually reduce the heavily infested drainage lines by selectively controlling weed species and allowing native species to colonise. Ongoing re-infestation is occurring from upstream and monitoring in drainage lines is conducted regularly to ensure outbreaks are identified and controlled. EcOz

Environmental Services (2009) recommended to 'Undertake weed surveys and removal within open stormwater drains leading into Rapid Creek'.

An example of drainage line management can be found in the drain running from the visitor carpark on Sir Norman Brearley Drive in the middle of the reserve through to Rapid Creek (the area shown in white in Figure 2). It was completely choked with *Urochloa humidicola* (tully grass), *Stachytarpheta* species (snakeweeds), *Centrosema molle* (centro) and *Urochloa decumbens* (signal grass) with *Cenchrus polystachios* (mission grass) growing densely along the edges. It is now dominated by native grasses, herbs and aquatic species such as *Nymphaea violacea* (water lily) as shown on the front cover.

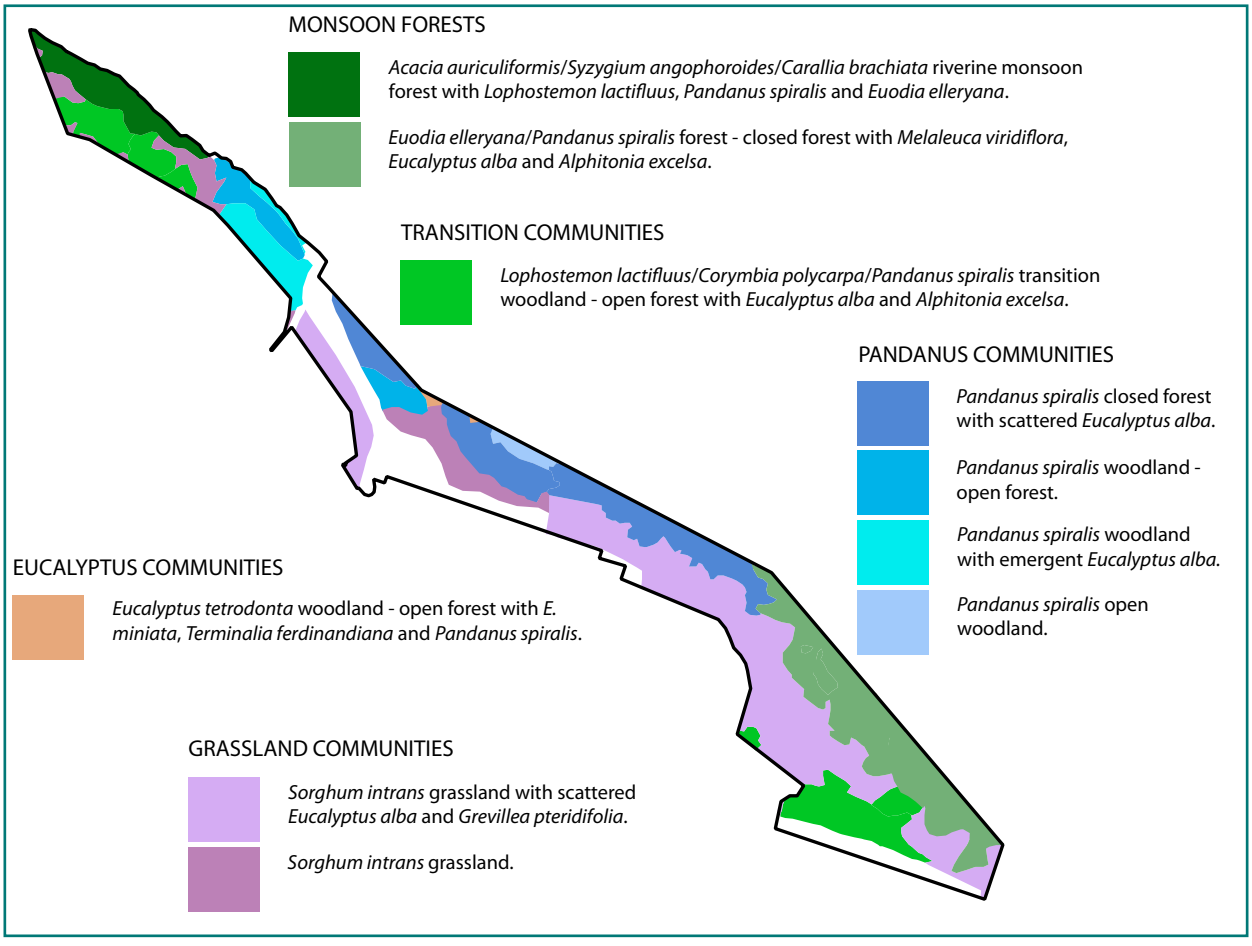

Figure 2: Remnant vegetation communities mapped within the Rapid Creek Reserve (mapping information provided by the NT Government - mapped in the early 1990's)

WEEDS CONTROLLED

This section contains lists of weeds that have been controlled in the Rapid Creek Reserve. Following each list is a brief discussion about key species and ongoing issues. Declared weeds are discussed first, then high priority environmental weeds, followed by other weeds. Naming and declaration of weeds follows Smith (2011) and Schmid and Smith (2012) apart for more recent declarations.

Declared weeds

Table 1: Declared weeds controlled on the Rapid Creek Reserve

Scientific name	Common name	Status
Andropogon gayanus	Gamba grass	Class A B C, WoNS & KTP
Asystasia gangetica subsp. *micrantha*	Chinese violet	NAQS
Azadirachta indica	Neem	Class B C
Cenchrus pedicellatus	Annual mission grass	KTP
Cenchrus polystachios	Mission grass	Class B C & KTP
Hyptis suaveolens	Hyptis	Class B C
Mimosa pudica	Common sensitive plant	Class B C
Senna alata	Candle bush	Class B C
Senna obtusifolia	Sicklepod	Class B C
Sida acuta	Spinyhead sida	Class B C
Sida cordifolia	Flannel weed	Class B C
Stachytarpheta cayennensis	Snakeweed	Class B C
Stachytarpheta jamaicensis	Snakeweed	Class B C
Urochloa mutica	Para grass	KTP

- Class A, B and C weeds: declared under the Northern Territory *Weeds Management Act 2001*
- WoNS: Weeds of National Significance
- KTP: Key Threatening Processes to Australia's biodiversity under the *Environment Protection and Biodiversity Conservation Act 1999*
- NAQS: Northern Australia Quarantine Strategy alert species

Stachytarpheta species (snakeweeds) are the most prolific of the remaining declared species; they tend to grow in damper areas, particularly drainage lines. Wildman Land Management (2008) state 'Snakeweeds, Hyptis and Wild Passion Fruit occur in medium density along Rapid Creek and drains, and require significant focus.' Ongoing re-infestation of these species appears to originate from the drainage systems upstream. An approach implemented over the past several seasons is to encourage the establishment of desirable species such as wetland grasses to provide competition and prevent further seed spread downstream.

Cenchrus pedicellatus (annual mission grass), *Cenchrus polystachios* (mission grass) and *Andropogon gayanus* (gamba grass) present challenges as they are easily distributed via wind and animals. Once established these tall, grassy weeds produce serious fire threats. In relation to the reserve Wildman Land Management (2008) states 'The High Priority weeds Gamba and Mission Grass still persist throughout the area and require vigilant follow up treatment'. EcOz Environmental Services (2009) states that the mission grass group '... currently persists within the ... Rapid Creek Precinct in relatively low abundances.' The species were prolific within the reserve but are now reduced to minor outbreaks. Little Falcon Consulting (2018a) notes 'Survey of the site did not indicate the presence of declared grasses that can lead to the accumulation of high fuel loadings'. These species are treated with the highest priority and are continually monitored and managed with an aim for eradication. However ongoing vigilance is required as re-infestation from surrounding land is likely to continue.

EcOz Environmental Services (2009) noted 'Hyptis was identified within the Rapid Creek Precinct and currently persists in relatively minor densities.' *Hyptis suaveolens* (hyptis) is now vastly reduced but ongoing infestations are recorded, mainly in drainage lines. These are eliminated as soon as possible.

Asystasia gangetica subsp. *micrantha* (chinese violet) is a target weed species of the Northern Australia Quarantine Strategy which had not established naturalised populations in the Northern Territory. A naturalised population covering about 60m^2 was found within the Rapid Creek Reserve in 2015. The outbreak elicited significant interest from the scientific community and resulted in a paper being published (Westaway et al. 2016). All known plants were controlled in 2015 and eradication of the population is aimed for. Very occasional single plants are still detected and controlled. Ongoing surveillance is crucial to ensure eradication of this species at this site.

Broad leaf weeds are treated selectively within areas that are to remain grassed such as firebreaks, with the long term goal being to establish a native low grass cover to assist with erosion prevention. *Mimosa pudica* (common sensitive plant) is the most significant broad leaf weed controlled in grassed areas.

High priority environmental weeds

Table 2: High priority environmental weeds controlled on the Rapid Creek Reserve

Scientific name	Common name
Calopogonium mucunoides	Calopo
Centrosema molle	Centro
Chloris barbata	Purple top chloris
Crotalaria goreensis	Gambia pea
Hyparrhenia rufa	Thatch grass
Ipomoea quamoclit	Wandering jew
Ipomoea triloba	Morning glory
Leucaena leucocephala	Coffee bush
Macroptilium atropurpureum	Siratro
Macroptilium lathyroides	Phasey bean
Merremia aegyptia	Hairy merremia
Merremia dissecta	White convolvulus creeper
Passiflora foetida	Bush passion fruit
Sporobolus spp.	Rat's tail grasses
Stylosanthes hamata	Caribbean stylo
Stylosanthes viscosa	Sticky stylo

The most significant of these species are the vine weeds *Calopogonium mucunoides* (calopo), *Centrosema molle* (centro), *Ipomoea triloba* (morning glory), *Merremia aegyptia* (hairy merremia), *Merremia dissecta* (white convolvulus creeper) and *Passiflora foetida* (wild passion fruit). These species can quickly suffocate native plants. Control aims to prevent plants going to seed and gradually the seed bank of these destructive plants is being reduced.

EcOz Environmental Services (2009) recorded *Crotalaria goreensis* (gambia pea) in the reserve. This species is still found and controlled on a regular basis throughout the reserve. The seed appears to have a long lifespan in the soil and it germinates prolifically following fire.

Other weeds

Table 3: Other weeds controlled on the Rapid Creek Reserve

Scientific name	Common name
Alysicarpus spp.	Buffalo clovers
Caryota mitis	Fishtail palm
Cassia fistula	Golden shower
Chrysopogon aciculatus	Mackie's pest
Crotalaria pallida	Streaked rattlepod
Cyanthillium cinereum	Vernonia
Cyperus spp.	Sedges
Eulophia graminea	Exotic ground orchid
Euphorbia heterophylla	Milk weed
Euphorbia hirta	Asthma plant
Hibiscus sabdariffa	Rosella
Khaya senegalensis	African mahogany
Ixora sp.	Ixora
Melinis repens	Red Natal grass
Micrococca mercurialis	Micrococca
Mitracarpus hirtus	Berrimah weed
Paspalum plicatulum	Brownseed paspalum
Phyllanthus emblica	Indian gooseberry
Phyllanthus spp.	Phyllanthus
Richardia brasiliensis	Mexican clover
Rotboellia cochinchinensis	Itch grass
Ruellia tuberosa	Popping seed
Sesamum orientale	Sesame
Synedrella nodiflora	Cinderella weed
Tridax procumbens	Tridax daisy
Urochloa decumbens	Signal grass
Urochloa humidicola	Tully grass

Urochloa humidicola (tully grass) can still be found within some drainage lines and other wet areas. Little Falcon Consulting (2018a) notes ' ... Tully grass ... is present along drainage lines and extends into areas of the woodland understorey.' The issue with this species is that it is a highly competitive species displacing a number of desirable native species. The major risks with removal of this species is erosion and creation of an environment suitable for other weed species to replace it. The approach to management is to work from the top of a drainage system controlling small sections at a time to allow desirable species to colonise in its place. Large areas throughout the reserve that were previously infested are now colonised with native species. As areas gradually rehabilitate with dense native ground cover species the risk of re-infestation appears to reduce. There are extensive infestations upstream from the reserve which will mean ongoing re-infestation is a long-term risk. In relation to control of *Urochloa humidicola* (tully grass) Little Falcon Consulting (2018a) states 'This however needs to occur in conjunction with management of the very extensive infestations that are located upstream on department of Defence land and extend east across Amy Johnson Drive.'

Paspalum plicatulum (brownseed paspalum) occurs in similar areas to *Urochloa humidicola* (tully grass) and behaves in a similar fashion in terms of management. It too is gradually being eradicated and replaced with native species.

Urochloa decumbens (signal grass) was present in a drainage line growing in association with *Urochloa humidicola* (tully grass). It was identified through the NT Herbarium and they kept a specimen for their records as they had very few records of this species in the NT. The species now appears to be eradicated in the Rapid Creek Reserve.

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