

## **Weed management of legacy mine sites in the Northern Territory**

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**Summary** The Northern Territory has a number of legacy mine sites which may pose a high risk to the natural environment and human safety. The Legacy Mines Unit (LMU) of the Northern Territory Government Department of Mines and Energy was founded in 2013 to inventory, prioritise and manage remediation works for legacy sites in the Northern Territory. Weed management has been identified as an area of interest for the LMU. Most legacy sites have ongoing weed management issues leading to an increased potential for weeds to spread off-site. Weeds at legacy sites can compromise revegetation success, spread into surrounding clean country, increase fuel loads and fire frequency/intensity and diminish visual amenity for tourism. We present two weed management case studies that highlight the work to date that has been done by the Unit: weed survey and control works conducted by an indigenous land management team at Tennant Creek and a baseline weed survey at a former gold mine in the Darwin region.

**Keywords** Legacy mine, weeds, Northern Territory, management, survey.

### INTRODUCTION

The Northern Territory (NT) has a number of legacy mine sites which may pose a high risk to the natural environment and human safety. Most of these legacy sites were created before 2005 and pre-dated the NT Government's policy of requiring operators to lodge a 100% rehabilitation security bond. In 2013 the Mining Management Act was amended to require all operators to pay a 1% levy on their security. The objective of the levy is to generate the necessary funds to begin addressing historical mining impacts. As a result of this, the Legacy Mines Unit (LMU) of the NT Government Department of Mines and Energy was founded in 2013 to inventory, prioritise and manage remediation works for legacy sites in the NT.

The LMU has commenced weed survey and control programs at selected legacy mine sites in the NT. Weeds at legacy sites can compromise re-vegetation success, spread into surrounding clean country, increase fuel loads and fire frequency/intensity and diminish visual amenity for tourism. Weed survey and control at these sites will assist in planning (e.g.

producing weed management plans) and implementing follow-up control. In this paper we present two weed management case studies that highlight the work to date that has been done by the LMU: weed survey and control works conducted by an indigenous land management team at Tennant Creek and a baseline weed survey at a former gold mine in the Darwin Region.

### CASE STUDIES

**1. Weed management at Tennant Creek** The town of Tennant Creek is located 1000 km south of Darwin and 500 km north of Alice Springs, in the Barkly Region of the NT (Figure 1). The region has a semi-arid climate, with a cool winter from May to September and a hot summer from October to April. The region has had intermittent prospecting, mining and exploration since gold was first discovered in 1933. A gold rush to the area shortly afterwards formed the Tennant Creek Township in 1934, which remains the major population centre for the region. The peak of gold and copper mining occurred in the 1970s with the Nobles Nob, Juno, Peko and Warrego mines producing significant amounts of gold. Most operations ceased production by the 1980s with re-treatment of tailings occurring at some sites up to the mid-late 1990s. Many of the sites are within 15 km of the town and can be accessed by existing tracks.

Many of the mine sites around Tennant Creek have limited information on the location and density of weeds. Conducting detailed surveys and mapping of weeds on mining tenements will allow the information to be used to facilitate on-going monitoring and follow-up work after initial surveys; and to assist with creating weed management plans for these areas, based on the Tennant Creek Regional Weed Management Plan. The first site at Tennant Creek selected for weed survey and control was a 243 ha area of interest located approximately 4 km south of Tennant Creek and comprising of existing mining tenements and contains several inactive mines, most notably the historic Eldorado gold mine.

In early 2016 the LMU engaged the land management team from the Tennant Creek based Jululikari Council Aboriginal Corporation to conduct the work. The land management team was comprised of six

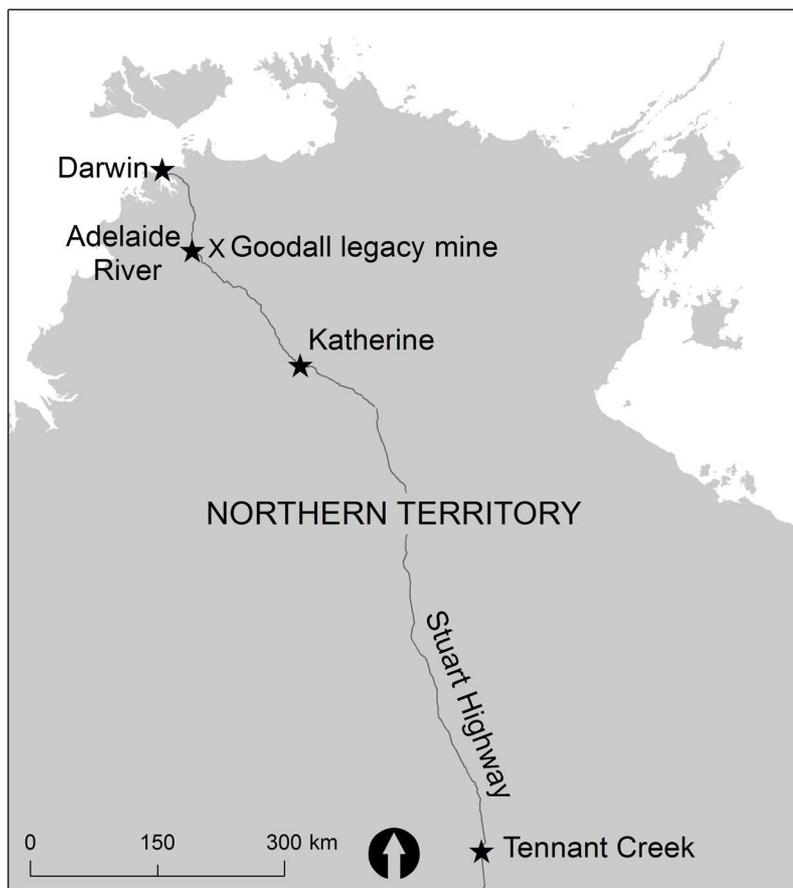


Figure 1. Location of Tennant Creek and Goodall legacy mine.

indigenous staff, with two additional indigenous ‘work for the dole’ participants. The team had previous experience with weed management at a number of indigenous communities in the vicinity of Tennant Creek. All members of the team had been trained in chemical handling and most had completed (or were working towards) certification in horticulture and conservation and land management.

The work was conducted during April and May 2016. The area was surveyed from four-wheel-drive vehicles, quad bikes and on foot. Data were captured with handheld Global Positioning System (GPS) units and recorded onto hard copy sheets. The format of the data was compatible with the NT Weed Data Collection Guidelines (Weed Management Branch, Northern Territory Government 2015). Overall the survey area had a very sparse distribution of weeds. Three rubber bush (*Calotropis procera* Aiton) plants were found and

treated using the basal bark method with Access™ and diesel mixed at a 1:60 L ratio. Rubber bush is a Class B weed species in the NT (growth and spread to be controlled by the landowner) and is a common weed species in the Barkly Region.

## 2. Baseline weed survey at Goodall legacy mine

The former Goodall gold mine is located approximately 100 km south-east of Darwin and approximately 30 km east of the Adelaide River township (Figure 1). Operations at the mine commenced in 1988 and gold bearing ore was mined in four pits until the end of 1992 and then from two pits in 2002 and 2003. Some rehabilitation was conducted in 1993 and 1994, which included capping and re-vegetation of waste rock dumps.

Unlike most legacy sites, Goodall has no current lease or operator, making it a true legacy site.

Normally an operator of a site would have a current Mine Management Plan (MMP), which would include provision for environmental management of the site. In the absence of an operator and MMP, the responsibility of land management falls with the LMU on behalf of the NT Government.

The Goodall site had limited information on the location and density of weeds. In early 2016, the LMU engaged an NT-based environmental consultancy (Ecoz Pty Ltd.) to conduct a baseline weed survey at Goodall. The objective of the survey was to provide information on the location and density of weeds on the site and surrounding area, with a particular focus on declared weeds. This information would assist the LMU to plan and implement weed management at the site in the future.

The survey was conducted over a 665 ha area, which comprised: the Goodall mine footprint (300 ha) which included semi-disturbed areas of eucalypt woodland with a grassy sorghum understory and disturbed areas with an acacia shrubs; 92 ha of riparian vegetation along two creek lines; undisturbed/semi-disturbed eucalypt woodland with a grassy sorghum understory; and a disturbed area consisting of the former mine worker accommodation.

The survey was conducted from June 20–23 2016 by a botanist with extensive local experience in weed identification, with assistance from two Larrakia indigenous rangers. The area was mostly surveyed by quad bike/all-terrain vehicle. Data were recorded using Cybertracker™ software on a handheld device, with data entry fields complying with the NT Weed Data Collection Guidelines. The survey took 20 hours (60 person hours) to complete, with 84 km of transects traversed.

A total of 300 weed patches were surveyed, in which most were found in drainage areas, along tracks and areas of disturbance including waste rock dumps. The majority of the weed cover recorded within the survey area was the Class B weed hyptis (*Hyptis suaveolens* L.) with 211 patches. The survey also recorded 12 patches of Chinese apple (*Ziziphus mauritiana* Lamk.), which is a Class A weed (to be eradicated in all areas of the NT, except where classified as Class B). In total there was one Class A weed, four Class B weeds and nine environmental weeds recorded during the survey.

## DISCUSSION

A small number of weeds was surveyed and controlled within the selected mining tenements at Tennant Creek. Nonetheless, surveying mining tenements regarded as being relatively weed-free remains a relevant management activity for the LMU, as it is important to record and map both the presence and absence of weeds at a given site. There are a number of tenements and associated mine sites around Tennant Creek that have larger disturbance footprints and a correspondingly larger potential for weed infestations. These sites and surrounding mining tenements will be progressively surveyed over the next two years and weed control will be conducted concurrently. The detailed weed survey and control data will allow treated infestations to be effectively monitored and timely follow-up treatment applied where necessary.

The Goodall survey provided valuable baseline data at a mine site where data were previously lacking. In the short-term, weed management at the site will be focused on preventing further weed spread by treating the weed infestations identified in the survey and conducting follow up treatment where required. In the longer term, a weed management plan will be produced.

This plan will focus on two main aspects:

1. reduce the likelihood that weeds are introduced and spread at the site, and
2. ensure that future rehabilitation of the site is not compromised by weeds.

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## REFERENCES

Weed Management Branch, Northern Territory Government (2015). Northern Territory Weed Data Collection Manual. (Northern Territory Government of Australia, Darwin).