

Lion's tail control at Boodjamulla National Park

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Summary Fire plays an important role in weed management activities for many different weed species.

This paper outlines how fire has been incorporated into lion's tail (*Leonotis nepetifolia*) eradication programs at Boodjamulla National Park.

Keywords Lion's tail, *Leonotis nepetifolia*, weed management, fire, seed recruitment, seed bank, herbicide treatment.

INTRODUCTION

Queensland Parks and Wildlife Service (QPWS) staff have been engaged in lion's tail management activities at Boodjamulla (Lawn Hill) National Park, North West Queensland, since 2002.

Lion's tail, reportedly introduced to the Lawn Hill area as an ornamental around 1910–1920, is an erect annual herb (Figure 1) which grows up to 3 m high (Smith 2002, Miller and Schultz 1999).

Lion's tail establishes particularly well in riparian areas and flood plains where seeds are easily spread. It also flourishes in disturbed areas such as roadsides and overgrazed areas. It has the ability to develop into large colonies that displace native species (Smith 2002).

QPWS is now dealing with lion's tail as a critical conservation issue, because of its strategic occurrence and because it has not spread too widely. Mason (2002) reported that lion's tail was 'not yet widespread in Boodjamulla' and that there was an 'opportunity to decimate if not virtually eliminate it using herbicides...and spraying plants in the vegetative stage before flowering'.

As a result of this report, management activities such as mapping distribution, manual removal of plants and seed heads, and herbicide spraying were instigated. These activities have continued within Boodjamulla National Park and the surrounding buffer zone over the past 4–5 years. It is only in the past 2–3 years, since lion's tail eradication has been listed as a critical conservation issue for QPWS, that funding has been allocated specifically to targeting this species.

More recent surveying of lion's tail distribution has identified three main areas of concern: Lawn Hill Creek; Louie Creek; and the area surrounding the park's entrance gate. In previous years' lion's tail has also grown along the 'Wild Dog Dreaming' walking track. Weed control activities appear to have eradicated

this infestation, as lion's tail has not been observed in this location for the past two years.

During the past 12 months, some lion's tail management activities have been timed to coincide with fire events, as it is recognised that there are several advantages in combining fire with weed management programs.

MATERIALS AND METHODS

Early 2007 provided a unique opportunity to target lion's tail infestations at Boodjamulla, as most of the infestation areas had been burnt through planned burning and wildfire. Both fire types cleared surrounding vegetation to reveal dense lion's tail germination (see Figure 2 for an example of seedlings from another location).

A planned burn at the entrance gate was implemented in December 2006 to prepare the site for spraying. One other location (Louie Creek) was burnt



Figure 1. *Leonotis nepetifolia* (photo by Graham Florance).



Figure 2. Lion's tail seedlings (photo by Graham Florance).

by the extensive wildfire of November 2006. The third area, Lawn Hill Creek (Resource Reserve), has not been burnt for at least ten years.

Herbicide spraying (Roundup Biactive, 700 mL:100 L, 600 L Qwik Spray unit and 100 mL:15 L, 8 L Hardi Spray Packs + Pulse wetting agent 100 mL:100 L) was conducted after the sites had received enough rainfall to encourage seed germination and new growth. Initial spraying took place in late January and February.

Follow up monitoring, spraying and hand-pulling was conducted at 4–6 week intervals at the entrance gate site, depending on staff availability. Seed heads have also been collected and burnt at this site, in an effort to reduce further recruitment to the soil seed bank.

The Lawn Hill Creek site has been revisited four times and new plants have been manually removed.

Louie Creek has also received four follow-up treatments. This site has proven more difficult to maintain due to cultural restrictions to accessing the site, as it is significant to Waanyi Traditional Owners. In order to better manage lion's tail in this area, steps are being taken to engage Traditional Owners from the town of Doomadgee, to participate in weed management activities in the future.

Photo monitoring points were established at the Lawn Hill Creek site in February 2007. These were revisited and photographed in April 2007, once herbicide treatment had taken effect. All plants were killed by spraying. The monitoring points were again visited in late June, by which stage new plants had germinated. Herbicide (Roundup Biactive, rates as above) was applied to larger infestations, while smaller areas were hand-pulled. Photographs were taken of the monitoring points and will continue to be recorded on a six monthly basis.

Planned burning will be conducted in part of this location during the 2008 wet season. This will allow

direct comparison to be made on the impact fire has on seedling recruitment, through comparing germination in burnt and unburnt areas.

Staff at Boodjamulla National Park also took advantage of the wildfire and planned burning events to access lion's tail infested sites that were previously overgrown and inaccessible. This enabled further mapping of the weed's distribution.

RESULTS

Herbicide spraying after fire improved the accessibility of weed infested locations. It also improved the efficiency of spraying as less herbicide per plant was required.

Fire appeared to promote a high percentage of the existing seed bank to germinate. Further study is required to confirm whether the fire did in fact prompt a germination event, or whether the plants were simply more visible due to the fire-cleared surroundings.

Lion's tail germination continued to occur between January and April, and four re-spray events were conducted. Lion's tail plants began flowering in late March with probable mature seed by May 2007.

Due to unseasonal rain, new plants were still emerging and flowering in June, July and August, however their growth was much less active than it had been in earlier months.

These plants produced inflorescences at a very early stage, due to the stress of growing in drier conditions, so it was important to ensure that all plants were removed, to prevent new seed being produced.

Tabulated results from this weed eradication project are not available at this stage, as monitoring points have only recently been established.

Monitoring transects will also be established in the near future. This will provide more tangible data to reflect the effectiveness of the program.

DISCUSSION

As a result of recent lion's tail control project work at Boodjamulla, fire has been identified as a useful tool for:

1. Clearing large and old dried-out infestation areas.
2. Allowing newly germinated plants to be located and identified more easily due to the clearing of surrounding vegetation.
3. Applying post-fire herbicide to young plants before they reach maturity and begin to flower. (Herbicide can also be applied to non-fired plants but it may not be as effective if surrounded by dense vegetation).

Combining fire and herbicide control methods allows land managers to:

1. Ensure that herbicide is applied effectively to young, green plants that will readily take up the treatment.
2. Avoid applying excessive amounts of herbicide to dense infestations, where many of the smaller plants may not receive any treatment at all.
3. Reduce the amount of follow-up work required as the herbicide application and subsequent eradication of plants is more effective.
4. Control the timing of weed management activities.

Lion's tail poses a potential threat to the freshwater wetlands and grasslands of the Gulf Plain, should it become more widespread. Lion's tail at Boodjamulla grows predominantly in well shaded areas along creeks and rivers. In other Protected Area Estates, such as Lakefield National Park, different climatic conditions and increased rainfall result in lion's tail also growing on flood plains.

Infestations of lion's tail at Boodjamulla are currently contained within riparian areas. The disadvantage is that riparian areas are more fire sensitive and cannot be burnt too often.

In addition, locations such as the Lawn Hill Creek Resource Reserve, which has not burnt for about 10 years, require extra care to be taken when implementing planned burns, as there is a far greater fuel load.

The Resource Reserve poses further challenges to lion's tail management. Its northern boundary is a watercourse, Lawn Hill Creek, where the southern side of the creek borders the Resource Reserve and the northern side backs onto grazing country. This creates difficulty in containing the weed population, as seeds are easily spread downstream. In order to effectively manage lion's tail in this area, negotiation must be undertaken, so that QPWS and the adjoining pastoral company may adopt a collaborative approach to weed management.

The Resource Reserve also shares its western boundary with a privately owned tourist accommodation and camping operator. This introduces additional weed hygiene issues to Boodjamulla, as tourists commute to and from the Park each day.

Seed travels downstream from the Resource Reserve to Adels Grove, where dense infestations have

been observed in the campground and scattered around visitor facilities.

Therefore there is the risk that visitors will unwittingly spread lion's tail seed to other areas both within and outside of the Park, by picking flowers or unintentionally carrying seed on vehicles, clothing or camping equipment.

Although further investigation is required to determine to what extent fire affects lion's tail germination events, the overall results of control activities at Boodjamulla National Park indicate that it is more efficient and effective to incorporate fire into lion's tail management. An important benefit is improving accessibility and clearing infestation areas so that seedlings are easily identified.

Lion's tail response to the weed management practices discussed in this paper will become more evident after several wet seasons.

Future monitoring activities at Boodjamulla will focus on learning more about lion's tail behaviour and investigating to what extent fire assists with depletion of the residual seed bank.

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