

The Zen of controlling bitou bush in Crowdy Bay National Park

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Introduction

The bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata* (DC.) T.Norl.) control program on Diamond Head in Crowdy Bay National Park, New South Wales, began 27 years ago when the ranger for the park approached the local group of the National Parks Association (NPA) to help tackle the bitou bush problem. The project was a positive practical contribution at a time when the group was very active in raising community awareness about local environmental issues. At the time, the National Parks and Wildlife Service (NPWS) District Manager remonstrated that the project was only 'justifiable if feasible results are attainable'. Results of the project to date have shown that efforts have been well invested, and prove that consistently coordinated management over many years can produce positive control outcomes over wide areas. Projects such as this one that aim to remove weeds from large scale areas are time consuming, challenging, and costly but also produce positive results with persistence and a degree of flexibility in the application of the techniques

History of bitou bush control at Crowdy Bay National Park

Invasive weed control, like meditation, is a practice that only reaps true results with constant practice. For the first nineteen years, groups of twenty or so volunteers, together with NPWS officers met twice per year and carefully hand pulled or cut and poisoned bitou bush over the length and breadth of Diamond Head. The gatherings or Bitou Bashes, as they are known, continue today and, on average, groups of 25 people meet to work for six hours during autumn and winter each year. NPWS staff attend the Bitou Bash Days and bring tools, herbicide and refreshments and assist with the work. Contractors and NPWS staff also ground-spray infestations too large for the volunteers to successfully attack. The sprayed areas continue to be meticulously followed up by volunteers or contract bush regenerators to remove re-sprouting bitou seedlings.

Toward the end of the first 19 years, it became obvious that it was impossible to control plants in inaccessible areas on the cliff face of the headland. Abseiling was trialled as a means to access out-of-reach areas, however it proved to be time

consuming and inefficient. Serendipitously then, a new method of treatment delivery using a helicopter fitted out with agricultural boom spraying equipment arrived on the scene around 1998. Using low concentrations of glyphosate to kill bitou bush in the cooler months without adversely affecting the dormant remnant native vegetation proved to be extremely successful (see Toth *et al.* 1996). Vast areas of hitherto unreachable bitou bush were killed and good native recruitment occurred in the sprayed areas. It must be noted however that follow-up work on ground in these areas is impossible given the terrain. In these instances, the few remaining plants are controlled using aerial spot spraying.

The development of aerial spraying methods expanded in 2000 to include the valuable technique of aerial spot spraying. This method uses ground based spraying equipment mounted in a helicopter. The herbicide can therefore be applied via a cone-shaped nozzle which is lowered from the helicopter to spray individual bitou bush plants (Toth and Winkler 2008). When there are only a few individual plants, boom spraying is not efficient and can result in an unacceptable level of non target kill. The aerial spot spray method has thus become an important tool enabling the treatment of very discrete areas or individual plants where ground spraying is not feasible. To date, aerial spot spraying has been employed on inaccessible areas on the headland to continue control as bitou bush plants decrease in number.

Expanding the program

With the strong support provided by aerial spraying, the program was able to further expand to join the bitou bush-controlled headlands of Diamond Head north to Perpendicular Point in Kattang Nature Reserve, along the sweeping expanse of Dunbogan Beach. The Friends of Kattang Nature Reserve had been working since 1995 to achieve a bitou bush-free status on the headland at Perpendicular Point, with great success. At this stage the project expanded to include co-operation from Port Macquarie-Hastings Council, as a 3.7 km portion of the 8.3 km beach was managed by Council.

Aerial spraying began along the length of Dunbogan Beach in the winter of 2002. The results were outstanding, however,

soon after all adult plants were controlled, the seed bed germinated prolifically. It was obvious broad-scale spraying would be an ongoing event until the seed bank was exhausted. Hand weeding continued by the volunteers at the twice yearly Bitou Bash to ensure vigilance in headland areas. Volunteer work also expanded to include new infestations discovered behind the fore-dune, particularly in the significant littoral rainforest along Dunbogan Beach. Larger infestations that were inaccessible to helicopter spraying (due to canopy cover) were treated by NPWS and contract bush regenerators. Backpack herbicide spraying was extremely time-consuming for these widespread infestations and a technique was developed that used quad bikes and a tank trailer, where it was possible to navigate through the bush. But heavily vegetated areas without access tracks limited the usefulness of this approach.

Challenges

Although aerial spraying has been an excellent addition to the program, there are a number of variables that can negatively affect implementation. Inclement weather anywhere along the coast can affect all other regions. There is a limited window of time during the year when aerial spraying can occur and there are very few suitable helicopters and applicators. If weather prevents spraying in one area, the applicators will move to another in an effort to complete spraying within the limited seasonal window. The aerial spraying program takes place along the length of the NSW coast, thus delays have a domino effect down the coastline. Problematic too are the more local effects of poor weather, as calm and clear conditions are needed on the day (see Broese van Groenou and Downey 2006). Logistics are also complex, requiring much forward planning and the co-operation of 20 or more participants from Council, Landcare, NPA volunteers and NPWS. Timing of aerial spraying is also a key factor in gaining control and ensuring the efficacy of the program. Anecdotaly, bitou bush has begun flowering earlier over the last couple of seasons. As a result, the majority of plants have flowered and seeded by the time aerial spraying occurs. This may set the program back significantly if the seed bank is increased.

Monitoring of the aerial spraying program was introduced in 1999 to track the changes to health and condition of native plants. Selection of monitoring sites was problematic at first, as the much of the sprayed area is on steep and inaccessible headlands. However, suitable sites were established and monitoring protocols were refined over time to a single-page template, which is efficient and easy to use. Results from the surveyed sites have been positive, with very few losses of non target plants.

The value of volunteers in bitou bush control

In 2007, it was determined that aerial spraying was no longer viable for Dunbogan beach as there were not enough bitou bush plants for it to be efficient. A contractor was engaged to ground-spray the remaining plants on the foredune and hind dune, and the excellent results have been followed up by volunteers on Bitou Bash days. Vigilance at this stage is critical to maintaining areas where aerial spraying and ground control has been completed.

The NPA community group provides ongoing labour support on Bitou Bash days and, importantly, has attracted ongoing grant funding. To date, eight Envirofund grants totalling \$93 850 (with the 9th application of \$32 000 pending) have contributed significantly to the project. The NPWS contribution since 1998 including budget funding and in kind contributions is in excess of \$200 000.

Conclusion

The Crowdy Bay National Park bitou bush control program has demonstrated many successes over the last 27 years. The program continues to expand, and in the last two years has incorporated significant areas around Crowdy Beach. Dedicated community volunteers have made much of these successes possible and, overall, the program has shown to be feasible and efficient. In addition to the extensive aerial spraying and ground control campaigns, over 224 000 individual bitou bush plants have been hand-removed over the course of the project by volunteers. These amazing efforts continue to prevent further bitou bush invasion and protect these valuable coastal areas.

Acknowledgments

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ing long-term commitment to bitou bush control at these sites. Lastly, Mike Dodkin (NPWS) for his efforts in coordinating the project over the last 28 years.

References

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Management of bitou bush on the New South Wales north coast

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Introduction

The North Coast Weeds Advisory Committee (NCWAC) is an advisory and coordinating body for weed management covering 290 kilometres of coastline stretching from the Queensland border to the Shire of Nambucca in the south and encompassing the Tweed, Byron, Ballina, Richmond Valley, Clarence Valley, Coffs Harbour, Bellingen and Nambucca Councils. The committee helps to promote best practice weed management and assists in the implementation and co-ordination of effective on-ground weed management programs. The committee's management of the noxious weed bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata* (DC.) Norl.) is carried out by a variety of organizations and funding is obtained from a diverse range of sources. This paper presents an overview of the success of this program.

The North Coast Weeds Advisory Committee

The NCWAC has representatives from five Local Control Authorities (LCAs), who are responsible for the administering of the NSW *Noxious Weed Act 1993* on free hold and Council managed lands. The success of the NCWAC program is due to the co-operative effort between these LCAs and other committee members including the NSW Department of Primary Industries, Department of Environment and Climate Change, Department of Lands, the Queensland Department of Primary Industries and Fisheries and the Northern Rivers Catchment Management Authority. The committee also cooperates with a number of local land managers, including community groups, Aboriginal Land Councils and private property owners. The committee meets quarterly and sponsors an annual weed forum that brings

together key stakeholders and members of the community to share the latest weed research and management information. A dedicated project and planning officer organizes NCWAC events and assists with the development of strategies and funding applications. The part-time project officer position is funded by matching contributions from the five participating LCAs and NSW Department of Primary Industries, at a total cost of approx \$32 000 per year.

Bitou bush management

Bitou bush was gazetted as a noxious weed across all NSW North Coast LCAs in 1998, and the NCWAC took immediate action. The committee formed the North Coast Bitou Bush Taskforce in 1999 and appointed a project officer to develop a regional bitou bush strategy, which was completed in 2001. A bitou bush regional control plan was adopted in 2002. Since