A community approach to pest plant control in South Australia's rangelands

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Summary The Blinman/Parachilna Pest Plant Control Project is a community initiative, managed and delivered at a community level. Through this project the community has dramatically raised the profile of the invasive potential of *Opuntia* spp. in South Australia's Rangelands. It has also undertaken significant on-ground works to prevent the spread of *Opuntia* spp. beyond the district. However, long-term control is dependent not only on community will and capacity, but also upon engagement with research institutions to provide scientific answers to perplexing questions and on the commitment of government agencies to provide on-going financial support for what is likely to be a very long project.

Keywords *Opuntia*, biological control, community capacity.

INTRODUCTION

Broad scale invasion of agricultural land by *Opuntia* spp. is not without precedent in Australia. In 1924 some 24 million hectares of productive pastoral and cropping land in Queensland and New South Wales was infested with several species of prickly pear. At that time a single chemical treatment would have cost more than twice the value of all primary production in the state of Queensland (Walton 2005). So what can a few dozen people on isolated pastoral properties in South Australia's Flinders Ranges hope to achieve as they confront a rapid increase in the distribution and density of wheel cactus (*Opuntia robusta* Wendl.) and prickly pear (*Opuntia stricta* Haw.)? Once again, the cost of control is considerably more than the value of the land.

Nine pastoral families, two businesses and a few individuals from the tiny communities of Blinman and Parachilna initiated, are managing, and delivering a Natural Heritage Trust (NHT) funded project, the Blinman/Parachilna Pest Plant Control Project. They are assisted by a small group of dedicated volunteers. The community competes annually with other projects for funding through the South Australia Arid Lands Integrated Natural Resource Management Investment Strategy (SAAL INRM). In only three years the group has made significant progress in containing and controlling invasive *Opuntia* species across a 400 km^2 affected area of South Australia's Flinders Ranges.

BACKGROUND

The biophysical environment A long, narrow mountainous province, the Flinders Ranges rise abruptly above the arid lowlands of the Torrens, Frome and Eyre plains. Stretching from Crystal Brook in the south to Mount Hopeless in the north, the Flinders Ranges straddle two major bioclimatic regions, the Bassian and Eyrean, (Brandle 2001). The project area, at latitude 31°S, falls within the Eyrean bioclimatic region. Temperatures range from 0°C to the mid-40s in an average year. Here rainfall is erratic and occurs mainly during summer months. Monsoonal troughs deliver the unpredictable, but significant events that drive the region's ecosystems, occurring typically as thunderstorms with heavy falls and flash-flooding.

The project area encompasses a complete transverse of the ranges from their depositional margins to the west and east through their most rugged elevated areas. The landscapes of the project area include high mountain ranges, (the Heysen and ABC Ranges cut through the project area, with numerous peaks above 700 to 850 m), hogback ridges, deep gorges, precipitous cliffs and escarpments, rocky outcrops, steep slopes (>70°), foothills, low ranges, valleys, plains, creek channels and flood-outs. The project area drains into the Lakes Torrens and Frome catchments. Such a highly variable land surface across a relatively small geographic area supports diverse ecological communities. Whilst *Opuntia* spp. are found in all communities, the highest densities occur in River Red gum (*Eucalyptus camaldulensis* Dehnh.) dominated riparian areas, and in white cypress pine woodland (*Callitris glaucophylla* Mueller).

The social environment Grazing is the principal land use in the Flinders Ranges. Properties in the project area range from 75 km^2 (Oratunga) to 1685 km^2 (Wirrealpa). Most stations run sheep only, with three properties (Commodore, Motpena and Wirrealpa) also running cattle on the plains. Typically the stations are operated by a resident owner/manager. Commodore is the only property in the project area with a resident manager and absentee owners. None of the nine participating properties employ full-time station hands. Labour is hired on a needs basis, principally for mustering, crutching and shearing. Less than half of the properties have resident adult children

involved in property management. Two small towns service the district, Blinman with a permanent population of 17 and Parachilna with six. Nevertheless, the two towns and wedded districts support two progress associations.

The funding environment The Flinders Ranges fall within the South Australian Arid Lands (SAAL) Integrated Natural Resource Management (INRM) region. An INRM Plan was developed for the South Australian Rangelands (now South Australian Arid Lands) in 2004. The plan set management priorities for the next five years (2005–2010). INRM groups must compete for funding annually. Government and non-government bodies are invited to submit project proposals to their respective INRM groups. Those project proposals that are likely to contribute most significantly to the sustainable management of natural resources in the rangelands form the basis of the annual SAAL Investment Strategy. The Blinman/Parachilna Pest Plant Control Project was included in the 2004/05 ($100,000) and 2005/06 ($112,000) SAAL Investment Strategies.

Blinman/Parachilna pest plant control project Alarmed by a dramatic increase in the distribution and density of wheel cactus during the previous decade, a small group of landholders in the Blinman and Parachilna districts met in 1999 to discuss their concerns. As a result, some minor treatment works were undertaken on Alpana and Gum Creek stations in that year with assistance from the Department for Environment and Heritage (DEH) and the Animal and Plant Control Commission (APCC).

Unable to fund further wheel cactus control works as part of property management due to the cost of control and time required to access isolated populations in rugged mountainous terrain, the landholders sought funding through the 2002 Rangeland Action Project (RAP). Their bid was successful, and the landholders received $36,700 from the North Flinders Soil Conservation Board to implement the Blinman Progress Association Bushcare Project. A landholder survey and mapping exercise was undertaken to define the infested area and provide density estimates. Wheel cactus was thought to occur across a 350 km^2 area, with prickly pear extending the total affected area to more than 400 km^2. A strategic planning workshop was conducted with community representation and key agency involvement (APCC, DEH, Department for Water, Land and Biodiversity Conservation, Rural Solutions SA). A strategic planning framework was devised and two major objectives were identified. The first was to plan and implement effective control strategies for infestations of key pest plants in the district. The second was to educate and gain commitment and funding support from the broader community and other organisations. Short and long term goals were set. RAP funding was also used to engage a part-time project coordinator, to purchase equipment and herbicide, and to provide safe chemical handling and ATV training for landholders.

In 2004, the combined Blinman and Parachilna Progress Associations submitted a funding proposal to the South Australian Rangelands INRM Group. The proposal, Blinman/Parachilna Pest Plant Control was successful and became part of the 2004/05 SAAL Investment Strategy. Further funding was received through the 2005/06 Investment Strategy.

RESULTS

Implementation of effective control strategies A containment strategy has been implemented with marginal areas to be treated initially. During the 2004/05 funding year, contractors were engaged to treat outlier populations and isolated plants along the eastern and western margins of the project area. Areas of high conservation value, including swamps, springs, watercourses, gorges and flood-out country were also targeted. The herbicide Grazon DS (active constituents picloram and triclopyr) applied as a foliar spray (one part to twenty in water with Caltex Summer Spray Oil added at one part to 100), was the main method of control, with smaller plants being physically removed and buried or burned. At the end of the 2004/05 funding year, 90 km^2, or 22% of the project area had been searched and treated by contractors and landholders. In total, 12,196 wheel cactus, prickly pear and devil's rope pear plants (*Cylindopuntia imbricata* Haw.) were destroyed by contractors at an average cost of $4.50 per plant (including labour, chemicals, plant and equipment). Landholders treated or removed and destroyed a further 3000 plants. However, high recruitment levels are anticipated and all treated areas will require follow-up work within four years. For example, a three-fold increase in wheel cactus numbers was encountered during follow-up works undertaken on Alpana and Gum Creek Stations in 2005, with initial herbicide treatments in 1999.

Chemical efficacy trials were also undertaken during the 2004/05 funding year. Strict scientific methods were not used in the design of the trials, which were intended as a rough cut only to give some indication of those chemicals, application rates and methods that might be more rigorously tested. In the most successful trial, injections of undiluted glyphosate and Grazon were tested on wheel cactus. Chemicals were injected into stems and pads at rates of 1 mL and

2 mL per pad, delivered as 5 mL and 10 mL doses. All plants died within six weeks of treatment, trunks and pads completely rotting away. Randomised block trials will be undertaken during the next twelve months to further test the efficacy of stem/pad injection, using undiluted glyphosate at various dosage rates per pad. Rural Solutions SA officers will assist with the design of the trials and site selection.

Extension and engagement A major objective of the project is to raise public awareness of the threat that *Opuntia* species pose to rangeland environments and to seek engagement with individuals and groups who may be able to contribute to the project. Targeted groups have included research institutions, local councils, horticultural groups, volunteer organisations, the local community and other communities in districts where *Opuntia* populations are known to occur, (Burra, Peterborough, Murraylands in South Australia, Charlton in Victoria). Perhaps the most important outcome of this process has been the creation of a divisional PhD scholarship (University of Adelaide, School of Agriculture and Wine, Plant and Pest Science) for research into biological control options for wheel cactus. Funding partners include the South Australian government (APCC), the Weeds CRC and the Blinman and Parachilna Progress Associations.

PhD candidate Justin Williams aims to find a suitable biological control option for wheel cactus by assessing the genetic diversity of wheel cactus and cochineal (*Dactylopius* spp.) populations in Australia. He will test a range of cochineal biotypes on wheel cactus, investigate factors that may limit the success of cochineal as a biological control agent for wheel cactus populations in the semi-arid Flinders Ranges, and evaluate the biocontrol potential of other insects that may be successful pests on wheel cactus in native habitats (north and central Mexico).

Public presentations have been made to such groups as the Friends of the Australian Arid Lands Botanic Gardens, the Royal Geographic Society, the Weeds Management Society of South Australia (WMSSA) and regional Probus clubs. Two project newsletters are issued each year, with the latest edition available in both electronic and hard copy formats. Media opportunities are sought with the project having been profiled on Stateline (ABC television), in the Stock Journal and on ABC radio (the Country Hour).

Over the past three years the tiny communities of Parachilna and Blinman have been able to significantly raise the profile of *Opuntia* spp. as pest plants in South Australia. This is reflected in several recent projects in which *Opuntia* spp. are target species. Senior botanist Dr. R.J. Chinnock (State Herbarium of South Australia) is currently undertaking a taxonomic revision of *Opuntia* spp. and other cacti in South Australia. *Opuntia* spp. are one of three pest species (with buffel grass and camels) being targeted in the Regional Strategic Pest Planning and Coordination Project, developed by Rural Solutions SA as part of the 2005/06 SAAL Investment Strategy. Increasingly, *Opuntia* control methodologies and related information is being shared through networks across INRM regions and state borders.

DISCUSSION

Community capacity Geographic location and population size do not necessarily limit community capacity. A community's capacity to independently manage a pest plant control project will be determined by the skills it possesses and the networks it develops. To compete for funding through an INRM investment strategy, communities must be able to confidently use the language of government agencies and invest time in the development of their project proposals. Once funded, project proponents are required to report quarterly using dedicated reporting software. Understanding corporate language and balancing other business and community commitments to satisfy reporting procedures with stringent deadlines can be very confronting for communities that may possess the will to take on ambitious projects, but lack the background and skills required to meet contractual obligations. If INRM projects are to be initiated, managed and owned by communities, it is imperative that there are those within the community with the time and skills to be able to deliver what is a very challenging process.

INRM investment funding; however, provides communities with a means of evaluating the success of their projects both at a district level and within the broader regional context. Projects must align with regional goals and objectives and proponents are accountable. Once understood, primary resource condition targets (RCTs) and primary management action targets (MATs) provide a meaningful framework about which a project can be structured. The Activity Methodology (defined actions, methods, milestones, outputs and delivery mechanisms) forces proponents to plan projects thoroughly and provides a process for continuous assessment of progress. Consequently communities are much more likely to achieve what they set out to do.

Funding cycles Support from government agencies will be required into the future if the current level of investment in containment and control of *Opuntia* spp. in the Flinders Ranges is to deliver a lasting benefit. The current gains are likely to be lost over time if

funding ceases in the short term. The project has a projected lifespan of twenty to thirty years. A three-year funding cycle (one year's committed funds with indicative budgets for a further two years) does not provide the community with confidence that long-term control will be achieved, particularly when the cost of control is greater than the value of the land.

If the pastoral landscapes of the Flinders Ranges could be ascribed an economic value that reflected their true biodiversity and conservation worth, investment in long term control would not be so difficult to justify. Whilst the cost of treatment continues to exceed the value of the land, landholders will inevitably be forced to rely in part on agency support to manage the high recruitment levels that have been observed in all areas where herbicide treatment is the main control (Charlton, and Peterborough, and Kruger National Park in South Africa).

The research imperative Further engagement with research institutions will be required if long-term control is to be achieved. By itself, herbicide treatment cannot deliver lasting control nor any hope of eradication. Genetic variability within wheel cactus and cochineal populations in the Flinders Ranges is currently being examined in an attempt to find an effective biocontrol for wheel cactus. However, many other questions remain. How long does wheel cactus and prickly pear seed remain viable in the soil? Why is there such rapid recruitment of wheel cactus following herbicide treatment? Ravens appear to be an effective dispersal agent for wheel cactus in the Flinders Ranges. How far do they fly from feeding areas, and is it possible to develop predictive models for outlier spread, based on the feeding range of ravens? Might feral goats be contributing to the spread of prickly pear east of Blinman? With adequate funding, the Blinman and Parachilna communities can continue to manage and deliver a control program for wheel cactus and prickly pear. However, collaborative partnerships are needed to provide the science required to achieve long-term eradication of invasive *Opuntia* species from the Flinders Ranges.

ACKNOWLEDGMENTS

I wish to acknowledge Keith Wiseman of Commodore Station, Darryl Fels of Motpena Station, Corky Reschke of Mt Falkland Station, John and David Henery of Alpana Station, John Bedford of Oratunga Station, Keith Slade of Mooloolo Station, Ian Fargher of Angorichina Station, Warren and Barb Fargher of Wirrealpa Station, Bill and Tom McIntosh of Gum Creek Station, David Scicluna of Angorichina Village, and Margii Caldwell of the Prairie Hotel. I would also like to acknowledge the assistance of volunteers Lyell Roocke and Stan Conish, Bernhardt's Pest Control, PhD student Justin Williams, Sandy Gunther from SA Arid Lands, John Pitt and Ben Shepherd of PIRSA Rural Solutions and DEH Project Manager Damien Pearce.

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