

Development of strategies for the eradication of gorse (*Ulex europaeus* L.) at a wind farm construction site in North-East Tasmania

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Summary Gorse (*Ulex europaeus* L.) is a significant environmental and agricultural weed and currently infests over 2000 hectares of a wind farm site in North East Tasmania. This paper outlines the development of a long term best practice management program with an aim to eradicate this invasive species from both the agricultural and high conservation areas of the property. Management techniques have been designed and are currently being implemented to cost-effectively control this weed while addressing some of the unique characteristics of the property.

Keywords Wind farm, gorse, best practice, integrated, eradication, construction.

INTRODUCTION

Cape Portland Property is located at Cape Portland, North East Tasmania and is the location for the proposed Musselroe Wind Farm site. The site is approximately 5500 ha and consists of grazing land with areas of remnant vegetation containing biodiversity of high conservation value. Annual rainfall at the site is around 627 mm with evaporation exceeding 1020 mm per annum. Remnant vegetation on the property comprises open *Allocasuarina* woodlands and coastal heathlands. The shiny grasstree *Xanthorrhoea bracteata* and sand grasstree *Xanthorrhoea arenaria*, both listed as rare and endangered, are present at the site. Gorse is a significant threat to biodiversity and agricultural production and has been declared a Weed of National Significance (Thorp and Lynch 2000). The weed has the ability to dominate the understory in native ecosystems and is a direct threat to rare and threatened species present on site. Gorse has been present on the site for a considerable period of time and infestations occur on around 2000 ha in varying levels of density. Gorse is a declared weed under Tasmanian legislation and is a high priority for eradication in the Dorset Municipality.

The site has a number of characteristics that affect the implementation of a gorse eradication program. The site has significant amounts of rare and threatened species requiring an eradication program to mitigate any impacts. A large scale fencing program has been undertaken to remove stock from remnant and other areas of significant biodiversity. All weed threats to

biodiversity are intended to be removed from these areas and are included in the development of the plan. Wind has a major effect on the methods of control that can be employed. The site has highly erodible sandy soils and the subsequent removal of vegetation by mechanical methods or by non selective application of herbicides can result in significant wind erosion.

The eradication program development must also address the issues of a persistent seed bank and potential recruitment over a large area. To reduce the spread of weeds and disease from machinery movements, large vehicular drive-through automatic wash down stations have been constructed at strategic sites. Construction activities on site may be utilised to provide covering material on a small scale to prevent seedling emergence. Significant guidance for the development of the program was provided by the Gorse National Best Practice Manual (Gouldthorpe *et al.* 2006).

MATERIALS AND METHODS

On-ground mapping Gorse was mapped on a square metre basis over the site using a specially-devised mapping system. Each defined area or paddock was grid searched, isolated individual plants were given a 1 m² default setting and recorded as point data. Infestations larger than one plant up to 1000 m² were recorded as point data and the size of the infestation was estimated. Infestations larger than 1000 m² were boundary mapped and recorded as polygons. These were photographed and linked to the site in the database to enable the most appropriate control activity to be identified. The data quantified infestation size, allowing control logistics to be generated and provide adherence to quality measures of herbicide application. The goal was to ensure no individual plants or infestations remained untreated and this was measured and recorded against the data provided as an outcome of the mapping process.

Integrated gorse eradication plan developed An integrated prioritised eradication program was developed to manage gorse both in agricultural and environmental systems. This plan aims to eradicate gorse from areas of high biodiversity conservation. Appropriate

methods were selected to control gorse based on site characteristics. Outlier populations were also targeted as a priority to reduce seed bank development.

Construction limitations Weed control activities and construction activities at the site needed to be coordinated to ensure occupational and health and safety issues were addressed. The presence of heavy construction vehicles and blasting at the site along with herbicide application was managed with the development of a zoning plan to monitor and coordinate all activities. Allocation of secure zones to separate various operations ensured safety requirements were met.

Control activities commenced The herbicides triclopyr, picloram and metsulfuron-s-methyl are the primary herbicides being applied. The addition of an organosilicant penetrant and a marker dye are being used to enhance application efficacy. Herbicides are being applied by a range of units designed to be the most cost effective in the delivery of herbicide. Quad bikes with 70 L rack packs, 30 m hoses and hand guns were used to control small isolated plants. These were refilled by a truck mounted tanker to minimise turn around time. Areas up to 1000 m² were controlled using purpose-built all terrain 400 L tankers towed behind quad bikes with remote 100 m reels. A high clearance tractor and trailer were used on larger infestations with a high volume handgun capable of delivering up to 80 L min⁻¹. Due to the large size of the property all units had GPS guidance to enable effective quality control.

Fire is being used as a component in some areas as part of an integrated program to control and remove the physical barrier of gorse around the construction sites and within remnant vegetation. This has also the combined effect of germinating a substantial percentage of the gorse seed bank to be controlled by herbicide. A 3 t roller was pulled behind a specialised shielded high clearance tractor to compress the gorse. This was left for 2 weeks to allow broken material to dry out, fire breaks were installed to prevent movement of fire offsite and a controlled burn was implemented. Selective herbicide was then applied to control emerging gorse seedlings. Controlled burns using this method were limited to areas that were not susceptible to wind erosion.

DISCUSSION

The gorse management plan is currently being implemented, with half of the sites expected to be controlled in year 1 including all single plants included in the 1 m² category. Results so far indicate the program is in line to achieve the goals of adhering to best environmental

practice for weed management. Table 1 indicates the amounts of gorse in each individual category as well as the number of infestations.

Table 1. Area of gorse by mapping type.

Mapping category	Area		Number of infestations
	m ²	ha	
1 m ²	1,189	0.11	1189
2–1000 m ²	220,311	22.03	704
>1000 m ²	1,907,065	190.70	151
Total m ²	2,128,565	212.85	2044

Environmental outcomes The expected outcomes from this program will be the long term survival of a number of rare and threatened species at the site and an enhanced level and quality of biodiversity. Information on the development of a large-scale property-based gorse eradication program will be gained. This will include integrated program design, site-based control techniques, application techniques and equipment design. Herbicide application with ground-based equipment was considered the most cost-effective method of control due to the spatial distribution of gorse on the property. Off-target damage, particularly with regard to threatened species, was a significant factor in the design of the control techniques. Herbicide selection and application rates are also currently being investigated.

Future program Intensive mapping of the infestations will allow future control efforts to be targeted to residual seed banks. Due to the large site area there would have been difficulty finding these at a pre-flowering stage. The eradication program has an intensive 5 year phase to control all mature gorse to prevent flowering and seed set, with a 20 year longer term monitoring and control period.

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