

Fine-scale weed mapping of two mining leases in Northern Australia

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Summary The aim of this study was to survey the density and distribution of weeds on the Ranger and Jabiluka mining leases, located in Northern Australia. Fine scale mapping was conducted with a GPS and palm-top computer. This is part of an annual monitoring program that has been conducted since 2003. The survey results are used to assess the effectiveness of weed management over the previous weed control season.

Keywords Weed mapping, weed control.

INTRODUCTION

The Ranger Project Area (RPA) and Jabiluka Mineral Lease (MLN1) are located in Northern Australia and are surrounded by, but separate from, the World Heritage listed Kakadu National Park. Both leases are managed by Energy Resources of Australia Ltd (ERA), with the RPA being an operational site and the MLN1 non-operational.

Fine scale weed mapping has been conducted annually on the RPA and MLN1 since 2003 (Welch and Puig 2003, Welch *et al.* 2004, Gardener *et al.* 2005, Gardener *et al.* 2006, Ramsay and Gardener 2007, Gellert 2008, Gellert 2009). This mapping provides data to assess the effectiveness of weed control measures and to inform ERA's decision making in regards to future weed management.

MATERIALS AND METHODS

The timing of the survey coincides with the early dry season, when native grass species are drying out, while introduced species such as Mission Grass (*Pennisetum polystachion* Schultze) are flowering and easy to see.

Both leases have been divided up into a number of Weed Management Areas (WMA) based on the track network, the amenity of the area, natural land features and land use. The weed control effort (man hours and herbicide amount) are logged separately for each WMA.

In each WMA, on-ground survey efforts were concentrated within 100 m of previous weed locations, tracks, roads, drainage lines and creeks. The majority of surveying was done on foot, although where there were access issues (potential bogging of vehicles or interaction with heavy machinery), WMAs were surveyed via helicopter using the same methods. The helicopter was also used to survey remote and

undisturbed regions of the RPA and MLN1 using a grid pattern of transects at 100 m and travelling at 60 knots.

While all introduced species were recorded, fine-scale mapping is only conducted for 13 species that have been identified as 'priority species'.

Mapping data were recorded using a TDS Recon palm-top computer with ArcPad GIS software installed, which had been uploaded with maps of the RPA and MLN1, WMAs and weed locations from previous years. This allowed attributes (density, size, location and species composition) of individual weed infestations to be recorded electronically (and quickly) in the field. A 'point', 'polyline' or 'polygon' shapefile was used to record the infestation in ArcPad, depending on its spatial extent.

The survey data are used to produce maps of the spatial extent and density of priority weeds on the leases, and to calculate the weed area in each WMA. The percent change in weed area from the previous year is also calculated for each WMA.

The data are then used to assess the success of weed management in each WMA over the previous weed control season. This then assists ERA to set priorities and targets for weed control in the upcoming weed management season.

RESULTS

Twenty-five introduced species were recorded on the leases in 2009. Individual plants of two weed species that are not yet established on the leases were located and controlled before they could spread.

The total area of mapped 'priority' weeds on both of the leases in 2009 was 146.2 ha (Table 1). This was a 22.3 ha decrease in the area of weeds on the RPA since 2008, though the weed area of MLN1 remained the same. However, on both leases weeds had increased in some WMAs.

Overall there were 545.5 more hours spent managing weeds in the 2009 control season than in 2008. Control was found to be particularly successful in some areas such as WMA 9A (Figure 1) where weeds had decreased from 12.0 to 4.6 ha.

Mapping data were used to prioritise the WMA for the 2010 weed control season, based on risk of weed spread, proximity of weeds to sensitive areas and phase of invasion.

Table 1. Summary of weed area (ha) and control effort (number of hours) in 2008 and 2009.

Region	2008		2009	
	Weed area	Control effort	Weed area	Control effort
Jabiluka MLN1	5.9	138.0	5.9	337.0
RPA irrigated areas	101.7	669.7	91.7	814.6
RPA non-irrigated areas	60.8	174.6	48.6	376.2

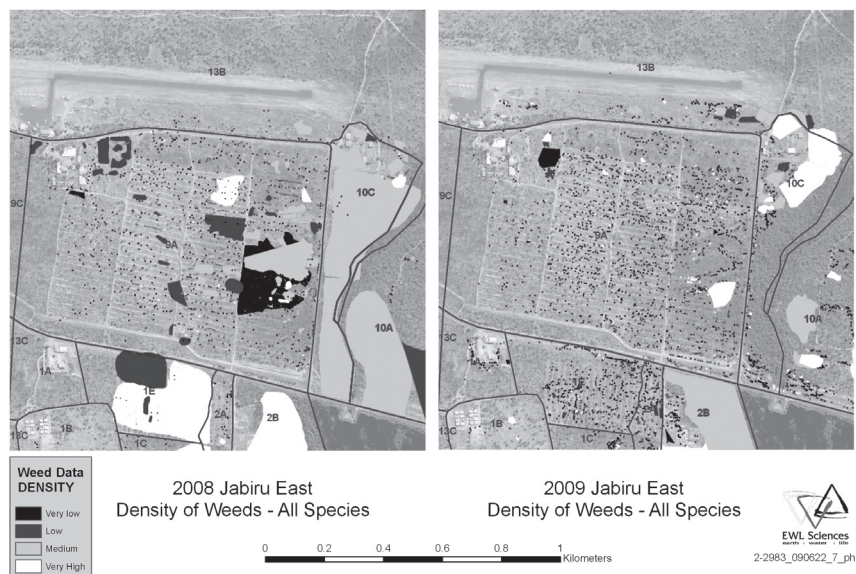


Figure 1. Maps comparing weed area and density in Weed Management Area 9A (located on the Ranger Project Area) between 2008 and 2009.

DISCUSSION

The weed mapping has been conducted by different personnel each year, and this has led to variability in recording of data. To increase the consistency of data recording between operators a standard operating procedure for the weed survey has been developed. This will increase the accuracy of data and increase the validity of comparisons between data from different years.

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