Quarram Nature Reserve – Grassland Community Monitoring

Background

Quarram Nature Reserve is an A Class Reserve vested in the Conservation Commission and comprises extensive areas of coastal parabolic sand dunes, freshwater lakes and swamps and interdune plains (Churchward et al, 1982). Low woodland, shrub and heath associations dominate the majority of the reserve, however historical records suggest that the small area of remaining native grassland in the interdune plain, east of Irwin Inlet, was once much wider spread than its current occurrence. This grassland community, known as the "Showgrounds", is one of the South West's last remaining native grassland communities and has been identified as a conservation value that must be protected during any management operations in this area.

It is believed that the Quarram Nature Reserve has a history of frequent burning dating back to Aboriginal inhabitation of the coast. Although the historical distribution of the grasslands is likely to be driven by geomorphology and landform systems, it is hypothesized that the structure and integrity of the grasslands are maintained by frequent fire. Given the short juvenile period and seed storage capabilities of the grassland community species, it is expected that these species are likely to be favoured over the shrub components of the ecosystem by a frequent fire regime.

The recent fire history of the Quarram Nature Reserve is non-existent. The area incorporating the "Showgrounds" has not been burnt for in excess of 30 years, resulting in a build up of litter that is unnatural for this ecosystem. Even prior to Aboriginal burning practices, the coastal landscapes would have been subject to frequent lightning induced fire events. There is some concern that the current infrequent fire regime is favouring shrub encroachment into the grasslands by allowing them additional time to mature, set seed and store large amounts of seed in the soil. Under this fire regime it would be expected that shrubs would rapidly out compete grasses by virtue of the sheer quantity of their stored seed in addition to the parent plants re-sprouting from lignotuber stocks following fire.

In addition to the grasslands, there are several swales consisting of dense sedges, which may support Quokka populations in the Reserve. These swales have also accumulated in excess of 30 years of litter and are now vulnerable to intense fire activity should a lightning strike ignite fuel within this ecotone.

A summer burn is proposed for a section of the Quarram Nature Reserve. A number of factors have been taken into consideration prior to prescribing the conditions for the burn. The grasslands will be favoured by a hot summer fire following flowering, the Priority listed *Dryandra sessilis* var *cordata* occurring within the burn area can only be taken in Summer/ Autumn (conditions imposed by Wildlife branch), and heavier sections comprising mature Banksia/ Peppermint/ Yate woodlands and Quokka sedge-land areas must be burnt under milder conditions given the volatile levels of litter accumulation.

A prescription has been completed taking into account all of these requirements and proposes to burn the grasslands and coastal heath in Autumn 2004 (wind driven buffer) excluding the Yate/ Banksia/ Peppermint woodlands and the sedge swales on the north eastern corner of the burn boundary (see WLP_507W Prescription for map and lighting strategies). The woodlands and swale will then be burnt in Spring 2004 in an effort to regenerate the portion of Quokka habitat within the burn area and to protect the mature woodlands from Wildfire.

Objectives

1. To protect the structure and integrity of the Priority listed grassland community in the Quarram Nature Reserve.
2. To regenerate Quokka habitat.

Site Selection

Grassland Community monitoring sites will be selected such that the following criteria are addressed:

1. The sites are representative of the range of structural types within and on the edges of the grassland community (i.e. grassland, grassland with some shrub component and shrub).
2. There is adequate plot replication within the burn area and adjacent unburnt area to ensure results obtained will be useful in a management sense.
3. There is replication within the burn area to the east of the Bibbulman track and within the burn area to the west of the Bibbulman track, to allow for additional fire regime trials in successive burning seasons.

Appropriate sites will be selected following a more detailed site assessment. However, Figure 1 illustrates possible location of sites to meet the above criteria.

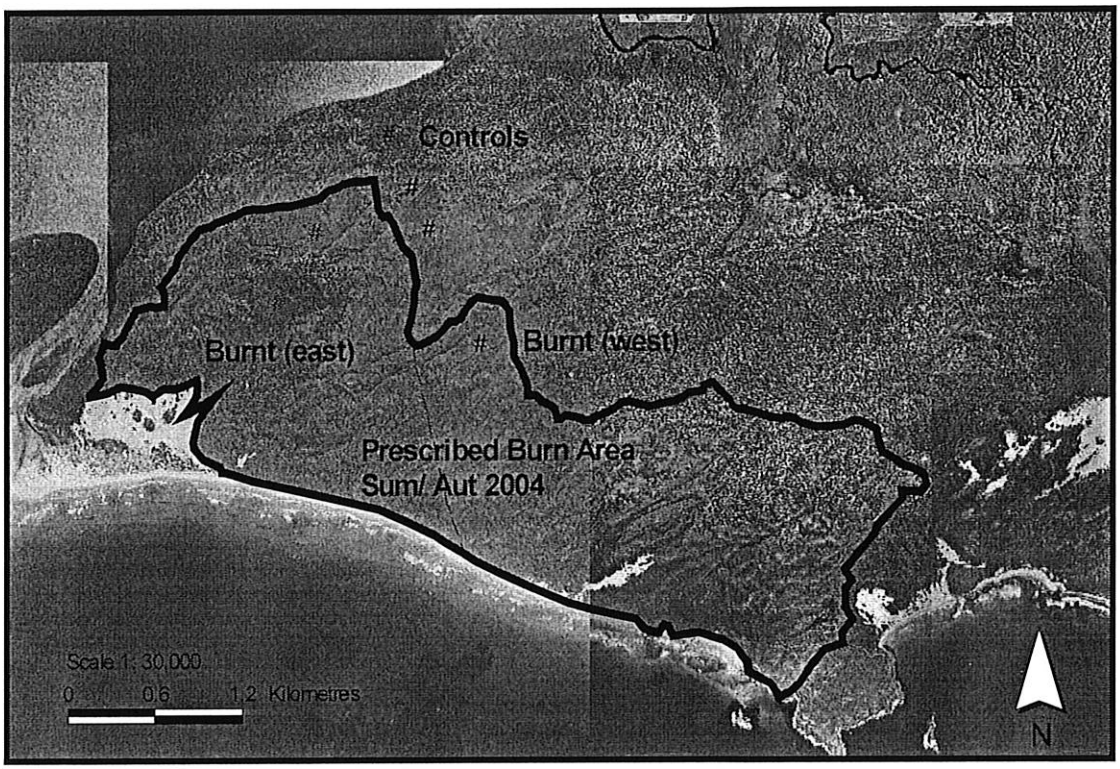

Figure 1: Quarram Nature Reserve Grassland Monitoring Possible Vegetation Plot Location

In the event that Quokka runnels, scats or tracks are observed during pre burn survey work, post burn Quokka monitoring will occur in areas where the activity was recorded.

Methods

1. General Pre-burn Survey Work.

General pre burn survey work will be completed during Spring/ Summer 2003 to compile the following information:

1.1 The presence or absence of *Setonix brachyurus* and *Pseudocheirus occidentalis* within the burn area will be determined, using the rapid "Liddelow" technique. This technique uses runnels, dreys, scats and tracks as indicators of fauna activity.

1.2 All grassland community species present will be documented prior to the burn. Personnel experienced in flora identification including Terry MacFarlane, Roger Hearn and Ray Cranfield will assist District staff and volunteers with grass identification.

1.3 Relevant geological information associated with the grassland and adjacent shrub communities will be documented.

2. Vegetation Plot Establishment

A modified version of the Forest Check procedures will be implemented for monitoring of the grassland community pre and post burn operations. Three ecotones have been identified as requiring monitoring. These ecotones include shrub land, the perceived transition zone between shrub and grassland and the grassland itself. For each ecotone four 30m² open quadrats will be established in a 100m² grid. In addition to the open plots, six 2m² grazing exclusion plots will be established at each site. Where possible, any topographical changes within the ecotone will be integrated into the design of the grid. Figure 2 shows a diagrammatic representation of the proposed monitoring set up.

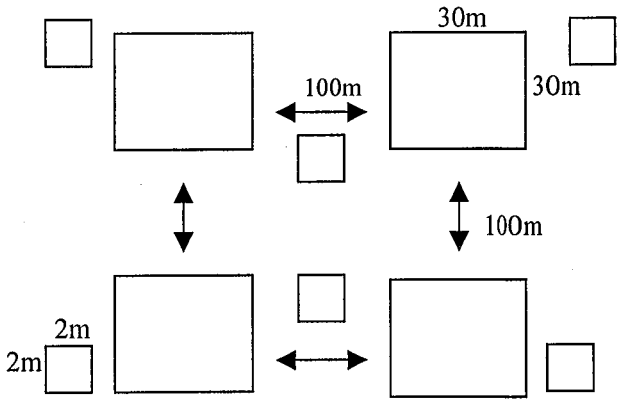

FIGURE 2: 100m² Vegetation Monitoring Grid, consisting of four 30m² open plots and six 2m² grazing exclusion plots.

Within each vegetation plot, the following information will be recorded:

- Species present
- Percentage cover of each of the species present
- Relative abundance of each of the species.
- Reproductive status of each of the species present - flowers
  0 = no flowers
  1= some flowers on some plants
  2 = some flowers on many plants
  3 = many flowers on many plants
- Reproductive status of each of the species present – fruit
  0 = no fruit
  1= some fruit on some plants
  2 = some fruit on many plants
  3 = many fruit on many plants

Voucher specimens will be taken of all species within the vegetation plots.

In addition to the vegetation monitoring plots,

It should be noted that post fire observations following a single fire event will not provide conclusive observations regarding the impacts of fire on the structure of the grassland communities. The first fire is likely result in an increase in the regeneration of many species including woody shrubs. It is the long-term maintenance of the grassland that this project is interested in. The initial monitoring will provide a baseline for comparison, after which additional fire introduction should be considered to determine appropriate fire regimes for the maintenance of the grassland community.

Monitoring Frequency.
The general survey work will occur in September, November and October 2003 for the establishment of accurate species lists.
Vegetation plot monitoring will occur Spring 2003 prior to the burn and then annually in Spring for three years initially, whereupon a decision should be made regarding the implementation of a more frequent burn regime.

Indicators of Success
OBJECTIVE 1: To protect the structure and integrity of the Priority listed grassland community in the Quarram Nature Reserve.

- Pre and post fire species correlations
- Vegetation structure
- Species assemblages

OBJECTIVE 2: To regenerate Quokka habitat.

- Pre and post fire Quokka presence in the swales.

Data Custodian
Matt Williams will be consulted for assistance with the establishment of a statistically "friendly" database for the treatment of flora data collected. It will be the responsibility of the District Nature Conservation Coordinator and the Threatened Flora Officer to develop and implement the database.

Analysis/ Reporting

Data will be reviewed in the third year of monitoring prior to the controlled burn planned for the section of the reserve east of the Bibbulman Track. At this point statistical analysis of the results and publication of some of the findings will be considered.

This project will have a high level of community volunteer involvement. Regular community education sessions will be essential for articulation of the outcomes of the efforts of district staff, research staff and volunteers.