

# THE LONG-TERM MONITORING OF LOWLAND NATIVE GRASSLAND SITES IN THE ACT

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## 1. INTRODUCTION

This monitoring program is an integral part of the Recovery Plan for relict lowland native grasslands. The program aims to monitor changes in vegetation composition, cover and structure, providing guidance for management of these sites and others.

The initial design and commencement of the program was established by the Grassland Project Officer, ACT Parks and Conservation Service, Wildlife Research Unit, who is to be responsible for the initial four years of its operation.

The monitoring program has been designed so as to be continued by a non-expert, although someone with experience in grassland vegetation. Standardised monitoring procedures have been established for comparative studies over time.

A comprehensive grassland herbarium has been established from field collected material and can be referred to at ACT Parks and Conservation Service, Wildlife Research Unit, O'Connor Depot. The Wildlife Research Unit will also provide technical advice and/or supervision.

The management of these initial sites will not be manipulated for the monitoring program. Changes in management will be noted but present practices will be allowed to continue. Other sites for research and/or monitoring purposes may be added over time.

### 1.1 Study aims

To measure change in species composition over time within sites on the basis of:

- \* changes in density and cover or growth form of significant species;
- \* proportion of exotics;
- \* invasiveness of exotics in particular, *Nasella neestana*, *Phalaris aquatica*, *Paspalum dilatatum*, *Hypochoeris radicata*, *Kunzea ericoides*;
- \* invasion of exotics from edges of sites;
- \* changes in management in a site over the period prior to monitoring and for the period over which monitoring takes place.
- \* changes in structure;

The monitoring program complements experimental work on management practises, particularly burning frequency and seasonal changes which is proposed to begin in 1994.

## 1.2 Study area

Lowland native grasslands have been identified as a nationally threatened community as they are no longer a major landscape feature throughout south-eastern Australia. Lowland grasslands are now highly fragmented and modified as a result of both rural and urban development. In the ACT the remaining remnants of lowland native grasslands can be found in Central Canberra and the Majura Valley, south to Hume, in parts of Gungahlin and Belconnen, in Tuggeranong and also in the lowland valleys throughout the Southern Tablelands. (see Figure 1 in text)

## 1.3 Time period for the study

The monitoring program has been designed to be carried out over a 20 year period. This period of time is required in order to see if the processes and dynamics within lowland native grasslands are directly associated to the changes in the grasslands itself, or alternatively whether they are a measure of the short-term fluctuations in populations as a result of perturbations such as weather patterns. It is necessary to collect the data at the same time every year for the data to be comparable. It should also occur when the majority of plants can be identified from flowering heads, fruits and seeds. A minimum of 5 years data would be required to detect any patterns arising.

The recommended timetable, therefore, is to survey in December every year from 1993 to 1996 and then every two to five years until 2112. The surveys will take approximately three weeks in 1993 and thereafter approximately 8-10 days, per survey.

## 2. METHODS

### 2.1 Study sites

Sites for the long-term monitoring program are located throughout central Canberra, Majura Valley, Belconnen, Gungahlin and Tuggeranong. Fifteen sites have been chosen for the first year's monitoring (Table 1) and additional sites may be added throughout the duration of the program. The sites were chosen on the basis of their high conservation rating but these sites also provide a variety of land use types and management regimes. In many cases the sites contained rare and/or endangered flora and fauna, previously identified, including *Delma impar* (striped legless lizard), *Synemon plana* (golden sun moth), *Keyacris scurra* (wingless grasshopper) and *Psoralea tenax* (emu foot).

Sites were chosen to represent a range of management regimes and also include the most significant sites in terms of species present.

**Table 1.** Long-term monitoring sites 1993

Sites	Dom.Spp	Mgmt	Transects
CC12 York Park Barton	Danth	Mown	8
MA01 Majura Valley E Army F.Ra	D/St/Th	Grazed	6
MA01 Majura Valley E CAA Beacon	Th/D	None	6
GU05 Lower Gungahlin	Them	Grazed	4
TU04 Kambah Pool	Them	Burnt	4
BE05 Belconnen Naval Base	Danth	Mow/gr	7
CC01 Yarramundi Reach	Them	Mown	4
CC13 Barton Cathedral	Them	Mown	4
WV02 Mt Taylor	Them	Burnt	3
CC08 Yarralumla Black St	Danth	Mown	2
CC02 Black Mtn SW	Them	Grazed	5
CC04 CSIRO Limestone Ave	Th/Dan	Mow/burnt	3
CC07 Dudley St Yarralumla	Th/Dan	Mown	3
GU03 Horse Park entrance	Th/Dan	Grazed	3

## 2.2 Plant species cover and structure

At each site the number of broad habitat types were identified according to the dominant species present. The number of transects per site were largely dependent on the site condition. In heterogeneous sites one or more transects were placed through each identified habitat type. In homogeneous sites replications of the one habitat type were carried out.

## 2.3 Transect design

Transect design is illustrated in Figure 2. Each transect is 30 meters in length and runs through the topographical gradient of the site. They have been permanently marked by burying a piece of stainless steel piping, approximately 10 cm in length, to a depth of 5 cm, at each end of the transect, to be located by a metal detector. Where appropriate, (not dangerous or not an inconvenience) white painted star pickets were used in addition to the stainless steel pegs for easy transect identification. Distance measurements, compass bearings, and other permanent site identifiers were used to pinpoint the exact location of each transect. Each transect was also referenced using a Geographic Positioning System (GPS).

Along each transect a 1.0 m<sup>2</sup> quadrat was placed on the south-eastern side at 5.0 metre intervals, starting at the 5 metre mark, thus giving five quadrats per transect.(Figure 2.)

## 2.4 Vegetation cover index

Within each quadrat all plants were identified to species level where possible and given a percentage cover value, that is 1-10% species cover was given a cover value 1; 11-20%, 2 ;.....91-100%, 10. These same cover values were also given for the presence of rocks and bare ground.

Litter cover was given ratings of very low (VL), low (L), moderate (M) and dense (D);

- \* Very Low (VL), a scattered thin layer of litter, of grass and other fine debris, usually with a high percentage, or consistent cover of bare ground.
- \* Low (L), a consistent thin layer of litter, comprising of grass and other fine debris with small patchy areas of bare ground usually present.
- \* Moderate (M), a patchy or consistent cover of litter up to several centimeters thick although not forming a dense mat. Minimal to no bare ground.
- \* Dense (D), patches of, or a consistent heavy layer of litter forming a dense mat, often inhibiting growth of underlying vegetation. No bare ground.

### 2.5 Sward height

A 1.0 m piece of dowel with 10 cm intervals marked along it was placed standing upright in the centre of each quadrat to measure the average sward height. The measurements were taken at the maximum height of the leaves and not to the top of the flower heads.

### 2.6 Photo points

At each of the lowland native grassland sites listed in Table 2, photographs will be taken from an easily identifiable point at each of the sites. Photographs will be taken from this same position at intervals of five years and the photos used as a comparative study of change in the grasslands at each of the chosen sites.

**Table 2.** Proposed photo point sites

Site	Dom. Spp	Mgmt
HA01 Hall Cemetery	Them	Mown
YS03 Qbn/Cooma Railway	Them	Burnt
JE01 "Woden"	D/St	Grazed
CC10 Lake B.G Foreshore sth	Danth	Mown
MA02 Campbell Park	Danth	Mown/Grz
TU05 Pine Island	Them	Burnt
BE07 Caswell Drive	Th/St	Grazed

### 2.7 Population counts

Many of the lowland native grassland sites in the ACT and region are home to a number of rare and/or endangered floral and faunal species. Where appropriate, individual population counts have been recorded:

- \* Cathedral site Barton. Numbers of plants of a small remnant population of *Ruttdosts leptorynchoides* were counted.

\* Army firing range Majura. Small isolated populations of *Themeda triandra* appeared to be establishing in what is a predominantly *Danthonia* grassland site. Where possible the number of plants, area covered and distance to the transect were counted and measured respectively.

\* Horse Park entrance site Gungahlin. The transects were established so as to incorporate populations of *Psoralea tenax*. In a separate study the *Psoralea* population has been mapped and individual plants counted (Dunford in prep.)

\* Black Mountain SW site. The distance from the transect position to potentially invasive species, *Kunzea ericoides* was measured where it was encroaching on the grassland.

## 2.8 MANAGEMENT HISTORY

The management history of the sites over the past ten years will be collected where possible and management between monitoring periods will also be documented, including grazing, mowing and burning.

## 2.9 DATA ANALYSIS

Measures of changes within sites will be analysed by applying statistical analyses including pattern analysis and analysis of variance. A report on the first four year's results will be available at the end of 1997.

## 3. OTHER RELATED STUDIES

Changes in spatial boundaries over time may be assessed for all sites using air photos from several past runs at about 10 year intervals up to 1989 and then several ensuring runs.

## 4. CONTACT OFFICER

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