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# MONITORING RANGELAND

## GUIDELINES FOR MEASURING CHANGE IN PERENNIAL VEGETATION

Prepared in response to requests by pastoralists
for guidelines to help them monitor the trends in their paddocks

Based on the 'Instruction manual of the Western Australian
rangeland monitoring system for arid shrublands' (1985)

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## Introduction

Pastoralists must know the effects their management has on the country. They must also know how the country responds to rainy periods and whether shrub reserves are improving. Monitoring accurately records these changes in the paddocks.

Range monitoring involves locating one or two permanent, fixed sites in each paddock on a station.

Use this pamphlet when installing range monitoring sites. It explains the method of site layout, photographic techniques and vegetation measurements involved in the process.

## The monitoring process

### Paddock equipment

Measuring tape, camera, step ladder (optional), 50 metres of rope. Use a 'clapper board' to identify the site in each photograph. For each site, two steel pickets are required plus, four small corner pegs (e.g. tent pegs), and a permanent site identification tag.

### Office equipment

A4 card or paper, plastic overlay material, glue (suitable for photographs e.g. clag), lever arch file, fine point permanent marker pen.

### Site selection

1. Choose the most important country type in the paddock for the first site. For the second site in the same paddock, choose the most sensitive country type.
2. Select a well-used water point closest to the chosen country type.
3. Determine the approximate salinity of the water.
4. To locate the site, use Table 1 to choose the correct distance from water.

**Table 1. Site distance from nearest water (km) in relation to water quality and country type**

| Water quality | Country type | |
|---|---|---|
| | Saline (saltbush, bluebush or lakeside) | Non-saline (grasses, bowgada, Wilcox bush, curara, cotton bush) |
| Less than 5,000 ppm * | 1.00-2.5 km | 1.5-3.5 km |
| More than 5,000 ppm * | 0.75-1.5 km | 1.5-3.5 km |

* 5000 ppm = 909 millisiemens/metre = 350 grains/gallon

5. At the correct distance from water, search for a site that is reasonably representative of the condition of that country type in the paddock.
Avoid choosing a site that is very different from the surrounding country (e.g. the only small patch of saltbush in the middle of a sago bush plain). Do not choose a site that goes across a change of country (e.g. located across the boundary between saltbush and wanderrie country).

6. Place the site 100 m away from the nearest track or fence to avoid areas of stock concentration.

7. When the precise site has been chosen, locate it accurately on the station plan, and give an adequate written description of its location (e.g. 1.5 km west of Bungarra Well, 100 m north of track; on sago bush flat).

## Site layout

1. Before laying out the site, select an alignment for the photograph so that the background is relatively open.

2. Position the two steel pickets along the chosen alignment, 13.5 m apart. The rear picket can be white or marked with a tyre (except in cattle country). Fix a permanent site identification tag to the front picket.

3. Position the corner markers as shown in Figure 1. It is important that the measurements are accurate. Run a 50 m rope or tape around the four corner pegs.

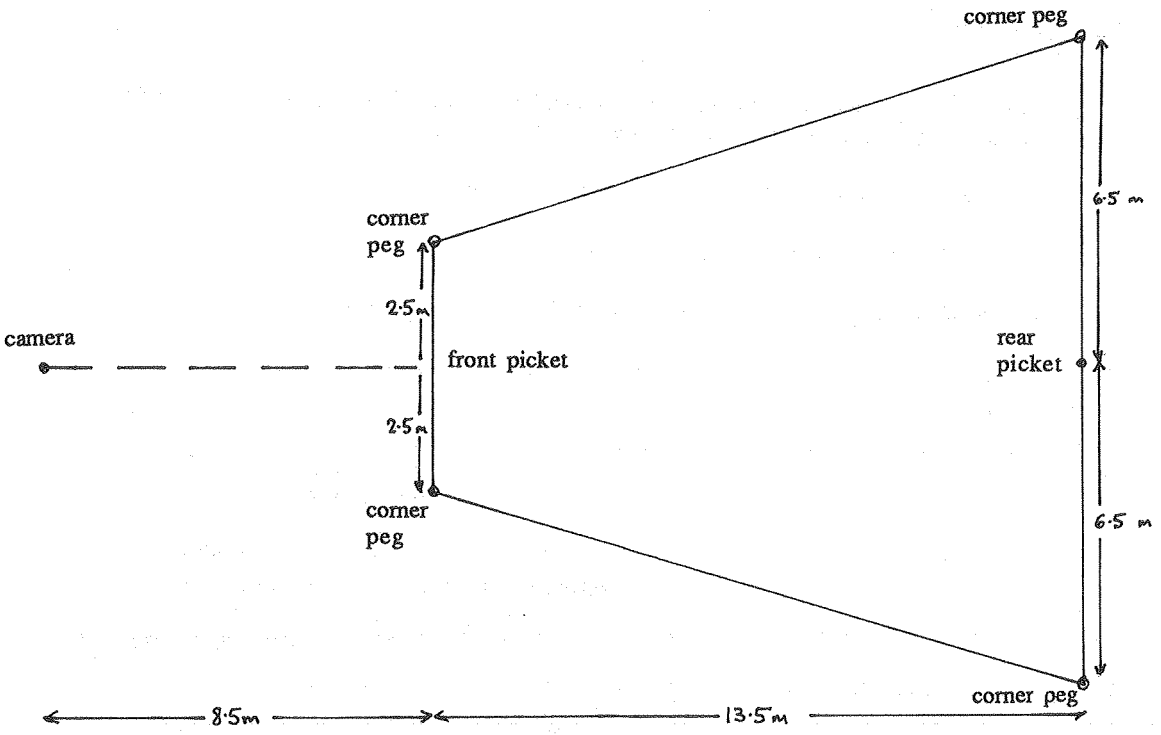



**Figure 1.** A scaled drawing of the site.

## Photographing the site

1. Set up the site identification 'clapper board' and place against the front picket. This will show clearly on the photograph the site number and date of photography.

2. To get the best photographic perspective of the site, take the photograph from 8.5 metres in front of the site. Stand on the roof of a vehicle or on the top of a step ladder. This technique will make most plants visible on the photograph. Avoid taking photographs into the sun early or late in the day. An example of the photographing procedure and of a photographed site is shown in Figures 2 and 3.

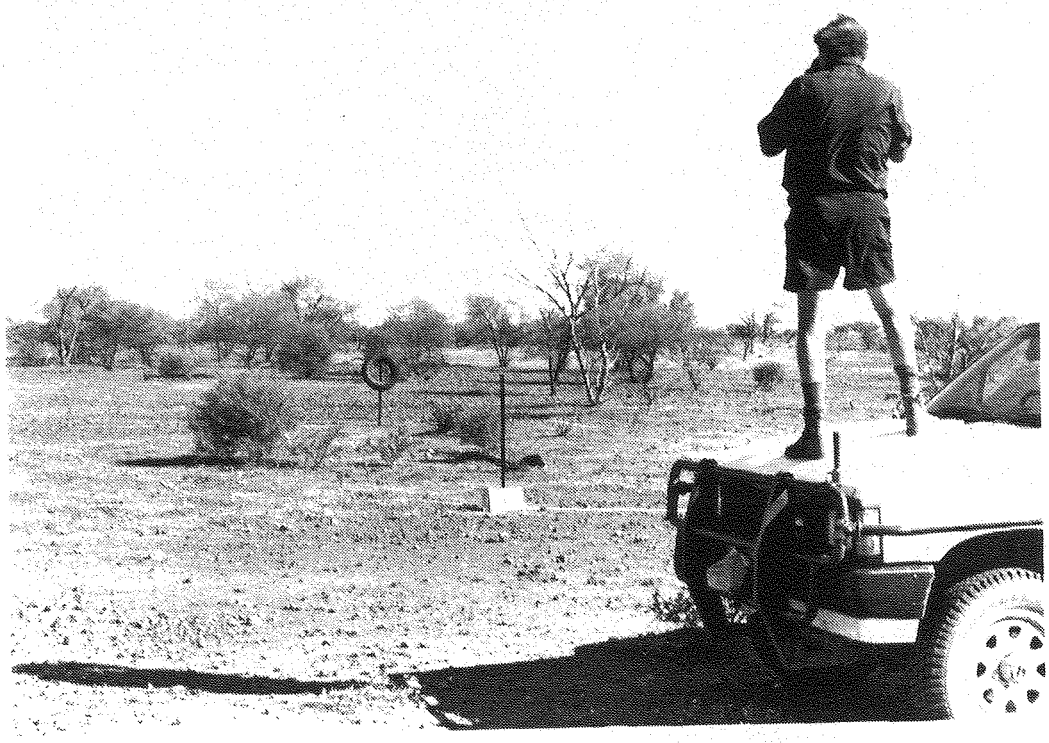


**Figure 2.** Photograph the site from 8.5 m in front of the site, with a camera height of 3 m. This fits all the site into the camera frame.

## Recording perennial plant numbers on the site for the first time

1. Write the common or scientific name of each species on a site record sheet. (A sample site record sheet is included as Appendix 1.)

2. For each species, count the mature plants within the site boundary. Enter the number on the site record sheet. Mature plants are bigger than 10 cm wide and 10 cm high or have woody stems (showing that they are more than two years old).

3. If individual plants are difficult to count where they grow in clumps, regard them as a single plant. Otherwise, develop a rule for when to count the plants within a clump. A useful rule is to count individual plants if there is more than 30 cm between stems where they enter the ground. Record any rule used on the site record sheet.

4. For each species, score the immature perennial plants within the site boundary. Enter the score on the site record sheet. The scoring procedure is as follows.

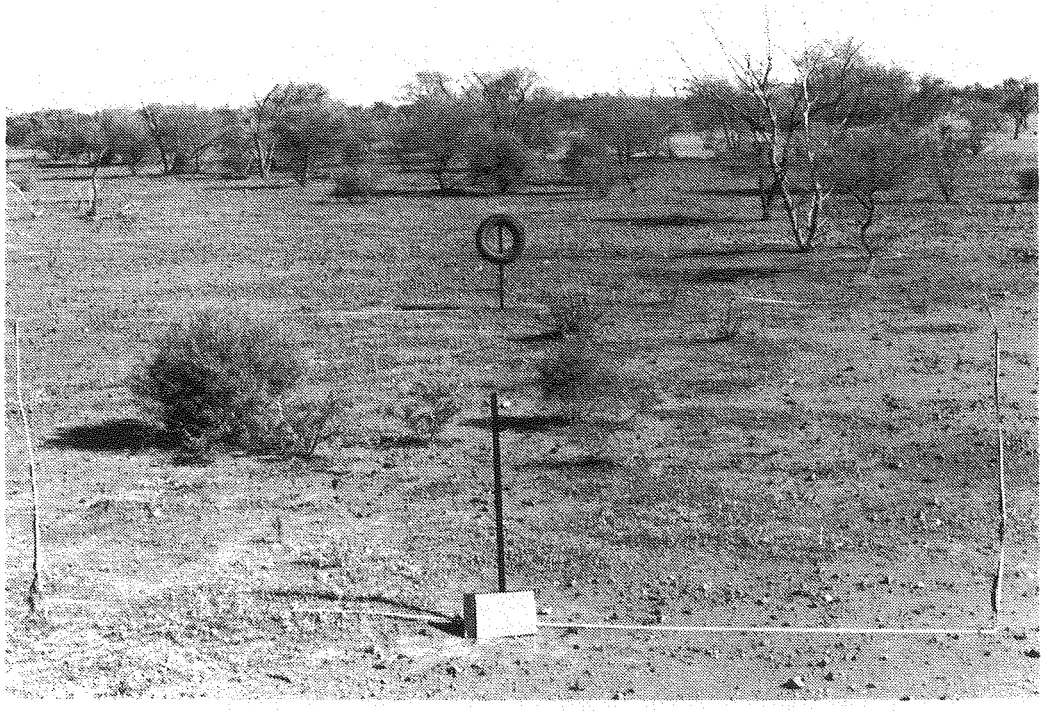


**Figure 3.** A rope or tape around the corner pegs can show up which plants are insise the site.

| Number of plants within site boundary | Score |
|---|---|
| Fewer than 60 per site | 1 |
| 60-300 per site | 2 |
| Over 300 per site | 3 |

## Recording other information

1. Record on the site record sheet the last twelve month's rainfall in the nearest rain gauge to the site.

2. Record stock movements in and out of the paddock using the paddock stock record sheet. (A sample paddock stock record sheet is included as Appendix 2 )

## Handling the photographs

1. Paste each photograph onto a standard sheet. If desired, fix a plastic overlay over the photograph. Use your own plant names if necessary.

2. Return to each site with the photograph as soon as possible (ideally within a month of site installation).

3. Identify and mark on the plastic overlay (or onto the photograph) at least one plant of each species found on the site. If there are only a small number of plants on the site they can all be marked on the photograph or overlay. An example of a marked-up photograph is shown on Figure 4. We have used a numbering system is used to simplify the example.

4. Store the photograph record sheets in a folder away from the light.

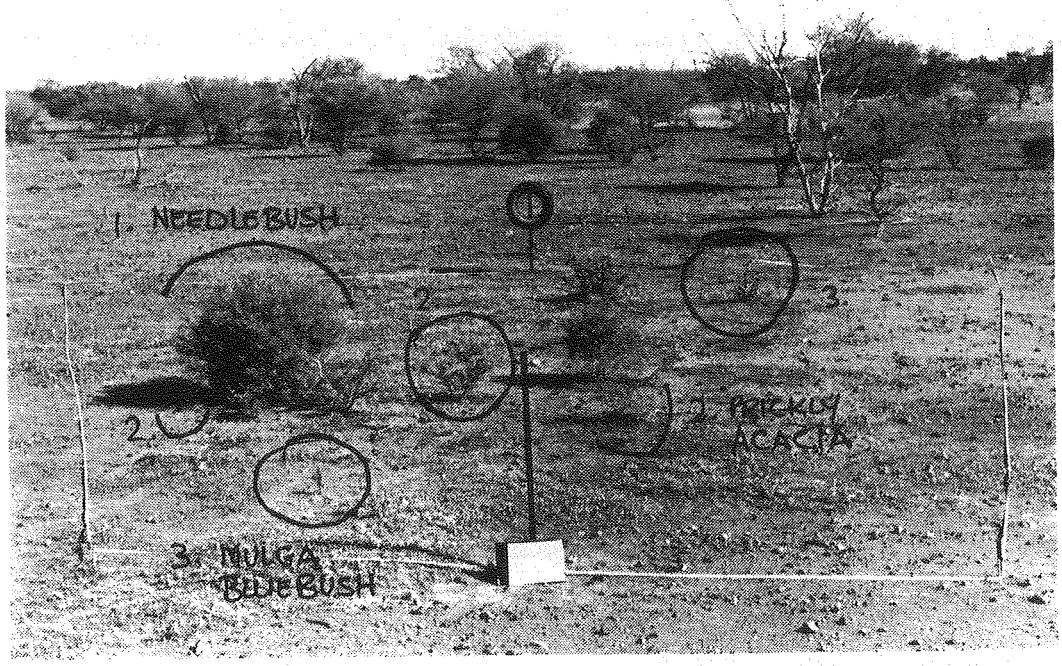



**Figure 4.** When the print comes back from developing, mark the plants on the photograph at the next site visit. A chinagraph pencil or permanent texta will write onto the photograph or onto a plastic overlay. Specimen plants can be numbered.

Key: 1 = Needlbush 2. = Prickly acacia 3. = Mulga bluebush

## Future site visits

### How often to look at the site

Visit the sites frequently to assess germinations or vegetation change. To help assess effects of grazing, compare the site with the record when deciding on the number of animals to add to, or remove from the paddock.

### When to re-count

To determine if there have been changes in the vegetation re-count the site at the same time each year. Use the same procedure as already described. Record the last 12 months rainfall and the stock movements in and out of the paddock using the record sheets. Re-photograph if there are changes in the vegetation. The photograph will need a site number and date on the clapper board. Put the new photograph onto a standard sheet and file with the earlier photographs.

### What to look for at every visit

Look at effects of grazing and climate on desirable plants in the marked sites. Compare the amount of feed with the most recent photograph.

### What to look for once each year

1. In the last 12 months have the adult perennial plants become larger or smaller? Check this against the photographs.
2. Are there plants newly visible that are not apparent on the most recent photograph?
3. Have there been any losses of plants that are still visible in the most recent photograph?
4. From a full re-count is there any change in the total number of individuals within each species on the site?

## Using monitoring site information

Frequent visits can be used to guide immediate decisions on stocking rates.

Changes in the numbers of perennial plants, major germination events and significant losses can all be used in guiding decisions relating to long-term paddock use.
These decisions may include when to:

- rest a paddock;
- change a grazing system (e.g. rotational to set stocking);
- change the class of stock;
- increase grazing pressure;
- develop new watering points; and
- place new or relocated fences.

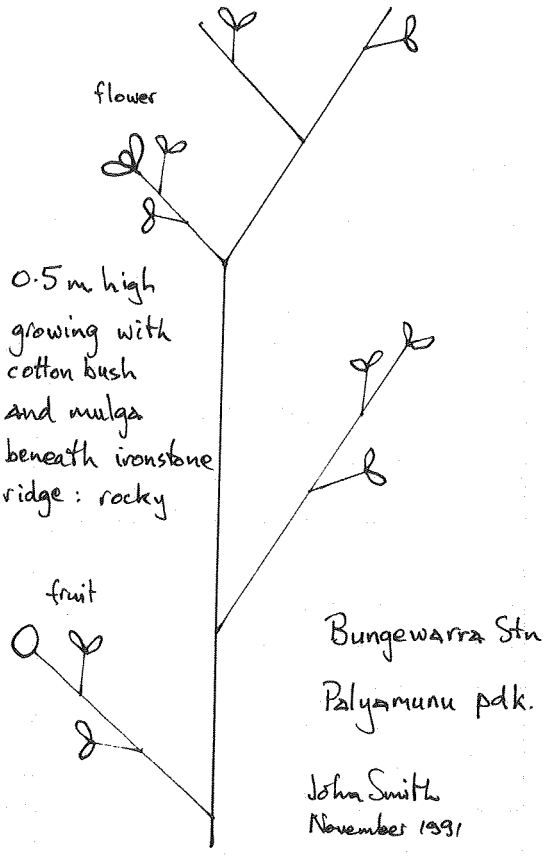
## How to identify plants

JS 2

1. 'Plants of the arid shrublands of W.A.', Mitchell A.A. and Wilcox D.G. (1988). The book gives separate sections for pictures of annual herbs, grasses, shrubs, trees. The index has two parts: one part lists common names and the last part the scientific names.

2. To send a plant for identification you will need three samples about 15 cm (6") long. Provide stalk, leaves, flowers and seed pods if possible. Press the samples flat in newspaper or inside a phone book. Do this while they are still fresh (otherwise they may break into pieces). Write the plant size.

   On three sheets of paper write the same page number (e.g. JS 1). Write the soil type or land system and what else is growing near it. Include the paddock and station name as well as your own. Keep one labelled sample page and send two to the Department of Agriculture. The number of your page may be used for the reply to you (e.g. JS 1 is flannel bush, *Solanum lasiophyllum*; JS 2 is tall saltbush, *Rhagodia eremaea*). Keep the plant collection where you can compare the replies with the samples you kept.




**Paddock stock record sheet (one sheet for each paddock)**

Paddock name: Grazed area:

Please complete a line of this table every time the number of animals changes. If stock are taken out of a paddock, record the number. If stock are let into a paddock, record the number. For column C, appropriate multiplying factors for classes of sheep can be chosen from: weaner 0.8, wether 1, dry ewe 1, ram 1.2, pregnant ewe 1.5, lactating ewe 1.7. One beast (large stock unit) can be regarded as eight small stock units. One way to fill in this sheet is shown in the example. The first five columns are the easiest to fill in and should be filled in when moving stock. This is essential information for your records; the calculations may be done later.

| Animal class | Date in | Date out | Comments | Number a | Days grazing b | Multiplying factor c | Small stock unit days (ssu days) a x b x c | Stocking rate 365 x hectares / total ssu days |
|---|---|---|---|---|---|---|---|---|
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# APPENDIX 1.

## Site record sheet

**Site no.** _____

**Paddock name** _____

**Water name** _____

**Salinity** _____ **Date measured**

| **Counting plants: how to record juvenile scores** | |
|---|---|
| Fewer than 60 | → J1 |
| 60-300 | → J2 |
| More than 300 | → J3 |

| Species | Date: ..... | | Rain between recording dates | Date: ..... | | Rain between recording dates | Date: ..... | | Rain between recording dates |
|---|---|---|---|---|---|---|---|---|---|
| | 1991 Count | 1991 Juvenile scores | | 1992 Count | 1992 Juvenile scores | | 1993 Count | 1993 Juvenile scores | |
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**Example**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NEEDLEBUSH | 3 | – | 173mm | 3 | – | | | | |
| PRICKLY WATTLE | 7 | – | | 7 | – | | | | |
| MULGA BLUE BUSH | 2 | J1 | | 3 | – | | | | |

# APPENDIX 2.

**Paddock stock record sheet (one sheet for each paddock)**

Paddock name: PALYAMUNU Grazed area: 8821 ha

Please complete a line of this table every time the number of animals changes. If stock are taken out of a paddock, record the number. If stock are let into a paddock, record the number. For column C, appropriate multiplying factors for classes of sheep can be chosen from: weaner 0.8, wether 1, dry ewe 1, ram 1.2, pregnant ewe 1.5, lactating ewe 1.7. One beast (large stock unit) can be regarded as eight small stock units. One way to fill in this sheet is shown in the example. The first five columns are the easiest to fill in and should be filled in when moving stock. This is essential information for your records; the calculations may be done later.

| Animal class | Date in | Date out | Comments | Number a | Days grazing b | Multiplying factor c | Small stock unit days (ssu days) a x b x c | Stocking rate 365 x hectares / total ssu days |
|---|---|---|---|---|---|---|---|---|
| EWE(GREEN) | 1·12·90 | | | 406 | | | | |
| | | 1·11·91 | SHEARING | 388 | 335 | 1·0 | 124005 | |
| | | | | | | | | |
| RAM | 15·12·90 | | JOINING (16) | | | | | |
| | | 28·2·91 | | 16 | 74 | 1·2 | 1421 | |
| | | | | | | | | |
| LAMB(BLUE) | | 1·11·91 | TO SALT PADDOCK | 220 | 150 | 0·8 | 41 250 | |
| | | | | | | | 166676 | 19·3 ha/ssu |
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