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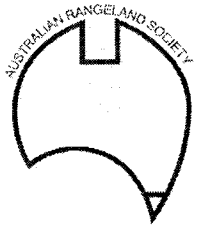

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USING A BROAD-SCALE MONITORING PROGRAM TO INTERPRET LEASE-LEVEL DATA

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ABSTRACT

The Western Australian Rangeland Monitoring System (WARMS) provides an assessment of change at district or vegetation group level. Site density is insufficient for lease-level assessment; such assessments are made by ground traverse during lease inspection. Using WARMS data to identify district-level changes, the extent to which broad-scale changes are reflected on individual leases can be determined.

By comparing both datasets (broad-scale and lease-level), those making judgements about the influences of management should be better able to attribute causal factors to the observed change, and so better evaluate the outcome of management actions. For example, broad-scale data might suggest widespread increases in perennial grass frequency across the district, yet observations on an individual lease in that same district may show a decline over the same period. This would signal that management may have led to the decline, prompting more detailed examination.

INTRODUCTION

Range condition assessment and the capacity of pastoral land to carry stock are relatively well understood, although debate about techniques and appropriate models continues (see Watson *et al.* 1996, Westoby *et al.* 1989). However, less well understood are the causes of identified changes. This uncertainty often leads to considerable debate between land managers and regulatory staff of land management agencies. The debate is not only about responsibility, because without some certainty as to the causes of change, decisions as to appropriate management responses will always be fraught with difficulty. Potential drivers of change include seasonal conditions, grazing pressure and management, fire history and, importantly, the interaction of such drivers. Without some confidence in the attribution of the change, dialogue between managers and regulators will focus far more on causality than on how best to achieve improvement in range condition.

Assessment of Western Australian pastoral leases results in a range condition report, which includes advice to the Pastoral Lands Board of WA regarding any issues on the lease. On those leases where range condition is considered unsatisfactory, management is obliged to act to address the problem(s) identified. However, in defining a response, there is often debate as to cause, and factors beyond management control, particularly unfavourable seasons, are often cited by managers as being fundamentally responsible. Such managers may assert that current management is appropriate, and that with a return to favourable seasons the problem will rectify itself. This often causes acrimony between agency staff and managers, and delays any implementation of remedial management.

The Western Australian Rangeland Monitoring System (WARMS) provides an objective assessment of change in perennial vegetation at the district or vegetation group (pasture type) level. WARMS is a ground-based system with permanent sites, but because of the relatively low density of WARMS sites, it is not possible to report at the individual lease scale. Rather, WARMS functions to provide a broad-scale picture of rangeland trend and in doing so integrates the impact of those general drivers that are not subject to individual management decisions. Consequently a group of WARMS sites can be used to provide a context within which one or more pastoral leases operate and so overcome the problem, at least partially, of establishing causality. Although individual WARMS sites may have been overgrazed, it is unlikely, although theoretically feasible, that all WARMS sites in a given district, or of a given vegetation type, have been subject to inappropriate management. This paper provides an example of how the information from WARMS sites can be used to interpret information from traverse assessment conducted at the lease level.

METHODS

WARMS sites are assessed every three years, with around one third of sites assessed annually. The frequencies of all perennial and some pastorally significant biennial grasses are recorded at the species level on permanent sites. Sites were initially located to represent the most common vegetation state for the vegetation type concerned. Data from the East Kimberley (39 sites) were evaluated from assessments made in 1996 through to 2005. The earliest WARMS data were collected immediately before the "base" traverse assessment of the case study lease, and the last just prior to the most recent traverse assessment. WARMS data were assessed at both the pasture community level and as "all sites". Changes in perennial grass frequency between assessments were evaluated and used to determine the general trend (in terms of drivers of range condition) experienced in the region from 1996 to 2005 to provide a general picture of change.

The range condition of pastoral leases in Western Australia is assessed by ground traverse, generally every six years. Both pasture condition (similarity to pristine vegetation) and soil condition (extent of soil erosion) are assessed at 1 kilometre intervals along selected traverses throughout the lease. Pasture and soil ratings are combined into an assessment of range condition. For the lease under consideration, range condition data were analysed at the pasture community level on two occasions (6 years apart), and were evaluated to determine the pasture condition status of the lease at the time of the second assessment (2005) as well as the change that had occurred between the two assessments (1999 and 2005).

RESULTS

WARMS data suggest that conditions were generally favourable for perennial grass establishment and expansion from 1996 to 2005 (Figure 1).

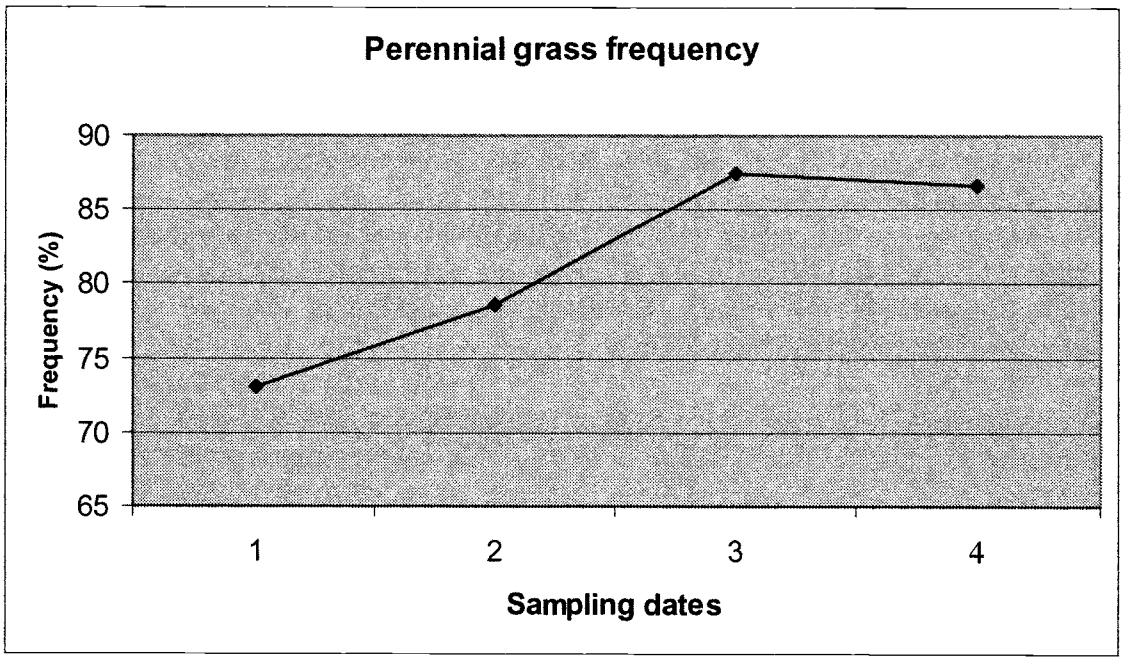

Figure 1: Perennial grass frequency (%) from WARMS sites, East Kimberley

Perennial grass frequency increased throughout the period under question, except for the final sampling interval when there was a slight, although not statistically significant, decline. This was to be expected given the favourable run of seasons from 1993 to 2004, providing an extended period favourable for perennial grass establishment and development. Therefore, WARMS results suggest an expectation for either maintenance of range condition (on leases where condition was generally satisfactory) or an improvement in condition elsewhere.

There were differences in the change in range condition among pasture communities (Table 1).

Table 1: Mean range condition score on two occasions (1999 and 2005) from a sample lease in the East Kimberley, WA

Pasture Type	Mean Range Condition Score* (1999)	Mean Range Condition Score* (2005)
Black soil	1.7	1.5
Hard spinifex	1.1	1.1
Ribbon grass	1.0	1.7
Arid short grass	3.0	3.0
Soft spinifex	1.1	1.3

* Ratings: 'Good'= 1; 'Fair'= 2; 'Poor'= 3.

The range condition of Ribbon grass (*Chrysopogon fallax*) pasture type declined from 1999 to 2005 and Black soil pasture type improved slightly, while a second pasture type (Arid short grass pastures) was rated as being in 'poor' range condition at both assessments.

DISCUSSION

In the case-study example, district changes inferred from WARMS data suggested an expectation that range condition would have either been stable or improving at the lease level. For the case-study lease, this was essentially correct, suggesting that lease-level drivers (i.e.

management decisions) were not particularly different from the general trend. This, in turn, suggests that management has generally been appropriate over this period. However, the decline from 'good' to 'fair' range condition in the Ribbon Grass type and the continuing 'poor' condition of the Arid Short Grass type over the six year interval does suggest that, in these particular instances, management may have been inappropriate. For example, cattle preferences for these pasture types may have induced an actual grazing pressure significantly above that applied by the manager within the management area concerned, and the pasture communities have not been able to benefit from the favourable seasonal conditions (as reflected in the overall WARMS data). In this case, reductions in livestock numbers and changes to grazing patterns could be warranted.

District-level change is influenced by the collective management of those leases in the chosen region in response to rainfall, fire etc. The ability to define a "district environment", within which changes in range condition at the lease level can be assessed, strengthens the capacity of both managers and agencies to define the drivers of change and so determine any required management actions. While this technique does not provide absolute certainty, the strength of the WARMS data lies in assisting to focus discussion by providing a "benchmark" statement of the impact of all drivers integrated across the district, with lease-level change differences from this being clearly identified. Since "lease-level" factors are most frequently management-induced, negative changes in range condition are more easily ascribed to a likely cause.While this may have been considered evident at some level previously, the added information provided by the WARMS sites assists the reporting officer in defining causality and so identifying whether any lease-level management changes are required.

CONCLUSIONS

Regional scale monitoring can provide context for changes observed at the lease scale, and so help determine whether lease-level changes are primarily due to management or to seasonal or other non-management factors. With this information, debates as to causality can be reduced and management actions targeted to achieve maximum response.

REFERENCES

Watson, I.W., Burnside, D.G. and Holm, A. McR. (1996). Event-driven or continuous - which is the better model for managers? *Rangel. J.*, 18: 351-369.

Westoby, M., Walker, B. & Noy-Meir, I. (1989). Opportunistic management for rangelands not at equilibrium. *J. Range Management,* 42: 266-274.