PUTTING TOGETHER THE PIECES: RESEARCH TOWARDS A FIRE MANAGEMENT STRATEGY FOR QUEEN VICTORIA SPRING NATURE RESERVE

David Pearson
CALM Woodvale
ph. (09) 405 5112

CALM manages a vast estate of desert nature reserves, totalling some 6 million hectares. Fire is a frequent and inevitable disturbance throughout most of this area, and its harnessing to create or maintain habitat heterogeneity and species diversity has been widely recommended.

In a study in hummock grassland on the south-western edge of the Great Victoria Desert, the effects of summer wildfires and cooler spring "prescribed" fires on species richness of terrestrial vertebrates and plants was examined. Species richness is one part of the widely and often misapplied term of "species diversity". Species richness refers to the number of different individual species which occur in a given area.

Spring fires usually result in a inter-digitating patchwork of fire scar and unburnt vegetation. Summer burns, when burning under good winds and hot conditions, tend to remove all above ground leaf material leaving few unburnt patches. Nonetheless, even fierce wildfires leave occasional areas unburnt because of landform effects (eg. steep dunes or salt lakes) or less severe fire conditions during night-time periods.

Species richness amongst reptiles was highest on the patchy burnt spring plots, because the fire opened up opportunities for a number of open area specialists but there was still sufficient spinifex cover to support those species which are dependent on it for foraging or shelter.

Summer fires led to a decline in species richness, at least in the short term. However, species typically thought of as spinifex-dependent began to reinvade burnt areas 3 years after fire, even though spinifex cover was very low. They appeared to be using the cover provided by the many herbs in the regrowth. The speed and success of recolonisation of burnt areas by such species may depend on the availability of unburnt refugia in fire scars. Patches of spinifex as small as 3 m^2 have been sufficient for the survival of some species.

Amongst the small mammals, species richness declined after the summer fire with the loss of *Ningaui ridei*. There was also a reduction in the abundance of all other dasyurids. *N. ridei* appears to do much of its foraging within spinifex hummocks; it did survive in spring burnt areas. Several dasyurids have good dispersal capabilities, particularly *Sminthopsis hirtipes* and *S.*

dolichura, the juveniles of which dispersed rapidly into summer burnt areas.

The question of the effect of fire on species richness in plant communities is more complex. The passage of a fire irrespective of season or intensity leads to the germination and growth of many ephemeral herbs and short-lived shrubs. It would appear superficially that fire increases plant species richness; but probably all non-sprouting species have regenerated from soil-stored seed which was present on the site prior to the fire. Hence species richness has not really changed, just the manner in which it is manifested. No plant species were found to become locally extinct due to fire although the abundance of some fire-sensitive species (eg. *Callitris pressei*) may initially decline.

The results from this study thus far, would suggest that the adoption of a spring patch-burning programme will result in higher small mammal and reptile species richness per unit of area. However, before we embark on an extensive programme of prescribed aerial or ground-based burning, we need to be clear about what we hope to achieve. We will never have the funds to patch-burn all the flammable plant communities in desert nature reserves (or any other region for that matter), and indeed, I would suggest that we should have no wish to.

We need to identify communities and species which have specific fire requirements and those high productivity sites (such as palaeo-drainages) where the application of fire could increase heterogeneity in biotic communities. Much of the remainder of the reserves could then be left to burn under "natural fire regimes", that is infrequent, lightning-ignited wildfires. This strategy would loosely resemble that of desert Aborigines who maintained seral patchworks in productive areas but burnt the remainder of their estates either irregularly when conditions permitted visitation or merely left them to burn by lightning-ignited fires.

To accurately plan and execute a fire management strategy for any desert nature reserve, which will be of benefit to nature conservation, we need to know more about their biotic and edaphic characteristics. Obviously, funds are just not available to carry out detailed surveys in each reserve in the next few years. We need to decide what information is required now to permit sensitive management for nature conservation. Whilst burning to prevent major wildfires is a laudable and justifiable objective on much of CALM's estate, we must look to more conservation-oriented goals in many of our nature reserves. Intervening to prevent wildfires expends considerable resources, resources which could be spent learning more about the reserves or monitoring other management problems.

We do need to use fire for nature conservation. But knowledge and expertise is available to make our management more

sophisticated than simply burning buffers or blocks to reduce the likelihood of large wildfires. In the list below, I have listed some preliminary ideas about the information we need to collect to adequately plan fire management strategies for the primary goal of maintaining or enhancing nature conservation values. This list is incomplete (particularly for faunal data), but nonetheless I hope it is of value in identifying what data is needed and how some of that data might be obtained at minimum cost. I would welcome suggestions and comments about factors which should be included or removed.

We are charged with an onerous responsibility; to act as custodians over a biotic heritage which needs to last for a long, long time. To do this to the best of our ability, we must use the best available information, spend time thinking about, and discussing our objectives, and how they can best be satisfied with the resources available.

Minimum Critical Data Set for fire management in a desert nature reserve

1. A detailed vegetation map at a scale of 1:50 000 to 1:80 000 - using old B&W aerial photography, TM imagery or borrowed colour aerial photography (mining companies?).

2. Accurate locations of DRF, poorly known and restricted plant taxa - from Herbaria records, books and experts, followed up by field survey.

3. A survey of fire regeneration strategies of above taxa from literature, experts or observations in fire scars.

4. Survey for fire-sensitive species and communities - look in places likely to escape fire on most occasions, eg. dune crests, creeklines and around rock outcrops.

5. Determination of regeneration requirements of any fire-sensitive communities or species, particularly obligate re-seeders - from field observation, etc.

6. Preparation of a fire history map at the same scale as the vegetation map to permit overlay.

7. If possible, determination of the time taken for species to regenerate, flower and set seed.

* . Design and implement a monitoring scheme based on permanent plots with the collection of pre-fire data wherever possible.

* Adopt a cautious and conservative approach to the scale of burning undertaken; retain large areas in an unburnt state.