

FIRE MANAGEMENT OF CONSERVATION RESERVES IN THE KIMBERLEY

On 4 October 2000 our speaker was Chris Done, Regional Manager in Kimberley for the Department of Conservation and Land Management WA. Chris generously stood in for Rick Sneeuwjagt, who was unable to attend, and we reproduce the talk he presented below (with some editing for reasons involving space).

Introduction

The Kimberley region is internationally renowned for its spectacular scenery, and the richness of its biological, cultural and economic resources. The region has an area of about 423,000 square kilometres, or approximately 16 percent of the area of the state of Western Australia.

The Department of Conservation and Land Management is responsible for the management of about 2.5 million hectares of conservation reserves including national parks, nature reserves, conservation parks and marine reserves. Other categories of land within the Region include pastoral leases, reserves for the Use and Benefit of Aborigines, and Vacant Crown Lands.

Pastoralism has been a major land use in the region for the past century and mining, irrigated agriculture, horticulture, tourism and conservation have been increasing in scope and importance in recent years. A major land use change has been the result of increasing number of Aboriginal groups wishing to establish rural communities and living away from existing towns. The tourism industry continues to expand.

Like other parts of northern Australia, the climate is a dry monsoonal climate with three distinct seasons and several transition periods. Generally the "wet" season falls between November and March, the moderate "early dry" season occurs from April to June/July; and the hot "late dry" season from July/August to November. Aboriginal groups from the region recognise five seasons or more. For example, local Aborigines from the Kimberley coast (Karrajari people) describe fire seasons of varying length. These are Mankala (wet, January to mid-March); Marrul (transition at end of rains); Parrkara (onset of cooler weather from May to August); Wirralpuru (transition to hotter weather) and Laja (extremely hot).

The Kimberley Region has in excess of 2000 species of vascular plants, many of which have closer affinities with plants of the Northern Territory and Queensland, than with the rest of Western Australia. The dominant vegetation types consist of tropical woodland savanna which are dominated by tall Sorghum grasses and Hummock grasses beneath scattered eucalypt tree species (eg: *E. tectifera*, *E. grandiflora*, *E. microtheca*) are three of more than 60 species of Eucalypts.

Like the rest of northern Australia, fire is a natural phenomenon in the Kimberley. Prior to Aboriginal presence, lightning was the main cause of extensive fires that

frequented the region. Fire was used extensively by Aboriginal people before European settlement as a land management tool for hunting as well as to facilitate movement throughout the area. Whilst much of the burning would have taken place in the dry seasons, there is clear evidence that fire was used throughout the year. This constant activity led to a patchwork of areas, which had been burnt at various times across much of the country. Potentially damaging fires, which occurred, either from lightning strikes or from deliberate lighting late in the dry season, did not become catastrophic because they ran into previously burnt areas.

It is generally agreed that since arrival of Europeans there has been a shift in the frequency of fires towards the late dry season resulting in large hot fires, which are of great concern because of their damaging impact on the flora and fauna of the region. Part of this change to late season fires has been due to the adoption of fire management techniques associated with stock grazing practices. In the main, pastoralists restricted the extent and frequency of fires which inevitably led to late season fires burning through those areas that had been missed by the limited early season burns.

Damage From Late Season Fires

An indication of the damage being incurred on the natural tree cover by late season fires can be observed from the study of impacts of “early dry” and “late dry” fires on the tree survival in a tropical woodland savanna in the Kakadu National Park. (Williams et al, 1999) (1).

A study of the effects of three different fire regimes on tree survival of different tree species has shown that, in general, about 98% of evergreen eucalypt woodland species survived low intensity “early dry season” burns that were applied each year over 5 seasons from 1990 to 1994. About 88% survived five annual treatments of moderate intense late-dry season fires, whilst about 85% survived a hot wildfire. The impacts on stem survival (as opposed to species survival) for these three fire treatments are more severe with 81% survival for early-dry season burns, 40% for late-dry season fires, and 47% for the wildfire. Thus it is clear that the high incidence of late dry season burns and wildfires will eventually lead to a severe decline in the presence of most of the tree species.

Cypress pine (*Callitrus intratropics*) is an important tree species found across the northern Kimberley, often as a component of Eucalypt dominated woodlands. Cypress pines were more common early in this century, but have declined over much of their range in northern Australia. Because they are relatively sensitive to fire; this decline has been attributed to changed fire regimes, in particular the occurrence of frequent, relatively intensive fires, which increase the mortality of adults and prevent successful survival of juveniles to the adult stage. Cypress pine may be a useful indicator of the more general response of local ecosystems to contemporary fire regimes. For example, if the interval between intense fires is too

short to allow replenishment of the seed banks of fire sensitive species, local extinctions of these species can be expected.

Although small in extent, rainforest patches (or vine thickets) have important conservation and cultural significance. Previous studies in WA and NT have suggested that patches can be damaged and reduced in size when their use by cattle makes it easier for intense fires to enter from the surrounding savanna.

Fire Management Responsibilities And Objectives

CALM as a land manager has specific fire management responsibilities under the WA Bushfires Act (1954). In particular there exists a legal and moral obligation to comply with those provisions relating to the prevention and control of wildfires on or near CALM managed lands, and the protection of life and property. CALM works closely with the Bush Fires Services (BFS) of the Fire and Emergency Services Authorities (FESA) in the region. The BFS has responsibility for liaising with pastoralists, land holders and local authorities as well as coordinating the fire prevention, prescribed burning, and fire suppression operations activities on other crown lands and private property.

On CALM managed lands, the broad fire management objectives for the Kimberley reserves are:

- To restrict the incidence and spread of late-dry season wildfires into and out of these conservation reserves for protection of life, property and natural values.
- To use fire appropriately to promote and sustain natural ecosystems.
- To assist Bushfire Services, local government and land holders/pastoralists/aboriginal communities in achieving satisfactory fire management outcomes for adjoining lands.

The former Forests Department has had an administrative presence in the Kimberley from 1979 to 1984. Since 1985 with the formation of the Department of CALM, staff numbers and fire management capability increased sufficiently to enable managers to become more pro active in the implementation of strategic buffer burns within key conservation reserves. Very little strategic fire protection occurred on other lands in the region until the late 1980s when the Bushfires Board began posting staff to the area. CALM began applying aerial burns in the Kimberley in 1986 within the Purnululu National Park (Bungle Bungle). The aerial ignition technology used was similar to that developed by the previous WA Forest Department for the southwest forest.

The use of aerial ignition to establish relatively narrow burn buffers within other lands in the region was taken up by the Bushfires Board and pastoralists in the late 1980s (Again I think that was the idea right from the start in 1986 or so). This was based on a cooperative arrangement between interested pastoralists, the Bushfires

Board and CALM whereby the costs of the aerial ignition program are shared. Those pastoralists who wished to burn some sections of their pastoral land would contribute to the cost of the aircraft hire.

Whilst this arrangement was an improvement on a previously unmanaged situation, the outcomes in most areas were still not satisfactory. Only a few pastoralists were interested and/or financially placed to participate the burn program, and as a result the locations of burn buffers were not always of strategic value in terms of preventing large areas of late dry season fires.

Insufficient funds meant that it was not possible to make more than one ignition run over the large distances involved. This meant that most ignition lines were only partly burnt and therefore were often not effective in restricting late dry season fires. CALM has been able to mostly overcome this deficiency by maintaining a close monitor on the grass curing and its readiness to burn. In some years two separate ignitions were applied in the early dry season months in some reserves to ensure these ignition fire lines were effectively burnt out. (To a certain extent this was more the intention than the fact as we too were severely limited by lack of resources). Extra ignitions have also been applied to achieve a patchwork of burnt and unburnt in order to promote the biodiversity of these conservation reserves. A general lack of response has limited the capacity for more detailed ignitions to achieve a fine scale mosaic of vegetation structural diversity. Marked differences occur in the patchwork of early dry season burns on several CALM conservation reserves and the predominantly late dry season fires that have occurred extensively on the adjoining pastoral and other crown lands.

Some Current Issues

The following are some key Fire Management issues that need to be addressed.

1. **Variability in Grass Curing and Fire Behaviour:** There is a relatively high degree of variability in grassy fuel loads and grass curing rates throughout the regions. Such variability can be a serious constraint in the application of broad scale fire management such as aerial prescribed burning programs. There is an urgent need to develop and utilise remote sensed data from satellite imagery to predict fuel conditions within major vegetation types. There is also a need to undertake studies to ground-truth the satellite data on grass curing, burn areas, and fire histories.
2. **The Tyranny of Distance and Remoteness:** The vast distances and sparse populations, and the variability of the highly flammable fuel types provide a major challenge to the effective application of economical and strategic fire management programs. There is no effective bushfire brigade structure and few large landholders who can provide significant ground support to regional fire managed programs.

3. Tourists critical of the use of fire in the Kimberley: Tourists and tour operators are often very critical of the presence of fire and smoke during the peak tourist season. Many visitors demonstrate no real understanding of the role of fire in the region, and its use as a land management tool and for the maintenance of biodiversity. The often negative attitudes to fire by these visitors poses a real threat to the future in the region, and it is obvious that land managers in Northern Australia must devote greater efforts in promoting the use of fire as a land management tool, and to inform and educate the public of the importance of fire in the ecology of the region.
4. Pastoralists: Most pastoralists understand the need for appropriate fires to achieve desired outcomes for stock grazing and for the protection of built assets. However, many pastoralists tend to apply fire strategies in isolation of each other, and other land managers. Consequently there is very little coordination in the development of strategically located burn buffers that would prevent the spread of damaging late dry season fires. It is important that fire prevention strategies should be managed at a regional level, which will involve several land managers working together to achieve agreed outcomes and in so doing, achieve maximum efficiency of the limited resources available in the region.
5. Traditional Owners: At Fire Management Workshop held at Kalumburu in June 1997, Aboriginal elders expressed concerns about the decline in knowledge of and changes in traditional burning practices, and at the deleterious impacts that the large, intense wildfires were having on their traditional food sources, and cultural values. Similar to the pastoralists, the traditional owners felt isolated from current fire management practices, and indicated a strong desire to become involved not only in regional burning practices but also in actively managing fire on Aboriginal reserves. The elders are keen for fire training programs to be made available for young Aboriginal people and that they be able to pass on the knowledge of traditional burning practices to younger people. For this reason WA fire and land management authorities are looking at ways to involve Aboriginal people in fire training programs including prescribed burning and basic fire fighting.

Strategies and Action Items

The following is a list of strategies and actions that are being implemented by CALM staff in order to achieve protection and biodiversity objectives both on CALM managed reserves and on neighbouring lands.

1. Working closely with other agencies, traditional owners, pastoralists and other interested groups to develop a better understanding on the issues, solutions for better fire management in the Kimberley. CALM co-hosted two workshops on fire in northern Australia in 1992 and in 1997 that involved a diverse range of land managers, traditional owners and fire management specialists, and

which focused on the important contemporary fire issues in the North Kimberley.

2. Work with BFS(FESA) to improve the development and maintenance of broad scale strategic burn buffers throughout the region, including the use of helicopters to achieve more effective burn outcomes.
3. On the basis of research findings increase the use of fire to achieve ecological objectives such as biodiversity and habitat enhancement.
4. Increase variation in seasonality and timing of burns to provide greater variation in burn patterns and vegetation responses to fire.
5. Maintain contact with NT and Qld fire managers (through the North Australian Fire Managers Forum) to enable the exchange and sharing of fire research and development formation and applications.
6. Continue research and development in fire ecology, fire management and remote sensing information systems that will lead to improvement in the understanding in the requirement and application of effective fire management in the Kimberley region ecosystems.
7. Provide information and education materials for land managers, tour operators, tourists and other members of the public on the roles and uses of fire in Kimberley conservation reserves, pastoral leases and other land use types.
8. Provide training for Aboriginal trainees in fire control operations and traditional and contemporary burning practices.

References

- (1) Williams R.J., Cook G.D., Gill A.M., Moore P.H.R. (1999) 'Fire regime, fire intensity and tree survival in a tropical savanna in northern Australia, *Australian J. of Ecology* (1999) 24, 50-59.
- (2) Saint P and Russell-Smith J (1997) Malgarra: Burning the Bush. Fourth North Australian Fire Management Workshop Kalumburu, North Kimberley, Western Australia June 1997.