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# Fire management guidelines for Kimberley pastoral rangelands : best management practice guidelines

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Department of **Agriculture and Food**



# ***FIRE MANAGEMENT GUIDELINES FOR KIMBERLEY PASTORAL RANGELANDS***

## ***BEST MANAGEMENT PRACTICE GUIDELINES***



**FIRE MANAGEMENT GUIDELINES FOR KIMBERLEY PASTORAL RANGELANDS**

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## **1. BACKGROUND**

Kimberley pastoralists operate in a highly fire-prone environment. Uncontrolled fires pose significant economic, safety, and environmental risks to pastoral enterprises. In contrast, the controlled use of fire can benefit land management, animal production and biodiversity conservation.

For any given country type, the interactions of fire, grazing and weather have complex effects on both land condition and animal production. Although general guidelines on the use of fire are valuable, based as they are on a combination of experience and available research findings, they should best be regarded as providing a starting point. At the property level, an adaptive approach that incorporates monitoring of the effects of documented management actions is recommended.

While this document deals with property-scale management of pastoral leases, there are many important issues arising from the characteristics of the broader, regional fire regime. These include community health and safety, biodiversity, and economic effects on the tourism and aviation industries. Regional fire regimes are particularly important for highly mobile fauna such as granivorous birds that depend on the availability of food resources across large areas. At the national level, the fire regime across the northern savannas affects greenhouse gas emissions and carbon storage in the landscape, potentially influencing the global climate.

## **2. KEY ISSUES FOR MANAGERS**

It is vital to manage the risks associated with wildfires by strategic fuel reduction over the property early in the dry season, while maintaining adequate reserves of feed for at least the remainder of the dry season.

It is also essential to maintain an effective network of firebreaks and tracks. Although these are often insufficient in themselves to stop a wind-driven fire they provide the means for quick access and for safely back-burning either during planned burning or for control of an approaching wildfire.

The large size of Kimberley paddocks means that fires (planned or unplanned) often burn only part of a paddock. It is important to prevent cattle from congregating on small areas regenerating after fire, particularly near water points. While damage is most likely in the early part of the wet season, when root reserves of perennial grasses need to be replenished, such animal congregation should be avoided at any time.

Uncontrolled or poorly managed fire regimes lead to unfavourable changes in pasture and overstorey. In the long term, the productive capacity of the land can be reduced. In addition, it is important to minimise the risk of accelerated soil erosion associated with the removal of litter and cover by fire.

Where necessary, burning can play a vital role in controlling shrub densities. If unchecked, shrub densities may increase to the point where mustering is difficult and grass production is reduced through competition. As a rule, the taller the shrub, the higher the fire intensity required to control it. The deliberate use of moderate to high intensity fires for this purpose requires very careful preparation and skill to ensure that the fire does not 'get away'.

Protecting station assets from fire is obviously essential. Vegetation should be kept away from homesteads, yards, bores and fences (electric fencing being particularly susceptible), and poly-pipe carrying water across country should be run in a trench and covered with soil.

Keeping damaging fires out of environmentally sensitive areas is also important. Apart from their conservation values, such areas may be of particular significance to Aboriginal people and are increasingly the focus of tourism activities contributing to enterprise income.

### **3. PLANNED BURNING**

Some key questions the manager should always consider are:

- What are the reason(s) for burning a particular area?
- What type of fire do I need?
- Can I successfully contain the fire?
- How do I manage grazing impacts after the fire?

Note: Fires vary in their characteristics, affect country types in different ways and, importantly, have cumulative effects over time. It is important to recognize that there is no single 'recipe' that can be applied.

Advice on the various aspects of fire management can be obtained from relevant government agencies including the Fire and Emergency Services Authority, Department of Agriculture Western Australia, Department of Conservation and Land Management and the local government shire. It is important that feedback from pastoralists contributes to the further development of guidelines such as these. Further refinement can also be expected in the light of research and demonstration projects currently being undertaken across northern Australia, notably through the Natural Heritage Trust and the Cooperative Research Centre for Tropical Savannas Management.

### **4. MANAGING WILDFIRE RISK**

Important aspects of managing wildfire risk are:

- aerial and ground burning early in the dry season to produce areas of low fuel;
- grading of fencelines and access tracks; these provide opportunities for back-burning against oncoming wildfire should that be required.
- clearing fuel from around assets such as buildings, yards (permanent and temporary) and bores;
- equipment readiness;
- training.

### **5. GUIDELINES FOR BURNING DIFFERENT TYPES OF COUNTRY**

#### **5.1 High Rainfall Zone (above about 700 mm average annual rainfall)**

In the more productive country (eg, gently undulating with red volcanic soils), an emphasis on rotational burning (every 2-3 years) early in the dry season is recommended, under the relatively low stocking rates that apply. This regime appears to be effective in controlling the effects of patchy grazing. Some burning after first storms can also be incorporated, provided that fires can be contained by low-fuel areas from earlier burning or other natural obstacles. A patchy mosaic of burnt and unburnt areas is desirable so that cattle have access to both bulk feed and the more nutritious regrowth.

A lower frequency (3 years or more) is recommended where recovery after fire is slower, for example on gravelly rises or rugged sandstone country, where plants are more dependent on regeneration from seed. Special areas around springs and rainforest patches deserve protection wherever possible, particularly from hot fires.

A regime of annual fires, especially if they are of high intensity, is believed to favour annual native sorghum over the more desirable perennial grasses (especially in sandy country) and is likely to have a range of damaging effects on the ecosystem. Such a fire regime should be avoided.

Burning during spells in the wet season is an approach for controlling annual sorghum that has been adopted recently in some NT national parks. Testing this technique in the Kimberley pastoral context has proved to be quite difficult because it is often hard to get such fires to 'carry' over significant areas and ground access across the property can be quite limited. Research has been carried out in the NT on the effects of wet-season burning on erosion rates and botanical composition. Kimberley managers have been encouraged to try out this technique on a limited scale, for example close to homesteads. The feasibility of aerial burning during the wet season is yet to be tested.

## **5.2 Intermediate Rainfall Zone (400-700 mm)**

### **5.2.1 Red Soil Pastures**

A cautious approach should be adopted in burning pastures on red soil country. Pastures tend to be less resilient to heavy grazing than those found on both lighter and heavier soils, and soils are often more prone to erosion.

Burning small patches along tracks early in the dry season can lead to a concentration of grazing and subsequent loss of perennial grasses, especially if this practice is carried out year after year.

It is important to monitor the density and height of shrubs. If shrub control is needed, consider spelling or reduced stocking after the wet season to ensure that an adequate fuel load remains for burning towards the end of the dry season (at least 2 tonnes/ha). After burning a paddock it is preferable to defer grazing for at least some months after the rains begin, to ensure that the perennial grasses can re-establish an adequate leaf area and rebuild root reserves.

### **5.2.2 Black Soil Pastures**

Black soil pastures have relatively high carrying capacities and have traditionally been protected from fire. However, burning can be considered for the following purposes:

- to encourage more even grazing within large paddocks;
- to rejuvenate rank pasture;
- to allow a temporary increase in the legume and annual component of pasture, which may improve nutritional quality;
- to break up large expanses of country with areas of lower fuel, and thus assist in reducing risks associated with wildfires; and
- for controlling woody shrubs.

It is important to bear in mind that pasture production on black soil country is more dependent on the amount and distribution of rainfall than is the case on the lighter soils.

How frequently and at what time of year should black soil pasture be burnt?

- A minimum of 4 years between fires is suggested as a general recommendation.
- For pasture management purposes, burning late in the year would be recommended, when the fire danger index has moderated, for example immediately after the first storms.

### 5.2.3 Limestone Grass Pasture

This pasture is dominated by annual or short-lived perennial *Enneapogon* grasses. No obvious benefits from burning have been identified, and burning of poor condition pasture should certainly be avoided. Occasional burning could be used if necessary to control shrubs such as prickly mimosa (*Acacia farnesiana*).

### 5.2.4 Pindan Pastures

Pindan is the term used to describe the vegetation occurring over deep red and yellow sands in the West Kimberley. It is characterised by dense stands of wattle (*Acacia* spp.). The main pasture species are curly spinifex and ribbon grass. Burning in October-December no more often than every 4 years, and resting over the subsequent wet season, has been recommended to keep the pasture in a condition attractive to stock.

## 5.3 Low Rainfall Zone (less than about 400 mm)

This zone is dominated by various forms of spinifex pasture. The general advice given in this section would also apply to the management of spinifex country in the intermediate rainfall zone.

### 5.3.1 Spinifex Pastures

These pastures are of most value to pastoralists when in the early stages of regeneration after fire (say 1-2 years). Spinifex communities should be allowed to mature further before burning again to ensure that seedbanks are well replenished.

Managers should adjust their burning to take account of the actual maturity of the spinifex as this can vary considerably according to topography and the rainfall received over the seasons since the last fire. As a guide, burning a proportion of the country each year at intervals of 4-6 years is suggested. The burning plan will obviously need to be flexible, taking into account any unplanned fires.

The response to fire depends on the spinifex species concerned and conditions at the time of burning. For example, under cool conditions soft spinifex (*Triodia pungens*) has been observed to re-sprout from rootstocks, while a hot fire will kill most adult plants and regeneration will depend on seed stored in the soil. Spinifex seedlings are vulnerable to being pulled out in the early stages and it is recommended that wherever possible grazing should be deferred until they are well established (in practice this may mean one wet-season).

Spinifex found on the more rugged hilly country appears to regenerate most commonly from rootstocks and often shows small amounts of regeneration even after fires occurring quite late in the dry season.

It is suggested that best practice should encompass burning both early in the dry season and late in the year under suitable conditions when fires can be controlled. The main purpose of early burning is to provide broad areas to act as firebreaks. These are required for wildfire control and to allow larger burns to be conducted safely towards the end of the year.



## **6. PLANNING CONSIDERATIONS AND INFORMATION NEEDED FOR OPERATIONAL BURNING DECISIONS**

### **6.1 Planning**

Fire management should be considered as a key aspect of the overall property management plan, and both prescribed burning and wildfire control activities should be incorporated. A laminated station map, marked-up to highlight areas where fire protection is a high priority, and showing station infrastructure, graded tracks, water-filling points etc., has proved to be a good starting point. The map can be updated as the season progresses, showing low-fuel areas resulting from aerial burning and other recent fires.

In most cases a permit will be required from the local Bush Fire Control Officer prior to burning.

Consultation and cooperation with neighbours and nearby communities are essential.

### **6.2 Training**

Ensure manager and employees undertake relevant training in fire safety and control that can be provided by the Fire and Emergency Services Authority (FESA).

### **6.3 Equipment**

Advice on key items such as drip torches, slip-on fire units, protective clothing and communications equipment is available through the local FESA office.

Relevant equipment including graders, water tanks and portable pumping equipment needs to be identified in the plan and maintained in a good state of readiness.

### **6.4 Satellite Information**

Imagery derived from the NOAA satellite can provide information on the following:

- degree of fuel 'curing';
- location of active fires (hotspots); and
- fire scars.

These map products are available from the Department of Land Information (Satellite Remote Sensing Services, Wembley). Satellite-derived information is used by FESA to plan aerial control burning and to assist pastoralists responding to wildfire emergencies.

The current system has some important limitations:

- a clear satellite image requires cloud-free conditions;
- mapping of fire scars resulting from patchy, early dry season burning is difficult;
- the minimum viewing size ('pixel') is about 1 km<sup>2</sup>, so that burnt areas of less than about 400 ha are poorly mapped; and
- the accuracy of firescar mapping depends on ground characteristics.

Improved systems based on the MODIS satellites are being developed to help overcome these limitations.

For an annual subscription, pastoralists can now receive information by fax or email on the location of active fires, in the event that these are detected on or near their lease, through the 'Fire Fax Service' (website: [www.dli.wa.gov.au](http://www.dli.wa.gov.au)). The Kimberley Regional Fire Management Project (KRFMP) can assist pastoralists with information on this system. Training in accessing fire scar information from the Internet is also available.

## **7. FIRE BEHAVIOUR PREDICTION**

### **7.1 Curing of Fuel**

Curing is a measure of pasture 'greenness' and is defined as the percentage of material in the sward that is dead. The degree of curing has an important effect on fire behaviour. The KRFMP has produced the *Kimberley Grasslands Field Curing Guide* to assist land managers estimate and communicate the degree of curing.

### **7.2 CSIRO Fire Meters**

A useful tool (and the one used to determine the 'fire danger' shown on the Main Roads signs along Kimberley roads) is the CSIRO Grassland Fire Danger Meter. This gives a measure of how difficult a fire will be to control based on curing, temperature, humidity and wind speed measured in the field.

A 'Fire Spread' meter is also available – this gives an indication of how fast the fire front can be expected to travel.

These meters are potentially useful to supplement the manager's own experience in making decisions about burning country. They should not be considered reliable for spinifex fuels.

### **7.3 Weather Forecasts**

The Bureau of Meteorology can provide spot weather forecasts (fee for service) to assist the manager in deciding when it is safe to light up an area intended for burning.