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## Fire management guidelines for southern shrubland and Pilbara pastoral rangelands : best management practice guidelines

Department of Agriculture and Food, Western Australia

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Department of **Agriculture and Food**



# FIRE MANAGEMENT GUIDELINES FOR SOUTHERN SHRUBLAND AND PILBARA PASTORAL RANGELANDS

## BEST MANAGEMENT PRACTICE GUIDELINES



**FIRE MANAGEMENT GUIDELINES FOR SOUTHERN SHRUBLAND AND PILBARA PASTORAL RANGELANDS**

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## **1. BACKGROUND**

Fire is integral to many ecosystems in Western Australian rangelands. Controlled fire can reduce the risk of wild fire, benefit pasture productivity and contribute positively to biodiversity values. Uncontrolled fire is a threat to safety and the business viability of pastoral enterprises and threatens rangeland biodiversity and productivity.

For any given country type interactions of fire, grazing and weather have complex effects on both land condition and animal production. It is important to acknowledge that in all landscapes there is a range of responses to fire. Different elements of biodiversity have differing sensitivities to fire. Fire use guidelines, based on a combination of experience and available research findings, are desirable but are best regarded as a starting point for managers. At the property level, an adaptive approach based on monitoring the results of documented management actions is recommended.

This document deals with property-scale management of pastoral leases. Many fire regime issues are more regional in character. These include community safety and health, the impact on regional economies, the societal and cultural values of landscape and the effects on tourism. Ecologically the high productivity, diversity and palatability of recently burnt vegetation is important for many species. Long-unburnt areas are important in providing for the breeding and shelter requirements of native fauna and for the effective conservation of species with long life cycles such as mature tree parasites, saprophytes and fungi. In mallee shrubland, for example, there is evidence that mallee fowl survival is improved where young mallee regrowth (up to 10 years post fire), which provides for the foraging needs of the animals, occurs alongside areas that have been unburnt for more than 40 years. At the national level, the fire regime in rangelands affects greenhouse gas emissions and carbon storage in the landscape and can potentially influence the global climate. The Australian Government, through the Department of Environment and Heritage, supports studies and on-ground projects dealing with regional fire management issues. These are being undertaken by the Cooperative Research Centre (CRC) for Tropical Savannas Management, the Desert Knowledge CRC and other groups accessing Natural Heritage Funds.

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

Maintain an effective network of fire breaks and implement a managed program to strategically control fire risk.

For properties with hummock spinifex pasture in the northern Gascoyne and Pilbara, the development of a long-term burning program is important for maintenance of pasture productivity. Appropriate burning intervals are commonly between 5 and 10 years. Too frequent fire will harm species diversity and may reduce potential stock carrying capacity. Seasonal conditions, soil type and pasture composition all contribute to the appropriate minimum interval between fires.

Protect station assets and stock from fire. Manage vegetation density and potential fuel near vulnerable infrastructure including fences (electric fencing being particularly susceptible) and temporary yards. Poly pipelines are best buried.

Discourage burning practice that promotes small, patchy pockets of regrowth that are likely to become the focus for excessive grazing pressure and consequent degradation. Persist with burning efforts until a sufficient area has been burnt that can confidently provide for planned stock needs and the predictable needs of other grazing animals.

Recognise the attractiveness of freshly burnt country to stock. An appropriate pattern of planned burns can make an important contribution to the maintenance of desired stock distribution on leases with spinifex pastures in the north Gascoyne and Pilbara.

Attempt to remove stock from freshly burnt areas until effective re-growth takes place and, in particular, when practical, temporarily prevent stock access to water points that are close to newly burnt pastures.

Monitor the effectiveness of fire for the control of woody weed and shrub densities in pasture. As a rule, the taller the shrub, the higher the fire intensity required to control it. In spinifex hummock grasslands, appropriately timed fires reliably remove stands of relatively unpalatable shrub species like *Acacia stellaticeps* and *Acacia bivenosa* and promote regenerated pasture that has a substantially improved stock feed value.

Be very cautious in the use of fire on productive river floodplains, where there may be potential to use fire to reduce the density of flood-responsive shrubs such as *Cullen spp.* and false mesquite (*Acacia farnesiana*). The use of moderate to high intensity fire for this purpose on floodplains requires very careful preparation and should not be attempted by inexperienced land managers. With experience, fire can be securely contained and limited to areas where the risk of soil erosion is low. The risk of soil erosion is always increased as litter and cover is reduced by fire. Appropriate timing, setting limits on the area that is burnt and the preservation of unburnt cover in places where erosion risk is high, are issues that will be taken into account by those with experience.

Avoid burning environmentally sensitive areas and consult with other interested parties if burning plans are considered for land that is shared with others. Some areas have particular significance to Aboriginal people, while others are increasingly the focus of tourist use.

### **3. PLANNED BURNING**

Key questions the manager should always consider are:

- What are the reason(s) for burning a particular area?
- What timing and type of fire do I need?
- Can I successfully contain the fire?
- What level of community consultation is appropriate? (Advice to neighbours; consultation with Aboriginal communities, Department of CALM, prospector, tourist and other interested groups; appropriate Local Authority or Bush Fire Control permits.)
- How do I monitor and manage the process of pasture recovery and grazing impacts after the fire?

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

Advice on 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 your local government Shire Office. It is important for pastoralists to contribute to the further development of fire management guidelines such as these. Research and demonstration projects in the Australian rangelands that are being conducted or supported by a range of organizations including the relevant CRCs, the

Natural Heritage Trust, and industry groups can be expected to make a continuing contribution.

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

Important aspects of managing wildfire risk are:

- preparatory and precautionary aerial and ground 'fire break' burning – most commonly between September and November;
- grading/fuel reduction along fencelines and access tracks that may serve as firebreaks; graded lines facilitate back-burning into an oncoming fire should that be required. Advance protection of vulnerable fibreglass and poly tanks, troughs and pipelines (with preferably, the burial of pipelines);
- appropriate movement of stock to safety;
- equipment readiness;
- training.

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

##### **5.1 Spinifex Pastures**

These pastures are of most value to pastoralists when in the early stages of regeneration after fire (say 1-2 years). Spinifex hummock grass communities should be allowed to mature for several years further before burning again to ensure that the diverse seedbanks upon which pasture recovery will depend have been sufficiently replenished, and that native shrubs and trees and their associated fauna can persist in the landscape.

Managers should adjust their burning to take account of the actual maturity of the spinifex as this may vary considerably; according to topography and the rainfall received over the run of seasons since the last fire. As a guide, burning a proportion of the country each year at intervals of 5-8 years is suggested. Any burning plan will obviously need to be flexible, taking into account any unplanned fires, and should optimise future access to an appropriate area of productive pasture.

The response to fire depends on the spinifex species concerned, location and conditions at the time of burning. For example, under cool conditions and in rugged hill and coastal country spinifex commonly recovers by re-sprouting from rootstocks. Hot fires will kill most adult plants and regeneration will depend on seed stored in the soil. Soft spinifex seedlings are vulnerable to being pulled out in the early stages and it is recommended that the grazing of these pastures should be deferred until soft spinifex plants are well established (in practice this may mean one wet-season – delay restocking until a high proportion of the spinifex seedlings has reached a diameter of more than 12 cm).

Early summer periods of relatively high fire risk are generally the best time for large-scale paddock burns - provided the appropriate precautions and preparation has been undertaken. Burning at this time optimises the likelihood that the first post-fire germinations will occur in response to summer rainfall. Heavy germination and recruitment of less palatable, undesirable pasture species (e.g. cockroach bush) is promoted by cool season winter rains.

Relatively hot conditions are desirable to achieve clean and complete burns. Account should be taken of the fuel load that is present and the flammability of different pasture types. When in doubt err on the side of caution and burn a little earlier – in

September or early October, rather than November. The disadvantages of commencing earlier are that there is likely to be a reduced level of control of woody weed species and that the labour requirement may be higher, as repeated efforts are needed to achieve sufficient fire coverage.

## **5.2 Tussock Grassland and Extensive River Floodplain Pastures**

The routine and regular burning of these pastures is not currently recommended. Woody weed encroachment, most commonly by false mesquite, *Acacia farnesiana*, but also by the post-flood recruitment of woody shrubs such as *Cullen spp.*, is common. Experiments have demonstrated that the problem species are vulnerable to fire. However, achieving the appropriate timing and fire frequency is problematic. Consecutive, carefully timed burns are generally needed. Stock grazing commonly depletes the available flammable biomass and inhibits the efficacy of fire.

After periods of exceptional growth and where the threat of future damaging wildfire exists, precautionary fire break preparation and a local fuel reduction program may be appropriate. Burning prior to winter when there is still some soil moisture for regrowth is recommended in such instances, to limit perennial grass mortality and to promote post-fire recovery. Managers should be alert to the vulnerability to grazing pressure of grass regrowth induced by dry season fire and protect accordingly. (Avoid burning local areas where erosion risk is high.)

## **5.3 Mallee Shrubland, Sandplain and Mixed Acacia Woodland Pastures**

Most of these plant communities are flammable and are adapted to experience occasional fire - other than those with a substantial chenopod understorey. However the interval between fires is generally long, usually at least 30 years and commonly much longer. Sufficient surface fuel to support large area fires only occurs after extended periods of above average rain. The presence of stock reduces the abundance of surface fuel material, particularly adjacent to stock water points. Hence the future incidence of fire will also be affected by prevailing long-term stock levels. Dry lightning ignition is the most common cause of fire in these communities.

It is not recommended that pastoral lease managers should promote fire on these pasture types. A planned fire program is also not recommended for hard spinifex pastures in the central Gascoyne and to the south and east of the Gascoyne. An appreciation that the vegetation is flammable and prone to occasional fire is however important for risk management. Naturally occurring fire is commonly beneficial to pasture productivity, over the longer term. Many perennial species, including trees, re-sprout extensively after fire. Re-sprout growth and early post-fire germinations are vulnerable to overgrazing. As is the case for spinifex and tussock grass pastures, managers should take all possible steps to protect burnt pastures during the process of early post-fire recovery.

At the regional level, potential landscape conservation benefits may be served by the improved management of fire interval in some plant communities adapted to low frequency fire. If individual pastoralists wish to investigate these opportunities, an approach to the Department of CALM is recommended.

## **5.4 Chenopod Shrublands, Samphire and Forbland Pastures**

An active policy of fire exclusion is recommended for these pasture types. They occur extensively in the semi-arid and arid rangelands, typically on saline soils in lower parts of the landscape. Grasses and herbs occur as a ground layer and provide a source of fuel. The high salt content and relatively succulent character of the leaves renders chenopod shrubs non-flammable. However overgrazing can lead to a decline in shrub cover and an increased incidence of fire, as grass and forb biomass increases.

The promotion and retention of the dominant fire-retardant shrub biomass is the most appropriate management strategy for fire prevention. Careful management of grazing pressure is important to prevent shrub degradation. Major components of both the short-lived herbage and the chenopod shrub foliage are palatable to stock, particularly when good quality (low salinity) stock water is provided.

At the regional level, the degradation of chenopod shrublands and consequent increase in grassy fuels across the landscape may have the effect of forming a bridge for fire between more naturally fire-prone plant communities and those that were formerly isolated. This may increase the potential for large, landscape-scale fires.

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

### **6.1 Planning**

For properties with spinifex hummock grass pasture in the northern Gascoyne and Pilbara, 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. Regular updates will show low and high-fuel areas that are the result of past burning activity (and potentially, heavy stocking).

In most cases a permit is required from the local Bush Fire Control Officer prior to burning. In some Shires, individual pastoralists who routinely undertake burning can be accredited as an appropriate fire control officer.

Consultation and cooperation with neighbours and nearby communities are essential. The Land Conservation District Committee process may be able to usefully coordinate planned burning activities at the LCDDC regional level.

### **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:

- location of active fires (hotspots); and
- fire scars.

These map products are available from the Department of Land Information (Satellite Remote Sensing Services, Floreat). 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 fire scar 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 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)).

## 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 Kimberley Regional Fire Management Project has recently produced the *Kimberley Grasslands Field Curing Guide* to assist land managers in that region to 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 on 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.

These meters are potentially useful to supplement the manager's own experience in making decisions about burning country, but were not designed for use in spinifex hummock grasslands.

### 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.