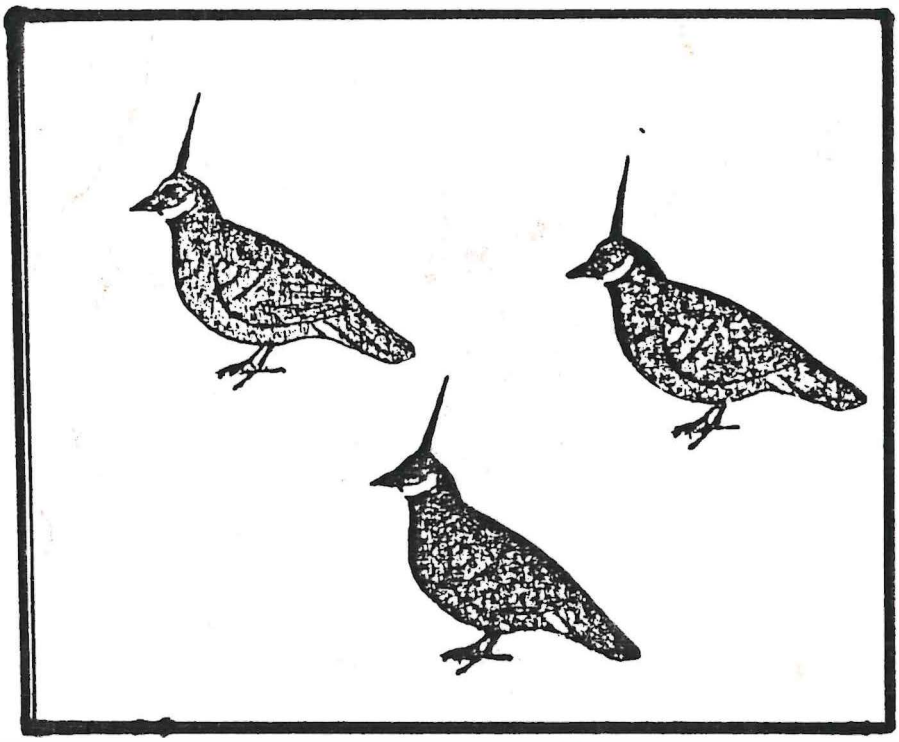
AN INFORMATION GUIDE FOR A CASE STUDY ON FIRE MANAGEMENT IN THE HAMERSLEY RANGE NATIONAL PARK



NATIONAL FIRE MANAGEMENT WORKSHOP

BUSSELTON

WESTERN AUSTRALIA

OCTOBER 12TH - 16TH 1986

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1. Location, size and tenure

The Hamersley Range National Park is an "A" class Reserve (A30082) of 617,606 ha which was proclaimed on 31st October, 1969. It is vested in the National Parks and Nature Conservation Authority (of Western Australia) and managed by the Department of Conservation and Land Management (C.A.L.M.)

The reserve is located in the central portion of the Hamersley Range between latitudes 22 degrees 13' and 23 degrees 13' and longitude 117 degrees 54' and 118 degrees 36' east. It is therefore on the southern edge of the arid tropics.

The iron ore mining towns of Tom Price and Paraburdoo are situated to the west of the Park and the former asbestos mining town of Wittenoom with a dwindling population (now less than 30 people) is situated to the north of the Park.

Wittenoom services tourist needs but it is likely that an alternative tourist complex will be built, perhaps in the central northern area of this Park in the near future.

2. Topography and Geomorphology

The Park lies between two major drainage systems, the Fortescue River to the North and the Ashburton River to the south.

The northern flank of the range consists of a sharply defined, steep scarp dissected by generally northward trending gorges. The gorges mostly start abruptly as sheer-sided chasms up to 100m deep. At the lower ends they tend to broaden out, the sides becoming scree slopes topped by cliffs. These gorges are the primary tourist attractions.

The Park is very mountainous being traversed by a series of hills and ridges running north west to south-east. Many of the hills are over 1,000m and often rise 300m above the valley floors. Almost all locations in the park are above 500m. The northern section of the Park is dominated by Mt. Vigors (1145m), the central Park by Mt.Bruce (1235m) and the southern portion by Mt. Barricade (1083m).

The dominant geological formations of the Park are the Fortescue and Hamersley Groups which form the Mt. Bruce Supergroup of Proterozoic rocks; predominantly jasperlite, chert, dolomite, dolerite, quartz and shale.

The northern portion of the Park is characterised by hills and mountains capped by the Brockman Iron Formation which in most cases have not been sufficiently enriched in iron to constitute ore bodies. However, the central area of the park is dissected by a system of low, often enriched ridges of the Marra Mamba formation. They run in a south-easterly direction. Higher ridges capped with Brockman Iron Formation often run parallel to the hills of Marra Mamba rock.

The southern part of the Park is dominated by the Milli Milli Anticline where Archaean porphyritic granite intrudes volcanics and schist. This is the only area of the reserve where Archaean rock outcrops. Between the Milli Milli Anticline and the Marra Mamba ridges the Fortescue Group surfaces. It is characterised by dolerite, shale,chert, quartzite and areas of calcrete.

The valleys between hills of the Hamersley Group contain colluvial fans and alluvial outwash plains. The scree material, or gibber, on the slopes of the hills and ridges is jaspilite from the Brockman Iron Formation and is rich in hematite and magnetite.

3. Climate

The climate is characteristically hot and dry. Winds commonly are easterlies. They may blow strongly for

days at a time in spring and autumn. Annual evaporation exceeds average precipitation by a factor of about 10. Mean maximum temperatures in summer and winter vary from the low 40 degrees Celsius and mid 20 degrees Celsius respectively. Mean minimum winter temperatures range down to about 10 degrees Celsius. Winter frosts occur in most years during June or July in the higher areas of the Hamersley Range.

The arithmetic average rainfall is 250mm to 300mm per year. However, this is a meaningless figure and rainfall is best described as erratic. Precipitation from one cyclone can approximate the arithmetic average and may be twice that amount. On the other hand years in which there is no effective rainfall are not unusual. It is unusual to have two consecutive months without at least a measurable trace of rain.

Most rain falls in summer when both the tropical monsoonal system and tropical cyclones may affect the region. Winter rainfall, usually derived from northward extensions of the cold fronts that traverse southern Australia, causes a bimodal peak in the rainfall pattern. It is common for any of these systems to fail, and so a given year may have good winter, poor summer rains; good summer, poor winter rains; good summer and winter rains or little if any rainfall.

An important characteristic of the climate is the frequent occurrence of dry thunderstorms between October and early December i.e. at the end of the driest time of the year when diurnal temperatures may exceed 40 degrees Celsius. Ignition by lightning strikes causes many fires at this time of year.

4. BIOTA

4.1 Vegetation

The vegetation of the Hamersley Plateau is described and mapped at 1:1000,000 by Beard (1975). At this scale,using the Beard-Webb classificatory system, two vegetation units are found in the Park. Most of it is mapped as 'Mulga & spinifex' with a limited area of 'Mulga Woodland' in the south-eastern section.

In the following table from Dawe and Dunlop (1980) the major vegetation units are described in relation to general landform and soil types using the classification of Muir (1977).

Landform	Soil Type	Vegetation Unit
High ridges or hills (ii) on protected slopes	Skeletal, shallow	i *Eucalyptus kingsmilli* open shrub mallee over mid-dense to open hummock grass. ii Clumps of *Callitris columellaris* low forest A or B.
Low ridges, or hills	Skeletal, shallow	i *Eucalyptus leucophloia* open low woodland over mid-dense *Triodia wiseana* or *T. basedqwii* hummock grass. ii *Acacia maitlandii* or *A. umbellata* low scrub A over mid-dense hummock grass. iii Mid-dense *Triodia basedowii* hummock grassland.
Scree slopes	Gibber with pockets of skeletal neutral soil.	i *Acacia bivenosa, A. dictyophleba, A. rhodophloia, A. kempeana* or *A. pyrifolia* scrub over mid-dense *Triodia wiseana* or *T. basedowii* hummock grass. ii *Cassia* spp. low scrub B over *Triodia* spp. mid-dense hummock grass. iii *Eucalyptus gamophylla* open shrub mallee over *Triodia basedowii* mid-dense hummock grass. iv *Acacia hilliana* and *A. adoxa* dwarf scrub over *Triodia basedowii* or *T. wiseana* mid-dense hummock grass.
Valley Floor	Neutral to slightly acidic loam or sandy loam.	Very open woodland of *Eucalyptus dichromophloia, Acacia pruinocarpa* and *Hakea suberea* over *Plectrachne schinzii* hummock grass or mid-dense hummock grass.
Outwash plains	Neutral to slightly acid deep loams or clayey loams.	i *Acacia aneura* low woodland B over open low bunch grassland. Grasses include *Aristida spp., Enneapogon spp., Eragrostis spp., Themeda australis, Perotis rara* and *Paraneurachne meulleri.* ii *Eucalyptus coolabah* low woodland A over low bunch grassland. iii *Acacia aneura* scrub over *Triodia pungens* hummock grass.
Calcrete and Dolomite outcrops. Low hills and dissected flats.	Basic soils usually shallow loams or clays. Stony pavements and scree.	i Open shrub mallee of *Eucalyptus transcontinentalis* and *E. oleosa* over open *Acacia bivenosa, Cassia desolata* scrub over *Triodia longiceps* mid-dense hummock grass. ii *Melaleuca eleutherostachya* low scrub B over *Triodia longiceps* mid-dense hummock grass. iii Dense to mid-dense *Triodia longiceps, T. wiseana* hummock grass.
Minor (1° cycle) drainage (i) channels	Shallow sandy soils, ph depending on local geology	i Very open fringing woodland of *Eucalyptus dichromophloia, E. leucophloia* or *E. coolabah* over mixed scrub including *Grevillea wickhamii, Acacia maitlandii, A. tumida, A. dictyophleba, A. bivenosa* etc. over *Triodia pungens* hummock grass.
(ii) minor outwashes	Sandy loams of varying ph.	Open to very open *Acacia* scrub *A. tenuissima, A. ancistrocarpa, A. tumida, A. dictyophleba, A. ineaquilatera* over dense *Triodia pungens* hummock grass.
Major Creeks (Turee Creek Systems)	Heavy gravel in channels, sandy levee banks and islands.	i Open *Eucalyptus camaldulensis* woodland over scrub or thicket of *Acacia tumida, A. coriacea* or *Acacia citrinoviridis.* ii *Melaleuca glomerata* thickets on sandy banks and island.
Gorges	Exposed rock, gravel and sand.	*Melaleuca leucodendron* fringing forest.

The northern section of the Park holds the best examples of gorge vegetation in the region.
Among the typical plants of the sheer walls of the gorges are Callitris columellaris, Ficus platypoda, Brachychiton sp. and Dodonaea spp. All of them are fire sensitive.

As in other Eremaen environments,there are many ephemerals. After summer rains, a community of annual grasses appears. Winter rain, which is not uncommon, favours the germination of annual herbs such as Asteraceae and certain Amaranthaceae.

Flowering in the perennial flora of Eremean origin is protracted throughout the year and strongly influenced by rainfall events. However many shrubs are of torresian origin. They tend to flower in winter.

4.2 Flora

Although several collections have been made from the Park there are no comprehensive lists of the flora. No species known to occur in the Park are gazetted as rare. However, there are many species that are very poorly known and may warrant gazettal as rare flora if further work proves them to be as scarce as they appear to be.

The genus Acacia is noteworthy for its diversity. Of an estimated 850 (approx) species in Australia, 46 are known to occur in the Park. Several of these have only been described in the last decade and four appear to be endemic to the Park.

Several mountain peaks are significant because they support mallees specific to that situation. South facing steep slopes are also significant because of their low insolation.

Such Sites that are fire sheltered by cliffs on mountains or in gorges support fire sensitive species such as Callitiis columellaris and Ficus platypoda.

4.3 Fauna

The Hamersley Range National Park is home to a rich fauna of 29 species of native mammal, over 130 species of bird, over 90 species of amphibian and reptile and at least 8 species of fish (Muir, 1983)

The hummocks of Triodia which dominate most of the range country are the preferred habitat for many species of ground living animals. At the heart of the spinifex clump the air is relatively still,

the temperature is lowered and more importantly, the humidity can remain higher thus conserving body moisture for insects, reptiles and small mammals seeking refuge during the day. The Pilbara Ningaui, Ningaui timealeyi and the little Red Antechinus, Antechinus rosamondae are two examples of small mammals commonly found in hummock grassland habitats.

The gorges are a significant habitat. The areas around pools and along streams at the bottom of some gorges are rich in birds, including several species of waterbirds. Several bats and raptors breed in rock crevices of the gorge walls.

Many species, notably birds are confined, at least in the Pilbara, to Mulga Woodlands. They are therefore at the northern limit of their distribution in the Hamersley Ranges. They include for example Bourke's Parrot, Mulga Parrot, Red-throat and four species of Thornbill.

Rare Fauna - Of the native vertebrate fauna presently known to occur in the Hamersley Range National Park, only four species have been declared rare and/or in need of special protection under the Wildlife Conservation Act (1950-1983).

Pseudomys chapmani,	Pebble-mound Mouse
Falco peregrinum,	Peregrine Falcon
Falco hypoleucos,	Grey Falcon
Liasis olivaceus barroni	Pilbara Olive Python

Scree slopes vegetated with mid-dense hummock grass with sparse emergent low shrubs or mallees is the preferred habitat of the Pebble-mound Mouse, which has only recently been distinguished from the Sandy Island Mouse, P. hermannsburgensis. The species is restricted to the Pilbara and its range is still contracting for reasons not clearly understood by biologists.

The Peregrine Falcon, Falco peregrinus, is distributed throughout the Australian continent but is not common anywhere. It is a rare visitor to the Pilbara mostly between March and August. Within the Park, birds of this species usually perch on cliff faces. Similarly, the Grey Falcon (Falco hypoleucos) is known to breed in the southern Pilbara and has been seen in the Park. Grey falcons are generally distributed over the whole State except for the south-west forested areas.

The Pilbara Olive Python, Liasis olivaceous barroni grows to a maximum length of about 4m. It

favours pools of permanent or semi-permanent water.

The discussion of gazetted rare species often results in the misconception that all other native species are securely represented with ample numbers and ample habitat. Unfortunately, this is not true.

Of special significance is the recent record of the Long-tailed Dunnart, Sminthopsis longicaudata in the Mt. Channar area just south-west of the National Park. This is the most western record of the species which, before 1975, was represented by only three specimens held in museums. It appears very specialised in its habitat preference in that all captures have been on scree slopes and ridges with Acacia aneura and Triodia pungens. Its reputed rarity may be a product of the difficulty in sampling the harsh environment it inhabits. This rare mammal must be regarded as possibly present when considering future management options.

In the Channar mining area near Paraburdoo, ten abandoned nests of the extremely rare Lesser Stick-nest Rat, Leporillus apicalis were found. Old stick-nests have been discovered in caves and

overhangs throughout central Australia, however the Channar records represent the most northerly records of the species. Although presumed extinct, the continuing presence of the Lesser Stick-nest Rat should be regarded as a remote possibility.

5. Legislation affecting Management

Legal Responsibilities

A Management Plan is being written for the Park. C.A.L.M. Staff must comply with approved Management Plans. These plans are developed through a planning process which includes widespread public consultation. In the case of National Parks, Management Plans shall be designed to allow for public recreation, consistent with the proper maintenance and restoration of the natural environment (i.e. the protection of indigenous flora and fauna and the preservation of any features of historic, archaeological or scientific interest). In both the preparation and implementation of Management Plans, departmental staff must comply with the various Acts and Legislation which impinge on operations. These are:

5.1 Acts administered by C.A.L.M.

Conservation and Land Management Act, 1984

Timber Industries Regulations Act, 1926

Wildlife Conservation Act, 1950

5.2 **Acts under which C.A.L.M. has specific responsibilities are:**

Bush Fires Act 1954

Land Tax Assessment Act, 1976

Mining Act, 1978

5.3 **Other State Acts which affect C.A.L.M.'S land management responsibilities include:**

Aboriginal Heritage Act, 1972

Aerial Spraying Control Act, 1966

Agricultural & Related Resources Protection Act 1976

Agricultural Protection Board Act 1950

Beekeepers Act, 1963

Control of Vehicles (Off-road Areas) Act, 1978

Country Areas Water Supply Act, 1947

Environmental Protection Act, 1986

Fisheries Act, 1905

Land Act, 1933

Local Government Act, 1960

Main Roads Act, 1930

Mining Act, 1978

Public Works Act, 1902

Rights in water and Irrigation Act, 1914

Soil and Land Conservation Act, 1945

State Energy Commission Act, 1979

State Planning Commission Act, 1977

Water Authority Act, 1984

(There are a number of relevant Commonwealth Acts as well).

6. Management Objectives

The objectives for the management of national parks generally are laid out in Section 56 (1) (c) of the Conservation and Land Management Act (1984):

"... to fulfil so much of the demand for recreation by members of the public as is consistent with the proper maintenance and restoration of the natural environment, the protection of indigenous flora and fauna and the preservation of archaeological, historic or scientific interest...."

Basically, the purpose of a national park is to provide opportunities for recreation in natural surroundings and to conserve elements of the biophysical environment represented in the park. The recreational activities must be managed to minimise conflicts between the

different types and to ensure that they do not jeopardise the long-term conservation objectives.

In developing a detailed Management Plan or even Interim Guidelines for Necessary Operations for any particular national park it is desirable to set down more detailed objectives for that park that reflect its particular uses and values. The following is a checklist of specific objectives that can be used as a starting point for defining detailed management objectives. Note though that it is merely a checklist; it is intended that it should be adapted to suit each particular park.

Detailed_Management_Objectives

1. To provide opportunities for appropriate public recreation in the park to the extent that the biophysical environment is capable of supporting them without incurring unacceptable damage and to the extent that the recreational experiences of visitors are not impaired by conflicting recreational use and to manage the recreational activities accordingly.

2. To promote the educational opportunities of the park and to provide for the proper use and

management of the scientific and educational resources of the park.

3. To conserve rare fauna present in the park.

4. To conserve rare flora occurring in the park.

5. To conserve any ~~identified~~, restricted assemblages of fauna and/or flora present in the park.

6 7 3 4 5 10 8 1 2 9 11

6. To conserve the ~~(representative) sample of the regional~~ indigenous biota found in the park.

7. To conserve the landscape features of the park. natural.

8. To provide protection for the lives and property values of visitors and ~~Departmental staff without compromising other values of the park.~~

9. To prevent the park having undue detrimental effects on neighbouring lands.

10. To conserve the archaeological, historical and scientific values of the park.

11. To maintain those values of the park that contribute to the regional nature conservation systems (network).

7. History and existing uses which influence current Management

7.1 Aboriginal Interests

The Park lies within the traditional homelands of the Bunjima people. Although Aboriginal people no longer live a traditional lifestyle, the land remains a vital part of their lives and their culture.

In recent years there has been a great urgency amongst elderly people to pass on traditions, laws and knowledge to younger generations. Aboriginal people are playing an increasingly important role in management decisions. Two initiated men, selected by their community elders as suitable custodians of Aboriginal interests as well as their ability to carry out "white fellow" jobs, have completed a year of intensive training and are now National Park Rangers in this Park.

C.A.L.M. is committed to consultation with Aboriginal people who have traditional links to the land the Department manages. This applies to this National Park.

7.2 Pastoral Industry

The Park is bordered by seven pastoral leases and some areas of vacant crown land. Pastoral leases were first granted in the area during the late 1800's and originally covered much of the present area of the Park. Although the stations initially ran sheep, all but one have now converted to cattle. There are serious problems with incursion of cattle onto the Park from two stations and minor problems with one other one. As a legacy of the pastoral practices, feral horses and some donkeys occur on the Park.

With minor exceptions there are no boundary fences, boundaries are not defined on the ground, and in most areas rugged terrain makes access to the actual boundary impossible.

7.3 Mining Industry

During the first half of the century asbestos was mined at a number of sites in the northern gorges. The major mine in Wittenoom Gorge is outside the Park.

There are extensive temporary reserves for iron ore, covered by agreement acts, superimposed on the Park. Extensive exploration has taken place on a deposit of Marra Mamba Ore at Marandoo, just

south of Mt. Bruce. It is likely that this deposit will be mined one day. The workforce would be housed in Tom Price. There is a small settlement at Marandoo, currently the only resident is the caretaker.

Alluvial Gold was mined on a small scale near Milli Milli spring at the turn of the century. There are current applications to mine claims in the Milli Milli Spring - Coppin Pool area one of which was illegally mined for a short time. Prospectors from Tom Price and other areas fossick with metal detectors. They pose some fire threat because they occassionally burn spinifex to facilitate fossicking.

7.4 Tourism

Until the advent of the Iron Ore industry, improved communications and 4 wheel drive vehicles, there was little tourist activity in this area. Since then tourism has expanded rapidly in the northern portion of the Park. The gorges are the principal attraction. In 1986 there were approximately 40,000 visitor days recorded in that area. Tourist traffic is almost but not completely confined to the cooler months of April to October. There are peaks in visitor

numbers corresponding with public holidays (Easter in particular) and school holidays.

By and large the Park is a point on a tour itinerary rather than a holiday destination. Most visitors spend less than 4 days in the Park. Park visitors are mostly law abiding but a less desirable element tends to visit the park when neighbouring mine employees are on strike.

There are four public campsites and several day use venues. However many visitors make their base in Wittenoom where powered sites and other more sophisticated facilities are available.

8. Adjacent land use and requirements for protection of life and property

8.1 Pastoral Stations

Adjacent pastoralists burn fairly extensively, particularly in hummock grasslands. They tend to burn late in the year when fires have the ability to run for several days. Fires are not controlled.

A major wildfire in the Park in 1986 originated on pastoral lease adjacent to the Park. It was started by an unidentified person.

Pastoralists would like to see an extensive burning program in the Park to minimise the risk of wild summer fires originating in or crossing the Park and burning pasture. The only station homestead which is close to the Park is Juna Downs.

8.2 Towns

It is unlikely that fires originating in the Park would pose a serious threat to Tom Price or Paraburdoo. However Wittenoom could be threatened by wildfire running parallel to the Park's northern boundary.

The settlement of Marandoo and the Park Headquarters (four houses and workshops etc) require protection.

8.3 Tourists

Dangerous fires are confined to the summer months when there are very few tourists in the Park.

There is no difficulty in warning tourists in the regularly used facility areas of fire hazards.

Open fires in facility areas are not permitted. All fires must be in BBQ's. BBQ's and wood are provided by Rangers. We are moving towards replacing wood BBQ's with gas BBQ's.

8.4 Travel_stop

4.4 ha on the extreme north east corner of the Park and adjacent to the new National Highway have been excised from the Park for a Travel Stop roadhouse development.

9. Fire_History

9.1 Aboriginal_burning_practices

Aboriginal people have lived in the Pilbara for at least 30,000 years (Flood 1983) and have undoubtedly used fire expertly throughout much of that time span. They were aware of fire sensitive communities. Kimber (1983) has shown that in the western deserts this included Mulga. Burning was an obligatory part of Aboriginal cultures in this

area. Although fire was used for numerous utilitarian purposes (eg hunting, cooking, comfort) it was also used for more complex purposes which are hard to define but are described by the people as "cleaning up the country" i.e. land management.

This patch burning would have resulted in complex mosaics of different age stands. Similar patterns can be clearly seen in hummock grasslands around Aboriginal Communities living in the desert today.

9.2 Pastoral Fires

Little is known of the fire regime in the area after pastoral settlement and before the Park was declared. However it probably approximated that on adjacent stations today. If that is so, burning, especially of hummock grasslands, would have been frequent but would have differed from Aboriginal burning in that the areas burnt would have been considerably larger.

9.3 National Park

The area has been National Park for almost 20 years. Until two or three years ago the policy was one of fire exclusion. Management fires were

largely limited to small areas burnt to protect park facilities. They were all winter burns.

As a consequence huge fuel loads built up in the extremely flamable hummock grasslands and wildfires ignited by lightning, mostly in November-December burnt vast areas, sweeping through mulga woodlands as well as hummock grasslands.

Data collected between June 1976 and June 1986 on the cause, location, date and area burnt by all fires occurring in the Hamersley Range National Park was provided by Park Rangers. Due to the size of the Park and several of the past wildfires, estimates of area burnt were taken from maps or aerial photographs. Visual estimates were sometimes made by the Rangers. This data has been summarized in the table below. It should be noted that there were probably many smaller lightning fires that were never detected.

SUMMARY OF FIRE DATA 1976 - 1986

CAUSE	NUMBER OF FIRES	% OF FIRES	MEAN AREA BURNT (ha)
Lightning	36	64.3	9662
Control Burn	12	21.4	171
Campers	3	5.4	178
Deliberate	4	7.1	261
Unknown	1	1.8	40

A devastating wildfire (admittedly deliberately lit on an adjacent station) burnt an estimated one hundred and fifty four thousand ha between 29th November and 13th December 1986. It originated outside the Park on the western boundary and was extinguished outside the eastern boundary, a distance of almost 70km.

Throughout the time the fire was burning, it was fanned by strong (30kph) winds. Fire fronts commonly advanced at 5 km per hour and speeds of upto 60km per hour were observed. Backburns jumped 10m roads within minutes of ignition and this technique was abandoned. The fire was not stopped until winds dropped.

Recently, recognition that fire is causing the replacement of mulga woodlands with hummock grasslands, and that a mosaic of different age stands produced by patch burning was essential to the survival of many mammals (and perhaps other species?) has led to a change in philosophy from fire exclusion to patch burning as an appropriate fire management regime.

C.A.L.M. has begun to impliment this philosophy but much work needs to be done on all aspects of its development.

10. Other factors influencing fire management

10.1 Fire sensitive communities

Hamersley Range National Park contains a complex mosaic of mulga woodlands and hummock grasslands. Mulga is fire sensitive, hummock grasslands are fire prone. Despite its wide habitat tolerance mulga tends to grow in predictable situations, however many of the sites at which it is found are capable of supporting either community type. In these situations fire seems to be a major factor determining which community is present. In the absence of fire, dense Mulga apparently is able to

exclude hummock grasses. However, hot fires running from hummock grasses into the edges of mulga stands kill peripheral Mulga trees enabling invasion of the margins of the stand by hummock grasses. The advance of hummock grasses enables subsequent fires to penetrate further into the stands and at the same time kill any Mulga trees that had survived earlier fires.

Thus the mosaic of mulga and hummock grasses is a dynamic mosaic of fire tolerant and fire sensitive communities. Mulga trees growing over hummock grass is usually an unstable transition stage from one vegetation type to the other.

Aboriginal people probably used to burn the hummock grass with skilfully controlled fires that did not encroach into mulga stands. The mosaic of burnt areas would have prevented lightning strikes developing into the huge and uncontrollable wild fires that are commonplace today. Additionally, it would have given a large measure of protection to mulga by effectively firebreaking the margins of the stands. (Start, 1986)

10.2 Fauna

Perhaps the most noticable change in the fauna of W.A since european settlement has been the near or complete extermination of many medium (large rudent to small wallaby) sized mammals. There is increasing evidence to suggest that this phenomenon is associated with changes in fire regimes. For example it seems that in hummock grasslands hare-wallabies were dependent on simultaneous access to newly burnt country for palatable plants that occur in the early stages of post fire regeneration, and long unburnt country which provides shade and cover. E.g. Boulton and Latz (1978).

The complex mozaics produced by Aboriginal patch burning would have suited the hare-wallabies. In its absence vast areas of even age stands provide either shelter but no food before fire or food but no shelter after fire.

While no populations of these mammals (except Rock Wallabies) are known in the Park, the fauna has not been surveyed in detail. There have been several recent records of hare-wallabies and rabbit eared bandicoots in the Pilbara and it

would be wise to consider that these mammals may be present when considering fire management.

10.3 **Bush Fires Act**

The Bush Fires Act is administered by the West Pilbara Shire Council. However, although C.A.L.M complies with the Act, it is probably the only body in the Pilbara that does so.

10.4 **Fire Management Goals of CALM** are:

To protect community and environmental values on land managed by the Department from damage or destruction from wildfire.

To use fires as a management tool to achieve land management objectives, in accordance with designated land use priorities and suggested fire management objectives for the park.

To confine fires to less than 10% of the total park area in any one single fire event.

To confine fires to less than 50% of the total park area in any 10 year period.

To reduce the risk and frequency of wildfires starting in or near the park from human activities.

To prevent the loss of plant and/or animal species through planned or unplanned fire (these objectives must be consistent subject to the general overall management objectives).

ii. **Resources currently available to CALM for fire management**

C.A.L.M. has very limited resources in this area.

4 National Park Rangers
1 light fire unit (450 l)
1 heavy duty unit (3000 l)

Staff assistance is available at Millstream about 250km north west.

2 National Park Rangers
2 light fire units (450 l)

In case of serious wildfires staff are available from Karratha and other Regions.

Communication is by HF radio installed in all vehicles, Park HQ and Regional HQ. VHF is being installed to overcome difficulties in using HF at night.

A neighbouring pastoralist has one grader and a light aircraft which are available for emergencies at cost. He is also willing to assist with control burns if available.

Mining Companies have been prepared to loan or hire heavy machinery in emergencies.

12. Conclusion

Hamersley Range National Park is a vast rugged reserve with very limited accessibility. The principal vegetation types are dominated by hummock grasses and mulga woodlands. The former are fire prone and its associated fauna is able to survive fires although some species are not able to tolerate large areas of uniform age. The latter are fire sensitive. There are many associated animal species which depend on this habitat.

The fire regime imposed by Aboriginals was one of patch burning. This protected mulga and provided a mosaic of different age vegetation in hummock grasslands.

Reversion to fire exclusion (effectively natural fire) has more or less obliterated the age mosaic in hummock grasslands and has expanded the area covered by hummock grasslands at the expense of mulga woodlands. The process is continuing. The nett effects have been to reduce diversity, probably cause the local extinction of some mammals and create very hazardous conditions during summer.

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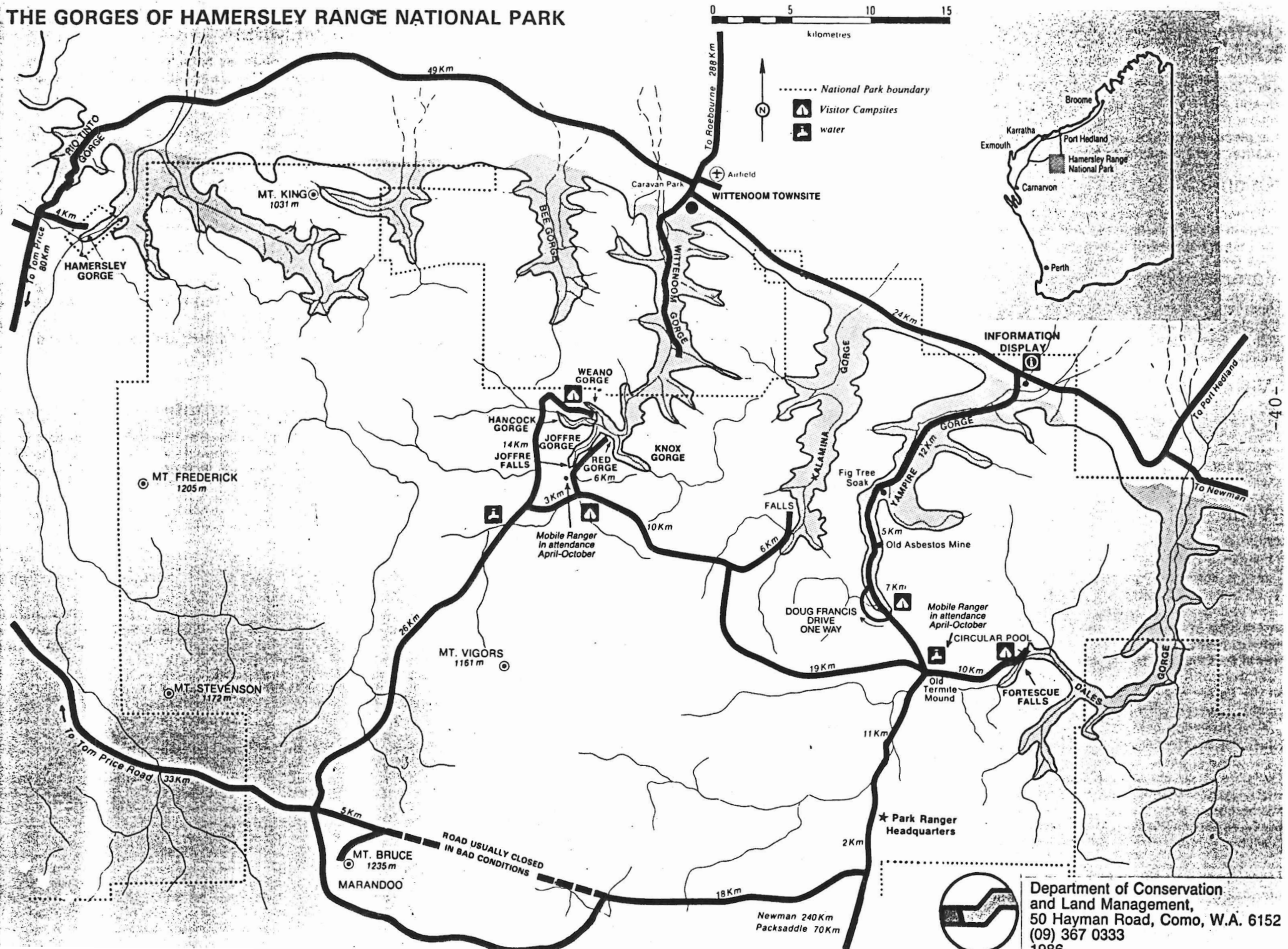

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