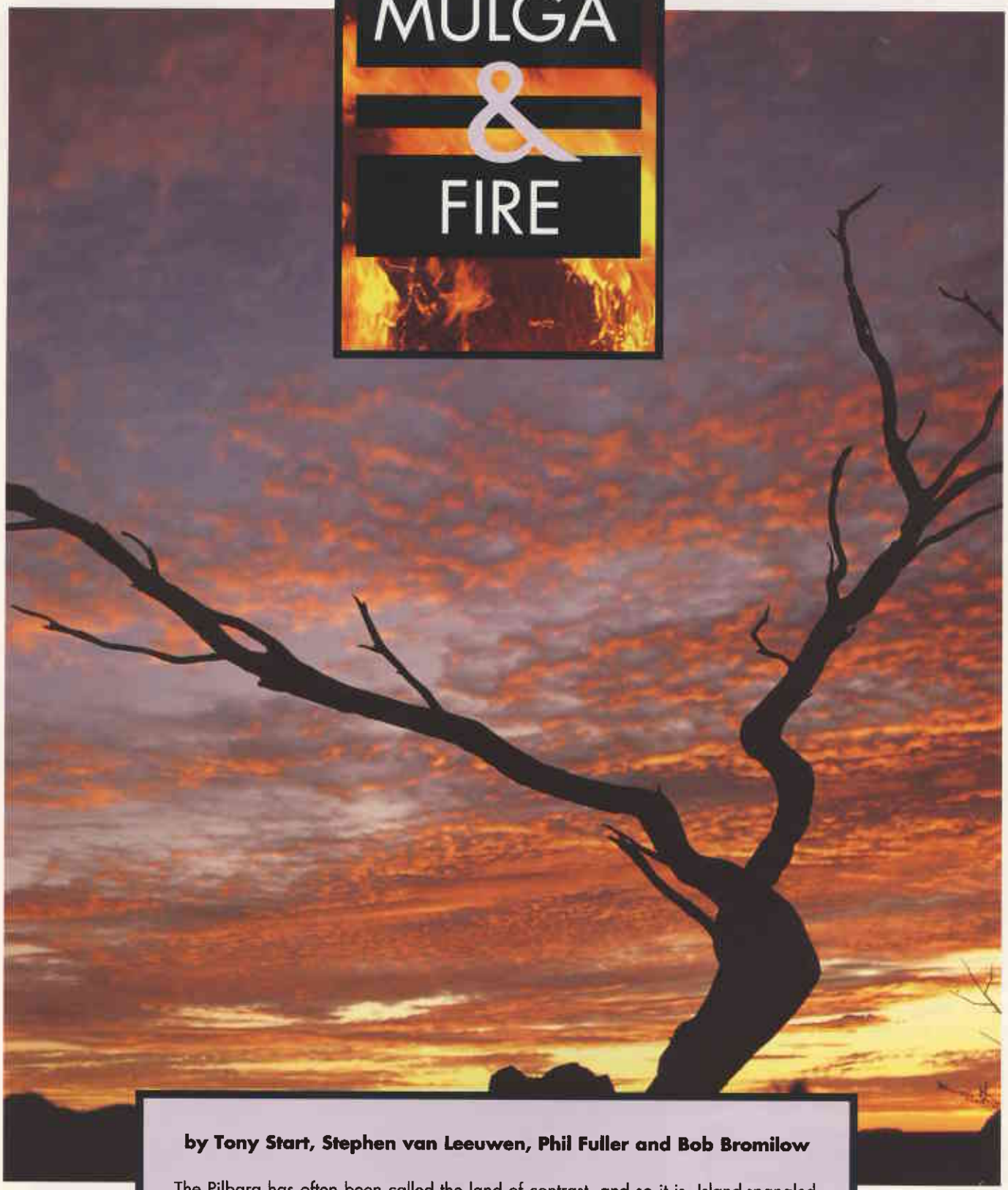
MULGA & FIRE



by Tony Start, Stephen van Leeuwen, Phil Fuller and Bob Bromilow

The Pilbara has often been called the land of contrast, and so it is. Island-spangled blue seas, great plains of spinifex, mountain ranges dotted with white-trunked gums, daunting cliffs and stomach-wrenching gorges. It is an ancient, arid land where Aboriginal people have lived for more than 40 000 years.
Though it is an ancient land, it has resources that modern civilisation hungers for. The pursuit of these resources has wrought many changes in the Pilbara.

Photo - Robert Garvey

We extract salt from the sea and exploit deposits of gas, iron and other minerals. We create air-conditioned towns with green lawns, and plant trees where none grew before. For a hundred years or more, pioneering pastoralists have grazed sheep and then cattle on the once seemingly endless pastures.

But to those who look past the transient monuments of modern humans, and see through the mask of an apparently immutable landscape moulded by nature over countless ages, there are other contrasts and other changes. Woodlands of mulga trees live juxtaposed with grasslands dominated by spinifex, that hummock-shaped perennial grass renowned for being so prickly.

The woodlands are shady, often with an understorey of shrubs that vary with the site on which they grow. There are blue- or red-flowered eremophilas, yellow-flowered cassias and, after rain, a bewildering array of brightly coloured annuals. Where cyclonic storms inundate low-lying flats the understorey changes to metre-deep swards of kangaroo grass. After rain the kangaroo grass sends up tufts of green leaves and copper-coloured flowering spikes. Later it produces seeds with silky barbs that work their way through the best of socks to torment tender ankles.

There are, of course, many animals that relish these woodlands. They include arboreal geckos that emerge at night to prey on unwary insects, and dragon lizards that wait at the entrances of mulga ants' nests, gobbling up the artisans as they emerge, then retreating to the safety of the mulga tree's lower branches to sleep off full stomachs.

Mulga ants and specialised lizards are not the only animals that depend on mulga woodlands. There are many others such as thornbills, warblers, and those gems, the unobtrusive, pastel-coloured Bourke's parrots that feed on the seeds they find on the ground under mulga trees. Mulga trees provide safety for the parrots when they are threatened and nesting holes when the breeding urge takes hold.

Metres away from a clump of mulga the ground is hot and stony. Spinifex strives to cover it but seldom manages to occupy more than half of the space available. Despite this it provides for the needs of an impressive assortment of animals that have adapted to this seemingly inhospitable habitat. Amongst their specialisations is the ability to recover from frequent fires, for spinifex is a fire-friendly fuel. It is well aerated and rich in flammable oils.

Lightning, carelessly thrown matches, or, before the advent of European man, Aborigines' fire sticks, frequently set the spinifex alight. A breeze is all that is needed to spread the fire from hummock to hummock. Fanned by a good wind the fires can cover many square kilometres and burn for weeks. Spinifex grasslands have evolved with fire. All the animals and plants that inhabit them have mechanisms that ensure survival or the capacity to recolonise the burnt areas, provided, of course, the fires are not too frequent and extensive.

In contrast, fire often kills mulga trees, letting the sun's heat onto the ground. Animals and plants dependent on the shade and protection of the trees perish. A few that can tolerate the harsher conditions persist, and some, including the fire-prone spinifex, flourish. With time, the woodland should regenerate and be recolonised.

In the Pilbara, Aborigines probably secured the mulga woodlands, making firebreaks around them by cleverly patch-burning in the grasslands. But Aboriginal people have migrated to townships, abandoning thousands of years of traditional practice.

The result is change. Fires now burn into the mulga from the spinifex. Some of the once-safe woodlands are retreating, their place apparently being taken by spinifex grasslands.

Many geckos live in mulga trees, emerging at night to hunt insects. This one is *Diptodactylus strophorus*.
Photo - Jiri Lochman ▼

White cassia. Cassias are common elements of mulga woodlands and spinifex grasslands.
Photo - Jiri Lochman ▼▼

SOME MORE FLAMMABLE THAN OTHERS

However, the picture is not that simple. The understorey in a mulga woodland varies with the site on which it grows. For example, in some parts of Hamersley Range National Park there are well-watered creek banks and flats that are liable to flooding after heavy rains; such places often have deep, fine-textured soils with a high clay content and carry a dense, waist-high sward of kangaroo grass. At the other end of the catchments, high on rocky ridges where soil is confined to crevices in the cracked and crumpled ironstone, the understorey is mostly limited to a sparse and select suite of hardy, woody shrubs.

Where creeks draining the high country spill out onto the flats, and sometimes in the broad valleys of the larger rivers like the Fortescue, mulga grows in bands stretched across the barely perceptible flow line. Each band or 'grove' acts as a contour bank trapping moisture and nutrients and supporting a diverse understorey of shrubs, herbs, grasses and ferns. In stark contrast, the 'intergroves' are devoid of vegetation except when carpets of tiny ephemerals flourish briefly after heavy rains.

Gentle slopes above the flats are made up of materials eroded from the ridges. Their freely draining soils are often characterised by the presence of many stones, especially on the surface. They seem to have supported the most diverse understorey of shrubs and grasses including, significantly, some spinifex. Variation in the flora on these slopes reflects subtle variations in their topography.

Apart from arboreal species such as birds and some reptiles, most species of plants and animals found in the mulga woodlands live in the understoreys. Here, as we have seen, there is great variety in structure and composition; indeed many of the communities that have been lumped together as 'mulga woodlands' have little in common besides mulga trees and some animals that live in those trees. However, we still know very little about the characteristics of the different communities and we don't know to which communities many of the species belong that 'live in mulga'.

As one might expect with such variation in the understorey, the capacity for different communities to carry fire is also variable. This is reflected in the differing degrees of vulnerability amongst the woodland communities to long-term damage or even elimination by fire. The most vulnerable communities are those with an understorey that readily carries fire and regenerates fast enough to burn again before the woodland structure redevelops. If the interval between successive fires is too short for mulga seedlings to mature and produce their own crop of seed, then the mulga itself can be wiped out.

Where the mulga grows in groves, there is often evidence of occasional fires: fire scars, charred stumps and, very occasionally, even-aged groves of regenerating trees. However, the bare intergroves seem to confine most fires to one or two groves and the frequency is so low that the burnt groves regenerate. This community seems to be fire-safe, although it is vulnerable to other

Grey honeyeaters, unobtrusive birds of mulga woodland.
Photo - Babs & Bert Wells ▸

Ptilotus rotundifolius - mulla mulla that thrives in spinifex country.
Photo - Jiri Lochman ▾

MULGA

Mulga, *Acacia aneura*, grows in a broad belt across the arid mid-latitudes of Australia from the southern Pilbara in Western Australia to western Queensland, western New South Wales and northern South Australia. It usually grows into a small tree with a semi-rounded canopy and commonly forms extensive woodlands.

However, it is remarkable for the diversity of life forms and phyllode ('leaf') shapes it exhibits as well as the variety of habitats in which it grows. There are weeping forms, forms that look like Christmas trees, shrubby forms and many others. Some have short broad phyllodes, others have long needle-like phyllodes and there are many in-between shapes and sizes. This variation poses one of the major unresolved problems to Australian arid-zone botanists interested in the classification of plants. Is mulga one species, as current wisdom has it, or in fact a complex of species? It is hoped that future research will address this issue. Photo - Tony Start

SPINIFEX

Spinifex is the common name given to several species of grass that belong to the genera *Triodia* and *Plectrachne*. Botanists often refer to these grasses as hummock grasses or, occasionally, porcupine grass to distinguish them from quite different grasses belonging to the genus *Spinifex*. The latter grow on coastal dunes. Photo - Tony Start

disturbances. These include alteration to drainage, and grazing by cattle, donkeys and feral horses.

Similarly, woodlands on the rocky ridges can burn. Here, the sparse, woody shrubs that grow below the mulga canopy produce little fuel. They can burn, but they do so very infrequently.

On the flats, mulga persists, suggesting that this community is fairly resilient; but it is still not completely safe. Indeed, when the kangaroo grass has flourished after good cyclonic rains and then died off, there are times of great danger.

But the relatively gentle slopes where the understorey is diverse are the most vulnerable sites. In fact, in much of the Pilbara, it is now difficult to find intact mulga woodlands on gentle slopes. It seems that the spinifex that was part of the understorey flourishes after fires, creating a highly flammable stage in the regeneration cycle. Today's fire regimes, without the complex pattern of patch burns that Aboriginal people created outside the woodlands, increase the likelihood of repeat fires before the woodland has reformed.

GOING, GOING...?

Extensive areas of dead and charred mulga stags standing defiantly over dense spinifex grasslands are mute evidence of the changes occurring on slopes in the Pilbara. A few more years, a few more fires, and even the dead stumps will have gone: people will not know that there was ever a woodland there. Gone too will be the diverse array of animals and plants that depended on the woodland structure - at least they will have gone from those sites, and those confined to that community will be gone from the area.

CALM staff are aware of the dangers. They have started a long-term research project to find out more about the characteristics and the composition of the different communities and to locate the most vulnerable ones in the Hamersley Range National Park, where patch-burning is being reintroduced. The aim of all this work is to make sure that, at least in nature reserves and national parks, good management will ensure that the diversity of the mulga woodlands persists. ⊡

There is little chance that regenerating mulga will survive the next fire in this spinifex.
Photo - Tony Start ◄

Mulga woodland on scree slopes has a sparse understorey that seldom carries fire.
Photo - Tony Start ◄

The authors are members of the Research Division of CALM. They have all lived or worked in the Arid Zone for many years. They are researching the problems of fire management in mulga woodlands in the Pilbara Region. Tony Start and Phil Fuller can be contacted at CALM's Wildlife Research Centre on (09) 405 5100. Stephen van Leeuwen and Bob Bromilow are based at CALM's Karratha office and can be contacted on (091) 868 288.

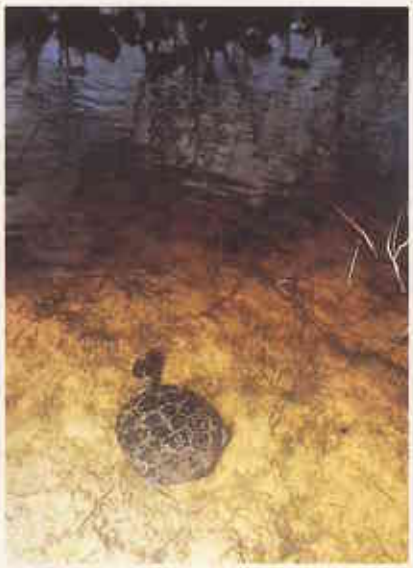
LANDSCOPE

VOLUME SIX NO. 4 - WINTER EDITION 1991

Cloud-capped Bluff Knoll, majestically brooding sentinel of the Stirling Range. Does it hold a secret in its stony heart - perhaps the answer to the missing mammal mystery? See story on page 9.

Mulga and fire - at best an uneasy relationship - sometimes symbiotic, sometimes disastrous. Find out when and where on page 20.

The Kimberley's rugged grandeur is deceptively fragile. Additional reserves managed by CALM help protect the region's delicate, complex and diverse ecosystems. See page 35.



A western swamp tortoise (Pseudemydura umbrina). *Could this be one of the last to be photographed? Not if CALM's ten-year recovery plan succeeds. See page 28 for details.*

An uncommon dragon, Caimaniops amphiboluriodes *inhabits mulga shrubs. Many other dragon lizards prefer harsher habitats such as rock-piles and salt lake beds. See page 51.*

FEATURES

REGULARS

COVER

Central netted dragon (Ctenophorus inermis), *one of the more than 60 species of dragon lizard that inhabit the arid and semi-arid parts of Australia. The acute eyesight and swiftness of dragon lizards are essential in order to avoid predators and to capture food. See page 51.*

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