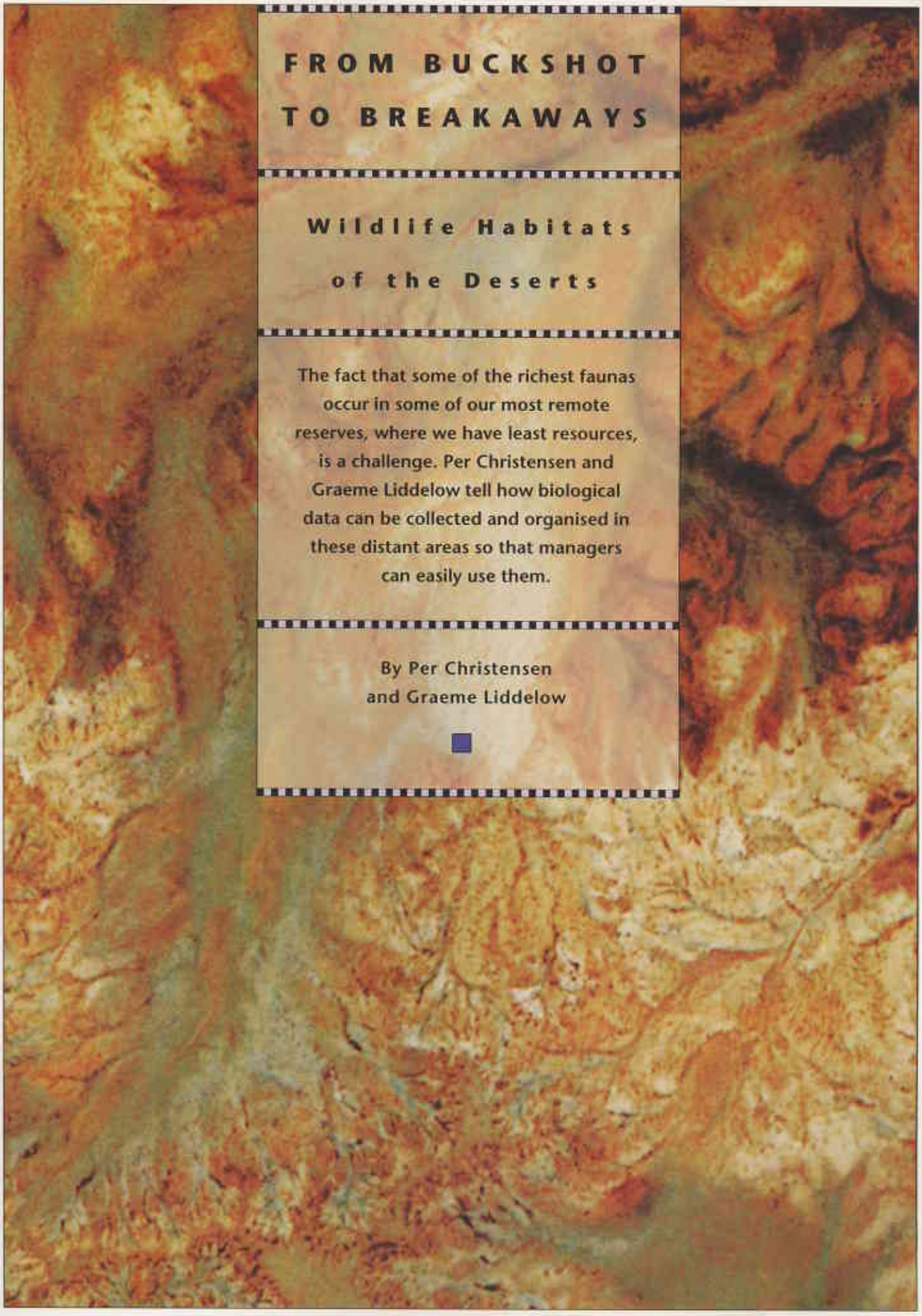

FROM BUCKSHOT TO BREAKAWAYS

Wildlife Habitats of the Deserts

The fact that some of the richest faunas occur in some of our most remote reserves, where we have least resources, is a challenge. Per Christensen and Graeme Liddelow tell how biological data can be collected and organised in these distant areas so that managers can easily use them.

By Per Christensen
and Graeme Liddelow

As you wind your way slowly inland from Carnegie, the last station east of Wiluna on the Gunbarrel Highway, you enter the desert. The transition is not an abrupt one. The most obvious change is the abundance of spinifex, which increases as you travel until it gradually dominates the landscape. A desert is not just an area of low rainfall, high temperature and lots of sand; it is defined as a region of unreliable and unpredictable rainfall. Indeed, it is the occasional deluge, when rivers flow and lakes fill with water, that allows a range of plants and animals to live in these deserts.

The Gunbarrel Highway is winding, in places almost tortuous, and certainly not smooth as it crosses the south-west corner of the Gibson Desert Nature Reserve. The desert landscape of the Gibson to the north-east of the road is one of vast spinifex plains, interspersed with groves of mulga running up into a range of flat-topped hills, the Young Range.

The Range is flanked by rocky breakaways, cut here and there by small ravines in which an occasional gum tree thrusts up through the rocks. Northwards, hidden from view by undulations in the plains, lies a system of broad shallow valleys - an ancient river system that originated at least 20 million years or so ago, when these desert regions received a higher and more reliable rainfall and were probably clothed in rainforest. It is here, in this ancient landscape, that we take up the story of the desert mammals.

WHERE IS THE WILDLIFE?

Wherever animals occur, from the arctic to the tropics, there is a pattern to their distribution. The pattern of their occurrence is related to the basic necessities of life, food and shelter, and is usually predictable. Food and, in many cases, shelter are provided by plants. This means that an understanding of the vegetation is basic to understanding animal distribution.

The plants of the desert form distinct communities, which are determined very largely by soils and landform. Even to the most casual observer many of these are obvious. The wide rolling plains of spinifex, for example, are strikingly different from the lakes with their woodlands of gum trees.

There are four major and easily recognisable landforms and vegetation units in the Young Range area of the Gibson Desert: hill tops and slopes, mulga, spinifex plains and sand dunes. Hill tops and rocky slopes are typically characterised by massive rocks and boulders and a sparse cover of vegetation. Mulga grows on the middle to lower slopes, typically in good soils with some depth, and is associated with patchy spinifex and a variety of woody shrubs. Spinifex plains are typically undulating plains on shallow soils over clay, with or without continuous spinifex and occasional trees or shrubs. Sand dunes are usually composed of deep, windblown sand with spinifex and a characteristic suite of shrubs including species of *Hakea* and *Grevillea*.

MAPPING THE MAMMALS

Field checks have shown that these landform and vegetation units relate closely to recognisable patterns on LANDSAT images, taken from orbiting satellites, and, therefore, they can be easily mapped. If we try to separate these four landform and vegetation units further, by using a standard scientific technique based on patterns in the distribution of individual plant species, the picture becomes more complex. The four units are still recognisable, but there is an overlap between them.

Does animal distribution relate to these units? If it does, we have a simple system that could be used to create a preliminary map of the distributions of

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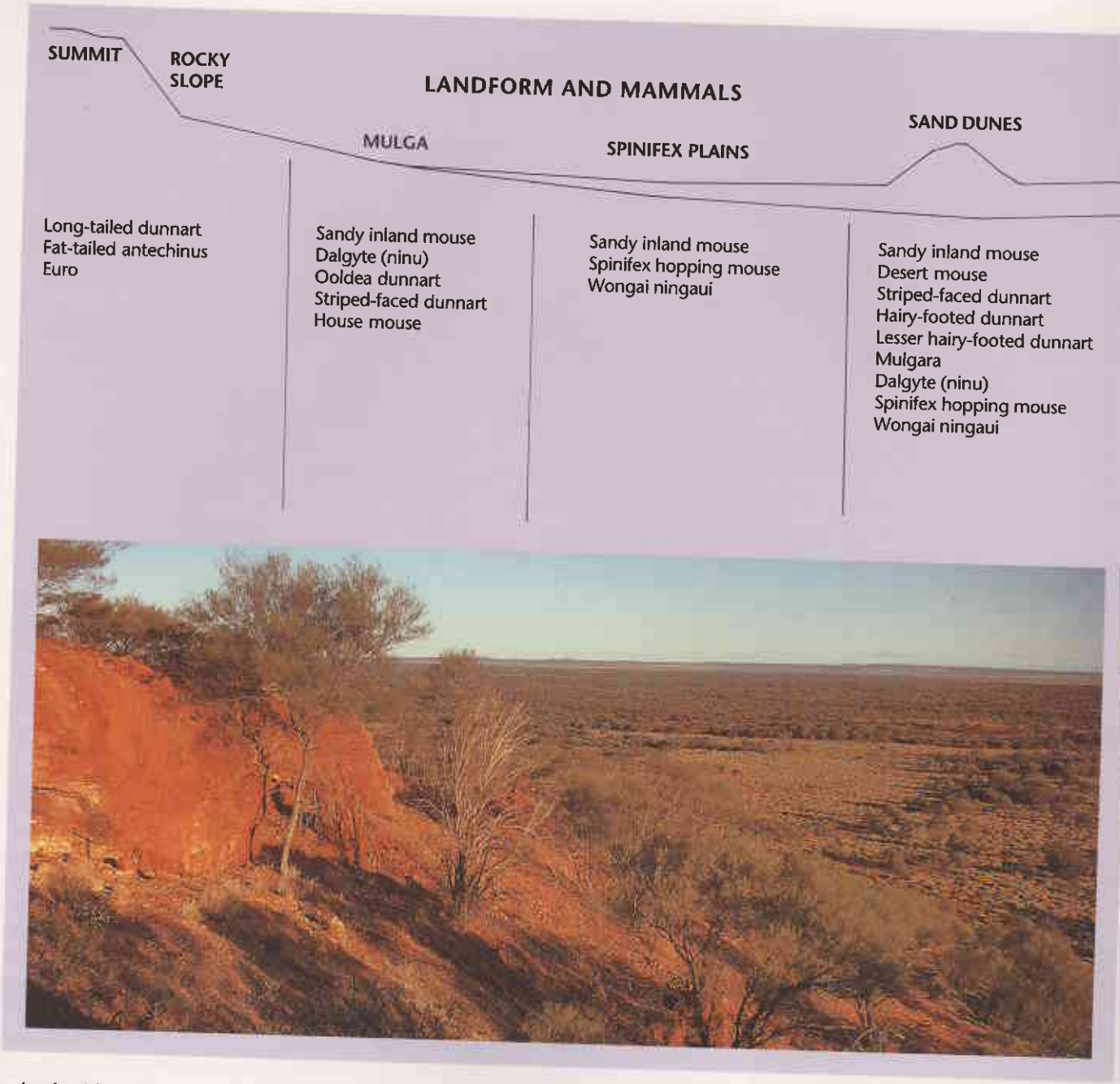
LANDSAT image of the Young Range area of the Gibson Desert Nature Reserve supplied by the Australian Centre for Remote Sensing and digitally enhanced by the Remote Sensing Applications Centre.
Department of Land Administration, WA

Carnegie Station (above left) marks the start of the western end of the Gunbarrel Highway (left).
Photos - Jiri Lochman



animals within the reserve. Such a simple map could be computerised and used to calculate areas and other information, and it can be used in everyday management to help make decisions on road access and the like.

Information obtained from trapping and searching for signs of animals in the Young Range area suggest that there is indeed a relationship between mammal distribution and the landform and vegetation units.

The reasons for the pattern of distribution that has been observed are not yet known in detail, but enough is known to make some educated guesses. Thus, the areas where the highest numbers of different species of plants occur, the middle to lower slopes, are also the most nutritionally rich. The topsoil here, which over the years has washed down onto the lower slopes, has the highest content of phosphate and potassium, which are indicators of soil fertility. Although small in total area, this landform, together with the hill tops, contains one of the richest mammal faunas of the desert.

A VARIETY OF HABITATS

Other environmental factors also affect the presence of animals, and we may interpret the distribution of many species even with the fairly rudimentary knowledge that is presently available. At least three species are associated with hill tops and rocky slopes: the euro (*Macropus robustus*), the fat-tailed antechinus (*Pseudantechinus macdonnellensis*) and the long-tailed dunnart (*Sminthopsis longicaudata*). The latter two are small carnivorous marsupials. The euro makes use of the

The fat-tailed antechinus lives among the jumbled rocks of the breakaways.
Photo - Ray Smith

many caves on the slopes during the heat of the day, coming down to feed on the lower slopes at night. The fat-tailed antechinus lives among the jumbled rocks of the breakaways, a habitat to which it seems to be restricted in this area. The long-tailed dunnart, an uncommon species, appears to be restricted to rugged rocky areas such as the tops of the Young Range. Extinct lesser stick-nest rats (*Leporillus apicalis*) once used the caves as sites to build their nests - a large jumble of sticks. Remains of these nests can still be found in the caves of the Young Range. The last specimen of the stick-nest rat was collected in 1933. Its disappearance is believed to be linked to predation by the introduced fox and the feral cat.

The special habitat requirements, for instance burrows, of some species further explain their distribution. The dalgyte (*Macrotis lagotis*), for example, digs burrows to a depth of two metres. Sand dune country and the lower slopes offer the only sites with sufficiently deep sand for these excavations. The mulgara (*Dasycercus cristicauda*), another small marsupial carnivore, lives in burrows that it digs on the flats between sand dunes. Little is known of its habits, and numbers seem to fluctuate from year to year. Few animals have been recorded in Western Australia since 1959.

The boodie (*Bettongia lesueur*), now extinct on the mainland, lived in most habitats, including dunes and buckshot plains. Most noticeable are communal warrens excavated beneath sheets of calcrete, a type of limestone, that occur on the lower slopes and bottoms of the ancient drainage lines. These rock formations are marked on geological maps of the area as *Czk* and are an unerring guide to the places where boodies used to occur in abundance. David Carnegie, the explorer who passed through this area in 1896 on his way

Above: The wongai ningaui is common in the spinifex plains, one of the most inhospitable habitats in the desert.
Photo - Ray Smith

Right: The mulgara is a small, carnivorous marsupial that lives in burrows on flats between sand dunes.
Photo - Jiri Lochman

from Kalgoorlie to Halls Creek, remarked on this fact.

The spinifex hopping-mouse (*Notomys alexis*), another burrowing species, occurs in some stony and most sandy habitats, often in the vicinity of sand dunes. Together with the diminutive and aggressive carnivore the wongai ningaui (*Ningaui ridei*), it appears to be well adapted to desert conditions. Following the recent three-year drought in the Gibson, these were the two most common species of small mammals to be found. The ningaui lives in a range of habitats where there is clumped spinifex, but is especially common in one of the most inhospitable of habitats, the buckshot plains. These vast plains with short sparse hummocks of spinifex occur on very shallow sandy soils, the surface of which is covered with a 'buckshot' gravel. Why the ningaui prefers this harsh habitat is a mystery. Perhaps the other marsupials of the Gibson Desert are smart and just leave it to them!

CONCLUSION

Because we can see that each of the wonderfully diverse desert mammals appears to favour a particular habitat within the intricately complex desert ecosystem, we need not be overawed by the implications of managing such an area. There are simple predictable patterns which can be easily identified, explained and mapped. This information can be used immediately for reserve management and may be used as a framework on which to build future knowledge. As scientists, perhaps we should consider spending more time identifying and recording the simple, even obvious, broad patterns which, because they can be easily mapped, will assist managers who are just now starting to prepare management plans for these remote but important conservation areas.

Per Christensen is a Senior Principal Scientist and Graeme Liddelow is a Senior Technical Officer with CALM. They can be contacted on (097) 71 1988.

Top: The spinifex hopping mouse is most common in the vicinity of sand dunes.
Photo - Wade Hughes/Lochman Transparencies

Above: The sparse cover of the spinifex plains is the preferred habitat of the wongai ningaui.
Photo - Tony Start

Left: Dalgytes prefer areas of deep sands where they can readily dig their burrows.
Photo - Ray Smith

Wildfires are synonymous with Western Australian summers, but what can be done to lessen the threat to life and property? Lachlan McCaw discusses the problem on page 49.

Daisies belong to the Asteraceae family, one of the world's largest families of flowering plants. Suzanne Curry presents some of them in 'Delightful Daisies' on page 41.

LANDSCOPE

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Aborigines have eked out a living in the harsh Western Desert region for thousands of years. Their intimate knowledge of the desert is helping scientists learn more about its plants and animals. See 'Digging Sticks and Desert Dwellers' on page 10.

'Rainforests and Bats', on page 34, tells the story of the recent LANDSCOPE *Expedition to the Mitchell Plateau.*

Can images from space help locate desert mammals? See 'From Buckshot to Breakaways' on page 23.

FEATURES

REGULARS

SPECIALS

COVER

Cape Barren geese live on the islands and rocks of the Archipelago of Recherche. A few years ago their numbers appeared very low and their survival was in doubt. However, a recent survey of the islands has brought good news with a marked increase in the bird's population.

The illustration is by Philippa Nikulinsky.

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