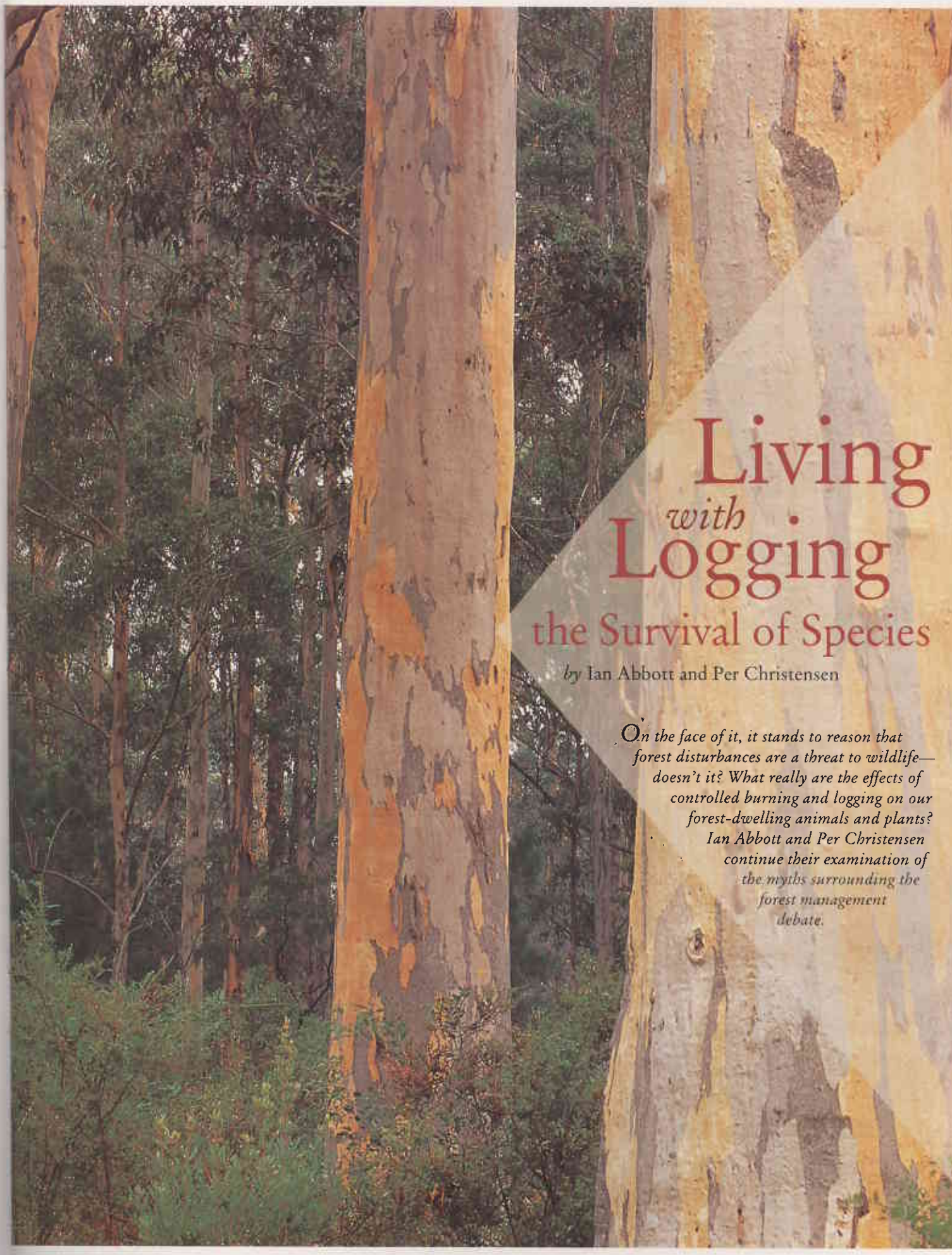


Living *with* Logging

the Survival of Species

by Ian Abbott and Per Christensen

On the face of it, it stands to reason that forest disturbances are a threat to wildlife—doesn't it? What really are the effects of controlled burning and logging on our forest-dwelling animals and plants? Ian Abbott and Per Christensen continue their examination of the myths surrounding the forest management debate.

In 1633 in Italy, Galileo was forced to withdraw publicly his support for the startling theory that the Earth revolves around the Sun. When the judgement was delivered by the Inquisition, Galileo is reputed to have whispered 'Eppur si muove' ['All the same, it does move']. More than 350 years later in the Western Australian forests, we must be equally watchful that what seems obvious (as the apparent movement of the Sun around the Earth did to 17th-century civilisation) does not blind us to the truth.

In a previous article ('Looking Beyond the Obvious', *LANDSCOPE*, Winter 1995), we discussed some widely held beliefs about scientific knowledge of WA's forests, the cherished status of old growth forest, the adequacy of the reserve system, and the effects of clearfelling. By looking behind what seems obvious, we found that the reverse was often true: appearances frequently bear little relation to the facts.

In this article, we shall look at the effects, both real and supposed, of controlled burning and logging in our South West forests.

UNDISCOVERED SPECIES

In 1994, a new species of frog was discovered in State forest near Walpole. This provided a new occasion for an often-repeated criticism of logging and controlled burning: that it harms vertebrate or plant species as yet undiscovered by science. In this example we might formulate the argument as follows:

1. Many areas around Walpole have been logged or burned in the past.
2. The new frog species has been found only in three forest sites (about five hectares).
3. Therefore, it became extinct elsewhere because of logging or burning.

This conclusion does not follow. The significant factor about this new species of frog is not that it occurs in forest (burned or unburned), but that it does so in a much more restricted habitat—peat swamp. It has survived because there has been little gross disturbance of this habitat, which occurs in non-forest flats between forested areas. A more valid conclusion here might not find against controlled burning, but for it: those forest blocks had been the site of spring burning, which has helped protect the frog's habitat from summer fires.

Quenda now live in very dense, swampy places, where they find shelter from foxes.
Photo – Jiri Lochman

Tammar wallabies have vanished from most of their range, but they thrive when protected from foxes.
Photo – Babs & Bert Wells/CALM

The evidence is that most vertebrate fauna of the forest has already been discovered and named by scientists. Nearly all of the reptile, bird and mammal species were collected and described by 1850, before any logging took place. With the sole exception of Lewin's water rail (a bird that lived in swamps, not forests), these species are still present. Only five new vertebrate species (some two per cent of the total known vertebrate fauna) have been found in WA forests since 1970. By the law of diminishing returns, few new vertebrate species await discovery in the forest.

The lure of discovering new species sometimes prompts calls for more biological surveying. Superficially this may seem an attractive idea. However, it has been shown that most vertebrate and plant species in jarrah and karri forest occur over relatively large areas, so it is unlikely that the surveys already undertaken would not have identified nearly all species in these groups. For example, when fifteen surveys of southern forests for mammals, birds, reptiles, amphibians, freshwater fishes and vascular plants were tabulated, the first few surveys in different parts of the forest resulted in the recording of many species. After the twelfth survey, the number of previously unrecorded species diminished markedly. There is almost no likely reward for increased survey effort.

Previous page
Karri (*Eucalyptus diversicolor*) in State forest.
Photo – Jiri Lochman

Left: Numbat. This species experienced a marked decline in distribution and abundence before a program of fox control was begun.
Photo – Bert & Bert Wells/CALM

The carpet python is rarely found nowadays on mainland Western Australia, though it is common on several islands.
Photo – Babs & Bert Wells

Baudin's cockatoo is a magnificant and noisy forest bird that breeds in tree hollows.
Photo – Jiri Lochman

Red-eared firetail is a seldom seen but perhaps common inhabitant of dense vegetation, often along streams.
Photo – Babs & Bert Wells/CALM

All this brings us to the fundamental issue. Should the State halt a well-managed and necessary activity on the slight chance that a new species remains to be found, one which, rather improbably, might be threatened by current methods of controlled burns and logging? This is a question for the community, not for scientists; but the answer should not be sought without the perspective that science can bring.

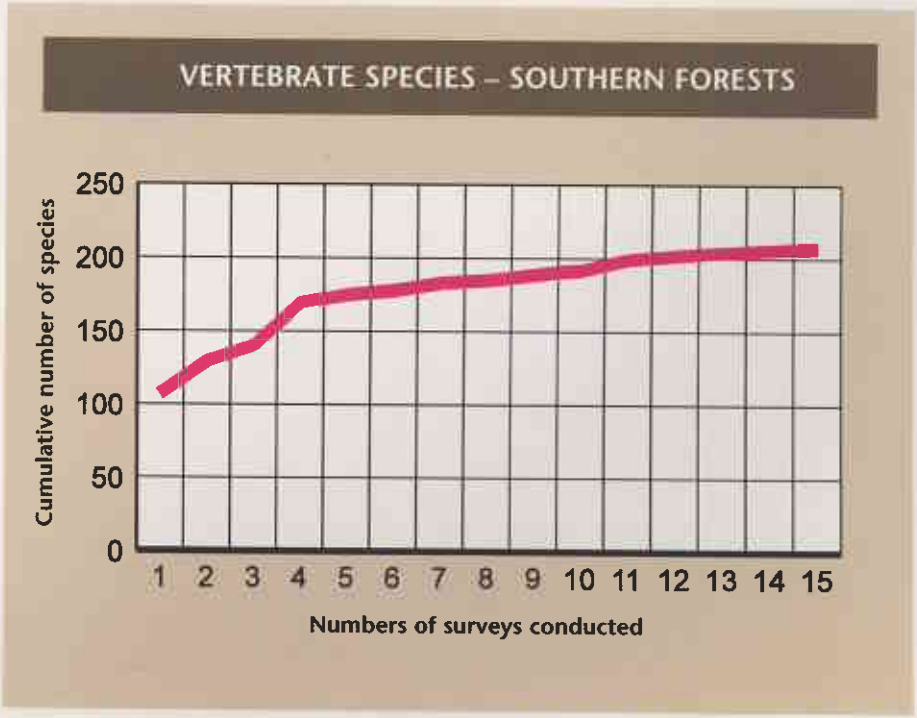
SPECIES EXTINCTION

It may seem at first that logging or burning might permanently reduce the biodiversity of native State forest. (State forest is designated by Act of Parliament for a number of uses, including recreation and logging. Up to two per cent is actually logged each year, and only a part of this is clearfelled.) Scientific research continues to study the effects of controlled burns and logging, but the results so far tell us that they cause only temporary disturbances. Any local disappearances of species are made good as animals and plants return. There is little in the extensive scientific literature to suggest any permanent or irreversible changes to the ecosystem.

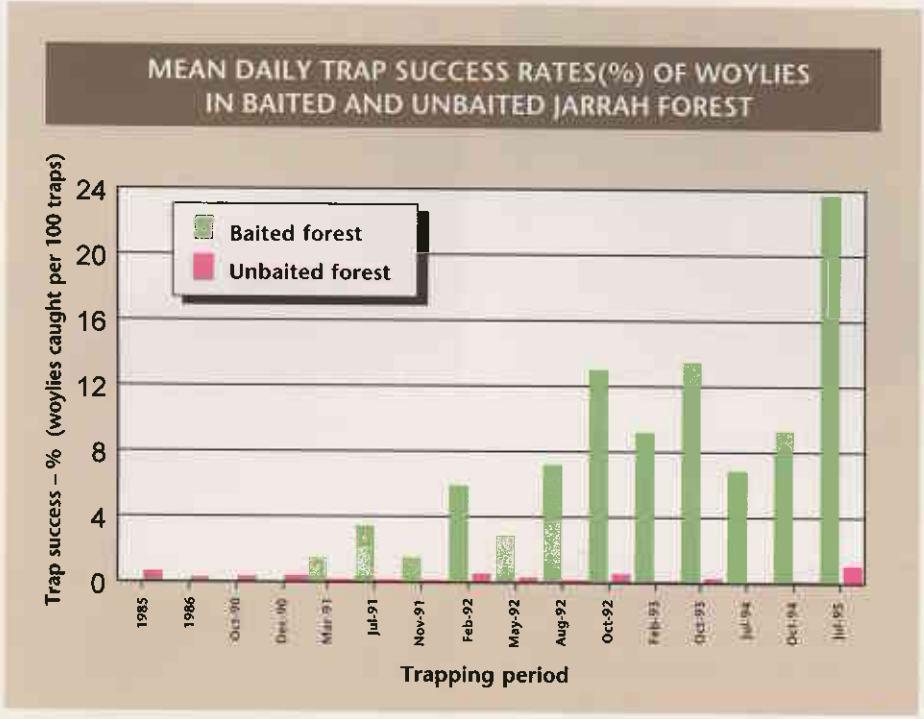
From the evidence available, species survival has little to do with forest disturbance, whether natural or artificial. Life and death are part of nature's cycle; many young animals and seeds die in undisturbed forest for many reasons, often because there is no space for them. In the latter case, indeed, any disturbance to the forest—including logging and burning—can actually enhance the survival of some species by modifying the habitat to accommodate them.

The South West forests are among the few places in Australia where we can still find the pre-European vertebrate fauna almost completely intact, even though some mammals have declined in distribution in the forests because of fox predation. This fact alone suggests that current forest management must be working. Indeed, only one species of vertebrate or plant has apparently become extinct in State forest. This species, Lewin's water rail, was last recorded in State forest in Western Australia in 1932, and also disappeared from its habitat (swamps) outside State forest. As swamps in State forest were not logged (or subjected to protective burning until the 1950s), neither factor can have caused the species' apparent demise.

In contrast, 26 species have become extinct on the Swan Coastal Plain, probably due to the clearing of nearly 80 per cent of its native vegetation for agriculture and urban development. An astonishing 43 species have disappeared from the Wheatbelt, because more than 90 per cent of its native vegetation has been cleared for cereal growing. Of the original forest, 42 per cent has been cleared for farming; 12 species have been lost from this part. In State forest, however, only two per cent of forest has been permanently cleared for public utilities such as highways, railways, power grids and dams.



A cumulative curve for vertebrate (mammal, bird, reptile, frog, freshwater fish) species in southern forests of WA.



The argument about species extinction is sometimes applied also to plant communities. It might be thought, for example, that every patch of forest is unique because it contains a mixture of plant species not quite the same as anywhere else. At best, however, these patches are unique only in the sense that a kaleidoscope image is unique. One patch may be fractionally different from others, but its elements are amply represented elsewhere.

The reason that extinctions of species have been few in WA forests is that sustainable use of natural resources, if properly managed, helps conserve the natural environment. This insight seems to have first been recorded in WA by the eminent WA geographer Dr Joseph Gentilli, who wrote:

'Good forest stands are well preserved as areas of natural environment for the very simple reason that they are well protected because of their economic value.'

No matter what value is the motivating factor, protection is protection. All the evidence suggests that species are safe in the forest, whether it is logged or not.

Ironically, the people often criticised for allegedly harming the forest are the people who feel they have done most to protect it. The foresters of Western Australia laid the foundations for forest management in the State, which has helped to ensure that these species are still present in the forests. In a series of policies made possible by the Forests Act of 1919, the forests have been looked after in ways that have sufficiently sustained them. Managed burning has reduced the threat and impact of wildfire, large areas have been placed into reserves, and areas designated for timber production have been logged on a sustainable basis. Without such controls, our forests would presumably have gone the way of many other forests elsewhere in the world—taking many species with them.

Above: At Batalling, scientists record the number of woylies caught in areas where foxes have been controlled since 1991, as well as in adjacent areas.
Data – Keith Morris

Left: Example of a large jarrah tree damaged by wildfire.
Photo – Jiri Lochman

RARE SPECIES

Decline in populations of native mammals such as the chuditch (*Dasyurus geoffroii*), woylie (*Bettongia penicillata*), numbat (*Myrmecobius fasciatus*), quenda (*Isoodon obesulus*), western ringtail possum (*Pseudocheirus occidentalis*) and tammar (*Macropus eugenii*) is often attributed to logging and burning. The implication is that if logging and burning were stopped, such species would respond by becoming more common.

The culprit, however, is not forest management. Before the 1920s, these threatened native mammal species occurred throughout the South West, including the Swan Coastal Plain and Wheatbelt, and several even ranged into the deserts and interstate. It was the arrival of the introduced red fox that virtually eliminated them from outside State forest. These species were protected within State forest by the forest's dense understorey and the presence of poison peas (*Gastrolobium* spp.). Experimental baiting in regrowth jarrah forest since 1991 has demonstrated large increases in the abundance of chuditch (see 'Return of the Chuditch', *LANDSCOPE*, Summer 1992–93) and woylie. Baiting in Dryandra (just east of State forest) began in 1982, allowing the numbat to resurge in numbers after being close to extinction.

State forest, the traditional source of most of the State's timber, not only seems to be no threat to threatened or specially protected species, but is actually a haven for them. Other than Lewin's water rail (presumed extinct), six rare bird species either live or breed there: the mallee fowl (*Leipoa ocellata*), the peregrine falcon (*Falco peregrinus*), Carnaby's cockatoo (*Calyptorhynchus latirostris*), Baudin's cockatoo (*C. baudinii*), the crested shrike-tit (*Falcunculus frontatus*) and the red-eared firetail (*Stagonopleura oculata*). Other rare animals found in State forest are two frog species, the white-bellied frog (*Geocrinia alba*) and the orange-bellied frog (*G. vitellina*), and two species of snake, the woma python (*Aspidites ramsayi*) and the carpet python (*Morelia spilota*). All of these took refuge from cleared areas into areas of forest which, in many cases, have been logged for the past century.

Most of these bird and reptile species occur more widely than State forest. Significantly, however, State forest seems to be the place where they thrive. Carnaby's cockatoo and the woma python are Wheatbelt species, which breed in wandoo woodland in the eastern extremity of State forest. The white-bellied frog occurs mainly on private property, where its habitat has to be protected against grazing; in State forest it is secure without such protection. The crested shrike-tit occurs mainly in wandoo and other woodland. Since 1971 it has colonised the karri forest and is now widespread there, occurring in regrowth as well as old growth forest. The mallee fowl also appears to have colonised karri forest near the Frankland and Deep Rivers—evidently the dense thickets of regenerating karri after clearfelling provide a safe haven from fox predation. The only species on the list that are uncommon in the forest are the peregrine falcon and carpet python, but they are widespread.

Wandoo woodland with the poison pea (*Gastrolobium microcarpum*) in flower. Photo – Marie Lochman

What is true for animals seems also to be true for plants. Only 30 species of Declared Rare Flora (DRF) are known to exist in State forest. By contrast, 132 species in the Wheatbelt have been designated as DRF. Locations of known populations are recorded on operational plans, and are not disturbed without Ministerial approval. Field staff from the Department of Conservation and Land Management (CALM) have also searched for and located many populations previously unknown to scientists. Before logging roads are constructed, the forest is searched systematically for the presence of any DRF known in the region.

HOLLOWS

It is sometimes said that logging and burning operations place stress on species dependent on tree-hollows, which occur only in older trees. In jarrah forests, hollows are scarce in trees smaller than 50 centimetres in diameter (about 90 years old). Hollows in jarrah become common in trees broader than 80 centimetres in diameter (about 150 years old).

Fifteen of the 29 mammal species present in State forest use hollows. Only two species, the brush-tailed wambenger (*Phascogale tapoatafa*) and western false pipistrelle (*Falsistrellus mackenziei*), are largely restricted to State forest. Furthermore, eight of the hollow-using species are very small (weighing less than 15 grams, the weight of a 50 cent coin). As there are plenty of small hollows throughout most of the forest, it is unlikely that these and the two next smallest (25–35 grams) species are limited in distribution or abundance by the supply of hollows.

The other species that use hollows in live trees (brush-tailed wambenger, western ringtail possum and brushtail possum) live in home ranges varying from 2.5 hectares to 40 hectares. In jarrah forest, therefore, CALM's policy is to leave

Left: The wambenger is an arboreal species of mammal formerly widespread in the south-west, but now restricted mainly to State forest.

Below: The tree martin, one of the smaller species of hollow-using birds widespread in the south-west, does not require large nesting hollows.
Photos – Babs & Bert Wells/CALM

three hollow-bearing trees per hectare—a choice of 7–120 habitat trees per home range for a suitable nesting hollow. In addition, trees with hollows occur in streamside reserves, which are not logged. In karri forest, some 40 000 hectares of mature forest are set aside in National Parks, Nature Reserves and Conservation Parks, with a further 18 000 hectares protected in road, river and stream zones. All clearfelled sections (with an average area of 50 hectares) are close to mature forest containing hollow-bearing trees.

Two other mammal species use hollows, but not in live trees. Female numbats and chuditch spend most of their lives in an area of 50 hectares and 90 hectares, respectively. There, hollows in fallen limbs, burnt-out stumps and suitable waste sections of logs are available for refuge and nesting. Logging increases the abundance of suitable hollows on the ground for these species.

The increases in abundance of these medium-sized, hollow-requiring mammal species, following widespread fox-baiting of forests, suggest it is this predator that limits their distribution and abundance, not the availability of hollows.

Nesting hollows are required by 21 of the 113 bird species present in State forest, though 19 of these species occur widely or nearly solely outside State forest. Only two species (Baudin's cockatoo and the forest red-tailed black cockatoo *Calyptorhynchus magnificus naso*) are dependent upon State forest. Small species such as the tree martin and striated pardalote need small holes, which are in plentiful supply. Larger species (for example, the barking owl and the red-tailed black cockatoo) have larger home ranges, and the provision of three habitat trees per hectare in jarrah forest allows a choice of large hollows from about 150 trees per home range. Species found most frequently in karri forest (such as the purple-crowned lorikeet, the western rosella and Baudin's cockatoo) have available 40 000 hectares of mature forest (46 per cent of karri forest) reserved from logging.

None of these hollow-dependent species is therefore considered to have been put at risk by logging operations in State forest.

DISTURBANCE AND GONDWANAN SPECIES

Many invertebrate species in south-west WA are thought to be survivors of ancient species present when Australia was part of the supercontinent Gondwana, which broke up about 65 million years ago. These species require cool wet habitats. Most occur in freshwater streams and swamps. Terrestrial species appear to be confined to moist or water-gaining sites, such as soil and litter around granite outcrops, and in tingle and karri forest in the wettest part of WA.

It is frequently presumed that terrestrial Gondwanan species are ultra-sensitive to any disturbance—such as burning, logging or road construction—which tends to open the canopy or reduce the amount of litter in the forest. The facts are otherwise.

Natural climatic changes in the past few thousand years have temporarily decreased the abundance of karri forest. Past wildfires (essential for the natural regeneration of senescent karri forest) must have incinerated relatively large areas of forest. Rather than being sensitive to environmental change, therefore, Gondwanan relict species may well be

Right: Varied-leaf grevillea (*Grevillea cirsiifolia*), an example of a rare plant that grows in State forest.
Photo – Andrew Brown/CALM

Below: Purple-crowned lorikeet is particularly common in karri forest, where it sups nectar from the karri blossom.
Photo – Babs & Bert Wells/CALM

resilient and capable of coping with change; their patchy distribution may be caused by naturally discontinuous habitats. As part of its nature conservation policy, CALM leaves up to 5-metre zones of uncut forest around any rock outcrops more than 0.2 hectares in size, and also leaves a 60-metre-wide minimum zone along streams. Almost all of these species occur in non-forest types that are a part of CALM's reserve system and not subject to logging.

Since 1978, ecologists have recognised that 'intermediate disturbance'—such as occasional fire in the forest—promotes species diversity. That is how our forests and wildlife have evolved. The extremes (no disturbance or very frequent disturbance) actually reduce biodiversity.

PRECAUTIONARY PRINCIPLE

The precautionary principle asserts that decisions should be guided by careful evaluation to avoid, wherever practical, serious or irreversible damage to the environment, and by an assessment of the risks and benefits of various options. Stated thus, few would disagree with the principle.

Regrettably, however, it is too easily interpreted as 'Do nothing until everything is known'. Some people who are worried about logging and controlled burns in forests would like to see surveys of every square metre, so as to detect rare, hidden species presumed to be on the verge of extinction. Because such minute scrutiny would be hugely expensive, time consuming and impractical, the approach adopted by CALM has been to conduct regional biological surveys, to develop an understanding of the major vegetation types. This, together with more detailed studies of key species and the impact of management practices, enables CALM to make decisions in accord with the precautionary principle. If there is a compelling reason to make a minute study, one is made—as happened, for example, in the cases of *Grevillea cirsiifolia* and *Acacia aphylla* in the jarrah forest.

Forest management is like any other area of science. While it cannot be based on perfect knowledge, it is supported by a broad and robust body of scientific concepts, empirical facts and scientific principles. There is an ongoing need to refine or modify these concepts and principles, and to acquire further facts; indeed, about one third of CALM's current science projects concern research in native forests. Such research will never finish, and its results will always influence forest management. That is what it is for.

As the example of Galileo shows, we must welcome the truth exactly as it is—even if the evidence of our own eyes makes it difficult at first to believe.

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The research data referred to are available from the library at CALM's Como Research Centre on (09) 334 0314.

Visitors can walk in the treetops along a series of walkways, platforms and stairways at the new Forest Heritage Centre in Dwellingup. (See page 10.)

A major survey of the Carnarvon Basin has recently been completed by staff from CALM, the WA Museum and the University of WA. What did they find? (See page 15.)

LANDSCOPE

VOLUME ELEVEN No. 2 SUMMER ISSUE 1995–96

It was a very good year in the Wildflower State. Find out just how good in our story on page 38.

Australia has its own families of songbirds that are very different from their European namesakes. See 'True Blue Birds' on page 45.

Quokkas were once widespread on WA's mainland, but the most visible populations are now found on just two islands. 'Where Have All the Quokkas Gone?' (See page 49.)

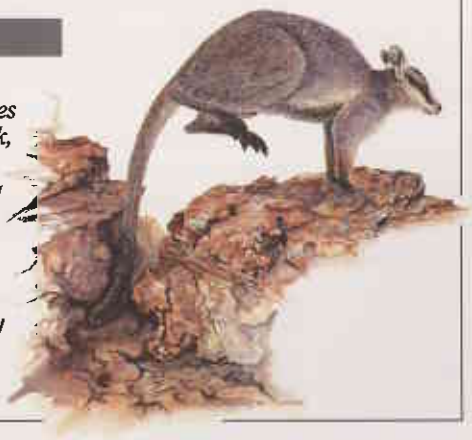
FEATURES

REGULARS

COVER

Western black-footed rock-wallabies are on the increase in Yardie Creek, thanks to a CALM fox-baiting program. Their numbers are being monitored by local tour operators Neil and Rhonda McGregor. See our story on page 36.

Illustration by Philippa Nikulinsky



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