

FEW forests are as magnificent as the karri: it has great beauty and biological diversity, it produces exceptionally strong and versatile timber, and it is popular for recreation. Some people fear the karri forest is being destroyed; others feel that valuable resources and jobs are being foregone. What is really going on?

In the first of two articles on karri, **Barney White** and **Roger Underwood** look at:



Robert Garvey

A trout fisherman deep in the heart of the karri forest. Mt Frankland National Park (opposite).

CONSERVATION RESERVES IN THE **KARRI FOREST**

KARRI forest occurs only in the south-west of Western Australia.

Spanning the lower catchments of the Donnelly, Warren, Gardner, Shannon, Deep and Frankland Rivers, it grows mainly on red earth soils (karri loams) on lower slopes where rainfall exceeds 1100 mm. At its best karri grows in pure stands. Where the soils change, karri grows in association with other trees, chiefly marri.

There is a strong maritime influence on karri; most grows within 40 km of the sea. Many fine stands grow to the water's edge on inlets permanently open to the sea, and others are found in sheltered localities on brown sands derived from coastal limestone.

A line drawn on the map which links the west coast at Busselton to Nannup, Bridgetown, Lake Muir, Pardelup and then to the south coast at Denmark encompasses the main occurrence of the karri forest.

Within this area a comprehensive and secure conservation reserve

system needs to be, and indeed is now established.

WHY CONSERVATION RESERVES? |||||

Conservation reserves, such as national parks, nature reserves or conservation parks, meet many demands. Most importantly, they provide a scientific baseline against which the effects of disturbance in other areas can be evaluated. They also provide examples of ecosystems as nature provided them and this has an intrinsic appeal to modern men and women. Furthermore, a reserve system provides security against inappropriate land use. For example it would be very unlikely that society would want to convert a karri forest national park into dairy farms or fell the trees for timber. Finally, stands of mature karri forest are beautiful and awe-inspiring, and reserves provide ideal places to protect such forests.

In the early 1970s a group of distinguished scientists from the Australian Academy of Science drew up specifications for the "perfect" conservation reserve system (see page 34).



THE FORESTS DEPARTMENT

During the late 1960s and early 1970s the FD evolved a policy of multiple use for State forests. As no credible alternative reserve system existed in karri outside State forests at that time, the FD accepted the responsibility for all aspects of forest conservation. An essential component of this policy was the setting aside of a substantial area of State forest from timber cutting. It was hoped that reserves could be designed which were adequate, in recognised scientific terms, for the purpose of conservation, and to a lesser extent for recreation. This process was foreshadowed in the Department's General Working Plan (ie, forest management plan) of 1972.



HISTORY

Prior to 1970 the area of karri forest set aside specifically for conservation was deficient. With the exception of the Walpole-Nornalup National Park, conservation was largely restricted to a handful of small national parks and reserves near Pemberton. Few of these met any recognised criteria for conservation reserves. The majority of the karri forest in public ownership was State forest, which had timber production as its primary purpose.

However, during the late 1960s a number of moves began which paved the way for a radical change in the State's conservation reserve system over the next 20 years. Two agencies were involved: the then-Forests Department (FD) (now incorporated into CALM) and the Environmental Protection Authority of W.A.

In seeking to establish a conservation reserve system in the karri forest, the two agencies took different paths. But in the end both approaches were implemented.

Multiple Use as described in the FD's forest management plans relied upon a system of zoning in which each zone was allocated a priority use. Other uses were encouraged, tolerated or forbidden depending upon the degree to which they conflicted with the priority use on each area. The zones were called Management Priority Areas (MPAs), and each had a specified priority use. Conservation took precedence in MPAs for Flora, Fauna and Landscape. MPAs for Recreation also had high incidental conservation value.

CHARACTERISTICS OF A PERFECT RESERVE SYSTEM

REPRESENTATIVENESS

The reserve system should sample the key biological communities intended for conservation, and contain the widest possible habitat, floristic and geomorphological diversity within those communities.

SIZE AND STRUCTURE

Reserves should be large (20 000-50 000 ha), well proportioned or circular in shape and have natural boundaries such as coastlines, watershed, rivers, ridges or geomorphological changes. If smaller, reserves should be buffered by State forest or water reserves.

NATURALNESS

Reserves should be in a natural undisturbed state, free of introduced species and pathogens.

SECURITY

The tenure and purpose of management for the reserves should be secured by Act of

Parliament, requiring the agreement of that body to effect change.

MANAGEMENT

Reserves should be managed and protected by a skilled and well funded organisation. It should contain, a core area which would remain inviolate from disturbance other than that for approved research, and which in turn is surrounded by a buffer area in which uses compatible with the continued existence of the population to be conserved, would be permitted.

REPLICATION

Reserves should be replicated elsewhere and connected by a corridor(s) which would allow the migration of flora and fauna.



Karri forest in the Shannon

Cliff Winfield



Robert Garvey

The selection and mapping of the conservation MPAs in State forest was carried out in the early 1970s. The criteria used were those set out in the Australian Academy of Science Report "A Natural System of Ecological Reserves in Australia" and its authoritative addendum, the famous Specht Report. These reports summarised current international scientific opinion on conservation reserves, and placed it in the Australian context.

It was fortunate that at this time more than half the karri was still virgin forest. Although the timber industry had been cutting karri since the 1890s, harvesting had been largely restricted to the western half of the forest.

Foresters working on the establishment of the reserve system were able to consult a considerable body of biological knowledge about the forest.

The structure, density, floristic composition and general health of the upper-storey of the entire forest was well known and accurately mapped. The FD's forest type maps were derived from aerial photography, and presented information of a quality second-to-none for equivalent land management agencies in Australia. Other detail useful for natural land management such as the degree of fire damage, the presence of unusual tree species, rock outcrops, wetlands, reed swamps, riverine

The Porongorups with karri in the foreground.

Crowea angustifolia form part of the dense karri forest understorey.



Cliff Winfield

communities, lakes, rivers and streams were also accurately mapped on the Aerial Photographic Interpretation (API) plans.

The floristic composition of the understorey and shrub vegetation was also well known, although not formally surveyed or mapped. Experienced foresters working in karri country were able to distinguish and locate site variations dominated by a single species: viz Netic (*Bossiaea laidlawiana*) dominating in the Donnelly River Valley at the western extremity of the main karri occurrence; karri wattle (*Acacia pentadenia*) dominating in the eastern half; hazel (*Trymalium spathulatum*) often dominating where karri grew tallest; *Acacia urophylla* dominating on more fertile sites; and *Hovea elliptica* often dominating in mixed karri-marri stands. A herbarium collection of over 1000 karri forest plant species had been developed at Manjimup, and fauna surveys had commenced.

Other important variations in the karri were known to occur. In the west, centre and north, karri is typically restricted to the red earth and podsollic soils of the lower slopes in the main drainage systems. In the south and east it occurs more on granitic soils as well as on red earths, and in river alluvium. This difference coincides with a change in underlying geology from gneissic metamorphic rocks in the west to granite in the east. Outside the main forest, karri is found in smaller patches in soils derived from different parent material. On the Leeuwin-Naturaliste, ridge patches grow on brown sands derived from coastal limestone. Further small occurrences on similar soils occur along the south coast. The largest outlier is at the Porongurup Range 100 km to the north-east of Denmark where a large batholith of porphyritic granite with bare summits cradles the karri below. The Porongurups karri is almost entirely contained within a national park. Other outliers occur at

Mt Manypeaks, Albany, Mt Barker, Rocky Gully, Nannup and, in one puzzling locality, on the Blackwood Plateau.

To accommodate these variables in a reserve system, the following approach was taken:

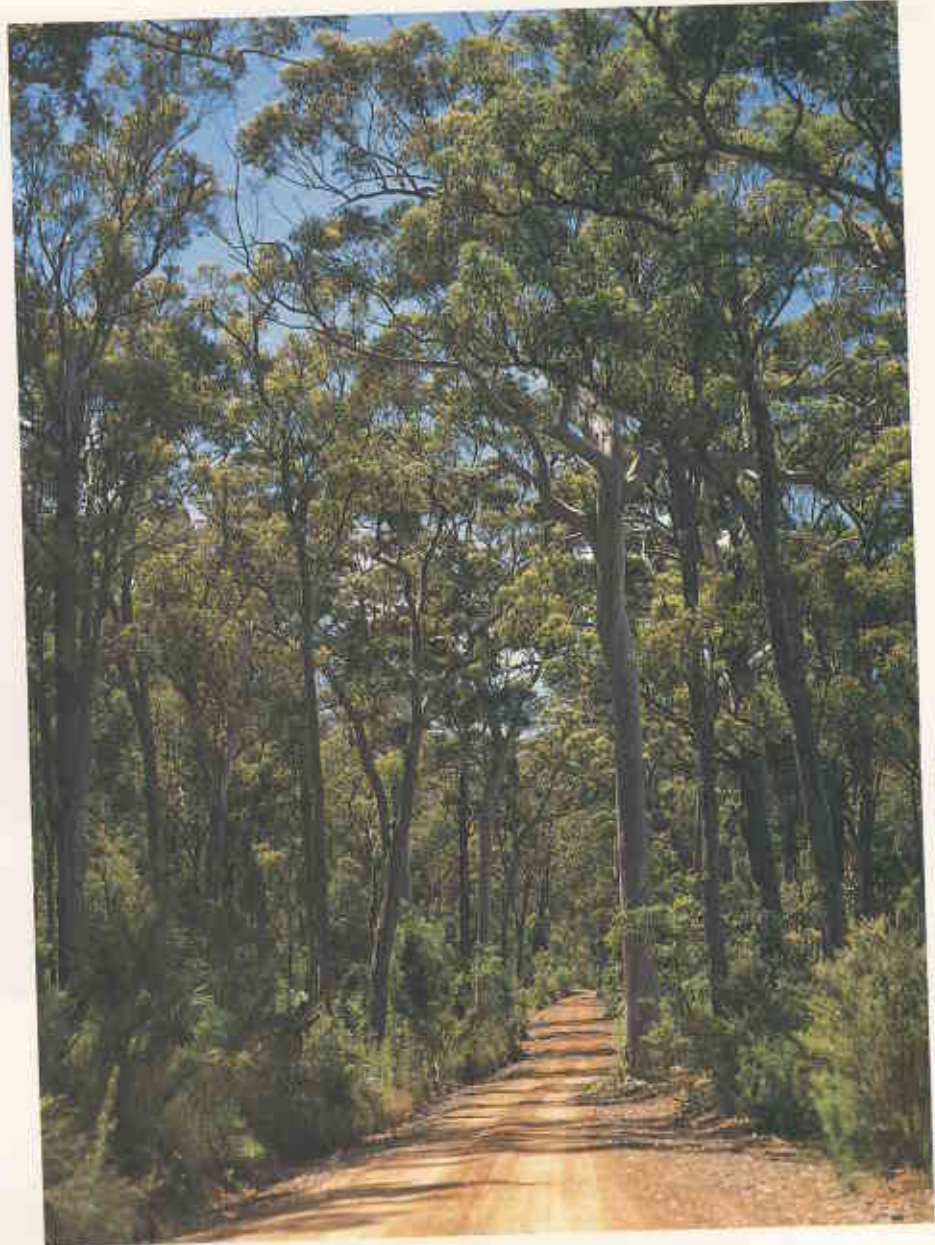
Firstly, two large virgin areas of forest were sought. It was hoped to find areas in the 30,000 to 50,000 hectare size range with a maximum diversity of site types within their boundaries;

Secondly, a series of smaller reserves, preferably virgin forest, were sought which sampled all the major river systems and the outlier occurrences.

The basis of selection were the (API) maps, overlain with known data on geology, landform, soils and understorey vegetation. When appropriately coloured in, the API plans were ideal for comparing alternative proposals, because diversity could be compared visually, thereby allowing rapid elimination of the obviously poorer options. After some months of deliberation and debate, a preferred option for the reserve system was decided upon, and eventually published in the FD's forest management plan, and implemented.

The first of the two very large reserves selected was the 30,000 ha Wattle-Soho area (now designated the Mt Frankland National Park) which straddles the upper catchments of the Weld, Deep and Frankland Rivers. This is an area of superb mature karri forest and great biological and landscape diversity. The second large reserve selected comprised the lower Shannon River Basin plus an adjacent segment of the proposed d'Entrecasteaux National Park. This is also an area of great beauty and diversity and encompasses coastal elements not found in the Wattle-Soho reserve.

The smaller areas making up the karri reserve system were Curtin forest (upper Shannon River), Boorara forest (Gardner River),



Cliff Winfield

Dombakup and Hawke-Treen forests (Warren River), Strickland forest (Donnelly), Chester forest (Blackwood plateau), Boranup forest (Leeuwin-Naturaliste ridge), Giants forest (Bow River), and Swarbrick, Keystone and Dawson forests (Walpole River). These were supported by the recreation reserves, One Tree Bridge (Donnelly), Brockman (Warren River), Muirillup (Gardner River) and Mt Frankland forest (Frankland River).

Other areas were also set aside to be managed for purposes other than timber production. Road, river and stream zones were designated, together with wetlands, rock outcrops and a number of sites of

Giant karri in the new Mt. Frankland National Park.
The fragile spider orchid (*Caladenia* sp.).



Cliff Winfield

historical or cultural interest. These areas, together with the MPAs added up to nearly half the karri forest.

On the basis of the best information available, the FD was satisfied that this reserve system contained all the genetic diversity required and that it captured the magic and majesty unique to virgin karri. Together with the proposed d'Entrecasteaux National Park and other reserves covering jarrah and wandoo forest, such as the adjacent Perup Fauna Reserve, the view was taken that a very comprehensive reserve system had been developed for southern forests.

THE EPA INITIATIVE

In December 1971 the Environmental Protection Authority was established. Part of its role was to 'consider and initiate the means of enhancing the quality of the environment'. The EPA recognised that the establishment of an adequate conservation reserve system throughout WA would be essential in achieving this objective. Accordingly, it established the Conservation Through Reserves Committee (CTRC) which first met in February 1972. The CTRC divided the State of WA into 12 natural areas called 'systems'. Systems 1 and 2 more or less covered the same area as that covered by the 'southern forests' of the FD. The CTRC, in looking into reservation for conservation in Systems 1 and 2 did not work with the FD, who had already commenced the same exercise. Thus two officially responsible and qualified organisations were evaluating the same area of forest simultaneously.

In August 1974 the CTRC published its report to the EPA, and revealed that it had taken a different approach to the FD. The CTRC did not examine the question of establishing a network of small reserves spanning the whole forest. Their brief was to look for large and significant areas. They therefore opted to create one large reserve

comprising the entire Shannon River Basin. This, added to the pre-existing national parks and other small reserves near Pemberton and Walpole was considered to meet the aim of the CTRC - 'to set aside sufficient native habitat to be preserved and managed both for the preservation of animals and plants, and for the enjoyment and education of the population'.



Broke Inlet at the mouth of the Shannon River. *Cliff Winfield*

The CTRC was enthusiastic about the Shannon River watershed because it was a large contiguous area containing areas of virgin karri and karri-marri. This area was proposed so that it might act as a benchmark area for changes in biological, hydrological, pedological and sedimentological parameters which may take place elsewhere as a result of timber harvesting. The presence of the Broke Inlet in a largely intact natural state at the mouth of the Shannon, and the presence therein of a sedimentary delta of classic form, were seen to add to the value of the proposed reserve.

The CTRC's views were shared by many people in the community, who viewed the Shannon proposal as an opportunity to create a large karri forest national park of international value. Finally after some years of controversy, the new Labor Government in 1983 immediately implemented a pre-election promise to create a Shannon Park. The entire Shannon Basin was declared an MPA for Flora, Fauna and Landscape. More recently this area has been designated the Shannon National Park.

And so two independently derived reserve systems for the karri forest were amalgamated. Any argument about the biological superiority of one proposal compared to the other became unnecessary. Both were implemented.

CALM'S CONTRIBUTION

Despite its biological adequacy, the reserve system inherited by CALM when it took over forest management in WA in 1985 still had one major deficiency: the reserves in State forest (Conservation and Recreation MPAs) had no security. Although State forest itself has the equivalent of A Class security, and the Department is bound by its management plans, the purposes for which areas of forest are managed may be changed at any time without reference to Parliament, by simple Ministerial decision.

CALM has now developed (and the Government has endorsed) a system for converting all the Conservation and Recreation MPAs from State forest to national parks, nature reserves or conservation parks. Once so classified, both the tenure and purpose of the reserved areas can only be changed with Parliamentary approval. A more secure situation is not possible.

No reservation system should be so inflexible that it cannot be refined in the light of insights gained from continuing research. CALM believes that the conservation system in its southern forests is now close to being right. Nevertheless, research has continued and it is interesting to examine the impact of recent studies.

The system of Conservation and Recreation Management Priority Areas in the karri forest was conceived in the early 1970s and has been in place since 1977. Timber cutting ceased in the Shannon Basin in 1983, prior to its conversion to a conservation



Cliff Winfield

reserve. The d'Entrecasteaux National Park has been managed as a reserve since about the same time. In the meantime, research work in biological, ecological and related (soils, geomorphology, hydrology, fire, silviculture and pathology) fields has continued.

Now, in 1988, how does the karri reserve system stand up in the light of increasing research and heightened practical insights?

For a start, nineteen detailed biological surveys have been completed by scientists in the southern forests. Noteworthy amongst the results is the finding that few plant species, apart from the dominant trees themselves (such as karri, yellow tingle and red tingle) are entirely restricted to the area. Likewise, no species of vertebrate fauna appears to be confined to the karri forest.

Associated landforms such as the granite monadnocks and the lower catchments of the Hay and Mitchell Rivers, where the Darling, Stirling and Warren Botanical sub-districts join, are botanically far richer. Plains, lakes, swamps, riverine associations and coastal landforms (areas not subject to timber harvest and very largely not "counted" in the reserve system) also make a special contribution. These surveys



Robert Garvey

Mt Frankland National Park (above).
Karri Valley (left).

did not recommend changes, or adjustments to the existing karri forest reserve system.

A concern in some quarters is that the reserve system should encompass all the genetic variability of karri itself. During 1986-87, geneticists studied this question using the protein electrophoresis technique. These studies showed that all the major genotypes of the species that occur on Crown lands are represented in the reserve system.

Finally, scientists have recently completed a detailed study of the dominant vascular perennial plants of the region, in their relation to site. (This approach had been developed in the early 1970s by forester Joe Havel for the northern jarrah forest and was used as a basis for designing the conservation reserve system now in place in that area.) All thirteen different site/

vegetation types distinguished in the karri forest region are represented in the existing reserve system.

THE FUTURE

In any forest such as the karri, which combines beauty, utility and natural productivity in so propitious a manner, conflict about reservation and timber harvest is inevitable. There will always be those who advocate that a greater area be set aside in reserves, and those who feel a greater area should be made available for timber production.

There will also always be arguments about which areas should be reserved: people's views will be coloured by where they live and work, or recreate.

In the end, political decisions will largely decide the exact balance that is struck between areas.

29 DEC 1988

WESTERN AUSTRALIA

LANDSCOPE

EDITORIAL

It is difficult to remember a time when our daily news did not feature some environmental controversy. To people involved in environmental research and management, the popularity of 'the environment' is a mixed blessing.

Greater public consciousness of environmental issues has meant increased funding and, to some extent, greater prestige. But many scientists working on ecosystems are uncomfortable when their work is placed in the political spotlight.

The knowledge that a scientific observation that once would have been tucked away in a scientific journal to be read only by a few colleagues could become the centre-point of a political controversy is daunting.

Retaining objectivity in any research area is difficult. For those engaged in research on the natural environment it is even more difficult. Unlike the physical sciences in the natural sciences the truth is often camouflaged by interactions between factors which vary over time and space. When the results of this type of research are placed in the political arena, the mixture is often volatile and the truth a casualty.

To enable scientists to better seek the truth and communicate it, the scientific community has adopted what has been called "the scientific method". The scientific method is a code of conduct with rigid requirements. An offshoot of that code is a set of rules which scientists must follow, at least in reputable scientific journals, if they are to have their research published. Unfortunately, a byproduct of this is that scientific articles are not the easiest to read and are often plain boring.

Given that the environment has become a major political issue, it is important that those involved in the debate are fully informed. But scientists are faced with a dilemma. They need to popularise their work to reach a wider audience. On the other hand, they cannot afford to lose objectivity.

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NATIVE CREATIONS



Nouvelle jardins, multiculturalism or laissez-faire; which garden fashion will you choose? Turn to page 22.

WILD MARRON



Do our wild marron have a future or will local gourmets keep catching them to the point of extinction? Find out on page 4.

KARRI MAGIC



What is really going on in the karri forest? On page 32 we take a look at the system of conservation reserves that have been established to preserve this awe-inspiring forest.

STRANDED!



Relive the euphoria of the Augusta whale rescue on page 18.

BACK TO BASICS



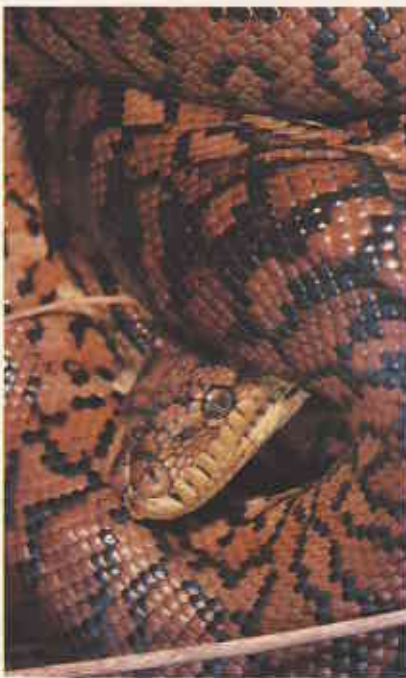
With today's massive land boom it's hard to imagine that the State once couldn't give land away fast enough. Now the government is buying back our valuable conservation areas. See page 43.

DESERT GEM

The Gibson Desert Nature Reserve covers over 1.8 million hectares. It is a desolate but subtly beautiful landscape. Read about this unique area and the management problems it presents on page 48.



SNAKES & ADDERS



Slim and active snakes have emerged hungry from their winter hibernation. But they're not all venomous. See page 51 for tips on living with snakes.

AFTER THE FOX



Foxes pose a major threat to native mammals and other fauna. Can we outfox them? See page 12.

A SIGHT TO BEHOLD



'Its pouch can hold more than its belly can', goes the popular rhyme. Find out more about this awkward but graceful bird on page 39.

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Cover Photograph

One of our natural wonders - the beaches of Hamelin Pool (Shark Bay) consist of billions of small shells.

Photo by Bill Bachman.

