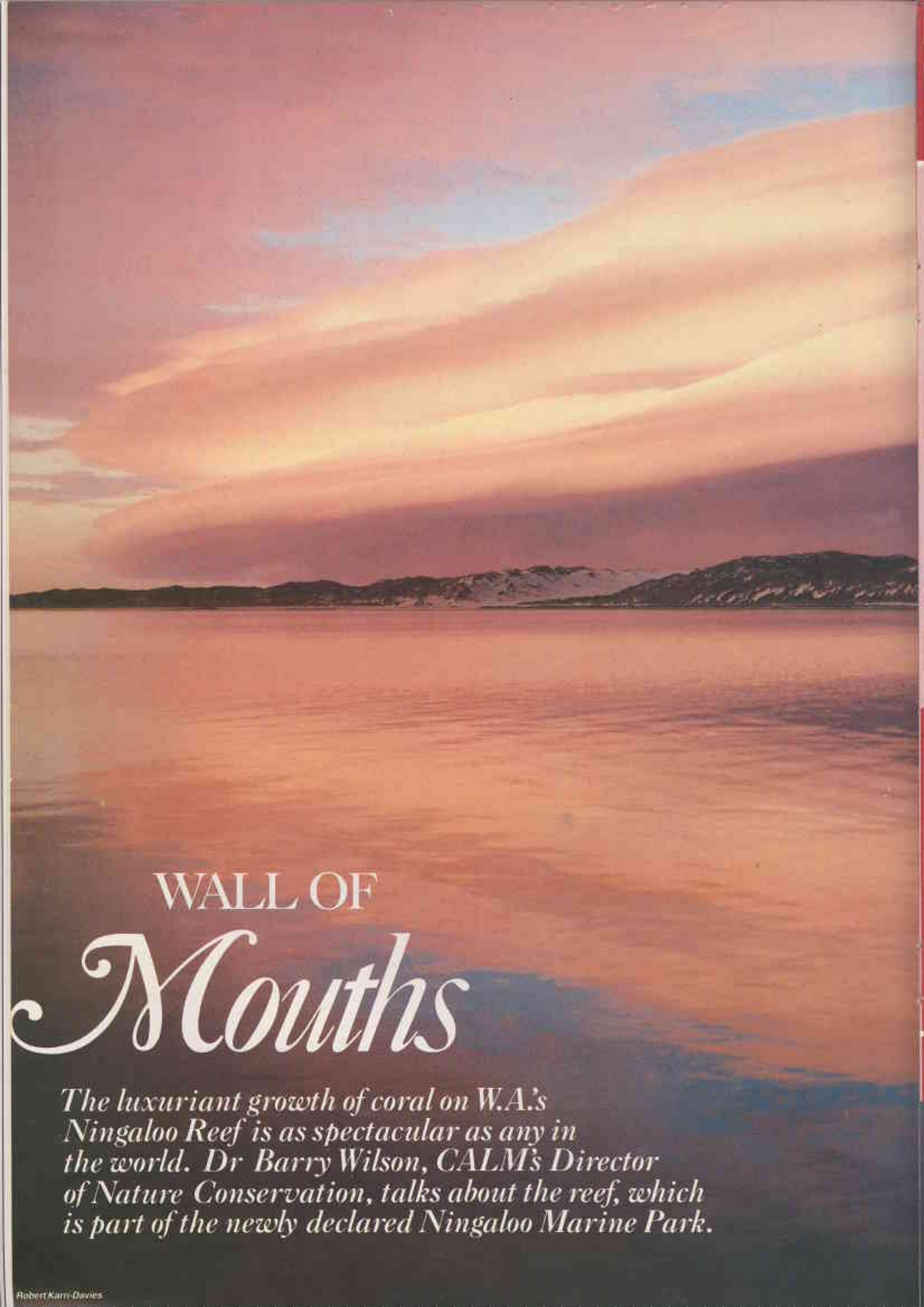


WALL OF *Mouths*

The luxuriant growth of coral on W.A.'s Ningaloo Reef is as spectacular as any in the world. Dr Barry Wilson, CALM's Director of Nature Conservation, talks about the reef, which is part of the newly declared Ningaloo Marine Park.

Robert Karri-Davies

Ningaloo Reef stretches down the coast along the western side of the Cape Range Peninsula and southwards to latitude 23°34'S, forming a ragged line of coral. For most of its 260 km length it lies a little distance offshore as a barrier reef protecting a shallow lagoon.


Bill Winchester

At certain places in the oceans of our blue planet there are 'hot-spots' where marine life is particularly abundant through the coincidence of favourable physical conditions. The Ningaloo coral reef is one of these.

The edge of the continental shelf is unusually close to land in this region, located just a few kilometres from the front edge of the reef. Mighty ocean swells spend their force on the reef-edge before spreading in foamy sheets over the shallow reef-flat and pouring into the lagoon behind. The coral reef owes its existence to this constant flow of clear, warm, oceanic water.

Sunlit surface ocean water seems clear but microscopic examination will show that it contains countless numbers of planktonic organisms, both plants and animals. The water flowing over Ningaloo Reef carries a never-ending supply of these tiny edible creatures. Corals and many other coral-reef animals are primarily 'suspension feeders' - they trap plankton as the water flows over them. The reef may be regarded as a giant energy trap, a 'wall of mouths' capturing and concentrating energy produced in the surface waters of the eastern Indian Ocean.

Many corals also maintain a culture of microscopic green algae, called zoozanthellae, in their skin tissue. During sunlit hours these symbionts photosynthesize and produce supplementary nutrients for the host corals. On the whole, the reef and lagoon are like a human city whose citizens are dependent upon food supplies grown elsewhere and transported in. Only a small portion of the system's driving energy is generated by photosynthesis on the spot.

From this concentration of ocean energy, trapped by the


Barry Wilson


Barry Wilson

plankton-eaters, the complex coral-reef ecosystem is built with a trophic chain which leads all the way up to the giant predatory tiger sharks - and man.

The coral wall forms a solid rampart protecting a sheltered lagoon from the powerful and temperamental forces of the open ocean. As well as forming an energy trap, the wall creates a system of habitats, including the high wave-action zone of the reef-front, the intertidal reef-flat zone which becomes exposed to air and sun at low tide, the sheltered back-reef edge, and the quiet lagoon. Variable physical structures provide a range of habitats for the large diversity of species which characterise coral-reef ecosystems.

Nature has endowed Ningaloo Reef with an exceptional concentration of marine life and a sheltered and safe lagoon. It has become a popular fishing, diving and recreation spot. Given the outstanding scenic and wilderness quality of this land-seascape it is no surprise that Ningaloo Reef has been declared as W.A.'s premier marine park.

Neil Wehlack

The modern Ningaloo Reef came into existence several thousand years ago when the sea rose to its present level after the last Pleistocene ice-age. Originally pioneer corals settled on rocky ridges of the sea-floor, and the reef we see today is built from the accumulated remains of successive generations of corals and other creatures with limey skeletons. The living corals of the reef grow on the structure left by earlier generations.

Most sexually mature corals release eggs and sperm into the water at a single, annual spawning time. While they drift with the currents, the eggs are fertilised and begin to divide and grow, eventually becoming tiny swimming larvae called planulae. When they have reached the appropriate development stage they find a suitable hard place on the sea-bed to settle, fasten themselves, and

Eva Boogaard

Robert Garvey

The coral *Galaxea* has relatively large polyps, each one separate and raised above the surface of the colony (above).

Fireweed. These delicate fronds are not plants but colonial hydroids. The polyps have stinging cells which may cause unpleasant rashes on the skin of an unwary diver (top left).

Staghorn and plate corals (far left).

One of many kinds of starfish which live on the reef (above left).

The hard coral grows in colonies with petal-like plates (left).

A fan-like gorgonian colony growing on an underwater cave wall where constant water flow brings a regular supply of plankton to feed the polyps (top right).

Ningaloo Reef: a winding wall of coral mouths (right).

transform into sedentary polyps stiffened and supported by a secreted skeleton of hard lime.

A few corals remain as single polyps in adult life, but the majority divide asexually to form colonies. Once established the colonies grow by this process of division. Some of the very large massive colonies may be centuries old and consist of thousands of individual but interconnected polyps, each one a genetic replica of the original single ancestor. When some of the polyps are killed or eaten they may be replaced by asexual growth of survivors of the colony. But if the entire colony is killed then replacement must be by settlement of a new larva, sexually produced by a parent coral elsewhere. The degree to which isolated coral reefs are dependent on occasional replenishment from other reefs is one of the important issues of current coral reef research.

The shape and fine structure of coral colonies seem infinitely varied. There are branching, flower-like, and encrusting forms, delicate fern-like colonies, and huge massive domes. Individual polyps may be pin-head sized or the size of a fist. They may be separate or merged together.

Ningaloo Reef is built by about 220 species of coral belonging to at least

Neil Wehlack

John Butler

A many-armed feather-star on a gorgonid soft-coral (above).

A gorgonid fan-coral (left).

A Butterfly Fish feeds on polyps of a living coral (above right).

A Clown Fish shelters among tentacle of a large, fleshy anemone, protected by the anemone's stinging cells (right).

Cape Range National Park

The magnificent Cape Range National Park abuts the northern portion of the new marine park. See *Landscope* Autumn Edition, 1987.

A management plan for Cape Range National Park was approved, after public input, in 1987, and a draft management plan for the State waters part of Ningaloo Marine Park was issued for public comment in June 1988.

Robert Garvey

The Cape Range Sturt Pea lacks the black throat typical of this plant elsewhere.

A draft management plan for the Commonwealth portion of the marine park is in preparation by the Australian National Parks and Wildlife Service.

Eventually all three plans will be integrated, and the three areas managed as a single park by the W.A. Department of Conservation and Land Management on behalf of both State and Commonwealth Governments.

N. Coleman

54 genera. The naturalist may find them as varied and as beautiful as the wildflowers of our southern forests.

For sheer visual splendour there are few ecosystems which can match a rich coral reef like Ningaloo. The variety of form and colour of the corals themselves provide the spectacular background. But the structural and biological habitat they create is the basis for a colourful community of great complexity.

Many of the reef invertebrates are plankton-feeders like the corals, and they position themselves where there is a strong flow of plankton-bearing water, enhancing the energy-trapping capacity of the coral wall. Other invertebrates are detrital feeders living on the organic waste of the ecosystem, herbivores feeding on plants,

John Butler

parasites or predators. Some kinds of invertebrates and fish eat living coral.

People often ask how Ningaloo Reef compares with other coral reefs, the Great Barrier Reef for example. In underwater spectacle, the average visitor will see little difference. As on all reefs there are places where coral growth is poor and others where it is luxuriant, with the attendant multitudes of colourful fish and other creatures which one expects to see on a rich coral reef. The luxuriant areas at Ningaloo are just as spectacular as you would see anywhere, and they are unusually accessible.

Almost all the coral species at Ningaloo are widespread throughout the tropical Indian and Western Pacific Oceans. This is true for most of the fishes, molluscs and other reef animals also, although in these groups there are some species peculiar to the W.A. coast.

The number of species of coral and other creatures present on the Ningaloo Reef is less than at some other reefs further north and on Queensland's Great Barrier Reef, perhaps because of the relatively simple physical structure of Ningaloo Reef and the smaller range of habitats. However, only the experts who count the species will notice that.

Managing For Posterity

Ningaloo Marine Park is a multiple-use marine reserve. It has been declared under both Commonwealth legislation (the offshore areas) and Western Australian legislation (the inshore areas under State jurisdiction).

The prime objective of management is to protect the natural values of the reef and marine environment for posterity, while providing for reasonable use, including public recreation and enjoyment, tourism, and commercial fishing.

Recreational use is concentrated mainly along the shore, the reef and the lagoon. It includes recreational fishing as well as passive activities like diving, swimming, sailing, beach-combing and camping on the shore. All of these activities take advantage of the wildness and naturalness of the marine environment and the wonders of the coral reef environment in particular.

Because of the accessibility of Ningaloo Reef from the shore there are unparalleled opportunities in this park for nature appreciation programs. With the assistance of a generous grant from the Australian Bicentennial Authority a visitor centre has been built at Milyering close to the shore within the Cape Range National Park. This centre is intended as a focus for tours and the educational programs for both the marine park and the adjacent terrestrial environment.

The majority of visitors are accommodated in the towns of Exmouth and Coral Bay and enter the park on a day-use basis. Guided shore tours, dive tours, and coral-viewing boat trips are available, and there is no doubt that these activities will develop and contribute significantly to the tourism industry of the region. However, camping in remote corners along the shore is traditional on this stretch of coast and the management program will ensure that it may continue. Preservation of the wilderness atmosphere of much of the coast is an important management objective.

A wide range of fish species are sought by recreational fishermen in this marine park. There is no evidence that current fishing pressure has had any significant effect on the fish populations. However, the resource is not infinite and care must be taken that future increase in fishing pressure does not cause diminution of the stocks.

Fisheries Act Regulations apply in the marine park. Visitors are expected to adhere to the prescribed bag limits so that recreational fishing may be sustained indefinitely for everyone. The principle adopted for recreational fishing in the park is that visitors should catch

Robert Garvey

The Milyering Bicentennial Visitor Centre (left).

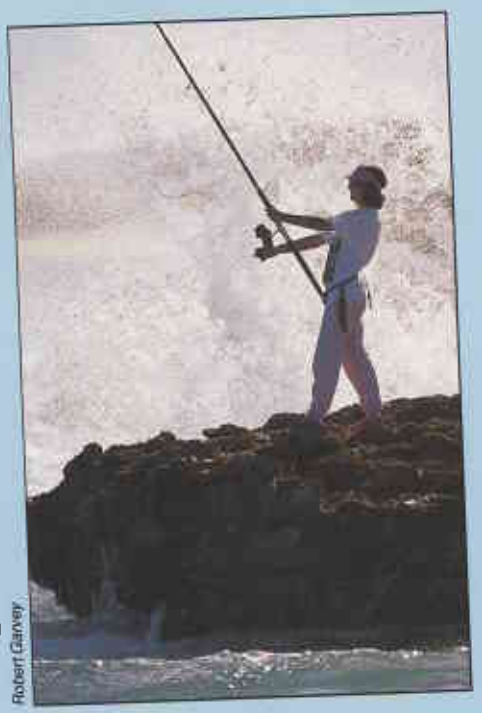
At Yardie Creek visitors may canoe in quiet waters behind the sand-bar, with the lagoon and coral reef beyond (below).

Coral-viewing boats operate from Coral Bay and Exmouth (centre).

Fishing from the shore is a fine way to relax and provide a camp meal (bottom).

Cliff Winfield

Robert Garvey



Robert Garvey

Neil Wehlack

Gerry Allen

A school of Bat Fish (above).

This Spangled Emperor is not destined for the frying-pan. He gets a free meal instead (left).

only what they can eat on a day-by-day basis.

Beyond the reef, where it is unlikely to have significant effect on recreational users, the existing level of commercial fishing is to continue, under the control of the Department of Fisheries. Here also, the management objective is to ensure that the fishery is sustainable and that there is no detrimental effect on the environmental values of the park.

The paramount management strategy for the marine park is to ensure that the reef itself remains perpetually in good condition. The secondary strategy is to ensure that users of the park do not impinge upon each other's activities to the point of conflict.

Zoning the marine park for different uses is the means by which these strategies are put into effect. Potentially conflicting uses will be spatially separated into different zones. In Ningaloo Marine Park three principal zone categories will be recognised.

Sanctuary zones -

are total protection areas where visitors may 'look but not touch'. They serve as special observation areas; reference areas for scientific studies, particularly as monitoring sites for study of long term changes; and as reproductive replenishment zones, providing recruits to nearby depleted reef communities in the event of excessive use.

Some sanctuary zones are designated so that visitors may experience coral and reef fish communities which have not been subject to human exploitation.

Recreation zones -

exclude commercial fishing but generally permit recreational fishing providing amateur fishing regulations are followed. Within these zones, potentially conflicting recreational activities such as spear-fishing and fish-watching may be also spatially separated.

General use zones -

provide for commercial fishing, as well as other uses. The bulk of the park is zoned for general use.

Providing a recreational amenity is one of the prime reasons for reserving and managing this marine park. Nevertheless, of paramount importance is that this wonderful natural feature, W.A.'s biggest coral reef be protected for posterity.

LANDSCOPE

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EDITORIAL

In W.A. the concept of marine conservation reserves was firmly established in 1984 when the CALM Act was passed, with provision for Marine Parks and Marine Nature Reserves, vested in the National Parks and Nature Conservation Authority.

Since 1984 two major Marine Parks have been declared in W.A: Marmion and Ningaloo.

This is a new field in W.A., and there are no local precedents to guide us in resolving the many management issues which have emerged.

A first consideration has been that fishing is already controlled under the Fisheries Act. It would be foolish for CALM to attempt to establish itself as a fisheries management agency. A policy decision has been made that any fisheries in Marine Parks will be regulated under the Fisheries Act.

A more philosophical problem has been that many citizens, although generally sympathetic to the conservation cause, are unaccustomed to the idea of having parks and reserves in the sea. The idea that the sea is a public common where anything and everything goes is still well entrenched in public attitudes. Yet there are many terrible examples around the world where coastal environments and their resources have been devastated by excessive and improper use. In W.A. we have not reached that point.

W.A. can be proud of its fisheries management record, based on the principle of sustainable use for posterity. Development of a marine parks and reserves system along our coast is another essential part of the overall objective. It is to be hoped, then, that our first initiatives in this direction will receive public support.

PINES

How can less than four per cent of the State's area supply us with all our timber needs, and save the hardwood forests at the same time? *Details on* ***page 28.***

BORERS

Now you ***can*** *be sure there are no borers in the door. Well, if they are there, at least you'll know what to call them after reading the article on* ***page 42.***

TROUBLED WATERS

Does the very word pollution make you feel powerless? Discover what you can do to help the wildlife victims on ***page 20.***

WALL OF MOUTHS

It's a fish-eat-coral world, but what do the coral eat? Find out on ***page 32.***

FOREST RENEWAL

What is the connection between the poets' of the First World War and W.A's forests? Find out on ***page 56.***

Jewel Of The Kimberley

What do you mean frog? In my home I am a prince. After all, Prince Regent is the only mainland reserve where all of the original animal species remain. Meet the rest of them on ***page 47.***

Hills' Belles

When Perth looks out its backdoor in spring the Hills are ablaze with colour. Your field guide to some of our glorious wildflowers starts on ***page 4.***

Gather No Moss

The trouble with lichen is that up until recently it wasn't protected flora. Now lichen and their relatives - mosses, liverworts and algae - have joined the rest of the State's flora. See ***page 54.***

Right On Track

Is a high-tech wilderness trek a contradiction in terms? Find out how 4WDs and conservation can co-exist peacefully on ***page 12.***

ATTENTION ADULTS!

Sick of taking the anklebiters to the same old national parks and camping spots? Put them to work for you. If they enter the kids' competition on ***page 63*** they could win two beautiful books on all the best picnic and camping spots between Perth and Eucla.

Cover Photo

Magpie Geese take off from the Ord River.

Photo: Richard Woldendorp.

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