

## RESEARCH

# BIODIVERSITY OF THE CARNARVON BASIN

**I**NLAND rivers, red dune systems, 'sunburnt' plains and inland ranges, but also sweeping beaches and spectacular coastal cliffs – all these features contribute to the geographic and resultant biological diversity of the Carnarvon Basin. It is part of the vast 'outback' that many people believe has been significant in development of the Australian character.

The boundary between the vast arid centre of Australia and the wetter areas of southwestern Australia runs south-east from Shark Bay, and was straddled by our study area. This area is rich in plant and animal species that are a significant part of Australia's biodiversity. We aimed to find out more about how these plants and animals are distributed across the landscape, so that we could make recommendations for sustainable management and suggest improvements to the conservation reserve system.

*Allan Burbidge*

Over 40 people took part in the survey of the biodiversity of the Carnarvon Basin, including scientists from the Department of Conservation and Land Management, the Western Australian Museum, University of Western Australia and elsewhere, as well as volunteers. Significant funding support was provided by Environment Australia.

People think that most of a biological survey is spent in the field, observing and catching things but, in fact, far more time is spent back at base, writing it all up. Most field work was done during several expeditions totalling about 12 weeks in 1994 and 1995. It took another five years (along with work on other major projects) to compile, analyse and interpret the data and write it up.

Mostly, field work went without a hitch, but various incidents and

memories come to mind. - like a trailer wheel rolling past the vehicle when an axle broke, millions of flies at a few sites (at one site, it was hard to see your sandwich at lunch time!), and the scorching conditions when we were digging holes for pit traps on a samphire flat with no shade for miles. But it was all worth it – we saw some fantastic places, met some interesting characters on the stations and in the towns, learnt an enormous amount and found numerous plants and animals that were new to science, and many others beyond their known range.

We surveyed 63 sites on land and 56 wetland sites. Numerous additional sites were surveyed for specific purposes, particularly for botanical sampling. We determined environmental factors related to plant and animal distribution patterns and developed models to predict the occurrence of the ecological communities identified.

### Plants

If your only experience of this region is from a speeding car on the highway, you might think that the vegetation is all pretty similar and possibly unexciting. In fact, the botanists, led by Greg Keighery and Neil Gibson, recorded 2133 different kinds of plants (species and subspecies) in the study area. Much of this richness comes from the area south of Shark Bay, which includes many species and plant communities more typical of southern parts of the State.

We recorded a total of 88 weedy plant species that are naturalised in the study area. Most of these are annuals. Many weeds displace native plants and reduce the food resources for our native animals. Among plant pests in the region, Buffel Grass, *Cenchrus ciliaris*, is known to be a serious environmental weed although it does have value as a pastoral species.

### Aquatics

Although, or perhaps because, the area is so arid, where water is found it has an enormous importance for flora and fauna. Not only does it provide moisture for wide-ranging animals, it also is critical habitat for specialised aquatic animals such as water boatmen, whirlygig beetles, backswimmers, water fleas, fairy shrimps and shield shrimps. The aquatic team, led by Stuart Halse, collected at least 492 species of aquatic invertebrates, many of which were not recorded in the



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conservation reserve system. There were more aquatic invertebrates than we expected. The team distinguished five different classes of wetland habitat, each with a different biological community: river pools, rock pools and larger flowing streams; seeps, springs and smaller creeks; freshwater claypans; birridas; and Lake MacLeod.

More than 29,000 waterbirds – 25 species – were recorded on Lake MacLeod during our survey in October 1994. The lake sometimes supports more than 100,000 waterbirds, making it a site of international importance.

### Ground-dwelling animals

We got another surprise in this part of the survey – there were many more spider species than we expected, and about 90% of them did not even have a scientific name. Mark Harvey of the WA Museum led the terrestrial invertebrate survey and his team recorded 10 scorpion species, 60 species of mygalomorph spiders (trapdoor spiders and relatives) from seven families, 33 families of araneomorph spiders (and more than 285 species), 15

species of centipedes and 11 species of millipedes.

The Carnarvon Basin is particularly rich in reptiles and includes geckos, legless lizards, dragons, skinks, goannas and snakes. An unusual feature of the lizard fauna is the high number of species with restricted distributions, mostly centred on Shark Bay.

Of the 279 bird species known to occur in the southern Carnarvon Basin, 162 breed there, with the remainder being migrants, nomads or occasional visitors. Ron Johnstone, Allan Burbidge and Phil Stone assessed all historical bird records and found that no bird species has become extinct here in the last century, but about 13 per cent have increased in abundance and 10 to 15 per cent have decreased. Reasons for this are unknown, but probably are related to pastoral activities such as the provision of artificial water supplies.

As elsewhere in Australia, numbers of native mammals have declined and numbers of feral species increased. Norm McKenzie and Alex Baynes found that nearly half the ground-dwelling native

mammal species in the Carnarvon Basin (22 of 48 original inhabitants) are extinct because of introduced predators, soil erosion and vegetation changes.

### Summary

Now, for the first time, the biodiversity of the southern Carnarvon Basin has been recorded in detail. We have documented the natural communities, discovered and named new species, and identified gaps in the conservation reserve system. This has led, through the State government's Gascoyne-Murchison Strategy and the Commonwealth's National Reserve System Program of the Natural Heritage Trust to the purchase of 470 000 ha of pastoral leases. This will help fill a number of gaps in the conservation reserve system and includes wetlands, sandplains, alluvial plains, river frontages, coastal flats, salt lakes and limestone uplands. We also recommended a number of management techniques that landholders can undertake to integrate biodiversity conservation with sustainable land use.

The detailed results have been published ('Biodiversity of the Southern Carnarvon Basin', edited by A.H. Burbidge, M.S. Harvey and N.L. McKenzie, Records of the Western Australian Museum Supplement No. 61 (595 pages)) but a 20 page companion guide has also been published and is available from Allan Burbidge.

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