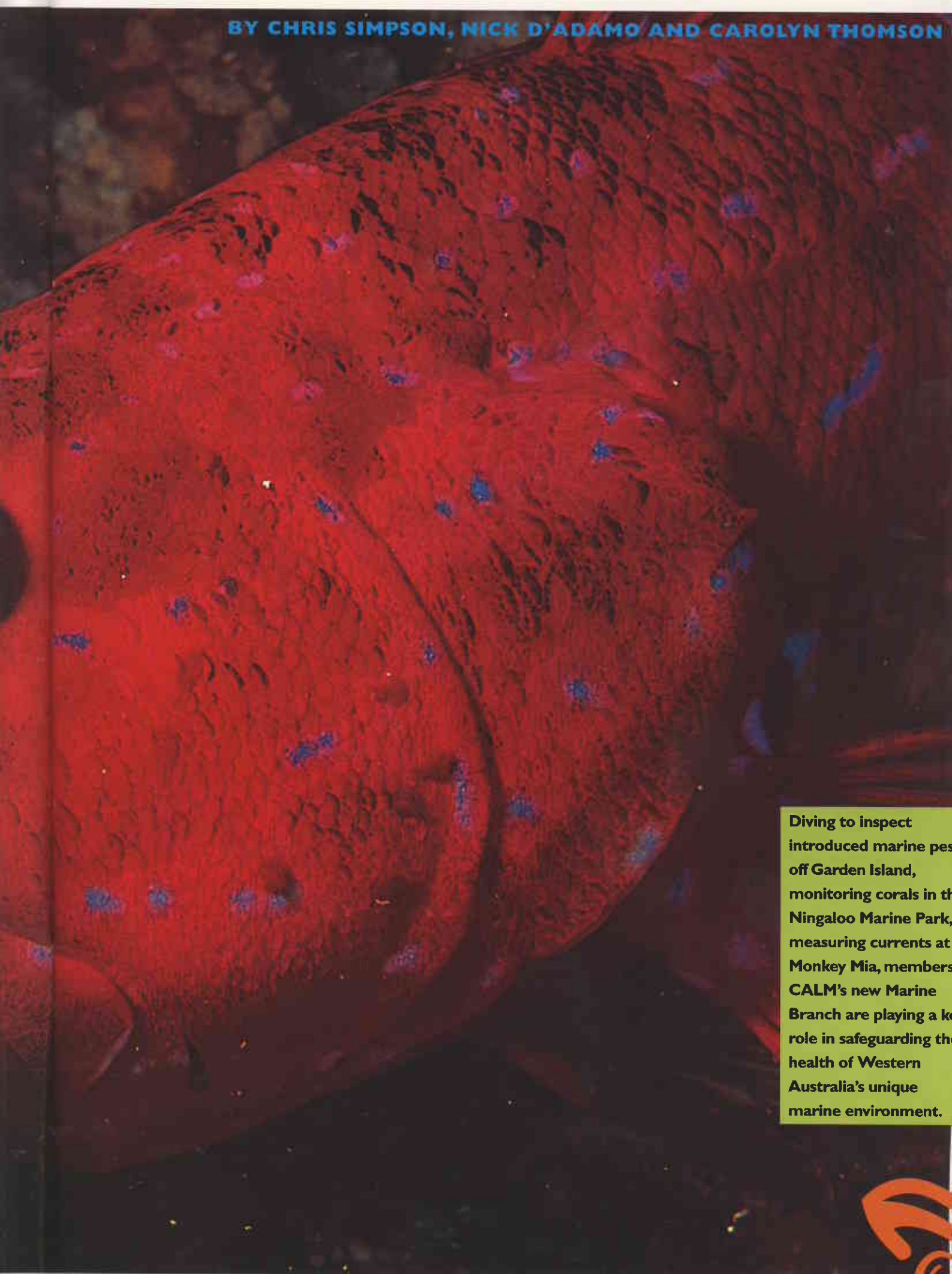

oceans of wealth

BY CHRIS SIMPSON, NICK D'ADAMO AND CAROLYN THOMSON



Diving to inspect introduced marine pes off Garden Island, monitoring corals in th Ningaloo Marine Park, measuring currents at Monkey Mia, members CALM's new Marine Branch are playing a k role in safeguarding th health of Western Australia's unique marine environment.

Western Australia has an exceptionally beautiful marine environment, with bountiful wildlife along a coastline from the tropical waters of the Kimberley to the cooler waters of the Great Australian Bight. Because of the warming effect of the south-bound Leeuwin Current, tropical reefs flourish farther south in WA than anywhere else in the world, and many of them are very close to the coastline.

The many bays, inlets and islands in the well-known Shark Bay region support a profusion of aquatic life. Dugongs, turtles, dolphins, whales, prawns, scallops, sea snakes, sharks and other fish are common. Communities of corals, sponges and other invertebrates, together with a unique mix of tropical and temperate fish species, have also formed in some areas. The wide intertidal flats on the shores of Shark Bay support a unique community of burrowing molluscs, hermit crabs and other invertebrates. At the foundation of its ecosystem are the huge expanses of seagrass meadows, which, among other things, are critical to the health and survival of the fascinating dugong.

Farther north, the 300-kilometre-long coral garden known as Ningaloo Reef is quite as beautiful as the better known Great Barrier Reef—yet, unlike the Great Barrier Reef, you can fin out to it from the shore and be immediately surrounded by one of nature's most beautiful natural aquariums. Dense areas of magnificent and varied corals abound in Ningaloo Reef, making it the largest fringing coral reef in Australia. Whales, dolphins, dugongs, manta rays, huge cod and the famous whale sharks can be seen there in abundance.

Although lesser known, the Rowley Shoals, off the north-west coast, are regarded by scientists as the best examples of shelf edge coral reefs in Australian waters.

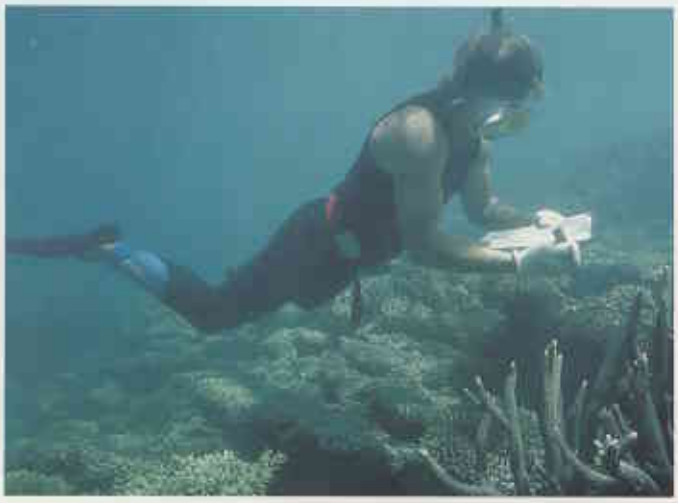
Other significant marine areas include the islands and reefs of the Montebello Islands, Dampier Archipelago, the Houtman Abrolhos Islands and the Recherche Archipelago, as well as the biologically diverse coastal waters near Perth and around Rottnest Island, which offer a mixture of tropical and temperate plants and animals close to the coast. So significant are these areas that in 1994 a pioneering report on marine conservation for WA (often referred to as the 'Wilson Report' after the report committee's chairman, Dr Barry Wilson) recommended that about 70 marine regions around the State's coastline, from the Northern Territory border to the South Australian border, be considered for classification as marine reserves so that their conservation values are safeguarded forever.

That same year, the State Government released a policy statement entitled *New Horizons in Marine Management* that reaffirmed the Government's commitment that "the principal thrust of the marine conservation effort will be to have one comprehensive [reserve] system under the CALM Act", and included several other key initiatives. These included the creation of a Marine Parks and Reserves Authority (MPRA) as a new vesting authority for marine reserves, a Scientific Advisory Committee to the MPRA and the creation of a specialist Marine Conservation Branch within CALM to 'drive' the marine reserves program.

Several issues were at the heart of the Government's approach: to conserve the marine environment of Western Australia; to ensure human usage is equitably managed; and to ensure that development of our marine environment is environmentally sustainable. The reasons for conserving our marine life are obvious, as most human usage depends on a healthy environment. Equity means we, current and future generations, all have a right to enjoy the beauty and wealth of our marine environment. Environmentally sustainable development means that we need to conduct our activities in such a way that we do not cause unacceptable changes and do not irreversibly damage the biological worth and beauty of the marine environment.

MARINE CONSERVATION

On land, there is a comprehensive system of national parks, nature reserves, State forest and other lands managed by



Previous page Harlequin fish are among the most colourful inhabitants of the offshore reefs in WA's temperate waters.
Photo – Ann Storrie

Above left: Researcher Chris Simpson monitoring the health of the coral reef in Ningaloo Marine Park.
Photo – Robert Garvey

Left: A researcher examining the effects of marine snail (*Drupella*) predation on a massive (*Porites*) coral.
Photo – Robert Garvey

CALM, encompassing 7.6 per cent of the State's total area. Our first national park—John Forrest, in the hills just east of Perth—was created in 1898. By contrast, WA's first marine park—Marmion Marine Park, offshore from Perth's northern suburbs—was created only in 1987.

The State's system of marine reserves has been expanding ever since, and there are now five more marine parks at Shoalwater Islands, Swan Estuary, Shark Bay, Ningaloo and the Rowley Shoals, and a marine nature reserve at Hamelin Pool in Shark Bay, which has some of the finest examples of stromatolites, 'living fossils', found anywhere on Earth. But we are still a long way from achieving a representative system that protects all the different types of marine habitats. For example, only four per cent of Australia's marine zone is protected in marine parks and other reserves, and of this, nearly nine-tenths is in the Great Barrier Reef Marine Park off the east coast.

One of the most important tasks of CALM's new Marine Conservation Branch is to ensure that key areas representing the suite of marine communities in WA are identified and managed in a State-wide system of marine conservation reserves.

One area from the Wilson Report is now being considered for establishment as a marine reserve in the near future: the reefs and lagoons of the Jurien Bay area. The intricate limestone reef system between Dongara and Trigg, which includes Jurien, is the temperate equivalent of the coral reefs of Ningaloo.

In collaboration with CALM's regional and district offices, the Marine Conservation Branch will have the task of turning this and future marine reserve proposals into reality. The branch will facilitate the public consultation process, involving key community groups and other interested parties, in the setting of reserve boundaries and management zones.

MARINE MANAGEMENT

It is not enough for an area to be reserved. Marine reserves must be wisely used. For management to be effective, there must be a good scientific understanding of the link between human usage and conservation values.

Improving the scientific basis of management at existing marine reserves is a major role of the Marine Conservation Branch. CALM has a number of marine park rangers and other marine staff within existing districts and regions, who are responsible for translating science into management. They provide recreational facilities such as underwater nature trails and signs, ensure that marine park users understand the importance of using the environment correctly, deal with problems of conflicting usage, see that rules and regulations are observed, and manage interaction between people and wildlife such as seals, dolphins, whales and whale sharks. To assist these regional and district staff in carrying out their work, the branch will provide policy, planning and scientific advice.

Above: WA's stunning coastal areas include limestone cliffs at Fish Creek, in D'Entrecasteaux National Park.
Photo – Marie Lochman

Right: Flinders Bay at Augusta.
Photo – Bill Belson/Lochman Transparencies

Below: The waters surrounding Rottnest Island. You can clearly see the territorial polygons of buffalo bream.
Photo – Dennis Sarson/Lochman Transparencies

Managing areas for conservation as well as commerce and tourism is often a difficult juggling act, especially as the marine environment is not well understood. Take, for example, the recent infestations of marine predators such as the crown of thorns starfish and the marine snail *Drupella*, which damaged large areas of coral on the Great Barrier Reef and parts of the Ningaloo Reef, respectively. Scientists are still divided about whether these phenomena are human-induced or simply part of the reefs' natural biological cycles.

Furthermore, huge numbers of oceanic animals and plants have free-swimming larvae that are dispersed by currents and may be spread a considerable distance from their place of origin. The inter-connection of biological

processes can be seen in the reef systems that stretch from as far north as Indonesia to the southern waters of the Abrolhos Islands and include the reefs of the north-west shelf. The 'Indonesian throughflow', a major current that connects these areas, is presently undergoing intensive research by oceanographers at the CSIRO.

Water currents can quickly spread pollutants and other unwanted substances into sensitive marine areas. In some cases, the lack of strong currents may make a region risky for development or waste discharge, due to the retention of wastes and contaminants. It is often difficult to understand the patterns of water flows in our coastal zone, because reefs, islands, sandbanks, spits and headlands can cause currents to deviate, reverse or eddy around in the same area. This complexity is increased by waves that pound the coast, and the ever-changing wind patterns and other forces such as the heating and cooling of the water, evaporation, river flows and the rotation of the Earth.

TAKING SCIENCE TO THE OCEAN

The Marine Conservation Branch's scientific and technical staff set up and coordinate biological and oceanographic research. They oversee field surveys, boating, diving and other tasks to investigate and monitor the near-shore and off-shore marine environments. Expertise in the branch includes areas such as marine ecology, oceanography, data management, marine wildlife, environmental modelling, marine reserve planning, remote sensing, environmental education and administration.

Above left: The Western Australian seahorse is found from Augusta to Shark Bay, and nowhere else in the world.
Photo – Pip O'Dell

Above right: Gorgonian corals are filter-feeding animals found on reef drop-offs all around the State's coastline.
Photo – Peter & Margy Nicholas/Lochman Transparencies

Oceanographic data are collected using increasingly sophisticated and efficient methods, such as orbiting satellites, which measure the distribution and movement of larvae, phytoplankton and ocean currents, underwater video to record seabed habitats and study the physiology of marine plants and animals, and Geographical Information Systems (GIS).

Electronic sensors record the speed of water moving past them. Salinity, temperature and density of marine water can be measured on the spot or instruments can be left in the water for months to detect changes in response to wind, tides, the sun's heating, river flows and atmospheric cooling. Satellite imagery is commonly used to take 'snapshots' of the ocean's surface temperature and colour patterns.

Marine Conservation Branch scientists can use such information to evaluate possible impacts of proposed coastal developments in WA's marine reserves. These techniques have recently been applied in places like Monkey Mia and elsewhere in Shark Bay, Jurien Bay, Ningaloo Reef and the Rowley Shoals.

Biological surveys, using underwater video and photography, and data reviews are essential in identifying and mapping major seabed habitats before the boundaries and zoning of proposed marine reserves can be considered. Satellite imagery is used to provide accurate, high resolution images of the major habitats. These, coupled with detailed field studies of the plant and animal communities in each area, help identify and map regions of 'core biodiversity' and define boundaries and zones within marine reserves. These maps, together with maps of the current uses of areas, will be vital during the public consultation process prior to reservation of an area.

The Marine Conservation Branch also identifies the information required to help inform the community about marine reservation. The key is to make educational material, such as pamphlets, videos and public lectures, easy to understand as well as scientifically accurate.

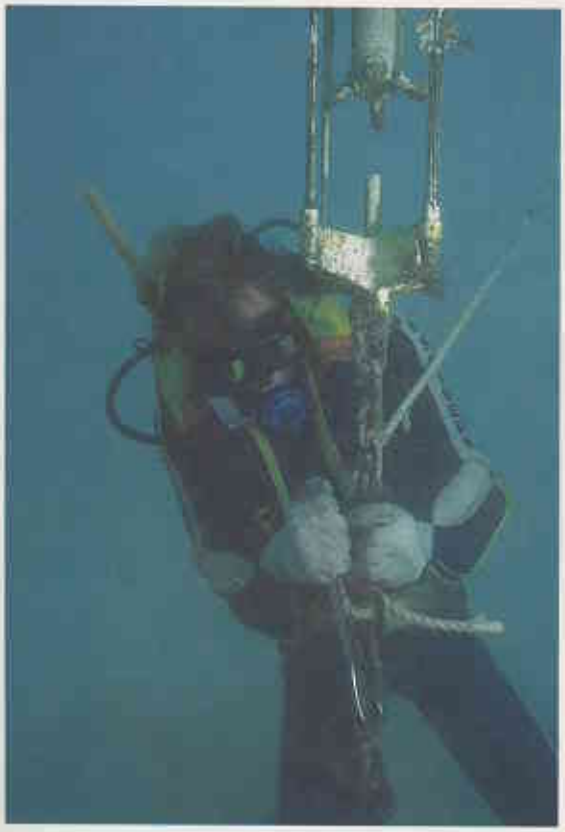
MONITORING HUMAN IMPACT

The Marine Conservation Branch and CALM's Gascoyne District recently began a major scientific project to monitor the health of the Shark Bay Marine Park. Pegs were placed at the start and finish of 50-metre sections (transects) of the sea bed. Researchers then swam along the rope and videotaped the area between the pegs to provide permanent records of the seabed community (whether it is composed of seagrass, algae or coral communities). When researchers go back in, say, two years or even ten years, they can measure any changes that may have occurred.

From March to May of each year, a remarkable aggregation of whale sharks occurs in the waters of the Ningaloo Marine Park. CALM has managed whale shark tourism in the marine park since 1993, mainly through the licensing of a limited number of commercial tour operators. The Marine Conservation Branch is now designing research and monitoring strategies with CALM's Exmouth office to see if current management needs to be modified. Better information will help ensure that future development of whale shark tourism is sustainable and equitable.

LOOKING TO THE FUTURE

The establishment of the Marine Conservation Branch within CALM will help set up a marine conservation system that should soon become the envy of other States and countries. This system integrates management policy and practice with the latest scientific research, and it will ensure that our unique marine environment will be passed to future generations in the most pristine condition possible.



Left: A diver uncouples a mooring for a current meter.
Photo – Robert Garvey

Above: Potato cod readily approach divers and soon disappear when a reef is heavily fished. They are common at Rowley Shoals Marine Park.
Photo – Peter & Margy Nicholas/Lochman Transparencies

Chris Simpson is the Manager of CALM's new Marine Conservation Branch. He has spent more than 20 years researching WA's marine environment from the tropics in the north around to the colder regions of the southern ocean. He discovered the annual coral spawning that occurs each autumn on WA coral reefs. He can be contacted by phone on (09) 432 5100 or by e-mail to chriss@calm.wa.gov.au.

Nick D'Adamo is an oceanographer with the Marine Conservation Branch. Since the early 1980s he has studied the currents and mixing patterns in WA's estuaries and coastal embayments, and has conducted hydrodynamic research in Italy's Venice Lagoon and Switzerland's Lac Leman. He can be contacted by phone on (09) 432 5104 or by e-mail to nickd@calm.wa.gov.au.

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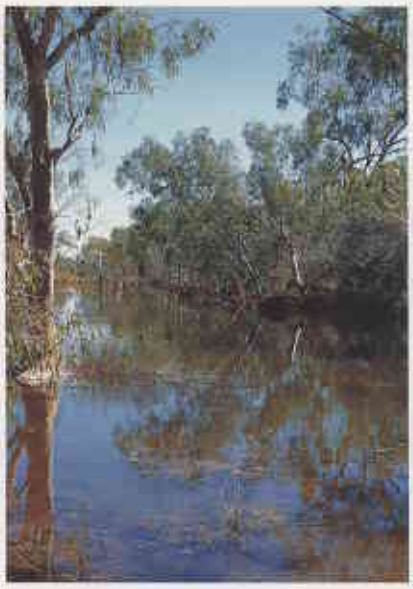
Further information on marine reserves can be obtained from CALM's *NatureBase* internet site at http://www.calm.wa.gov.au.



LANDSCOPE

VOLUME TWELVE NUMBER 3, AUTUMN 1997

Aquatic bugs are helping scientists to determine the health of WA's waterways. See Spineless Indicators on page 49.

CALM's new Marine Conservation Branch gets in deep (page 10) to play its vital role in safeguarding the health of WA's unique marine environment.

Called 'Karlamilyi' by desert Aborigines, Rudall River National Park (page 28) is steeped in history and bristling with wildlife.

The economic, social and conservation potential of Acacia in WA , a story of a golden future on page 16.

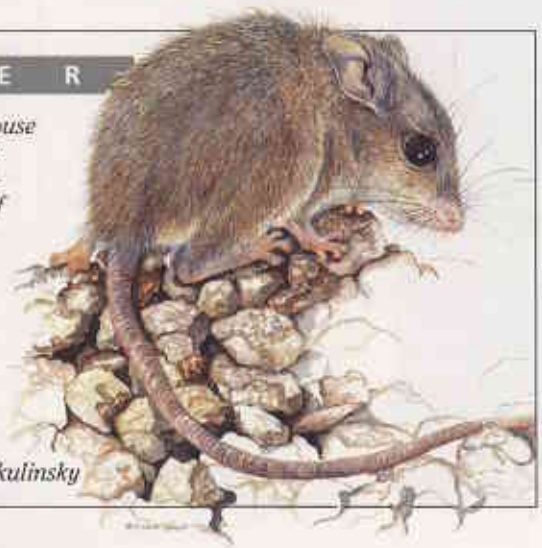
Fancy a walk? Join us while we look at the environment, history and building of a new Bibbulmun Track. See page 36.

FEATURES

REGULARS

COVER

The tiny pebble-mound mouse of the Pilbara (see story on page 42) is a tireless night-worker and the architect of many odd, red gravelly mounds, which look like miniture volcanoes among spinifex.



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