Landscope

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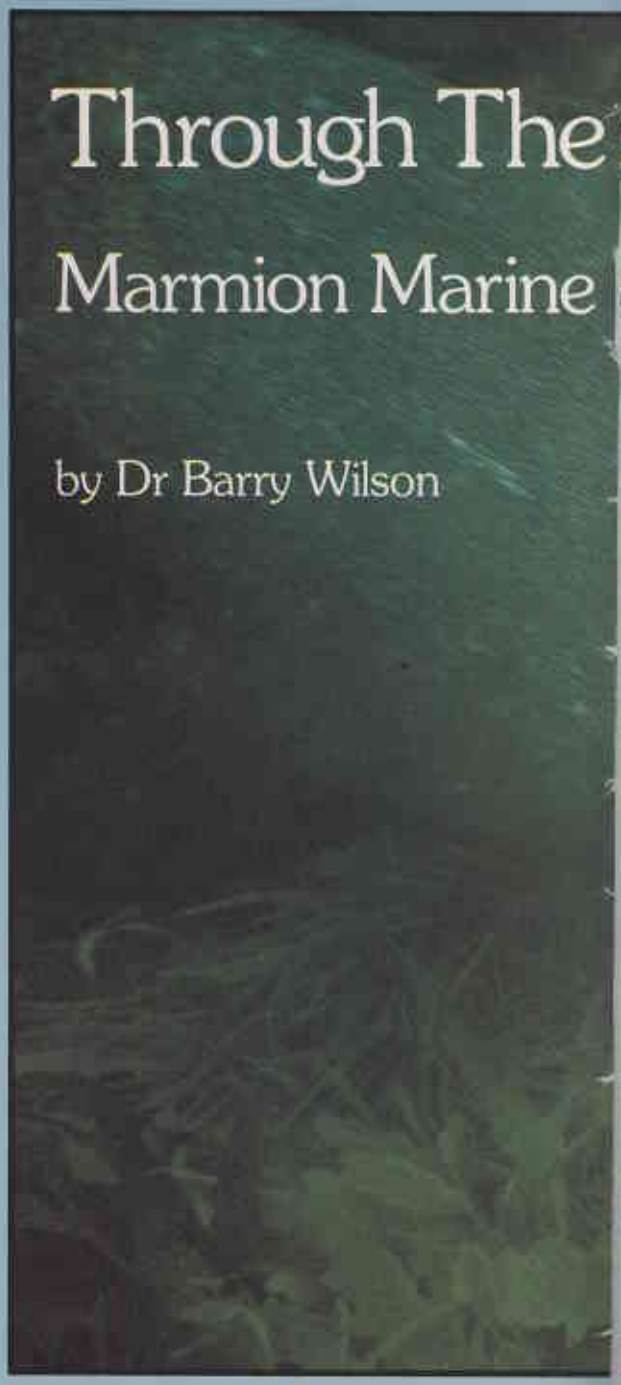
Cover

The Caspian Tern (*Sterna caspia*) is a good advertisement for the value of islands (see article p. 25). It breeds on islands all along W.A.s coast from Recherche Archipelago in the south to Lacepede Island near Broome. Cover photo by Cliff Winfield.



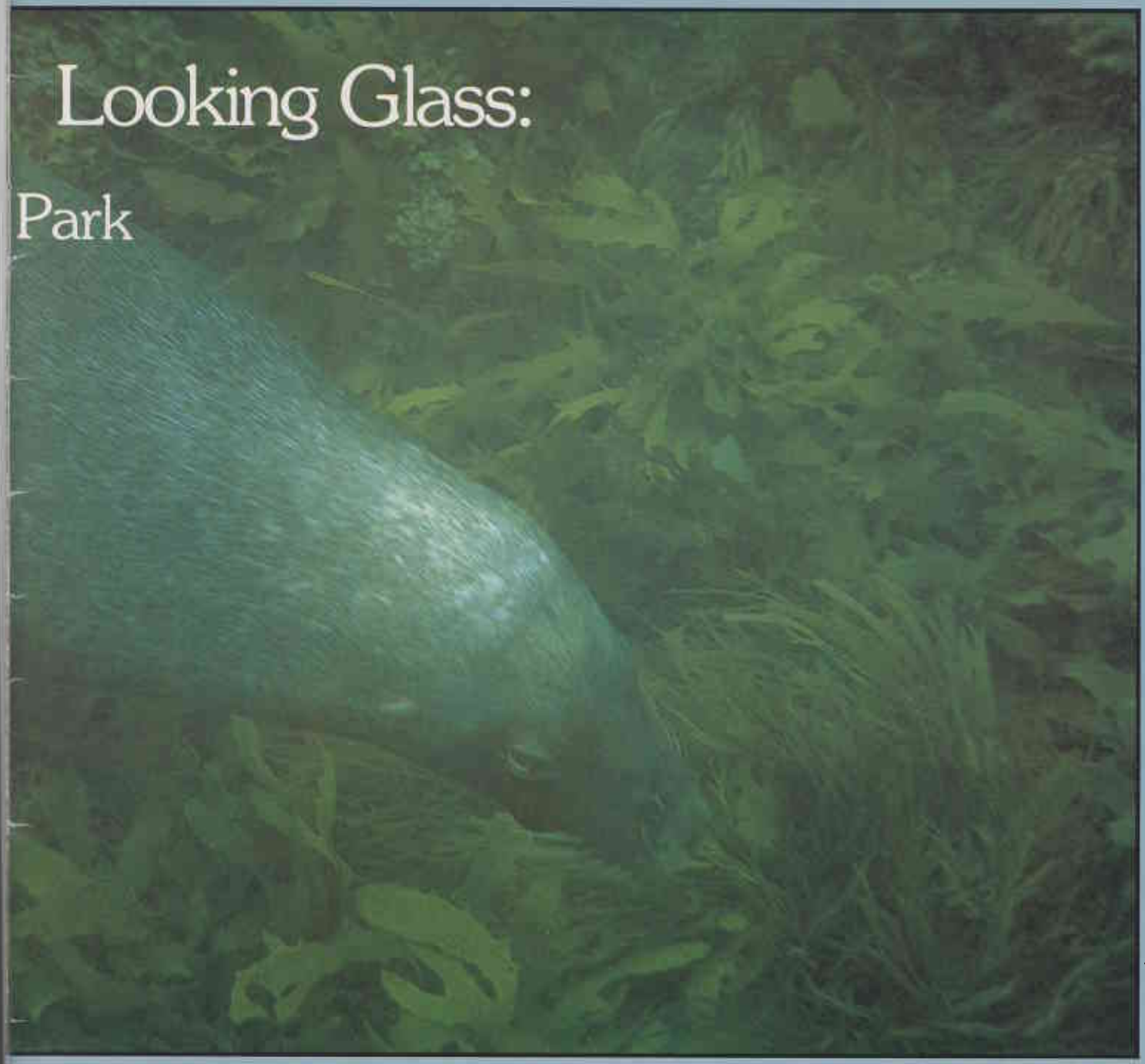
Through The Marmion Marine

by Dr Barry Wilson

To the land-bound observer standing on the dunes of the Whitford Nodes, on Perth's north coastline, the surface of the sea beyond may be still or turbulent, but it is always two-dimensional. It is hard to realise that below the surface, on the other side of the mirror, is a three-dimensional counter-world, with varied relief and diverse habitats. This world is populated by an alien array of the most impossibly grotesque and stunningly beautiful creatures, in such abundance and variety as to leave a snorkel-diver breathless in more ways than one.

Looking Glass:

Park



G. M. Morgan/W.A. Museum

This is the underwater world of the Marmion Marine Park. Many people swim, sail and fish there, but few know the full extent of its beauty. That is the privilege of the divers who explore its third dimension.

On the front doorstep of metropolitan Perth, this section of coastal water is of exceptional quality in terms of variety and abundance of flora and fauna, accessibility and safety. For many years the people of Perth have enjoyed it, but now people-pressure is increasing to critical levels and there is a danger of doing it irrevocable damage.

First Marine Park

It is for this reason that the Government has decided to establish the Marmion Marine Park as a recreation and conservation area for the enjoyment and inspiration of Perth people. It is this State's first marine park and will be established under the new provisions for marine parks and reserves in the Conservation and Land Management Act, vested in the National Parks and Nature Conservation Authority and managed by the Department of Conservation and Land Management.

The most urgent management task will be to regulate professional and recreational fishing in the park so that it can be sustained indefinitely at an acceptable level. Once an abundance of jewfish, blue groper, rock lobsters and many other delectable creatures inhabited the rocky reefs in this area. They are rare or more difficult to catch now, the inevitable result of selective over-fishing.

Controlling fishing is difficult, complex and

fundamental to proper management of a park of this kind, but it is only one part of the necessary management program. Protection and maintenance of the habitat itself and the entire ecosystem is essential. But what are these systems, how do they function, and what does one do to protect them?

Seascapes

The principal 'seascape' feature of the park is an off-shore reef protecting shallow lagoons between it and the beach. For the most part, the seabed of the lagoons is more or less level and covered with dense algal or seagrass beds or bare and moving sand. Here the ecosystem is based upon plants using energy from sunlight to photosynthesize food. Dead plant material cast up on the beach is decomposed by chemical processes or consumed by myriads of tiny crustaceans, so releasing re-usable energy back into the system. For the whole system to remain healthy these areas and these processes must be protected against pollution.

These shallow lagoons are the habitats of schooling fish such as Australian salmon, whiting, tailor, mullet, skippy and herring. Schools of these species may travel long distances along the coast. Catching adult fish in the park will have little long-term effect. What will count is the protection of their spawning and nursery grounds which are likely to be elsewhere (often in estuaries or protected bays) and the limitation of fishing pressure on the entire population. Park management can have little impact on these fish.

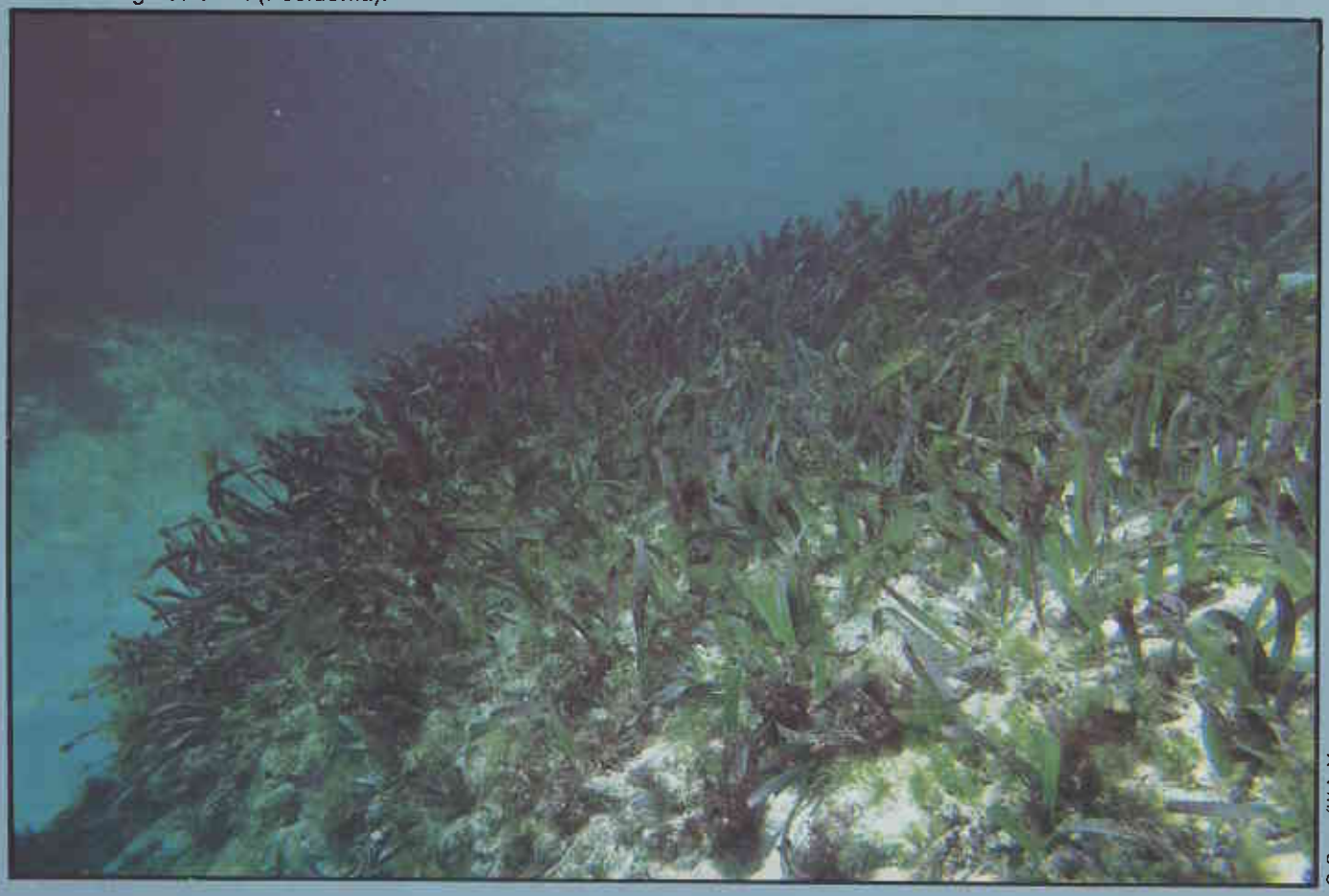
The outer reef itself, and a series of more protected reefs within the lagoons, are made of limestone and they are deeply undercut and cavernous. In those shaded places plants do not flourish, and an entirely different ecosystem operates. The rocky walls are covered by thick growths of sedentary (attached) invertebrate animals such as anemones, corals, sponges, lace-corals and sea-squirts. These creatures feed upon fine particles of detrital material and plankton produced in the open sea and carried to their waiting mouths by water currents. They in turn are fed upon by a variety of browsing and predatory molluscs, crabs, echinoderms, fish and other animals.

Underwater Spectacle

For its variety of form and bright colours, the invertebrate wall fauna has few equals as an underwater spectacle. Almost all the phyla and most of the classes of living animals may be found there. Many of the species are undescribed and these areas are a veritable treasure-house to the marine biologist. They have high conservation value.

The rocky ledges and the underwater caves also provide

Below: Seagrass bank (*Posidonia*).



C. Bryce/W.A. Museum

Bottom: A fan-coral or gorgonian (*Mopsella*) growing on a cave wall, with a feather-star using it as a feeding site.

Right: Golden Zooanthids growing on an underwater cave wall. Like corals the colony is made up of many individual polyps but there is no hard calcareous skeleton.

School of skippy (*Pseudocarana dentex*), a favorite game fish.

Above: People often collect abalone (*Haliotis roei*) and other edible molluscs on the reef flats at low tide, but this practice endangers the population.

Below: Portugese man-o-war (*Physalia physalis*). These colonial jellyfish may sting swimmers.

C. Bryce/W.A Museum

a secure home and hiding place for permanently resident fish such as gropers, wrasses and damselfish, many of which are extraordinarily colourful. Fish like these, which have a home-base, are especially susceptible to fishing, particularly if fishing pressure is maintained. During its normal life, which may be years or decades, each fish will occupy and defend its territory. If it is removed its place may be taken by another individual of the same species, but there is a limit to how often this can occur. Most species have quite specific feeding habits and once their particular niche in the system is vacant changes in the structure of the community must follow.

Fish Management: Different Strokes For Different Folks

It is for these reasons that rocky reef areas pose special problems for marine park management. There is evidence that the very accessible reefs in the lagoon have been badly over-fished in recent years and that there have been major changes in the reef's plant and animal communities. One of the primary tasks of park management will be to restore these communities to their original condition, or at least to limit human interference so that Mother Nature may do the job herself.

Capacity for dispersal is a critical factor in whether or not populations of a species can recover from severe reduction in numbers. Many marine animals, though the adults are confined to one spot or one territory, have planktonic larval stages which are carried long distances by ocean currents, and these may be a source of new recruits. Rock lobsters, for example, have a series of larval stages which spend many months floating in the plankton of the open sea before selecting a rocky place

Top left: A diver finds a cowry shell (*Cypraea friendii*) on a sponge in the seagrass bed.

Above: An egg-mass of the cowry shell (*Cypraea friendii*) laid on a sponge. One juvenile will hatch from each capsule as a tiny crawling snail.

Top right: An algal-feeding nudibranch.

Right: The starfish *Nectria wilsoni* was first discovered on the reefs off Whitford by the author and named after him.

Below: Two young *Parma mccullochi*, a common reef fish in the park.

C. Bryce/W.A. Museum

Above: Blue-devil (*Paraplesiops meleagris*), one of the loveliest fishes inhabiting rocky areas of the park.

Below: Western rock-lobsters (*Panulirus cygnus*) in a rock-crevice.

C. Bryce/W.A. Museum

Below: A hermit-crab (*Paguristes frontalis*) occupying the shell of a large creeper shell.

C. Bryce/W.A. Museum

to spend their more sedentary adult lives. If the adults are over-fished in one area, although their absence may cause local ecological changes, they are likely to be re-populated each season provided that there are sufficient breeding stocks elsewhere within dispersal range of the larvae.

At the opposite extreme, female cowry shells of the species *Cypraea venusta* and *Cypraea friendii*, lay egg-masses in upturned shells or depressions in sponges. The mother cowry 'sits' on her egg-mass like a hen on her nest, until the embryos hatch as tiny crawling snails. In these species there is no chance of dispersal at the larval stage, and over-collecting of the adults may result in local extinction of the species.

The management strategies to protect individual species must, therefore, be based on a knowledge of life history, especially reproduction, larval development and dispersal. The unhappy truth is that we are very ignorant about these things. A biological research program in the park, designed to provide this information, will be a long-term investment for more effective future management.

In the meantime it will be necessary to implement some generalised 'seat of the pants' management measures judged likely to give protection to the communities as a whole. The key to this is zoning. The idea is that different parts of the park are quite different as ecological systems and need different management. For example, although fishing for pelagic fish (those which inhabit the upper waters of the open ocean) in the lagoon areas is unlikely to have much long-term effect, fishing for the sedentary fish around the reefs certainly will. A zoning plan identifies the different areas and imposes appropriate management for each.

A case in point is the chain of small reefs running down the centre of the lagoon. These are favourite fishing spots, but they are also very susceptible to over-fishing. Furthermore, they are the very places where scientific and educational values are concentrated, for they support the most varied fauna. Some of these areas will be afforded full protection and no interference with the plants and animals will be permitted. They will serve as special marine life sanctuary zones and for study and reference purposes. They may also serve as breeding reservoirs providing recruits to repopulate fished or damaged areas.

But, management of marine parks is a new field and it is essential that we learn as we go along. Therefore, in the early years at least, while some areas are designated as full protection zones, others of similar nature will remain open to certain kinds of fishing. By careful monitoring of both areas over the next few years we will learn about the impacts of full protection and controlled fishing respectively and be able to modify management procedures.

Another reason for zoning is so that people can pursue different activities within the park without conflicting and competing with each other. Obviously snorkeling and power-boating would be a hazardous and unacceptable combination; an underwater fish photographer and a spearfisherman would be unlikely to operate amicably in the same place at the same time; mixing amateur angling and professional netting is a proven recipe for trouble. A zoning plan identifies those activities which are compatible and those which are not, and provides appropriate areas for each of them.

The Marmion Marine Park may be called a 'multiple use' area intended to conserve the environment and flora and fauna while providing for a wide variety of public uses on a sustainable basis. It is a marvellous asset for Perth, and a challenging and new kind of management task.

Divers preparing to dive at sunset in the quiet waters of the park.