

# Wonders of our Southern Seas



Western Australia's south coast region is famed for its diversity of wildflowers, and remote and spectacular landscapes. Although the region has some of the State's oldest and largest national parks, and an extensive system of nature reserves, little was known about the marine environment.



Now, a detailed marine biological survey of the area has produced some outstanding results.



## A MARINE SURVEY OF THE FITZGERALD REGION

by Jeremy Colman



DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

©1997. Reprint from LANDSCOPE magazine (Summer 1997-1998) published by the Department of Conservation and Land Management. Executive Editor: Ron Kowalilak. Managing Editor: Ray Bailey. Editor: David Gough. Story Editor: Carolyn Thomson. Designer: Maria Duthie.

2001289-06-3M



**W**estern Australia's south coast is remote and sparsely populated, and bears the full force of the Southern Ocean. For much of the year, the shores are pounded by heavy swells, generated farther south in the Roaring Forties. Most of the coastline consists of south-facing headlands and beaches exposed to strong wave action, and bays that are wide and open to the prevailing swell and winds. Consequently, this is a dangerous stretch of coastline with few areas where vessels can shelter from bad weather, or anchor in safety. However, relatively calm seas can occur in late autumn and early winter, thus creating occasional opportunities when the inshore waters are easily accessible to small boats and conditions are suitable for exploring the underwater habitats.

In March 1997, the Department of



Conservation and Land Management (CALM) mounted an expedition to survey the inshore waters across about 250 kilometres of coastline between Starvation Boat Harbour (east of Hopetoun) and Groper Bluff (west of Bremer Bay). The CALM-led team included marine scientists from the Department's Marine Conservation

Branch, Murdoch University and Edith Cowan University, two marine ecologists from the University of Tasmania, a shrimp biologist from Sweden, a professional underwater photographer, support staff and volunteers. The MV *Sea Lion*, a large fishing and diving vessel from Esperance, was chartered for a period of two weeks to provide living quarters and to serve as the diving and working

platform for the expedition.

## OUT FROM THE BIOSPHERE

The area chosen for the survey included the inshore waters adjacent to Fitzgerald River National Park. The park is one of the richest and most significant areas for plants and animals in Western Australia. It forms the 'core' of the larger notional Fitzgerald Biosphere Reserve, one of 12 internationally recognised biosphere reserves in Australia (see *LANDSCOPE*, Spring 1997). Its status was originally granted because of the park's extremely high floral diversity (it contains 20 per cent of the State's described plant species). In 1994, the Marine Parks and Reserves Selection Working Group, in its report *A Representative Marine Reserve System for Western Australia*, recommended that the coastal waters adjacent to Fitzgerald River National Park should be considered for reservation, as a part of a Statewide system of marine protected areas. A key step in the process of establishing a marine reserve is to assess the conservation values of a candidate area, and this includes gathering information on the biological, economic and cultural attributes of the proposed reserve.

### Previous page

**Main:** Australian sea lion

**Inset:** (from top) Western cleaner clingfish on a sponge; silver drummers in a cave; and a variety of seaweeds.

Photos – Eva Boogaard

**Above:** Seaweed-covered granite boulders in the intertidal zone at Bremer Bay.

**Left:** Sunrise over schist and quartzite cliffs in the eastern part of Fitzgerald River National Park.

Photos – Bill Belson/Lochman Transparencies







The objective of this expedition was to carry out a detailed survey of the marine plants and animals in coastal waters adjacent to the Fitzgerald Biosphere Reserve, and to examine the biological diversity of the seabed communities. This survey forms part of a major project, undertaken by the Marine Conservation Branch in conjunction with CALM's South Coast Region. It is funded by Environment Australia under the National Reserves System Cooperative Program, which is investigating relationships between the terrestrial, estuarine and marine environments across the south coast. While there are no existing marine reserves on the south coast at present, the project will provide recommendations on the integrated management of any adjoining terrestrial and marine reserves in the future.

## COASTAL TYPES

The coastline covered by the survey broadly consists of four distinct coastal types. The first area, which is also the most eastern, stretches from Starvation Boat Harbour to the mouth of Culham Inlet. It comprises limestone shores with narrow reefs and platforms running parallel to the shore. In the second zone, along the eastern part of the Fitzgerald River National Park, the schists and quartzite rocks of the Mount Barren Ranges extend right to the sea, resulting in precipitous cliffs and rocky shores.

The third coastal zone stretches from the mouth of Dempster Inlet south to Doubtful Island Bay. Here, there are a series of wide bays with sandy beaches, generally protected from the prevailing south-westerly swell. This area is characterised by a shallow-shelving, sandy seabed and extensive seagrass meadows beyond the surf zone. Southern right whales (*Eubalaena australis*) are frequently seen in this area during winter and spring, particularly in the sheltered waters around Point Ann and Point Charles. In recent years, a seasonal whale watching industry has developed in the area, which is being enhanced by the sighting of increasing numbers of humpback whales (*Megaptera novaeangliae*) in the same area during the winter months.

The fourth section of coastline, from the Doubtful Islands to Groper Bluff, consists of a series of granite headlands. The headlands are often separated by small curved bays and sandy beaches, such as those seen in Bremer and Dillon Bays. They are exposed to the open ocean swells and have steep cliffs and wave-swept slopes. Granite boulder fields often occur on the more sheltered sides of the headlands, and there are a number of deep offshore reefs with steep or vertical sides. The seabed around Point Hood and the Doubtful Islands drops away steeply to depths of 50 metres or more a short distance from the shore. These very different coastal

Researchers photographing some of the invertebrate life in a kelp bed.

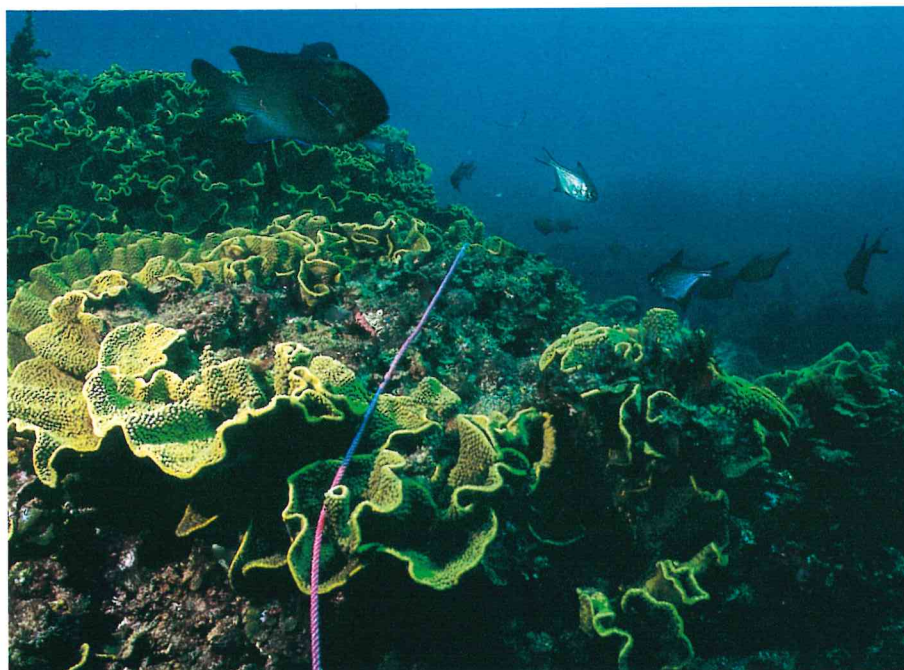
Photo – Eva Boogaard

types provide a variety of habitats for marine plants and animals.

## COUNTING AND COLLECTING

Forty-two sites, on limestone reefs, seagrass meadows and granite slopes and boulder fields, were investigated during the expedition. The selected sites were generally shallow, ranging from 5–12 metres in depth. Site depth was largely limited by the divers' air consumption rates, and the number of tasks that had to be carried out at each site. On arrival at each location, the MV *Sea Lion* anchored offshore and a team of divers was ferried inshore to the site, using an inflatable dinghy. Once the exact location had been determined, a 200-metre weighted and scaled rope was laid across the seabed from the inflatable. The task of the first pair of divers entering the water was to swim the length of the survey line and record the number of large fish species seen in an area five metres either side of the line. An estimate of the length of each fish was also recorded. Next, a second pair of divers swam along the line, searching through the weed and kelp on the bottom, recording the number of small fish and bottom-dwelling animals, such as sea stars, urchins, sea cucumbers, snails, crabs and lobsters, found within





one metre of the line. Samples of some plants and animals were collected for later identification back on the MV *Sea Lion*, and some were also preserved to form a reference collection.

The percentage cover of different species of seaweed was also recorded at a number of set points along the line. In seagrass meadows, once a census had been taken of large fish swimming across the top of the meadow, a diver swam along the length of the survey line filming a one-metre-wide strip of the meadow using an underwater video camera. This footage will be used to determine the percentage cover of the different species of seagrass. Seagrass samples were also collected from each site to investigate the productivity, or 'health', of the meadow. This information will provide useful comparisons with data from meadows across the south coast, such as those in Two Peoples Bay and around Albany. At each site, photographs and video footage were taken of the most visually striking plants and animals. One site, on the western side of Dillon Bay, provided excellent diving and spectacular video footage, including shots of a giant cuttlefish (*Sepia apama*), a huge school of swallowtails (*Centroberyx lineatus*) and several western blue devils (*Paraplesiops meleagris*), a striking fish covered in iridescent blue spots.

## SWELL AND SURGE

Strong south-easterly winds and heavy swells during the first week of the expedition prevented the team from investigating the limestone reef area along the exposed stretch of coastline east of Hopetoun. It is hoped that this part of the coast can be visited during a future survey. Heavy bottom surge at some of the shallow sites occasionally made working conditions difficult—sometimes it was necessary to hang on to kelp or rocks to

**Top:** The CALM-led marine research team preparing to survey a site.

**Centre:** (left) Reeling up the survey line on completion of sampling. (right) Collecting seagrass samples to estimate productivity.

**Left:** The survey line crossing a patch of 'cabbage' coral (*Turbinaria* sp.).  
Photos – Eva Boogaard





avoid being washed away from the survey line. Generally, the conditions were very good, with warm clear water and little current movement at most sites. Unexpected problems included curious Australian sea lions (*Neophoca cinerea*), who sometimes played 'tug-of-war' with divers trying to reel up the survey lines. One particular individual, obviously very interested in the information the divers were recording, took to coming right up and placing its nose on the top of the underwater slate as a diver was trying to write on it! The sea lions were much less timid than the more numerous New Zealand fur seals (*Arctocephalus forsteri*), which generally kept their distance. Both of these species are listed under the State's *Wildlife Conservation Act* as species that are in need of special protection.

The exposed granite reef sites are characterised by a heavy cover of kelp (*Ecklonia radiata*) and other brown seaweeds (particularly *Cystophora* and *Sargassum* species). These plants need light to photosynthesise, but here they grow at depths down to 30 metres or more, as a result of the clear inshore waters of the south coast. No major rivers run directly out into the sea in this region. Most of them discharge into inlets or estuaries that are either seasonally barred, or open to the sea only once every few years. Very low sediment inputs from rivers mean that there is generally little suspended material, contributing to high water clarity.

Below 30 metres or so, as light is filtered out, dense communities of sponges, sea squirts, fan corals and soft corals replace the seaweeds. Any rock surface, particularly the vertical walls of boulders and crevices, is covered in spectacular and colourful displays of these diverse animals.

The more sheltered sites on the western side of headlands were inhabited by large colonies of 'cabbage' coral (*Turbinaria* species). These impressive, multistorey structures, up to three metres in height, shelter a variety of fish, including large western

**Above:** A variety of sponges in different colours and growth forms encrust the granite rocks.

**Below:** The black-banded seaperch was one of a large variety of reef fish recorded during the survey.

Photos – Eva Boogaard

blue groper (*Achoerodus gouldii*), harlequin fish (*Othos dentex*), small but colourful, black-headed pullers (*Chromis klunzingeri*) and schools of bullseyes (*Pempheris* species). Other fish commonly encountered over weed and seagrass patches surrounding the







coral heads included queen snapper (*Nemadactylus valenciennesi*), old wives (*Enoplosus armatus*), toothbrush leatherjackets (*Acanthaluteres vittiger*), herring cale (*Odax cyanomelas*) and the familiar silver drummer or buffalo bream (*Kyphosus sydneyanus*).

## DIVERSE AND UNIQUE LIFE

Australia's temperate marine environments have some of the highest levels of biodiversity in the world. High proportions of the plant and animal species are not found anywhere else. The temperate coastal waters on the south of the continent have much richer and more diverse floral communities than those of the tropical waters of Australia. An illustration of this is that about 1 155 species of green, brown and red seaweeds have been recorded in temperate waters, about three times the level recorded in Australia's tropical regions. The high levels of biodiversity and endemism in temperate coastal waters mean they are particularly important from a global conservation perspective.

The expedition recorded more than 300 species of marine plants and animals from the nearshore waters adjoining the Fitzgerald Biosphere Reserve. Preliminary analysis of the results indicates that this area has very rich and diverse marine plant and animal communities. In general, the species found were typical of warm-temperate waters, the northernmost limit of their range usually being the reefs of the Houtman Abrolhos Islands or Rottnest Island. A small number of subtropical species were also recorded, including fish such as the western king wrasse (*Coris auricularis*) and Woodward's pomfret (*Schuettea woodwardi*), both of which range from Shark Bay south to the Recherche Archipelago, east of Esperance. The presence of these subtropical species on the south coast is probably a result of the warm Leeuwin Current, which moves



**Above left:** The offshore islands of this remote coastline support populations of the Recherche Cape Barren goose.  
Photo – John & Val Butler/Lochman Transparencies

**Left:** A giant cuttlefish (*Sepia apama*) rapidly changes colour to blend in with its surroundings.  
Photo – Eva Boogaard

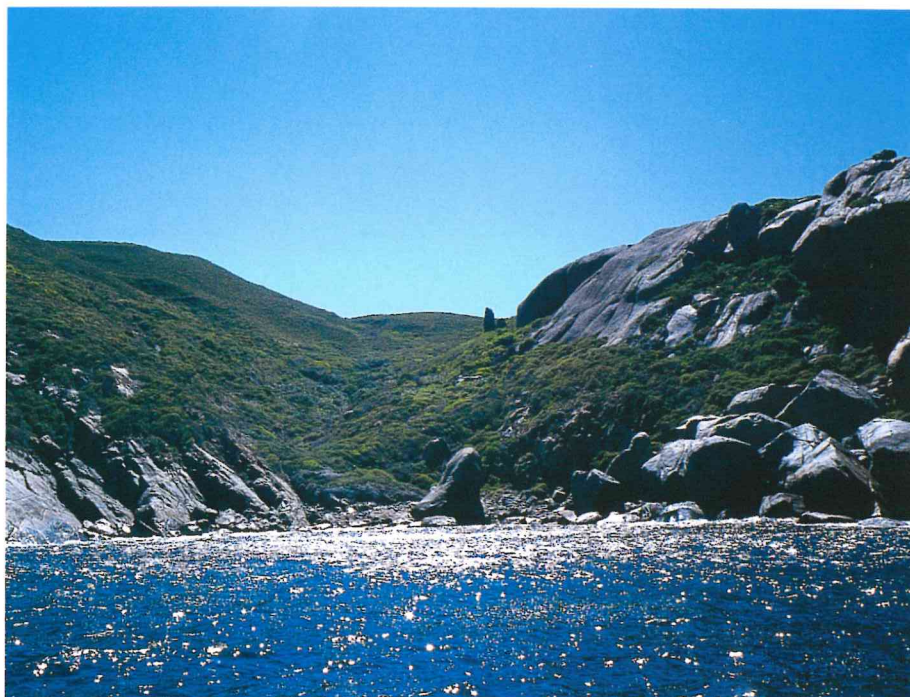


south down the west coast of Western Australia, round Cape Leeuwin and eastwards across the south coast into the Great Australian Bight. This current, strongest in winter and early spring, probably assists in the dispersal of some subtropical species (such as the hard coral *Turbinaria*) farther to the south and east of their normal ranges.

Outstanding features of these nearshore waters include abundant numbers of some large fish species, such as the western blue groper and queen snapper. This was particularly the case in granite reef areas. Large specimens of these species, highly prized by recreational fishers, have been greatly reduced or have largely disappeared from heavily fished temperate reefs elsewhere in Australia. Commercially important species, such as the greenlip abalone (*Haliotis laevis*), were also reasonably abundant throughout the area. Comparisons with similar temperate areas in other parts of Western Australia and elsewhere suggest that this part of the south coast is relatively undisturbed by human activities, probably due to the isolated and exposed nature of much of this coast. The survey confirmed the high conservation status of these waters suggested by the Marine Parks and Reserves Selection Working Group.

## REMOTE ISLANDS

The opportunity was also taken to visit a number of small offshore islands and isolated parts of the mainland. At these locations, team members counted seabird, seal and sea lion populations. These surveys had two significant outcomes—firstly, a rare sighting of two mature male sub-Antarctic fur seals (*Arctocephalus tropicalis*), and secondly, the verification of a reported haul-out site for New Zealand fur seals on the mainland. Both adults and pups were found, meaning that this site, at Cape Knob, could be a breeding site. If this were so, it would make it the first confirmed breeding location for this species on the Western Australian mainland. Sightings of the threatened Recherche Cape Barren goose (*Cereopsis novaehollandiae grisea*) were also recorded from Red Island, an isolated outcrop offshore from the central wilderness area of the Fitzgerald River National Park (see *LANDSCOPE*, Spring



1993). The expedition also visited Investigator Island, a remote horseshoe-shaped island 25 kilometres from the coast to the east of Starvation Boat Harbour. The island, rarely visited other than by the occasional fishing vessel, has two northward pointing arms that form a protected natural anchorage. It is home to a colony of New Zealand fur seals and is also a breeding site for Australian sea lions.

## NEW AND UNUSUAL SPECIES

Significant results of this first detailed survey included the discovery of a shrimp species that is new to science, and of another species of shrimp that may be a new record for Australian waters. A number of the sponges collected may well prove to be undescribed species. Another important result was the discovery of a specimen of the rarely seen large-tail cardinalfish (*Vincentia macrocauda*). Only a handful of specimens of this fish have been collected, most of them from the south coast by Dr Barry Hutchins from the Western Australian Museum. The specimen collected during this survey was unexpectedly found inside a sea squirt, where it might have taken shelter when disturbed by divers.

Overall, the survey was a resounding success, mainly due to the collaboration between CALM and marine scientists from Western Australia, interstate and overseas, who provided an extremely high level of expertise. This approach provides an appropriate model for future

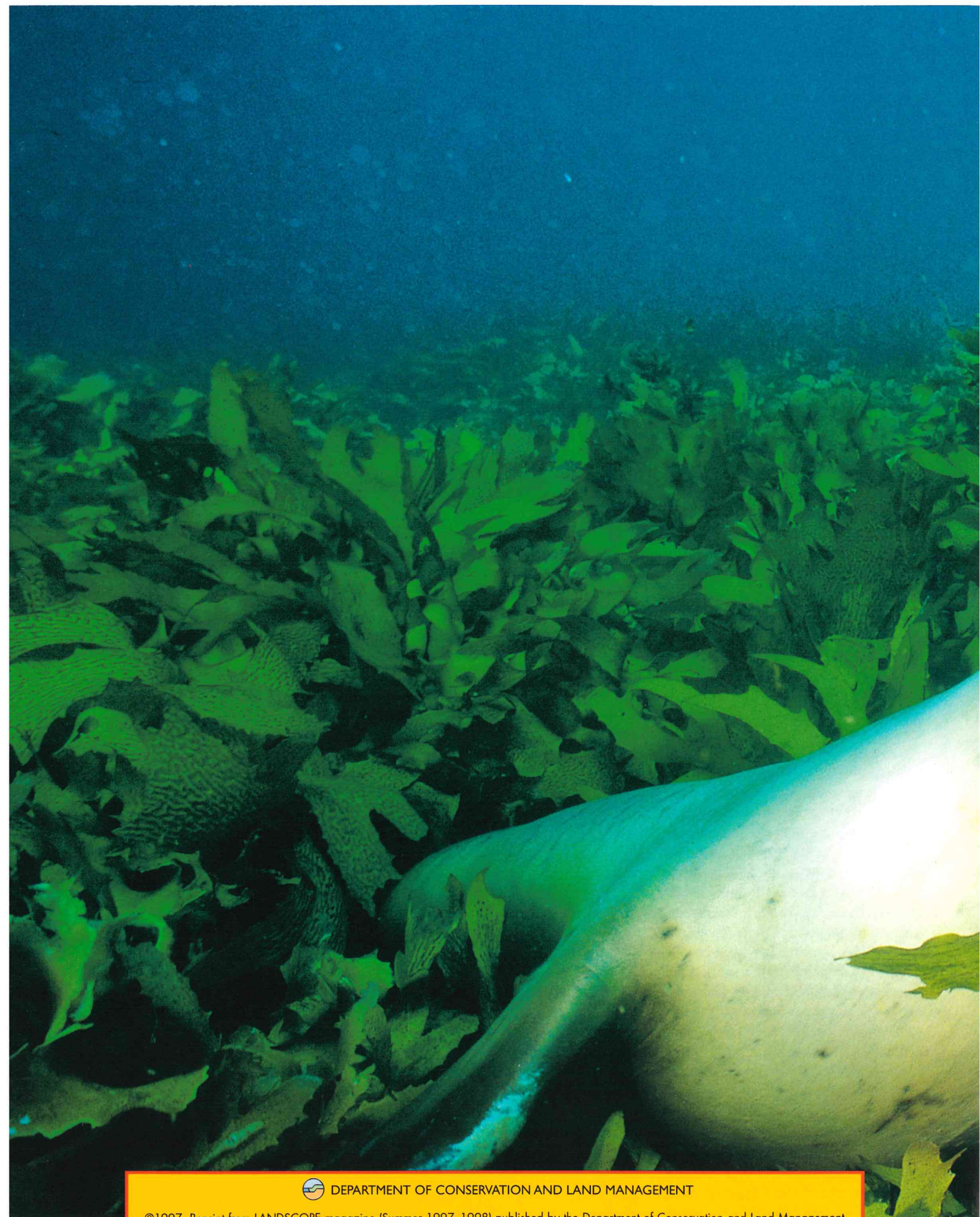
Spectacular granite cliffs and boulders are typical of the coastline around Bremer Bay and the Doubtful Islands.  
Photo – Eva Boogaard

investigations of the State's marine environment that will be undertaken by the Department's Marine Conservation Branch.

As the MV *Sea Lion* headed west towards Albany on the last day of the survey, the expedition members and crew were treated to a glorious day with a cloudless blue sky and calm seas. The spectacular, diverse and relatively untouched marine environment of the Fitzgerald region, combined with its wealth of marine wildlife, offers considerable potential for future diving and marine nature-based tourism activities. Expedition members have brought home lasting impressions of a profusion of underwater life and outstanding underwater scenery, mirrored by a stunning backdrop of granite monoliths and the rugged outlines of the Mount Barren Ranges.

Jeremy Colman is a marine ecologist with CALM's Marine Conservation Branch. He has 15 years experience in marine research and management, which has included studying deep sea communities in the north-eastern Atlantic and 30 months at an Antarctic base as a marine biologist for the British Antarctic Survey. He can be contacted by phone on (08) 9432 5110 or by email to [jeremyc@calm.wa.gov.au](mailto:jeremyc@calm.wa.gov.au).





DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

©1997. Reprint from LANDSCOPE magazine (Summer 1997-1998) published by the Department of Conservation and Land Management. Executive Editor: Ron Kawalilak. Managing Editor: Ray Bailey. Editor: David Gough. Story Editor: Carolyn Thomson. Designer: Maria Duthie.

2001289-06-3M