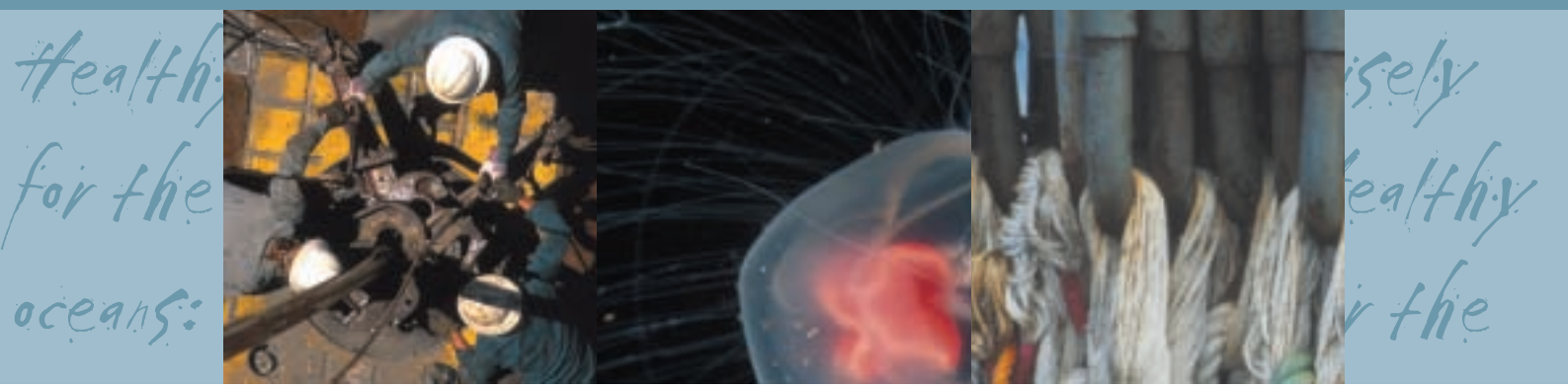
Description PAPER

Snapshot

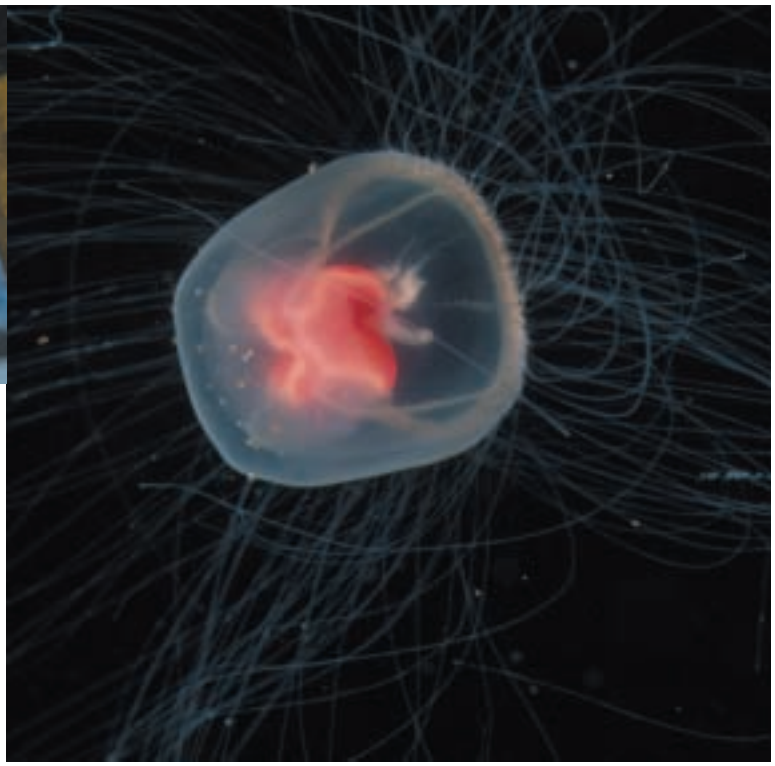
of the South-east



THE SOUTH-EAST REGIONAL MARINE PLAN

healthy oceans: cared for, understood and used wisely for the benefit of all, now and in the future healthy oceans: cared for, understood and used wisely for the

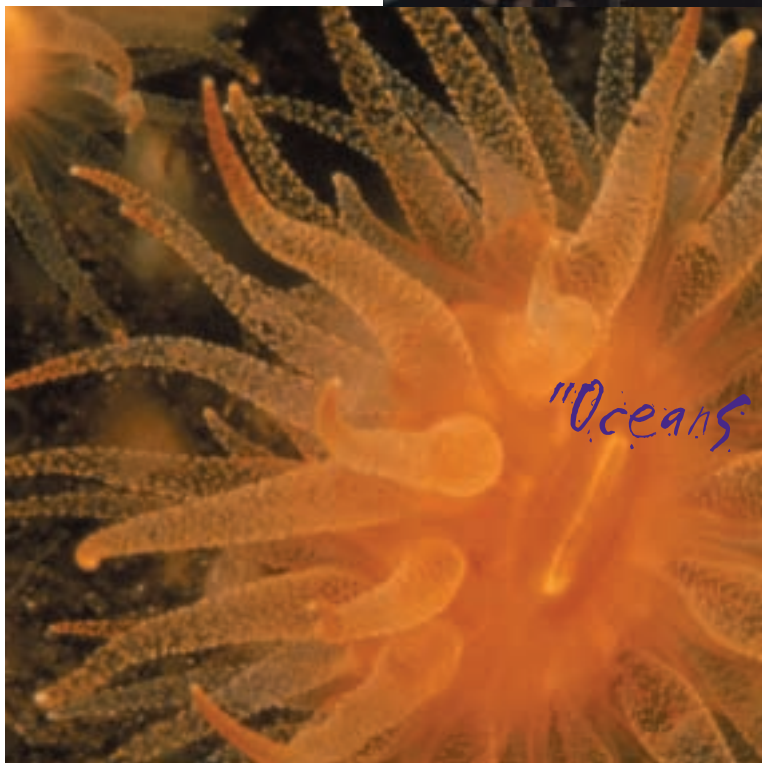
the invisible stream,
the current,
driving life
upwards from
the deep



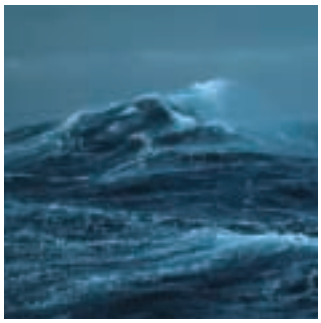
healthy oceans: cared for, understood and used wisely for the benefit of all, now and in the future healthy oceans: cared for, understood and used wisely for the

With no warning a sudden shift:
smooth water to broken sea

healthy oceans: cared for, understood and used wisely for the benefit of all, now and in the future healthy oceans: cared for, understood and used wisely for the



"Oceans are the beginning and
end of great journeys"



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A Snapshot of the South-east

A description of the South-east Marine Region

National Oceans Office 2001

A vision for Australia's oceans

"Healthy oceans cared for, understood and used wisely for the benefit of all, now and in the future"

(Australia's Oceans Policy 1998)

Speaking at the National Oceans Forum, Hobart 14 April 2000, Senator the Honorable Robert Hill (Minister for the Environment and Heritage, Chair National Oceans Ministerial Board) said;

Senator the Honorable Robert Hill.

"Regional Marine Plans are crucial to protect the future of the world's last frontier. While plans have been put in place to provide planning guidance on land, our vast global oceans have so far been left without such surety.

Regional Marine Plans will result in increased certainty and long-term security for maritime industries which contribute approximately $30 billion annually to the Australian economy – around 8 percent of GDP. They will improve community understanding of the marine environment, maintenance of environmental health and the development of an improved sense of ownership and responsibility for sustaining marine ecosystems.

Regional marine planning at this scale has never been attempted before in any nation's exclusive economic zone. It will include waters out to 200 nautical miles and any part of the continental shelf beyond that.

Pressures on the marine environment are significant, with the South-east Marine Region one of the most complex in Australia. Pressures include major urban coastal populations, ports, shipping, fishing, petroleum operations and other marine industries, making appropriate planning vital to the health of the area's ecosystem."

The National Oceans Office is an Executive Agency of the Commonwealth Government of Australia

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Contents

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"Healthy oceans; cared for, understood and used wisely for the benefit of all, now and in the future"

(Australia's Oceans Policy, Vol 1, p4).

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Summary

This *Snapshot* introduces the South-east Marine Region of Australia's ocean territory: its biological and physical nature; history; how we use it and how we manage those uses – from the coast to the deep seas.

Another document, the *Scoping Paper for the South-east Regional Marine Plan*, outlines the regional marine planning process currently under way. There is also a *Scoping Paper for the South-east Regional Marine Plan: A Summary* available.

This document is not intended to give a complete picture of all the complexities of the Region. Much of our understanding of the Region is still to be gained. A more detailed picture of the Region will emerge during the assessment stage of the Regional Marine Plan that is outlined in the *Scoping Paper*.

© CSIRO Marine Research

© CSIRO Marine Research

1 Introduction

A Snapshot of the South-east aims to provide a better understanding of the amazing marine region we live and work in or near. It describes the current knowledge we have of the Region and explores the human uses and past and current interactions we have with the marine environment.

In terms of human interactions, commercial and recreational fishing as well as aquaculture, represents the life blood for many in the South-east Marine Region. We extract oil and gas from the Region and the South-east is a focus for marine transport with millions of tonnes of cargo passing through its waters each year. Tourism and recreational activities such as diving, sea-kayaking and sailing are also popular human activities in the Region.

The Region is a place of convergence for a number of major ocean currents including the East Australian Current, the Zeehan Current and the Antarctic Circumpolar Current. This convergence results in mixing of cool and warm waters, seasonal upwellings of nutrient rich waters in some areas and complex water movements.

The Commonwealth government is currently developing a South-east Regional Marine Plan. To help in developing the Plan, this *Snapshot* describes the Regions' marine environment and its uses from the coast to the deep seas.

If you would like more information about the South-east Regional Marine Plan please read the *Scoping Paper for the South-east Regional Marine Plan* and find out how you can be involved. The National Oceans Office is coordinating the development of the Plan and contact details for the Office are provided on the back cover of this document.

© Tourism Tasmania

© Karen Gowlett-Holmes

Otway Light at Cape Otway, Victoria.

2 Australia's Oceans

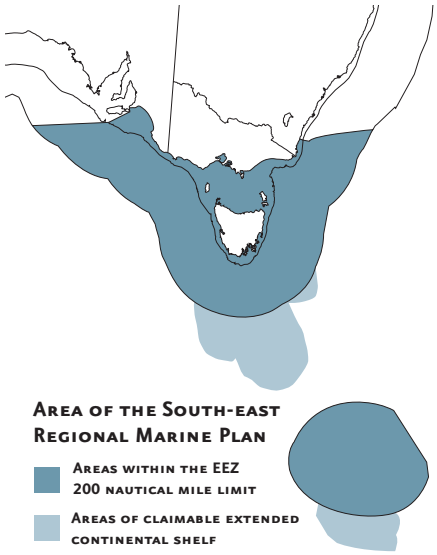
Australia's marine jurisdiction covers 16 million square kilometres of ocean, which is more than twice the land area of the continent. Our seas contain more than 4,000 fish species, over 500 coral species, over 50 mammal species and tens of thousands of invertebrates, plants and micro-organisms, many of which we know little about – including their potential. It is thought that 80 percent of our southern marine species are endemic; that is they occur nowhere else in the world!

The scope and extent of management responsibilities within the waters of the Region is based upon inter-governmental agreements and arrangements as well as internationally negotiated rights and obligations. Australia is a world leader in many areas of marine resource management, science and industry practices. Our marine-based industries contribute about $30 billion annually to our economy. The life of many small ports and communities on our coastline are dependent on the ocean and its resources, and on their sustained health and accessibility.

Nearly all Australians – 80 percent in fact – live on or near the coast. Our interactions with the sea are deeply embedded in our culture. Australia's ocean and coastal environments are steeped in culture and history. Aboriginal occupation dates back at least 40,000 years and contemporary Aboriginal communities maintain strong associations with 'sea country'. There are many reminders of early European settlement by way of shipwrecks, whaling stations, lighthouses, historic ports and other coastal historic sites. If you live on the coast you can probably see evidence of this in your own community.

2.1 Australia's South-east Marine Region

The South-east Marine Region comprises waters off Victoria, Tasmania, Macquarie Island, southern New South Wales and eastern South Australia – from latitude 36°48'S off southern New South Wales to Kangaroo Island off South Australia.



These waters extend from the low water mark out to the 200 nautical mile limit of Australia's Exclusive Economic Zone (EEZ). It also includes areas of the continental shelf beyond the EEZ that are claimable by Australia under the United Nations Convention on the Law of the Sea (UNCLOS). The total area of the South-east Marine Region exceeds 2 million square kilometres, approximately double the combined land area of New South Wales, Victoria and Tasmania.

The Region contains some of Australia's most productive fisheries with species of major importance to the national economy including the abalone and rock lobster fisheries. It is also home to some of the fastest growing aquaculture industries in the country. The Region contains vast oil and gas reserves and long-standing production facilities. The waters of the Region contain habitats for migratory and endemic species of both flora and fauna.

For example, marine mammals such as whales, dolphins and seals breed and nurse their young in the Region and over 20 species of migratory seabirds including penguins, albatrosses and shearwaters spend time in the Region. The Region also contains some of Australia's most important cultural relics in the form of shipwrecks and reminders of past Indigenous occupation.

Over 3.5 million people live in towns and cities along the coastline of the Region. Some of the towns have comparatively small populations, like Kingston SE in South Australia [2,000] or Eden in NSW [3,500]. Melbourne dwarfs all the rest. But all have much in common, not least of which are their intimate and unbreakable links with the history and life of the marine and coastal environment.

Strahan, West Coast, Tasmania.

The South-east Marine Region is a vast area with a diverse ecosystem still to be explored.

© Michael Baron

Southern Right Whale.

3 The Environment

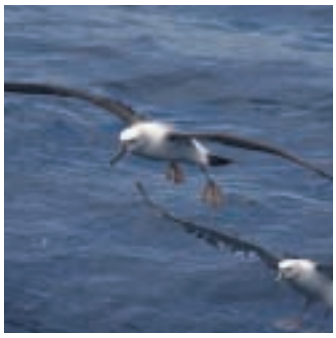
The South-east Marine Region is a vast area with a diverse ecosystem still to be explored. As a result, there are many mysteries within the deep oceans yet to be discovered. The following provides a brief outline of our current knowledge.

3.1 How the South-east Marine Region's ecosystems work

The sun, ocean currents, tides and wind drive a continuous cycle that influences a complex marine ecosystem. From seabird and whale migrations to the currents that carry nutrients and plankton, the marine ecosystem is a network of inextricably linked events. Add to this the many ways that people use the oceans, and we begin to see the South-east Marine Region as a whole working system where natural processes and human activities interact.

A marine ecosystem is a 'dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit' (*Convention on Biological Diversity*, June 1992). If you think of Australia's marine ecosystem as a giant jigsaw puzzle, the Region's ecosystem is simply a few of the pieces. All the pieces of the puzzle are linked to form a complete picture. The ocean currents and animal migrations are just two examples of the linkages between the Region and other areas in Australia and the world.

There are three major ocean currents in the Region. The East Australian Current is a southward flowing open ocean current that brings warm water from as far north as the Coral Sea off North Queensland. This current contributes to an overlap between the



© Karen Gowlett-Holmes

temperate and tropical communities along the southern waters of New South Wales. The Zeehan Current flows southward on the continental shelf transporting warmer water down the west coast of Tasmania, and the Antarctic Circumpolar Current is an eastward flowing current that gains strength south of Tasmania. The interactions of these currents result in complex water flows that determine species composition, distributions and dispersal, control the movement of sediments and nutrients, and influence the seasonal variations in salinity and temperature. As well, where the currents converge, there is a mixing of cool and warm waters. This results in upwellings of nutrient rich waters that provide a source of food for many marine species.

Another link with other marine environments that occur around Australia and the world, is the many species that spend only part of their life in the Region. This includes migratory species and species whose presence is determined by food resources and life cycle stages, for example:

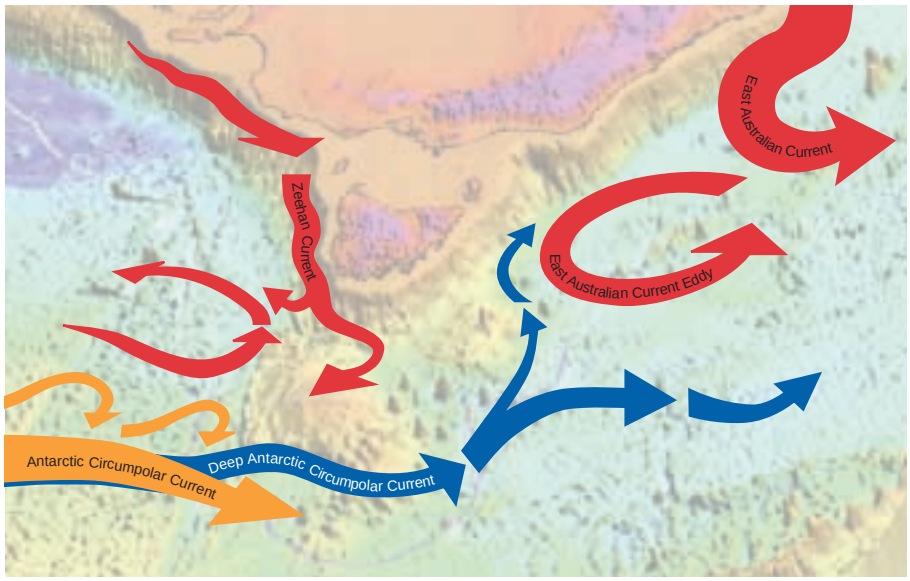
- fish of commercial significance such as southern bluefin tuna;
- marine mammals such as the southern right whale and the humpback whale;
- wide ranging predators such as the great white shark; and
- birds such as the wandering albatross and short tailed shearwater.

There are also links between the oceans and the land that influence the marine ecosystem. The river systems that drain into the South-east Marine Region provide inputs of freshwater into coastal ecosystems and have helped to shape underwater features at times of lower sea levels. Examples of this are the canyon structures at the eastern end of Bass Strait and offshore from the mouth of the River Murray.

The catchments for these river systems encompass all of Victoria and Tasmania, most of New South Wales and parts of South Australia and Queensland. The total land area of the catchment for the South-east Marine Region is in excess of 1.2 million square kilometres.

For the purposes of planning and management we can also look at the Region's ecosystem as a group of habitats. A habitat is simply the place where an organism lives. There are many things that influence where animals and plants live in the Region, including the shape and nature of the seabed and water depth.

The basins and ocean ridges on the seabed of the Region today were formed during a tumultuous geological history. A series of geological events occurring over hundreds of millions of years, including the break up of the great southern continent – *Gondwana*, gradually formed the arrangement of land and sea that we are familiar with today. The exact size and



Ocean currents in the Region.

The total land area of the catchment for the South-east Marine Region is in excess of 1.2 million square kilometres.

© CSIRO Marine Research

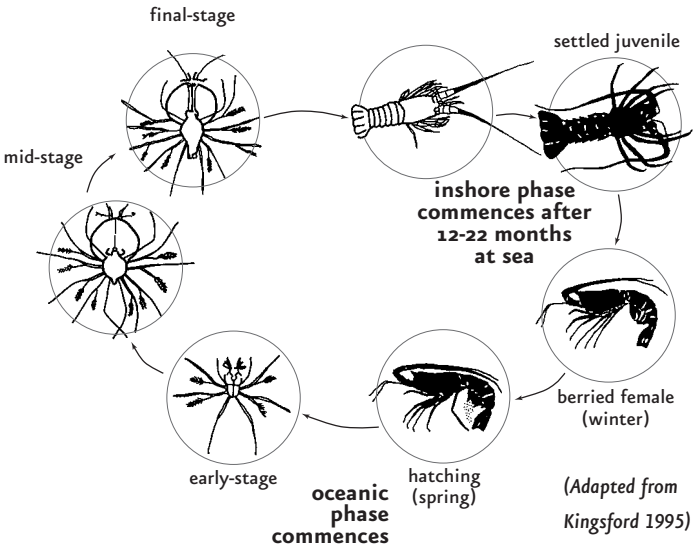
shape of the coastline and shelf reflects changing sea levels caused by the growth and decay of continental ice sheets. For example, Bass Strait first opened 12,000 – 13,000 thousand years ago and has been open and shut at least 8 times since.

The water depth in the Region ranges from the few centimetres where we paddle at the beach, to the vast oceans that may be thousands of metres deep. The deepest part of the Region is in the Hjort Trench near Macquarie Island. It is about 6,700 metres, but there are other key features of the Region including:

- the continental shelf, where water depths are generally less than 200 metres deep;
- the seamount structures off southern Tasmania;
- the shallow waters of Bass Strait;
- the sunken continental ridge known as the South Tasman Rise, south of Tasmania; and
- the steep continental slope.

There are many species that inhabit different habitats through their life cycle. For example, the young of the southern rock lobster float with plankton in deep water and move to reefs and estuaries as they grow.

Life history of the southern rock lobster



(Adapted from Kingsford 1995)

3.2 What sort of habitats are there in the South-east Marine Region?

We are most familiar with the habitats that occur along the coast and in shallow waters including beaches, rocky shores, wetlands and seagrass beds. These habitats are used by many marine species for at least part of their life history.
They also provide food and shelter for many migratory bird species.

Within the South-east Marine Region there are more than 45 wetlands of national importance. Ten of these are internationally recognised as critical habitat for migratory birds (Ramsar sites). Examples of these include: The Coorong and Lakes Alexandrina and Albert (South Australia); Corner Inlet, Gippsland Lakes and Western Port (Victoria); Oyster Cove and Moulting Lagoon (Tasmania); and Merimbula Lake (New South Wales).

Australia has the largest area of temperate seagrasses in the world. These include areas of seagrass in Victoria (Western Port and the Gippsland Lakes) and in Tasmania (the Hobart and D'Entrecasteaux regions, Triabunna and St. Helens on the east coast, the Tamar, Port Sorell and Duck Bay on the north west coast).

© Karen Gowlett-Holmes

A characteristic feature of the underwater landscape of the Region is the kelp forests. These resemble terrestrial forests and are composed of both canopy and understorey species. The kelps that form the giant kelp forests in Tasmania and Victoria (*Giant and Bull kelps*) can grow up to 30 centimetres a day, forming a dense canopy up to 30 metres above the seabed.

Knowledge of the ecology of giant kelp forests is incomplete, but it is believed that the upper canopy increases habitat complexity, and provides a refuge and possible nursery area for many fish and invertebrate species. It has also been suggested that the kelp forests are important in developing a detritus-based food chain.

Among the many animals that find shelter in the Region's kelp forests is the leafy sea dragon which feeds on amphipods (small shrimp like creatures).

The microalgae – 'the floating pasture of the sea' – are the foundation of the food chain. They depend for their diet upon upwellings from the ocean depths, which are rich in nutrients. The animals that 'graze' on this 'pasture' include small shrimp that are, in turn, eaten by larger predators.

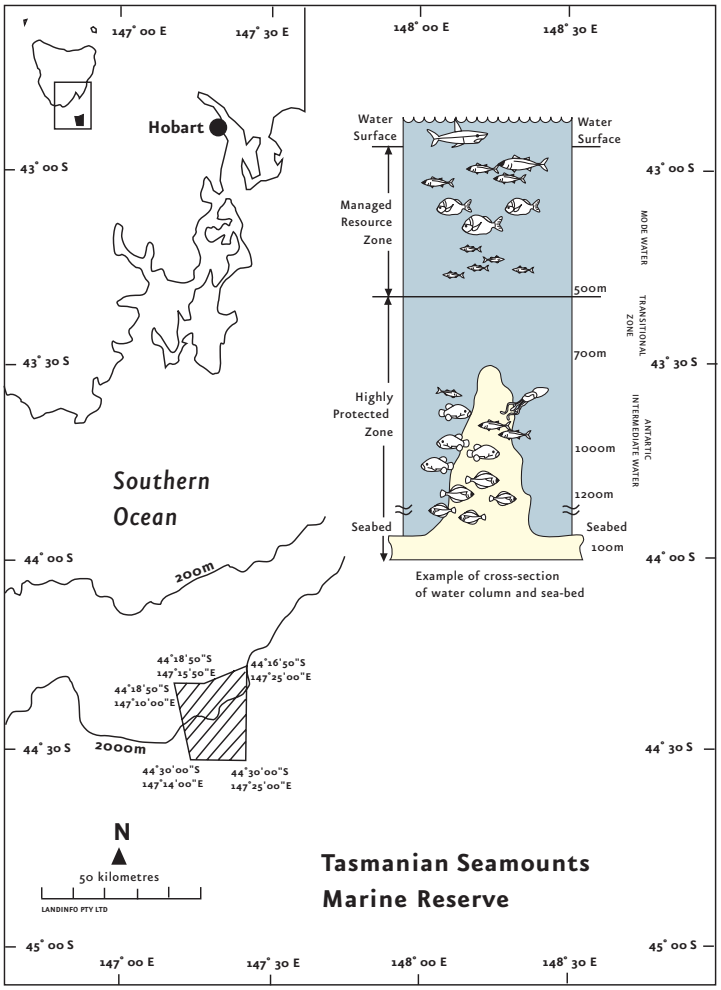
Submerged rocky reefs in temperate Australia are home to many marine animals including abalone, rock lobster and snapper, and they are popular for recreational diving.

Where these submerged reefs are deep enough, the amount of light is limited. As a result, plant life is generally restricted to encrusting red algae, which can tolerate much lower light levels than other marine plants. Of the 4,500 species of red algae known in the world, at least 800 occur in the Region.

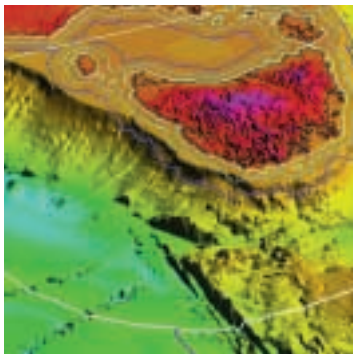
In southern Australia, submerged reefs have a very high species biodiversity and a high proportion of endemic species. Between 80 – 90 percent of many invertebrate groups (those animals without a backbone) are endemic.

© Karen Gowlett-Holmes

The leafy sea dragon is remarkably well camouflaged, and resembles a floating piece of torn off kelp.



Source: adapted from Environment Australia



© AGSO

Continental slope, south western Tasmania.

Seamounts host a rich and diverse assembly of life forms that have adapted to the strong currents typical of the deep-sea environment. Ocean currents converge at the peaks concentrating plankton and dissolved organic material near the mountain slopes. This is food to the vast array of animals that can survive in this environment.

Recent work on Australian seamounts has revealed more than 850 species, about a third of which are new to science. Sea spiders, worms, slipper lobsters and crabs live in and around the underwater forests formed by corals, sponges and sea fans. Animals that filter their food from strong currents are particularly successful in this environment. There are also a number of deep water fish species that live on or near the seamounts.

Seamounts are isolated habitats and it is possible that each mountain has its own unique and diverse ecosystem. Even with all these new discoveries, there is still much to learn about these amazing deep sea environments.

Submerged rocky reefs, caves, crevices and overhangs are covered with spectacular and diverse animal communities including bryozoans, soft corals, sea whips and sea cucumbers. In particular, sponges form large gardens that are richer in species than similar habitats elsewhere in the world. They also have a higher level of endemism.

These sponge gardens are generally deeper than 20 metres where there are low levels of light. They are found on rubble in areas with gentle currents, which is one reason why they support many delicate forms of life. As well as the animals fixed to the sea floor, sponge gardens and submerged reefs are home to many mobile animals including crabs, shrimp, abalone, sea stars, urchins and octopus. Many fish species also either live in, or regularly pass through, these habitats.

We know very little about the biology of species found on submerged reefs and the distribution of these habitats (and therefore the animal species that rely on them).

In the deeper waters of the Region there are extinct submarine volcanoes – seamounts. The most outstanding of these are in the Tasmanian Seamounts Marine Reserve, about 170 kilometres south of Tasmania. About 65 of the undersea mountain peaks in the Reserve are between 660 metres and 1,940 metres below the surface of the sea.

© Karen Gowlett-Holmes

3.3 Fish

Existing within these habitats and reliant upon them are a variety of fish species. The Australian marine environment contains an estimated 4,000 to 4,500 fish species. Of these only 3,600 have been described or identified. Of the species identified so far around 25 percent are endemic – most of these endemic species are found in the south.

Some of the fish species are well known to the majority of residents in the South-east Marine Region, through being common tablefish found in fish shops or the market, such as orange roughy, flathead, flake (shark), or trevalla. Some of the fish species are known for their recreational fishing fighting abilities. These range from offshore tunas and marlin to Australian salmon caught at the beach.

Besides fish, invertebrate species such as lobster, abalone, crabs, sea stars, sea urchins and squid are well known. There are, however, a multitude of other invertebrate species that are little known and many are still undiscovered.

Some pelagic species (those that live in the open ocean) travel vast distances. These species include the tunas and the great white shark. Other species are limited in either depth range or habitat such as reefs or sandy or muddy bottoms.

An example of how species composition may change with depth can be found when moving from the shallower continental shelf to the deeper continental slope. The fish of the continental shelf include up to 300 species off southern New South Wales and approximately 125 on the Tasmanian shelf. Dominant groups in shallow waters include whiting, trumpeter, morwong and flathead. In slightly deeper water, stingrays, gurnards, cods, morwongs and sharks dominate the fish fauna.

Until recently, the fish and invertebrates of the continental slopes, apart from those of commercial interest, have been largely unstudied. Research organisations, such as the CSIRO, are now dedicating resources to the study of the continental slopes and deeper water environments, including the South-east Marine Region. For this Region, in water depths between 200 and 600 metres, the major fish species include whiptails, spiky dories, king dories, blue grenadier, bellows fish, stargazers and sharks.

© Karen Gowlett-Holmes

Demersal fish – newly discovered species.

Marine mammals are a feature of the Region's fauna.

© Karen Gowlett-Holmes

Australian Sea Lion.

3.4 Mammals

Marine mammals (whales, seals and dolphins) are a feature of the Region's fauna. There are known to be:

- 24 whale species;
- 7 species of dolphin; and
- 7 species of seals and sea lions.

© CSIRO Marine Research

Seals

Both the New Zealand fur seal and the Australian fur seal breed within the Region. The males of both species are considerably larger than the females with the Australian fur seal weighing up to 360 kilogram and the New Zealand fur seal up to 185 kilogram. Both species breed ashore (generally on remote islands) and feed at sea, mostly on fish and squid. They are territorial and have more than one mate. Females give birth to a single pup with birthing for all members of the species occurring at the same time in early summer. The Antarctic and sub-Antarctic fur seals breed on Macquarie Island in low numbers. New Zealand fur seals visit the Island during the summer to moult and occasionally breed.

Fur seals were once hunted to near extinction. As early as 1798 the brig Nautilus collected 9,000 skins on a single expedition to Cape Barren Island (the Furneaux Group in Bass Strait). Now, all seals are protected. Some have learned to exploit the easy pickings of the salmon cages in the estuaries of Tasmania. Attempts to trap and deport them appear to be unsuccessful; seals captured and carried to the other end of the island are back at the salmon cages in no time. One individual has been caught and has returned several times, travelling up to 50 nautical miles a day.

© DPIWE Iynej Skira

Whales

There are many whales that utilise the South-east Marine Region. Two of the most interesting species are the blue whale and the southern right whale

Blue whales are the largest animals on the earth. They can grow to over 30 metres, weigh up to 180 tonnes and may live for 80 to 90 years.

Blue whales were once heavily exploited through commercial whaling and as a result are now listed as an endangered species. There are fears that commercial whaling has depleted these animals so much that they may never naturally recover. In fact, there are currently so few of these magnificent creatures that scientists find it difficult to locate and study them.

Blue whales are known to feed in and travel through the Region. They have been spotted along the waters of the continental shelf near Portland in Victoria. They travel vast distances in their annual migration, from the Antarctic up along the eastern and western coasts of Australia and into the South Pacific and Indian Oceans. It is believed they breed at the lower latitudes near the Antarctic and then travel up to warmer climates, around Australia and into the South Pacific and Indian Oceans to feed.

Southern right whales were so named because they were considered the 'right' whales to hunt by nineteenth century whalers. This was for a number of reasons including that they were so full of oil they floated when dead and they came into bays and shallow waters to calve thus making them an easy target. They also tend to try and help a wounded companion, so if whalers harpooned one of them the others would gather around rather than leave.

By the 1860's their numbers were so severely depleted that whalers could no longer hunt them profitably. From an estimated world population of 100,000 southern right whales, 30,000 were taken from Australian and New Zealand waters alone.

Unlike the blue whale, the southern right travels up from the south to breed and calf in the warmer waters off the coast of southern Australia. However, they are not fast swimmers, seldom reaching more than 9 kilometres per hour and taking over a month to swim the 5,000 kilometres or so from sub-Antarctic waters.

Newborn calves have virtually no blubber to insulate them from the cold so they are fattened on rich whale milk, which has a 40 percent fat content – compared to less than 4 percent for cows milk.

© Michael Baron

Southern Right Whale.

"The ocean is a continual source of wonder... a natural playground providing enjoyment, exhilaration, challenge, learning, interest and inspiration."

Jenny Mason, Mallacoota, Victoria.

© Karen Gowlett-Holmes

Shy Albatross.

3.5 Birds

More than 20 species of migratory seabird breed in the Region, including penguins, albatrosses, shearwaters and petrels. One of the most visible species is the little penguin, which breeds on islands and mainland sites. During foraging trips they may travel distances of up to several hundred kilometres. The breeding colony on Phillip Island is a major tourist attraction.

Albatrosses breed on Antarctic and sub-Antarctic Islands and inhabit Australian near-coastal waters in winter. They are the most efficient long-distance travellers of the bird kingdom. With wingspans of over three metres, they have perfected the ability to sail almost endlessly in the Roaring Forties – the prevailing westerly winds of the Southern Ocean – to make foraging trips of thousands of kilometres to feeding grounds over the entire Southern Hemisphere. They are often seen offshore in the Region. They use a technique called 'dynamic soaring', using the rising air pushed up by waves as a source of energy; their long narrow wings are especially adapted to this kind of flight, but they require too much energy to be used in 'powered' flight, and when the winds drop, the albatrosses land on the water. This is thought to be why albatrosses don't cross the equatorial 'doldrums' or windless areas; instead they stay in their respective hemispheres.

© Karen Gowlett-Holmes

Gentoo Penguin.

Smaller than albatrosses, weighing around 500 grams, and even more adventurous, are the short-tailed shearwaters. These birds, whose huge flocks skim and dip into the sea's surface, are a common sight in waters both inshore and far out to sea. Under their nickname 'muttonbird' they breed in immense numbers – most of the world's population of some 23 million breed within and adjacent to the South-east Marine Region. In a single season, the shearwater will breed in southern Australia, fly north past Japan, winter in the Aleutian Islands and return to Australia via the central Pacific. They are one of the few Australian birds to support an industry. On the islands and coastline of Bass Strait shearwater chicks are harvested for their flesh, oil and feathers.

Giant petrels are the principal scavenging birds of the Southern Ocean. Approximately 4,000 pairs of the southern giant petrel and 1,000 pairs of the northern giant petrel breed on Macquarie Island. Eight species of burrowing petrel also breed on the Island. Immature birds disperse to sea and travel widely to all southern continents.

Birds within the Region have been affected by a number of human induced impacts. This includes being accidentally hooked and drowned on longlines. They are also impacted upon by marine debris from shore and sea based sources. Marine pollution, such as oil spills, also poses a threat to certain bird species.

© Karen Gowlett-Holmes

King Penguins, Macquarie Island.

Indigenous people hold strongly to the view that connections with 'sea country' are as elemental as connections with the land.

© ATSIC

Pip Thomas with Mutton Bird catch.

4 History & People

The people of the Region are as dependent upon the resources and environmental services of the Region as are the creatures that inhabit the area.

4.1 From forty thousand years ago

Indigenous occupation of coastal areas adjacent to the Region dates back at least 40,000 years. For most of this period sea levels were much lower than they are today, allowing movement by land between Victoria and Tasmania. The earliest European visitors to the Region met the Indigenous people along the shorelines of its beaches and bays – one of the earliest European depictions of the original inhabitants shows two women in a canoe.

It has been estimated that between 5,000 and 10,000 Indigenous Australians occupied Tasmania prior to European settlement. Indigenous peoples in the area fished and collected shellfish. Seals and mutton birds were also important sources of food. In some places along the Victorian coastline, nodules of marine chert (a kind of flint) which were washed ashore, provided raw material for stone tools. In the Coorong area of South Australia, mesh nets, woven fish traps, spears and canoes were developed to exploit marine resources.

Indigenous peoples hold strongly to the view that connections with 'sea country' are as elemental as connections with the land.

4.2 From two hundred years ago

The first white settlers in the Region were colonists and convicts. More than 70,000 convicts were sent to Tasmania over a period of 50 years. For the convicts who travelled the vast distance from England by sea in often appalling conditions, the wild waters in Bass Strait and southern Tasmania were an effective barrier. Penal settlements such as Port Arthur, Sarah Island (Macquarie Harbour) and Maria Island were set up specifically as areas where escape by sea was virtually impossible.

Progressively, the Region became more important for the resources it provided, leading to further settlement throughout the nineteenth century.

Given the sometimes extreme weather conditions in Bass Strait and along the west coast of Tasmania, it is not surprising that shipwrecks and lighthouses constitute such a major part of the Region's marine cultural heritage. The Australian National Historic Shipwreck Database contains 1,014 entries for Tasmania and 606 entries for Victoria.

The first industries in the Region were sealing and whaling. In 1798, 15 men were landed on Cape Barren Island to harvest the fur seal colonies. In the first year they obtained 9,000 seal skins and 350 gallons of seal oil. The industry rapidly expanded into other parts of Bass Strait. By 1825, the industry was in decline although it continued on a reduced basis until the 1850s; as in other instances, the resource was overexploited, seal populations plummeted and the people moved on.

On 11 July 1810, the brig *Perseverance* landed a crew of 8 sealers on Macquarie Island, the last great sealing ground to be discovered south of the main Australian continent. Within 18 months, more than 120,000 seal skins had been shipped back to Sydney. Twenty years later, the fur seal population had been decimated and the elephant seal population reduced to about 30 percent of its original numbers.

Sealing was succeeded by whaling with the establishment of permanent settlements at places such as Portland and Port Fairy in Victoria, Victor Harbour in South Australia, Recherche Bay and Southport in Tasmania and Boyd Town in southern New South Wales. Over-exploitation in the whaling industry quickly resulted in a slump, and by 1840 the industry was in terminal decline.

Flensing a whale (1901).

Many outsiders have moved from the large cities to the slower pace of the smaller coastal settlements...

© Karen Gowlett-Holmes

© Karen Gowlett-Holmes

Recreational line fishing, Eden wharf, Twofold Bay, New South Wales.

4.3 Today

Over 3.5 million people live along the coastline of the Region and, while only a fraction make their living by way of the marine environment, all are aware of it. For those that live in the small coastal towns and settlements from Eden in New South Wales to Kingston in the South-east of South Australia, the sea assumes a greater significance. Many depend economically on the sea, directly or indirectly. They work in the ports, the processing plants, the fisheries, the boatyards and their children attend local schools. They serve – on the land and on the water – the growing number of tourists coming to the Region who hire out fishing boats, laze on the beaches or just come to appreciate the coastal ambience.

Many outsiders have moved from the large cities to the slower pace of the smaller coastal settlements; these people bring additional flavour, colour and resources with them. Some open businesses in the district. Each place is intriguing in its own right, and well worth visiting.

4.4 Organisations that care for our oceans

The interest and importance people feel for the oceans is reflected in the many marine-focused organisations that we belong to. These organisations may focus on areas like science, conservation, recreation, culture and industry and they embody the extensive scope of our use and involvement with the marine environment.

Recfish, the Marine and Coastal Community Network, the Australian Marine Sciences Association, Surfriders, Greenpeace, and the Sea Network are just some of these. In addition, local conservation groups, chambers of commerce and industry, Indigenous groups and communities include the health and conservation of the Region's marine environment as part of their work.

These formal and informal groups share membership and information and maintain an awareness of the marine environment and what occurs in it. They allow us to express our interest in the Region through membership and provide local initiatives in dune and seabird conservation. Many are also called upon in emergencies such as oil spills and whale strandings.

In addition to government, academic, and community interests, there are a number of industry bodies which also play a part. These include State fishing associations, the Australian Petroleum Production and Exploration Association, the Minerals Council of Australia, the Australian Seafood Industry Council, the Australian Shipping Federation, the Association of Australian Ports and Marine Authorities, and the Australian Marine Tourism Operators' Association.

Whale rescue, Orford, Tasmania.

CSIRO scientist tagging fish for research.

Bass Strait is one of the busiest shipping routes in Australia...

© Richard Bennett

Fast catamaran ferry.

5 Uses & Management

People have many uses of the marine environment. These uses change over time and reflect changing community values and technologies.

5.1 Shipping

Shipping has long been a major aspect of the Region's transport networks. Initially individual entrepreneurs moved their resources and assets around the coasts in vessels which they built themselves, owned or chartered. As the economy of the Region strengthened and became more diverse, the emergence of an independent shipping industry began with small coastal vessels being built at a number of locations.

Many regional types of vessels emerged, including the famous Tasmanian ketches and the Port Phillip couta boats. Before the emergence of motor vehicles, the sea was the Region's highway. The locally built ships, invariably of local timbers, were the prime movers and haulers.

In time, the task fell to more sophisticated vessels whose design was driven first by the emergence of steam power, followed by the internal combustion engine. The shape of ships evolved with the enlargement of their carrying capacity.

Nowadays the waters of Bass Strait and the coastal waters of the Region are served by large and sophisticated vessels, the latest of which is the high-speed Devil Cat. This fast catamaran ferry off the drawing boards of Incat, can carry 740 passengers and 200 cars across Bass Strait in a little over six hours.

Bass Strait is one of the busiest shipping routes in Australia with more than 3,000 vessels making the east-west passage through the Strait each year. Victoria and South Australia, as major areas of manufacturing in Australia, are large

© Dave Stevenson

Ship discharging bilge water.

exporters and use the sea as a convenient and economical means of transport.

As an Island State, shipping is particularly important to Tasmania. In addition to cargo trade, there are passenger and vehicular ferry services; regular visits by cruise liners; service industries for the maintenance and supply of visiting fishing vessels and Antarctic and Macquarie Island supply ships; and a flourishing specialised shipbuilding industry.

5.2 Ports

Australia is a nation of vast distances and is dependent on interstate and international trade. Some ports service bulk cargoes and high volume exports such as coal, grain and woodchips, as well as petroleum imports. Container ports handle general cargo which is moved in shipping containers. There are also low volume ports which may be important for tourism and fishing as well as occasional shipments of petroleum or timber products.

The major ports (such as Melbourne, Geelong, Western Port, Portland, Bell Bay, Hobart, Devonport, and Burnie) are vital to the Australian economy. Collectively, they handle over 40 million tonnes of cargo annually. Australia, as a major trading country, is dependent on its ports for efficient access to world markets.

Ports are also important to fishing operators for the repair of boats and gear, for the mooring of vessels and for the storage and processing of their catch. Tourists visit ports for their history and for access to offshore waters.

There are numerous other smaller ports along the coast of the Region. These service fishing vessels and a growing number of tourist vessels. Several were once important in the export of primary produce and retain strong cultural and historic links to the sea. They include Port MacDonnell, Robe, South End, Beachport and Kingston in South Australia; Port Fairy, Warrnambool, Queenscliff, Port Campbell, Apollo Bay, Lorne, Hastings, Port Welshpool, Port Albert, Lakes Entrance and Mallacoota in Victoria; and in Tasmania, Bridport, St. Helens, Coles Bay, Triabunna, Kettering, Dover, Strahan and Stanley. New South Wales has Eden, Merimbula, and Tathra.

The day to day management of ports is a State responsibility. However, both national and international standards and agreements affect the operation of ports. These may include requirements for pollution control, the safe disposal of ballast water and general ship safety.

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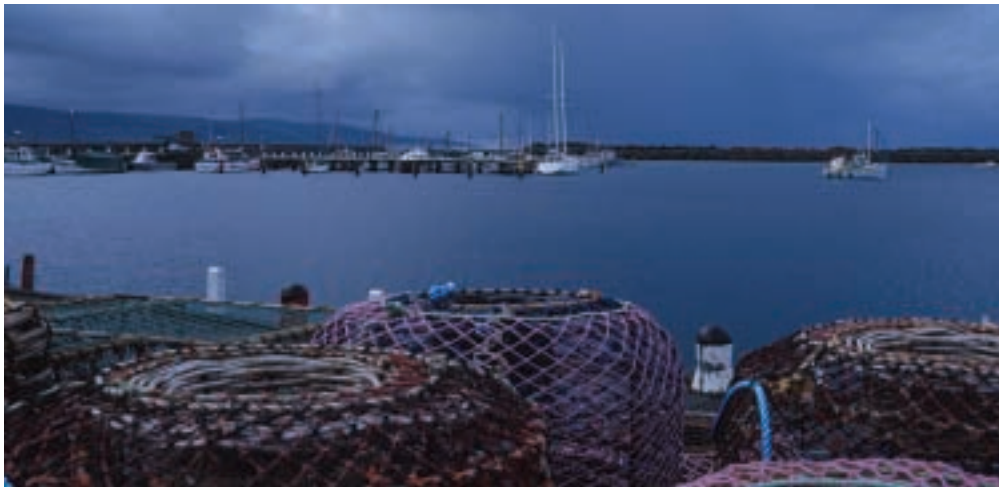

Cray pots, Apollo Bay, Victoria.

Macquarie Island

The Region's Outpost

Elephant seals and sub Antarctic skua.

Macquarie Island is situated about 1,500 kilometres south-east of Tasmania and is about half way between Tasmania and Antarctica. The main island is approximately 34 kilometres long and 5.5 kilometres wide at its broadest point.

In July 1810, Captain Hasselburgh of the *Perseverance* discovered Macquarie Island when he was blown off course while on a sealing expedition. However, he may not have been the first, at the time of his visit the wreckage of an old sailing vessel was found and origins of this wreck remain a mystery to this day.

Hasselburgh landed eight sealers with supplies for nine months on the Island and so began the history of exploitation on Macquarie. Sealing and the production of oil from elephant seals, king penguins and royal penguins continued until 1920 when public pressure, headed by the Antarctic explorer Sir Douglas Mawson, forced the cancellation of all sealing licences. In fact, many polar explorers including Mawson, Scott, Shackleton and Borchgrevink visited the Island on their way to and from the Antarctic.

Science has also played a big part in the human occupation of Macquarie Island. Scientific expeditions began in the 1880's to the Island and it features the oldest permanent sub-Antarctic research station. The research station, constructed in 1948, is home to over 40 scientists and technical and support personnel over summer and approximately 20 during winter. Scientific research activities include biology, botany, auroral physics, meteorology and medical research.

The sole extractive industry from the waters around Macquarie Island is the trawl fishery for Patagonian toothfish. This fishery formally commenced in late 1996 after two years of exploratory fishing and is managed by the Australian Fisheries Management Authority (AFMA) in a manner consistent with arrangements for Antarctic fisheries under the Commission for the Conservation of Antarctic Living Marine Resources (CCAMLR). Only one boat is allowed to fish in the fishery and total allowable catches for the fishery have been set since its inception. Strict operating conditions are imposed to minimise negative effects on the environment, including effects on non-target species. The fishery has also been subject to an extensive observer program to collect basic

fisheries and environmental data, particularly observations of seabirds and marine mammals.
Macquarie Island and the surrounding area are unique in their geological characteristics. It is, for example, the only known location where the oceanic crust, from a normal mid-ocean ridge, has been lifted above sea level in a major oceanic basin. Macquarie Island is also notable for its overall low biodiversity, at the same time as having an abundant biomass of some species and a high level of endemism. It is recognised as having one of the largest breeding habitats for sub-Antarctic marine life in the world, although several species on the Island are under threat including five albatross species, two penguin species and two seal species.

Macquarie Island is a World Heritage Area and was listed on the basis of its outstanding natural universal values. In particular, the Island represents an exceptional example of the major stages of the earth's evolutionary history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features. It is also recognised for having areas of exceptional natural beauty and aesthetic importance.

King Penguins.

Macquarie Island itself is a Tasmanian State Reserve with protection extending to the low water mark. A large portion of the marine area and its values are protected by the Macquarie Island Marine Park which was declared by the Commonwealth on 28 October 1999. The Marine Park protects the conservation values of the Region from human disturbance. The Commonwealth Macquarie Island Marine Park is the largest marine highly protected zone in the world, covering about 16.2 million hectares.

Pleurophyllum hookerii

Spread photographs Sharee McCammon ©

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Unloading catch, Pirates Bay, Tasmania.

5.3 Fisheries

The waters comprising the South-east Marine Region have long been a magnet for both local national and international fishing vessels. Indigenous people are well aware of the riches of the coastline and have, for thousands of years, drawn on these extensively as their shellfish middens show.

"The rock lobster season has a great economic and social impact on the entire community. Hundreds of boats carry crews dependant on the success of the season. The industry is thriving with the belief that numbers and catches of lobster can be kept at a sustainable level."

Tom Prowse, Millicent, South Australia.

Wild fisheries

The main fish species caught in the Region are:

- Abalone (greenlip and blacklip);
- Southern rock lobster;
- Skipjack tuna;
- Blue grenadier;
- Blue eye trevalla;
- Blue warehou;
- Spotted warehou;
- Flathead;
- Scallops
- Pink ling;
- Orange roughy;
- Redfish;
- Australian salmon
- School and gummy shark;
- Squid; and
- Inshore/reef finfish.

Fisheries managed at the State level include eels, giant/king crabs, baitfish, octopus, sea urchins and developmental fisheries such as jellyfish. Those managed by the Commonwealth include various tunas, billfish, eastern school whiting, John dory, gemfish, morwong and blue eye trevalla.

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Boats in these fisheries range from small inshore vessels no bigger than dinghies to 80 metre plus factory trawlers fishing offshore waters for blue grenadier and orange roughy. Most commercial fishing methods are employed in the Region and many species are targeted by more than one method. Methods used to take commercial fish species in the Region include:

- gillnets – for school and gummy sharks and blue warehou;
- demersal trawl nets – for orange roughy, redfish and pink ling;
- mid-water trawl nets – for blue grenadier;
- Danish seine – for flathead and eastern school whiting;
- Beach seine – for Australian salmon and garfish
- jigs – for squid;
- droplines – for blue-eye trevalla;
- setlines – for school and gummy sharks and pink ling;
- traps – for lobsters and live fish;
- diving – for abalone;
- dredging – for scallops; and
- handlines/rods – for inshore/reef finfish.

Fish taken are generally either chilled on ice for the regional markets (most trawl, net and line boats), frozen (factory trawlers), kept live for regional and international markets (lobster) or canned (some abalone and skipjack tuna).

Management responsibilities for individual fisheries within the Region are based upon the Offshore Constitutional Settlement (OCS). Under the OCS, individual fisheries can, by agreement be managed by either the Commonwealth or the State Government. For instance, the Commonwealth manages the blue eye trevalla fishery which occurs in both Commonwealth and State waters.

The Australian Fisheries Management Authority (AFMA), on behalf of the Commonwealth, manages 12 fisheries that occur wholly or partly in the Region – some of these fisheries also extend into State waters. The fisheries that fall mainly into the Region are the: Bass Strait Central Zone Scallop Fishery; South east Non-Trawl Fishery; South-east Trawl Fishery; South Tasman Rise Fishery; Southern Bluefin Tuna Fishery; Southern Shark Fishery; Southern Squid Jig Fishery; Jack Mackerel Fishery; and Macquarie Island Fishery.

The States in the Region (Tasmania, South Australia, New South Wales and Victoria) manage all other fisheries. State management includes fisheries which are confined primarily to State waters – such as the Tasmanian and South Australian abalone fisheries – or fisheries which cross over between State and Commonwealth waters – such as the lobster and giant crab fisheries. Some State managed fisheries are valuable and important to the local and regional economy. For instance, the Tasmanian Abalone Fishery landed over $74 million of fish in 1998/99, with 3,000 Tasmanians directly and indirectly benefiting financially from the industry. As well, between 1994 and 1997 the industry contributed over $11 million to the Tasmanian government through royalty payments.

Each year the Bureau of Rural Sciences (BRS) provides a status report on Commonwealth-managed fish stocks and evaluates the performance of the management of each fishery. In its most recent (1999) report the BRS assessed that in the South East fishery, where there are currently 17 species managed by quota, one of these (eastern gemfish) is overfished, 8 are fully fished (though one with declining catches – orange roughy),

Tasmania has been at the forefront of the farming of certain species, particularly Atlantic salmon.

© CSIRO Marine Research

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Orange Roughy catch.

one is underfished (blue grenadier) and 7 are of uncertain status. Likewise, in the Southern Shark Fishery the school shark is classed as overfished and the gummy shark is considered to be fully fished. The most noticeable example of fishing a species at unsustainable levels was the orange roughy fishery during the late 1980s and early 1990s. Following the introduction of total allowable catches in the fishery, which restrict the total weight of fish that can be taken, this fishery is now in the slow process of recovery.

Commonwealth and State governments now have the capacity to monitor harvests and, with the help of scientists and the fishing industry, can predict the long-term capacity of particular fisheries. Fishers themselves are keenly aware of the need to regulate catches and are working with governments to achieve sustainable harvest levels. Most of the major fisheries in the Region are now managed under a system of total allowable catches. These catches may be formally subdivided amongst the fishers as tradeable quotas (a percentage of the total allowable catch) or the fishery may be managed under input controls such as gear restrictions, seasonal or area closures. Some fisheries, such as the South East Trawl Fishery and the State abalone fisheries are managed under a combination of quotas and input controls.

Aquaculture

Over the past decade aquaculture has grown in importance within the South-east Marine Region. The main species cultured, by economic value, are Atlantic salmon and Pacific oysters. Native species such as mussels, abalone, scallops and now seahorses are also farmed on a smaller scale. Tasmania has been at the forefront of the farming of certain species, particularly Atlantic salmon. In 1997/98 over 7,000 tonnes of salmon was harvested, worth over $100 million after processing and value adding.

Aquaculture is primarily managed by the States. However, the Commonwealth does address national issues and is also responsible for developing a management framework for offshore aquaculture.

© ESSO

West Tuna oil platform, Bass Strait.

5.4 Oil & Gas

The South-east Marine Region contains large deposits of oil and gas which are of major importance to the national economy. In 1996, the Gippsland Basin at the eastern end of Bass Strait produced over 40 percent of Australia's total crude oil and nearly all of Victoria's natural gas needs.

These basins were formed though the break-up of the ancient continent of Gondwana. As the landmasses drifted apart rifts formed in the earth's crust into which coals and coaly shales were deposited over 100 million years ago.

Exploration for oil and gas in the Region commenced in 1941. However it was not until 1969 that the first natural gas was produced from the Gippsland Basin. Production has so far centred on this basin but there exist at least three other basins off western Victoria with the potential to hold large reserves of oil and gas, some of which have been proven. The Bass Basin is estimated to contain up to 50 million barrels of oil.

Since 1965, 19 offshore platforms have been built with undersea pipelines carrying the gas and oil to processing plants located at Longford (near Sale) in Victoria. Exploration for further deposits is continuing in the Region and new infrastructure to supply growing markets is being considered. For instance, a major energy company has entered into an agreement with the Tasmanian government to investigate the commercial viability of bringing natural gas into Tasmania via an undersea pipeline from Victoria.

Development and production operations are undertaken in accordance with a production licence (and where applicable a pipeline licence). Bringing oil and gas ashore and developing necessary land-based facilities requires State and Commonwealth approvals. In such circumstances, State and Commonwealth agencies generally agree to a joint Commonwealth-State impact assessment process.

The oil and gas industries have been particularly active in developing high levels of environmental awareness within the industry. They have developed a Code of Environmental Practice and producers within the Region actively pursue high standards of environmental management.

© ESSO

Workers on the drill floor of an oil platform.

© Tourism Tasmania

© Karen Gowlett-Holmes

Port Campbell National Park, Victoria.

5.5 Mineral & extractive resources

One of the possible emerging industries in the Region is the undersea gathering of minerals and genetic materials.

Australia, through UNCLOS, has the right to explore and exploit non-living resources to the limit of the EEZ and additional areas of claimable continental shelf. Little is known about offshore mineral resources, although the Region is not presently considered to be highly prospective on the basis of current technologies.

However, as technologies improve and mining costs decrease, mining of minerals and the gathering of nodules and crusts from deepwater may be viable. Rich gold, silver, copper and zinc sulphide deposits recently discovered at depths of 1,200 to 1,700 metres by the CSIRO off the coast of New Guinea may give impetus to the mining of Australia's South-east Marine Region.

Because of the diverse and unique species within the Region there is also increasing interest in the flora and fauna for their genetic material and chemical compounds.

5.6 Tourism & Recreation

Marine and coastal tourism is a thriving industry in the Region. With spectacular scenery along the coast including Victoria's famous Great Ocean Road and the Freycinet Peninsula in Tasmania, the Region has a lot to offer to locals and visitors alike. The shoreline is a base from which to watch migrating whales and other marine mammals and birds, like the Phillip Island penguins.

Near-shore and off-shore marine tourism is more specialised and ranges from long distance kayak touring to game fishing for tuna and marlin. A 1993 survey in Tasmania estimated that expenditure in the charter boat industry was $620 000 per year with most of that coming from those fishing for tuna.

The Region is also rich in diving sites; the area was navigationally hazardous and the coast is littered with shipwrecks, which are attractive to amateur divers and marine archaeologists alike. Add to that some of the best temperate diving in the world off the coast of Tasmania, especially with the kelp forests, and the area is a diver's paradise.

Recreational fishing is a major activity, with over one million people fishing in the waters of the Region each year. In Victoria, recreational fishing is thought to directly employ over 27,000 people with over one billion dollars spent on gear, bait, boats and outings; this puts the price of each kilogram of fish caught at around $200! Popular recreational fishing species include tiger flathead, bream, snapper, Australian salmon and lobster. Popular species from charter boats include southern bluefin tuna off south-eastern Tasmania and yellowfin tuna and marlin off north-eastern Tasmania and southern NSW.

Cruise ships are also growing in importance within the region. Luxury cruise ships travel the seas stopping at south-eastern ports to resupply and replenish provisions. Passengers from the ships visit our shops and restaurants and make an important economic contribution to coastal communities like Hobart. From the South-east the ships travel onto New Zealand, South Africa, the Pacific and even Antarctica. Hobart is Australia's Antarctic gateway with cruise ships and French, Russian and Australian Antarctic supply and scientific vessels regularly departing during the summer season.

Cruise ships also travel to Macquarie Island. Requests to visit the Island are currently growing with six tour companies requesting fifteen ship visits in the 2001-2002 season – more requests for ship visits than ever before. This would bring the total number of tourists travelling to the Island to 1,250, a figure well in excess of the current tourist quota of 750. Work is currently under way by the Tasmanian government to determine final approval numbers for tourists for the year.

Tourism in the Region is also boosted by a number of marine-focused festivals including the Australian Wooden Boat Festival in Hobart, which brings together boating enthusiasts from around the world, and the Festival of the Southern Ocean, a community arts and cultural festival, held in Mallacoota every Easter. In addition to these festivals the Region is world-renowned for blue water sailing and racing. The Sydney to Hobart Yacht Race and the Melbourne to Hobart Yacht Race are two of the biggest of these, taking place every year over the Christmas/New Year period and attracting competitors and spectators from around the world.

Within State waters, marine tourism activities are the responsibility of State agencies. In the case of the growing marine charter boat fishery, much of the fishing activity occurs in Commonwealth waters, where States do not currently have jurisdiction. The management arrangements for charter boat fishing are currently under review by the States and Commonwealth.

Game fishing, Tasman Island.

the waters of the South-east Marine Region are still important in the defence of the nation...

© INCAT

Australian Naval vessel.

5.7 Defence

During the second half of the nineteenth century, the Bass Strait area was instrumental in the maritime defence of the colonies. For instance, the Victorian government in 1856 acquired Australia's first warship, the screw sloop *Victoria*.

The Region is dotted with historical sites connected to the needs of the early settlers to provide defensive capabilities for the colonies. For instance, during the 1880s, in response to a perceived threat from large Russia naval guns, fixed torpedo tubes and searchlights were installed at the entrance to Port Phillip Bay. Another early defensive site can be found on Bellerive Bluff which is across the Derwent River from the city centre of Hobart.

The waters of the South-east Marine Region are still important in the defence of the nation, particularly in regards to training and exercises. Large areas are reserved for military activity and training, radar tracking military flying (including at very low altitudes), and gunnery.

The Region also contains one of the most important defence ship building facilities in Australia located at Williamstown in Port Phillip Bay. Currently 10 new *ANZAC* Class guided missile frigates for the Australian and New Zealand governments are being constructed at the facility.

5.8 Conservation & marine protected areas

Australia's oceans contain some of the most diverse, unique and spectacular marine life in the world. Perhaps 80 percent of our southern marine species do not occur anywhere else in the world. This means that we have a responsibility to keep our oceans healthy and use them wisely. One way of doing this is to declare and manage marine protected areas.

The Commonwealth and States have agreed to develop a National Representative System of Marine Protected Areas. This means that there will be a national system of marine protected areas that contain representative samples of Australia's marine ecosystems.

© Karen Gowlett-Holmes

Pipe fish.

The way that we can use marine protected areas depends on why they are declared. In some cases, virtually all human activity is excluded. Other areas have restrictions on particular activities, for example, particular fishing methods. Multiple use marine protected areas are declared to conserve the marine environment and provide opportunities for commercial and recreational activities such as tourism and fishing.

The States are contributing to the national system through the assessment of candidate sites for marine protected areas, management of existing marine parks and other marine reserves, and proposals for additional marine protected areas.

In the South-east Marine Region the Commonwealth has declared two marine protected areas. Macquarie Island Marine Park covers approximately 16.2 million hectares of Commonwealth waters on the eastern and southern side of the island – equal to around 34 percent of the area of Commonwealth waters surrounding the island. It was declared to protect the unique and vulnerable marine ecosystems of the Macquarie Island region, particularly:

- the migratory, feeding and breeding ranges of marine mammals and seabirds;
- a number of threatened species that depend on the area; and
- the unique benthic habitat.

The management plan for the Marine Park has not been finalised, but at this stage there are two management zones: the Highly Protected Zone, where fishing and mineral and petroleum exploration are prohibited and the Species/Habitat Management Zone, where limited commercial fishing may be permitted subject to conditions, but mineral and petroleum exploration are prohibited. The Tasmanian government is working on a complementary proposal for a marine protected area in the State waters of Macquarie Island.

The Tasmanian Seamounts Marine Reserve covers 370 square kilometres, 170 kilometres south of Hobart. It was declared to protect a sample of the unique bottom dwelling communities associated with the seamount region. The management plan for the Marine Reserve has not been finalised, but at this stage there are two management zones: the Highly Protected Zone (below a depth of 500 metres) where fishing and mineral and petroleum exploration are prohibited, and the Managed Resource Zone (above a depth of 500 metres) where fishing is allowed to continue.

© Sharee McCammon

Macquarie Island.

the impacts of human activity can travel immense distances in the water.

© Karen Gowlett-Holmes

Marinised tracked excavator.

6 Pressures

People impact upon the marine environment not only through such activities as fishing or oil exploration, but also as a result of accident and neglect and through the unintentional impacts of our society as a whole.

6.1 Water quality

The health and productivity of the oceans, coasts and estuaries are dependant on water quality. Poor water quality and the deposition of sediments and run-off are major threats to the marine environment. Pollution from the land contributes up to 80 percent of all marine pollution and is a major threat to in-shore systems with the potential for indirect effects to extend offshore.

Pollution effects ecological processes, public health and social and commercial use of marine resources. The impacts of human activity can travel immense distances in the water. Significant chemical residues such as the organo-chlorines have been found in the body fat of Antarctic penguins. These residues persist in the food chain for long periods, are widely dispersed and can be accumulated and concentrated up the food chain.

Land based sources of marine pollution effect water quality and sources can include sewage, persistent organic pollutants, radioactivity, metals, oils, nutrients, sediment deposition, litter, and acid sulphate soil discharge from inappropriate land clearing activities.

In areas such as Port Phillip Bay, Western Port, the Gippsland Lakes, the Derwent and Tamar Rivers, Macquarie Harbour and off


© CSIRO Marine Research

the coast of Burnie, land based pollution has impacted upon marine habitats. State governments (in some cases jointly with the Commonwealth) are actively involved in mitigation and rehabilitation programs in a number of areas including coastal and marine planning, catchment management plans, improved land use practices and sewerage treatment regulations and plans.

6.2 Waste & pollution

A potential source of marine pollution in the Region arises from the activities of ships. In 1995, the *Iron Baron* (a bulk commodities trader) was grounded on Hebe Reef at the approach to the Tamar River in northern Tasmania. Around 300 tonnes of bunker fuel oil escaped and, with weather conditions deteriorating and prevailing tidal conditions, the oil reached offshore islands and the shoreline near Low Head with a significant impact on wildlife, particularly on the little penguin.

At the international level, the International Maritime Organisation (IMO), a specialised agency of the United Nations, is responsible for preventing marine pollution from ships. A number of Conventions specifically address marine pollution, including: the *International Convention on Oil Pollution Preparedness, Response and Co-operation;* the *International Convention for the Prevention of Pollution from Ships;* and the *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter.*

In Australia, there are a number of bodies who address marine pollution issues. The Australian Maritime Safety Authority (AMSA) has developed a number of marine environmental protection measures such as the National Marine Oil Spill Contingency Plan.

Sea dumping is another source of marine pollution. In Australia such dumping is regulated through the *Environment Protection (Sea Dumping) Act 1981* and the *Environment Protection (Sea Dumping) Amendment Act 1986*. These Acts control the deliberate loading, dumping and incineration of wastes and other matter at sea and apply to all vessels, aircraft or platforms in Australian waters.

There are no current permits for the disposal of chemical or industrial wastes at sea in the South-east Marine Region. However, up until 1997, the waste product jarosite (a mixture of iron, ammonia, and various anions) was dumped on the edge of the continental shelf off south-eastern Tasmania. The jarosite was generated as a waste product from a zinc smelter in Hobart. It is now treated and disposed of on land.

Australia's coastal areas are increasingly littered with plastic bottles, plastic bags, tangled fishing lines, nets and other rubbish and this also impacts on the marine environment. The garbage can be left behind by beach-goers, it can be washed down from catchments and stormwater drains, it can come from ships' garbage, and from discarded fishing gear from anglers and fishing boats. Systematic surveys in Tasmania have revealed that almost 80 percent of all litter found on beaches is derived from recreational and commercial fishing.

Many thousands of marine mammals, turtles and seabirds die each year from swallowing plastic bags and other objects, or being trapped in discarded fishing gear. Lost fishing nets and traps may also continue to catch fish (often referred to as 'ghost fishing'). In Australia, the entanglement of fur seals in net fragments and other litter is high. For example, it is estimated that at any one time, around 500 seals in Tasmanian waters, and 45 seals at Victoria's Seal Rocks have 'collars' of plastic litter.

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6.3 Habitat modification

The great majority of Australia's population lives on or near the coast and this has resulted in much of the coastline being significantly altered by urban, industrial and port development, and also by facilities for tourism and recreation.

Major coastal impacts also result from coastal engineering structures such as breakwaters and seawalls associated with ports, harbours, canal estates, marinas, and reclamations. Estuaries and the coastal lakes and lagoons in the South-east Marine Region have been particularly affected by seawall construction.

Physical disturbances and changing patterns of sedimentation have resulted in significant local losses in saltmarsh, seagrass and mangrove habitats in the Region.

Seagrass habitats, in particular, have suffered significant losses in areas such as Western Port and Gippsland Lakes in Victoria, and the Hobart region and D'Entrecasteaux Channel, Triabunna and St Helens on the east coast, the Tamar and Port Sorell and Duck Bay on the north-west coast of Tasmania.

The Commonwealth and State governments in the Region consider how development might impact on the coastal environment by using environmental impact assessments. These assessments are recognised as one of the most widely used mechanisms for identifying the adverse ecological impacts of development and related proposals and finding ways of minimising these impacts.

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6.4 Threatened species

There are many threatened species, for example the various whales which inhabit or pass through the Region. Australia was once an enthusiastic whaling nation and the ruins of shore-based stations can be seen in places like Eden in southern NSW. Whaling was actively practised within the Region, and intensively off the east coast of Tasmania. Adventure Bay (Bruny Island), well-known as Captain Cook's landing place, rapidly became a centre for 'bay whaling' and the remnants of camps still exist along the shores of the Bay.

Some species, such as whales, continue to be threatened due to the past hunting efforts. Other species may be threatened due to overfishing which is exacerbated as a result of the species being naturally rare and restricted in their locations or because they have very low reproductive rates. The great white shark is an example of a species which is threatened at least partly due to its natural rarity and low reproductive rate.

The recently proclaimed Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is comprehensive in its protection of threatened species right across the Region. Similar environmental legislation also exists under each of the State governments in the Region.

The Region contains at least three species listed as endangered under the EPBC Act: the spotted handfish, blue whale and southern right whale. Other species, such as the leafy sea dragon, the viviparous seastar and great white shark, are either listed as endangered or nominated to be listed under State legislation.

Under the EPBC Act, all Commonwealth waters within the Region form part of the Australian Whale Sanctuary. The Sanctuary has been established to give formal recognition of the high level of protection and management afforded to cetaceans in Commonwealth marine areas.

Within the Region, there are numerous migratory seabirds of conservation significance that are recognised in international agreements (such as the Japanese and Australian Agreement for the Protection of Migratory Birds) and in State and Commonwealth legislation. Examples of important seabirds in the Region are provided earlier in this document.

There are also numerous coastal wetland areas in the Region that are listed under the Ramsar Convention on Wetlands. Ramsar sites have special ecological character and may contain vulnerable plants and animals including mangroves and waterbirds. These sites include wetlands at Moulting Lagoon and Orielton Lagoon in Tasmania; Corner Inlet, Gippsland Lakes and Western Port in Victoria; and the Coorong and Lakes Alexandrina and Albert in South Australia.

Within Tasmanian waters over 49 introduced species have been discovered to date.

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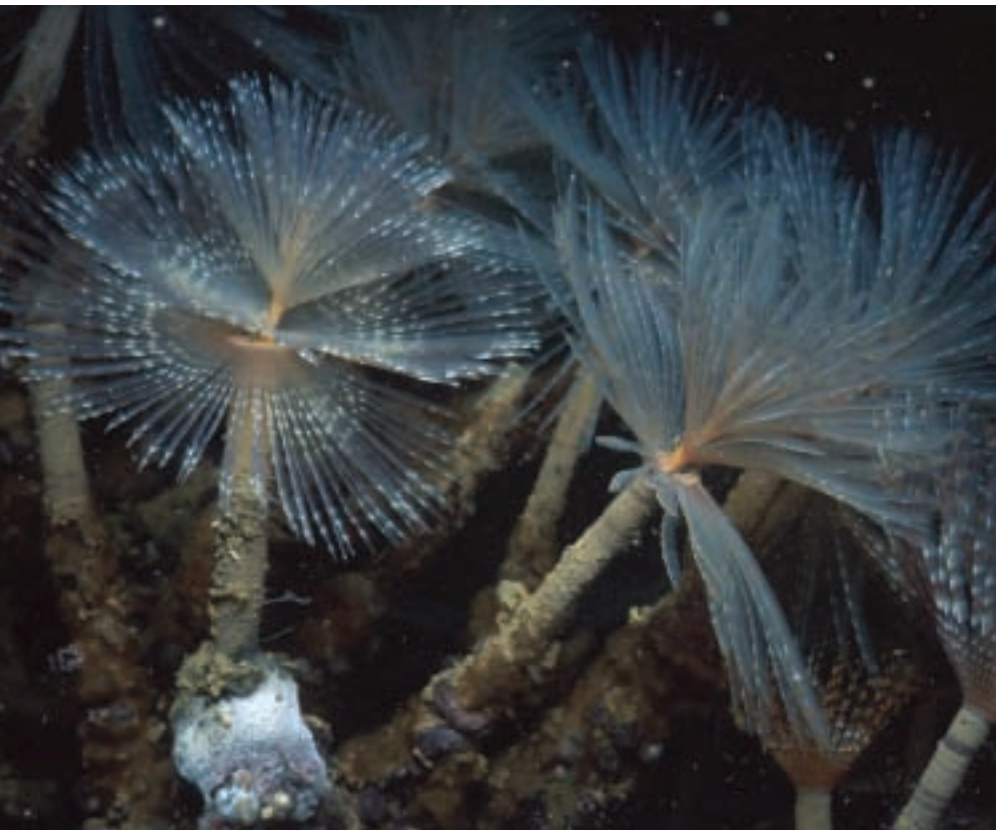

Mediterranean Fan Worm, introduced pest in southern Australia.

6.5 Introduced species

Introduced species can come into our marine environment by accident, such as via ships' ballast water or hull encrustations and in some cases they have even been deliberately introduced. Within Tasmanian waters over 49 introduced species have been discovered to date. Several introduced species have become pest species, either by displacing native species, dominating habitats or causing algal blooms. Pest species in the South-east Marine Region include:

- the northern pacific seastar *Asterias amurensis;*
- the fan worms *Sabella spallanzannii and Euchone* sp;
- the bivalves *Crassostrea gigas* (Pacific oyster), *Corbula gibba* and *Theora fragilis;*
- the crabs *Carcinus maenas* (European shore crab) and *Pyromaia tuberculata;*
- the macroalgae *Undaria pinnatifida* (Japanese giant kelp) and *Codium fragile tormentosoides;* and
- various toxic dinoflagellates such as *Gymnodinium catenatum*.

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Northern Pacific Seastar.

Many undesirable organisms are transported in ballast water which is later pumped out preparatory to loading Australian products for export. Some of these constitute a major threat to the natural environment and to aquaculture. Of the accidentally introduced marine species, several are causing serious concern. The northern pacific seastar is well-known: it poses a serious threat to shellfish aquaculture, and others such as certain species of bivalves, crabs, macroalgae and toxic dinoflagellates have also become pests, displacing native species, dominating habitats or causing algal blooms.

The Australian Quarantine and Inspection Service (AQIS) is Australia's lead Commonwealth agency for ballast water management. It is responsible for implementing the Australian Ballast Water Management Program which focuses on ways of minimising the risks of introducing harmful aquatic organisms and pathogens to Australia's marine environment in ships' ballast water and sediments. AQIS also provides barrier controls to prevent the importation of animal products that could threaten Australia's fisheries.

There are Commonwealth and State programs operating to control outbreaks of marine pests. CSIRO's Centre for Research on Introduced Marine Pests (CRIMP) operates the Tasmanian Marine Farm Pest Monitoring Project. This project has the aims of:

- raising awareness of marine pests in the marine farming sector; and
- assessing the potential for involving marine farmers in the early detection of marine pests.

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Japanese giant kelp.

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7 Overarching management within the Region

Both the Commonwealth and State governments have arrangements in place to manage the various uses that occur within the Region. The scope and extent of management responsibilities are based on inter-governmental agreements and arrangements as well as international rights and obligations. Management occurs within an inter-linked set of maritime zones from Australia's coast to 200 nautical miles and beyond.

7.1 Australia's maritime zones

Consistent with international law, Australia has declared a range of maritime zones. Each zone has associated uses and management measures that Australia can undertake.

Territorial Sea Baseline – this is the baseline from which Australia's maritime zones are measured. The baseline is made up of a number of components which are dependent upon the shape of the coastline:

- **Normal baseline** is defined as the low water mark along the coastline, including that of islands.
- **Straight baselines** are straight lines used to join specific points on the Normal Baseline. Straight Baselines are used where the coastline is deeply indented or where there is a system of fringing islands in the immediate vicinity.
- **Bay or river closing lines** are straight lines drawn across the mouth of rivers and bay openings.

Coastal waters – defined as the body of water, and adjacent seabed, stretching from the baseline to 3 nautical miles seaward.

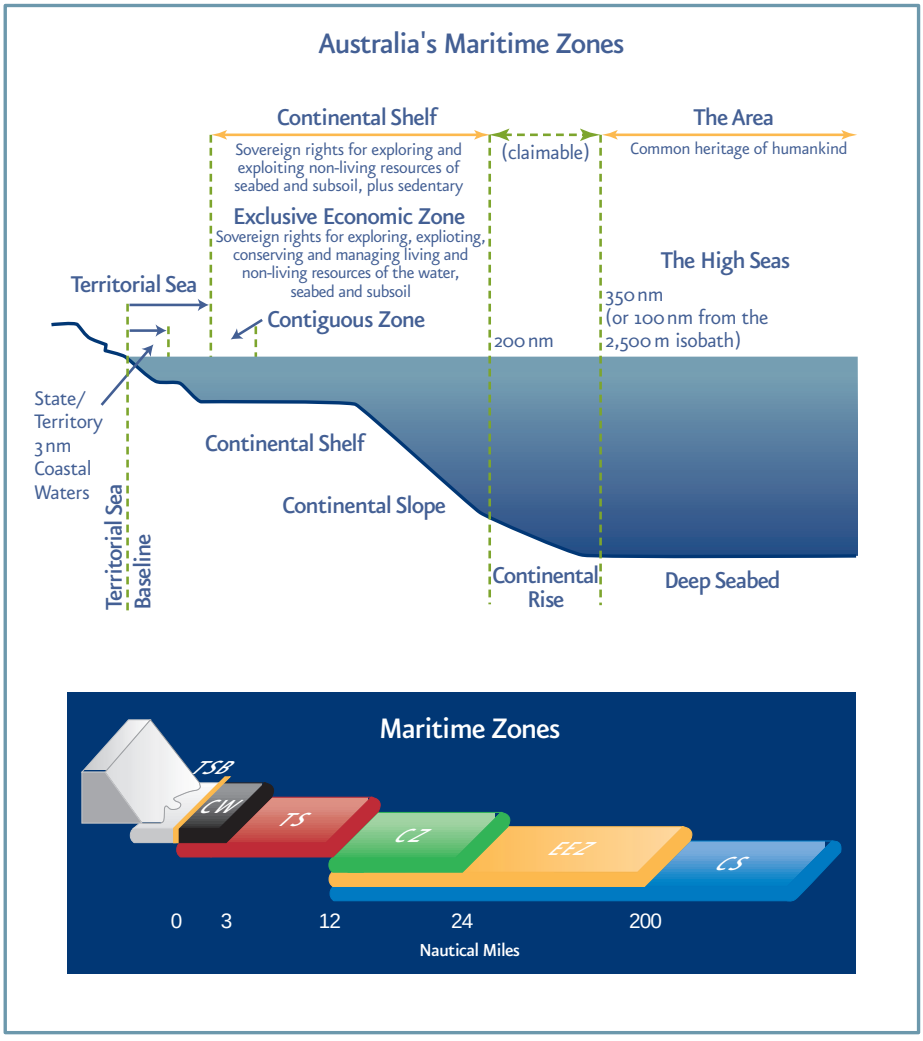
The territorial sea – the outer limit of the territorial sea is 12 nautical miles

seaward of the baseline. Australia has sovereignty over the waters and seabed. It may therefore impose comprehensive controls in this area, with the one major exception that it must respect the right of innocent passage of foreign vessels – including airplanes.

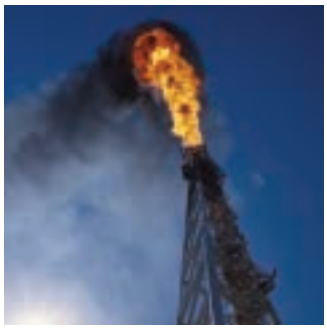
The contiguous zone - this is the area between 12 nautical miles and 24 nautical miles seaward of the baseline. In the contiguous zone, Australia can take limited enforcement measures in relation to customs, sanitary and immigration matters.

The Exclusive Economic Zone (EEZ) – this is the area between the 12 nautical miles and 200 nautical miles seaward of the baseline. In this area Australia has the right to explore and exploit living and non-living resources within the waters, on the seabed and its subsoil consistent with the obligation to also protect and conserve the marine environment.

The continental shelf – the area between 12 nautical miles and 200 nautical miles seaward of the territorial sea baseline (that is, it covers much of the same area as the EEZ) and any areas of physical continental shelf beyond 200 nautical miles. Australia has the right to explore and exploit the living and non-living resources of the shelf consistent with the EEZ except where the continental shelf extends beyond 200 nautical miles. In this case Australia only has rights to sedentary organisms, mineral and non-living resources of the seabed and subsoil only. However, the actual extent of the continental shelf beyond 200 nautical miles is still to be finalised between Australia and the United Nations Commission on the Limits of the Continental Shelf.



Source: Australia's Oceans Policy



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7.2 Commonwealth & State responsibilities

Management responsibilities within the South-east Marine Region are based upon a complex mix of Commonwealth and State legislation and understandings. For instance, coastal waters (which extend out to 3 nautical miles) are generally managed solely by the States under powers granted to them by the Commonwealth. This is based on the OCS (Offshore Constitutional Settlement), which grants coastal waters, including title to the seas and seabed, to the States and the Northern Territory. The Commonwealth government on the other hand retains sole responsibility for the oceans and seabed from 3 nautical miles out to the 200 nautical mile limit under powers granted within Australia's Constitution and through UNCLOS. The Commonwealth also has responsibilities under international law beyond 200 nautical miles for matters such as storm warnings, control of high seas fishing activity by Australian vessels and matters relating to the continental shelf.

Under the OCS the Commonwealth and State governments can enter into arrangements relating to the management of marine resources. Some of the issues covered by these arrangements include: oil and gas; other seabed minerals; fisheries; historic shipwrecks; ship-sourced marine pollution; and shipping and navigation.

A detailed analysis of all legislation and understandings relating to oceans governance will form part of the assessment process undertaken during regional marine planning (outlined within the *Scoping Paper for the South-east Regional Marine Plan*). This analysis will help in designing a South-east Regional Marine Plan that strengthens existing management arrangements without adding undue regulation.

7.3 International obligations

Australia is signatory to a number of international treaties, conventions and obligations that influence both existing and future uses and management within the South-east Marine Region. Regional Marine Plans will therefore need to be consistent with Australia's international obligations regarding the marine environment. These obligations not only relate to Australia's rights and jurisdiction, but also to our role in protecting the world's oceans. For instance, they cover such areas as:

- maintenance of biological diversity;
- prevention of pollution; and
- protection of certain species.

Examples of conventions entered into by Australia include:

- *United Nations Convention on the Law of the Sea* (UNCLOS) which recognises Australia's rights and responsibilities over the Exclusive Economic Zone;
- the protection of whales under the *International Convention for the Regulation of Whaling;*
- the protection of the habitats of certain migratory bird species under the *Ramsar Convention on Wetlands;* and
- prevention of marine pollution under the *International Convention on Prevention of Marine Pollution by Dumping of Wastes and Other Matter.*

8 Conclusion

All of Australia's oceans are precious, and their continued health and good management are inextricably connected to what happens on the land. If our oceans are in poor shape the effects will be felt on the land as well as the sea. All of those who rely on the ocean's well-being, both directly and indirectly, share a desire for intelligent and sustainable management.

The South-east Regional Marine Plan is the first of its kind to be undertaken. The Region is a rich and complex one. It deserves the best. We hope this *Snapshot* will lead you to share our view.

Migrating shearwaters, Fortescue Bay, Tasmania.

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White soft coral growing on a jetty.

Glossary

Algae: Simple plants containing chlorophyll – range from microscopic to large branching structures. Includes seaweeds.

AMSA: Australian Maritime Safety Authority.

Amphipods: a small crustacean like animal.

AQIS: Australian Quarantine and Inspection Service.

Aquaculture: Refers to the commercial growing of marine or freshwater animals and aquatic plants. Commonly called 'fish farming'.

Benthic: Bottom dwelling.

Billfish: Fish where the snout is extended into a 'bill' or 'spear'. Includes marlins, sailfish and swordfish.

Biodiversity: The variety of all life forms including the different plants, animals and micro-organisms, the genes they contain and the ecosystems they form.

Cetacean: Members of the mammalian group Cetacea, including whales, dolphins and porpoises.

Continental shelf: Relatively flat and shallow seabed from the shore to the edge of the continental slope. Generally less than 200 metre water depth.

Continental slope: The portion of the seabed where the continental shelf descends to greater depths. May be very steep drop-off with ridges and canyons.

Detritus: Organic debris from decomposing plants and animals or particles of rock or other material worn or broken away from a mass.

Demersal: Species that dwell at or near the bottom of a body of water

EEZ: Exclusive Economic Zone.

Endemic: Restricted to a specified region or locality.

Estuarine: Pertaining to the areas of inlets or mouths of rivers that are influenced by the tides and where salt and fresh waters mix.

Gondwana: The great land mass in the southern hemisphere thought to have once joined South America, Africa, southern Asia and Australia.

Invertebrate: An animal without an internal skeletal structure.

Life cycle: The complete course of development of an individual animal from fertilisation of an egg, through birth, juvenile development, dispersal, maturity and death.

Low water mark: The lowest point on the shoreline reached by the receding tide.

Marine mammal: Animals of the class Mammalia having glands for the nourishment of young and living in or dependent upon the sea.

Marine Protected Area (MPA): An area of sea and seabed especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.

Microalgae: Very small algae.

Microrganism: any form of small animal or plant life.

OCS: Offshore Constitutional Settlement.

Plankton: Aquatic, free drifting, suspended organisms (plants: phytoplankton; animals: zooplankton).

Pelagic: Species that live within the water column.

Predator: An organism that lives by preying on other organisms

Resource: A resource is anything that is used by people. A resource can be either renewable or non-renewable.

Seabird: A bird frequenting the sea or coast.

Seamount: An underwater cone-shaped remnant of an extinct volcano.

Sustainable management: Maintaining resources and values for future generations.

Temperate: Moderate in respect of temperature.

UNCLOS: United Nations Convention on the Law of the Sea.

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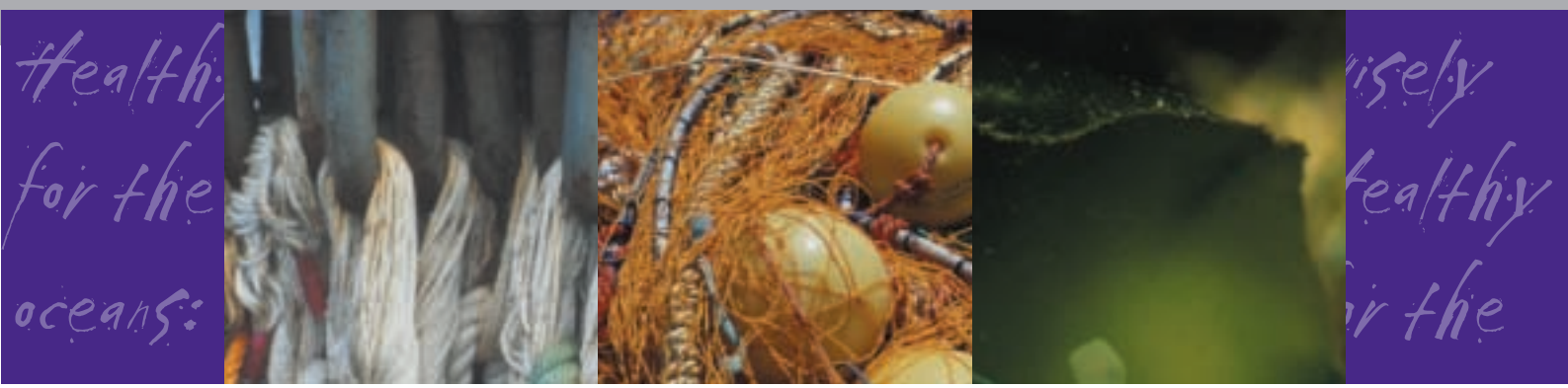

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Waiting,
A fleet of boats,
low and still,
lines out
The only movement a swirl of current

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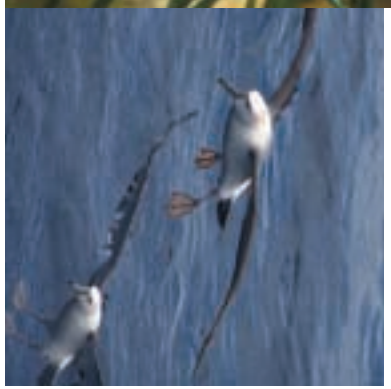

"...but my fancies turn ever away from land".

Henry Lawson, from The Vagabond

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