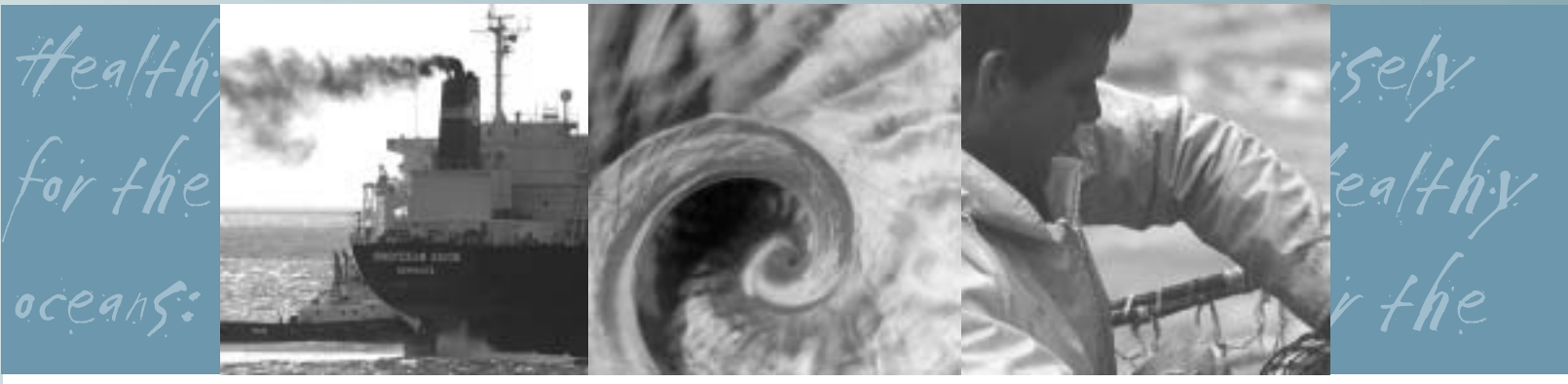
Summary PAPER

A Summary Paper

– glimpses of the South-east Marine Region



THE SOUTH-EAST REGIONAL MARINE PLAN

Title:
A Summary Paper – glimpses of the South-east Marine Region
The South-east Regional Marine Plan Assessment Reports

Disclaimer:
This paper was prepared by the National Oceans Office to assist with consultation on the development of the South-east Regional Marine Plan, as part of the Commonwealth Government's *Australia's Oceans Policy*. The views expressed in this report are not necessarily those of the Commonwealth. The Commonwealth does not accept responsibility for the contents of this report.

Sourcing:
Copies of this paper are available from:

The National Oceans Office
Level 1, 80 Elizabeth St, Hobart
GPO Box 2139
Hobart TAS 7001
Tel: +61 3 6221 5000
Fax: +61 3 6221 5050
www.oceans.gov.au

For further information about this paper, contact Ester Guerzoni, Public Affairs Officer, tel (03) 6221 5000.

Credits:

Design: CSIRO Marine Research

Prepress: Photolith

Printing: Printing Authority of Tasmania

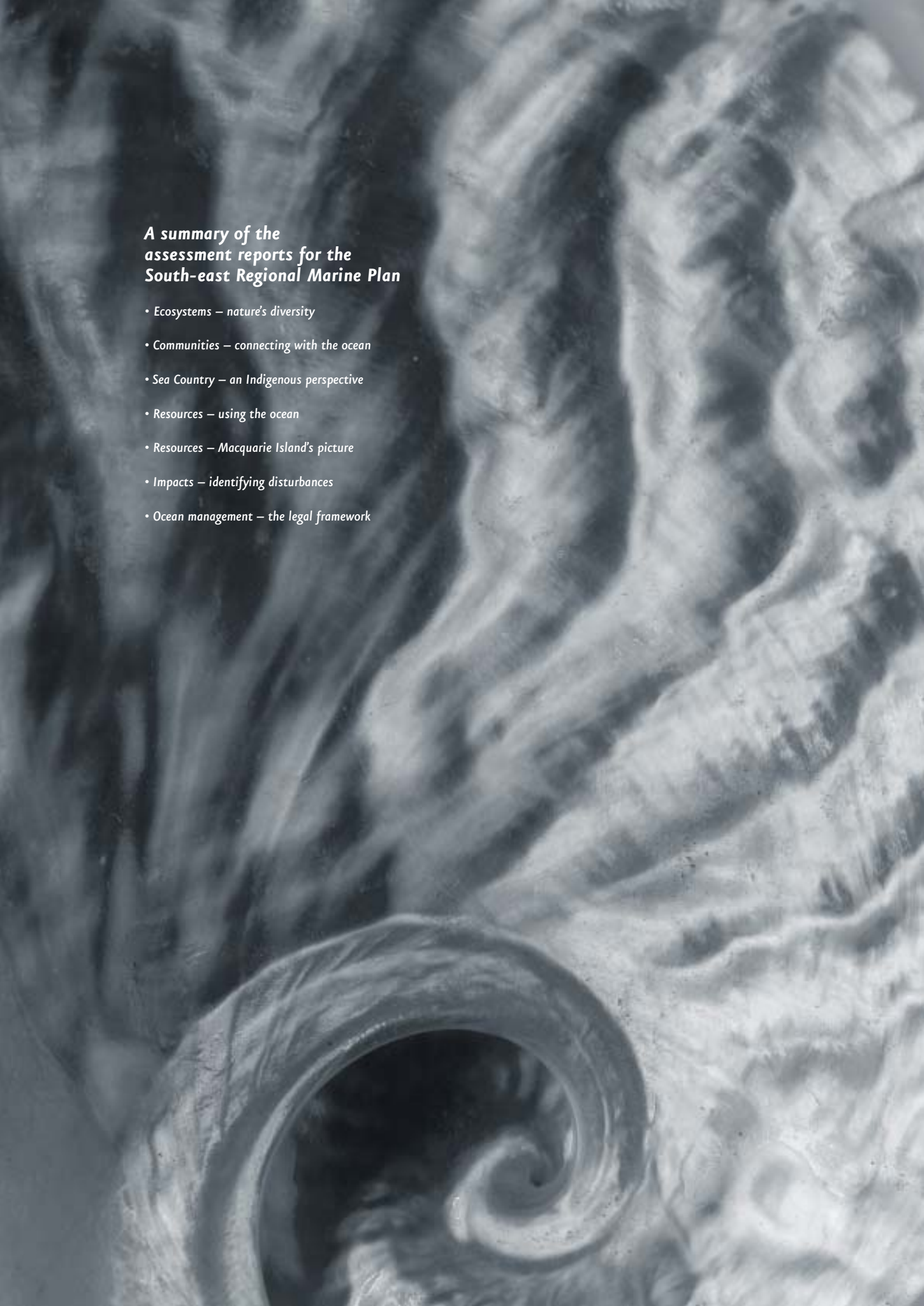
Published by the National Oceans Office

Photographs: ship, biscuit seastar, frond of giant kelp, shy albatross © Karen Gowlett-Holmes; abalone shell © John de la Roche; man fishing, orange roughy catch © CSIRO Marine Research; cephalapod © Dave Stevenson; Macquarie Island seals © Sharee McCammon.

State Library Ref:
A Summary Paper – glimpses of the South-east Marine Region
South-east Regional Marine Plan Assessment Reports

1-877043-06-0

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



A summary of the assessment reports for the South-east Regional Marine Plan

- *Ecosystems – nature's diversity*
- *Communities – connecting with the ocean*
- *Sea Country – an Indigenous perspective*
- *Resources – using the ocean*
- *Resources – Macquarie Island's picture*
- *Impacts – identifying disturbances*
- *Ocean management – the legal framework*

Foreword

This paper summarises the seven South-east Regional Marine Plan assessment reports, and is supported by a Discussion Paper which describes the planning process and suggests objectives for the South-east Regional Marine Plan. The Discussion Paper also includes examples of planning issues that may need to be addressed when developing the Plan.

More detail can be found in the South-east Regional Marine Plan assessment reports, Scoping Paper and Snapshot Document available from the National Oceans Office. Contact:

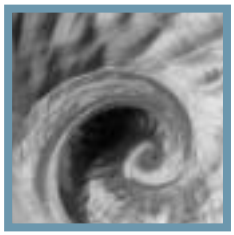
Postal: PO Box 2139, Hobart, TAS, 7001

Phone: (03) 6221 5000

Fax: (03) 6221 5050

Email: office@oceans.gov.au

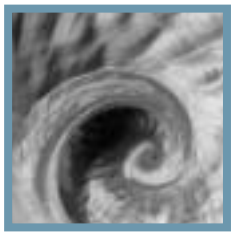
Web: www.oceans.gov.au



Contents

List of figures

List of maps



Introduction

This paper introduces and summarises some of the key findings of the seven South-east Regional Marine Plan assessment reports:

- *Ecosystems – nature's diversity*
- *Communities – connecting with the ocean*
- *Sea Country – an Indigenous perspective*
- *Resources – using the ocean*
- *Resources – Macquarie Island's picture*
- *Impacts – identifying disturbances*
- *Ocean management – the legal framework*.

The assessment reports and this paper aim to provide communities, industries and governments with a common understanding of the Region. From this common understanding you are invited to help us identify the key issues and planning concerns for the Region – for more information on how to be involved see the Discussion Paper.

Australia's Oceans Policy provides a framework for the people of Australia to explore, use, protect and enjoy our extensive marine resources. The Policy recognises the need to protect the biological diversity of the marine environment while at the same time promoting and encouraging sustainable, secure marine industries.

Regional marine planning is a way of achieving the *Oceans Policy* vision of *Healthy oceans: cared for, understood and used wisely for the benefit of all, now and in the future*. It uses large marine domains as one of the starting points for the planning process by creating regional boundaries that are based on ecosystem characteristics – a major step towards ecosystem-based management.

The South-east Marine Region brings together three large marine domains: the South-eastern, the South Tasman Rise and Macquarie. It covers over two million square kilometres of water off Victoria, Tasmania (including Macquarie Island), southern New South Wales and eastern South Australia (see Figure 1).

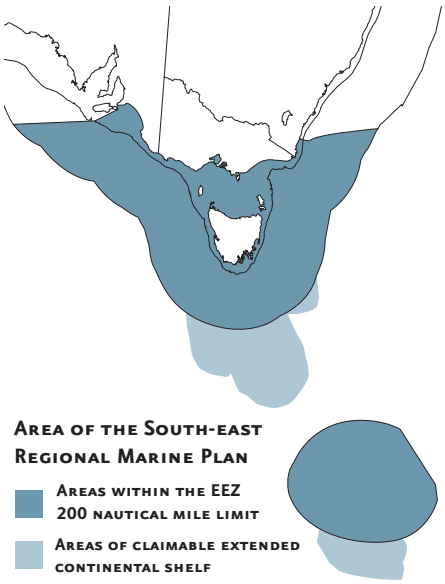


Figure 1: *The Region includes both inshore (State) waters (from the shore to three nautical miles outside the territorial sea baseline) and Commonwealth waters (from three to 200 nautical miles outside the territorial sea baseline), as well as the claimable continental shelf beyond the Exclusive Economic Zone (from the territorial sea baseline out to 200 nautical miles). While the Region includes State coastal waters, the South-east Regional Marine Plan will focus on the Commonwealth ocean waters.*

To build an understanding of this complex Region, information on ecosystems and human activities was gathered in a series of assessments covering both State and Commonwealth waters across six themes:

- biological and physical characteristics – identifying the key ecological characteristics in the Region, their linkages and interactions
- uses within the South-east Marine Region – describing our knowledge of the nature and dimension of human uses and their relationship with each other
- impacts on the ecosystem – providing an objective analysis of how activities can affect the Region's natural system
- community and cultural values – ensuring community wishes and aspirations are reflected in the planning process
- Indigenous uses and values – gaining an understanding of, and support for, Indigenous interests in the Region
- management and institutional arrangements – analysing current legislative and institutional frameworks to determine the best mechanism for implementing regional marine plans.

As part of the process, the National Oceans Office commissioned scientific projects and contributed to ongoing work aimed at expanding existing information about the deep ocean's ecosystems and marine resource use. Specialist working groups of stakeholders and experts in their fields have provided invaluable direction and input to the process. As well, stakeholder workshops, community surveys and consultations have all helped build our knowledge base and provided a voice for the people of the South-east Marine Region. Without this consultation, the picture would not be complete.

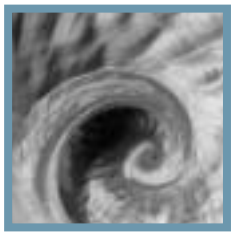
For more detail on the South-east Regional Marine Plan and the planning process see the Discussion Paper.

Ecosystems – nature's diversity

The assessment of the Region's biological and physical characteristics provides an overview of the structure and function of the Region's ecosystems and has produced two key inputs for developing an ecosystem-based regional marine plan:

- an Interim Bioregionalisation which identifies bioregions based on ecological attributes (geology, ocean currents, biota) between the continental shelf-break and the limits of Australia's Exclusive Economic Zone (see Box 1) – the bioregions provide an ecosystem-basis for developing planning units for the Region
- Ecosystem Conceptual Models that illustrate how the ecosystems of the Region function (see Box 2). These Conceptual Models provide a starting point for developing more formal models for specific management issues that are addressed by regional marine planning. They also help to develop ecosystem objectives and indicators – key elements in evaluating the success of the management plan so that we can change management depending on the outcomes of the evaluation.

The assessment has significantly improved our knowledge of the deep-water ecosystems of the Region and their physical and biological characteristics, which are summarised below.



Marine ecosystems

A marine ecosystem consists of the physical environment and the plants and animals that live there. The physical environment provides the necessary ingredients, including energy, nutrients and oxygen, for biological production: building biomass (total weight of plants and animals) and cycling nutrients back to the physical environment.

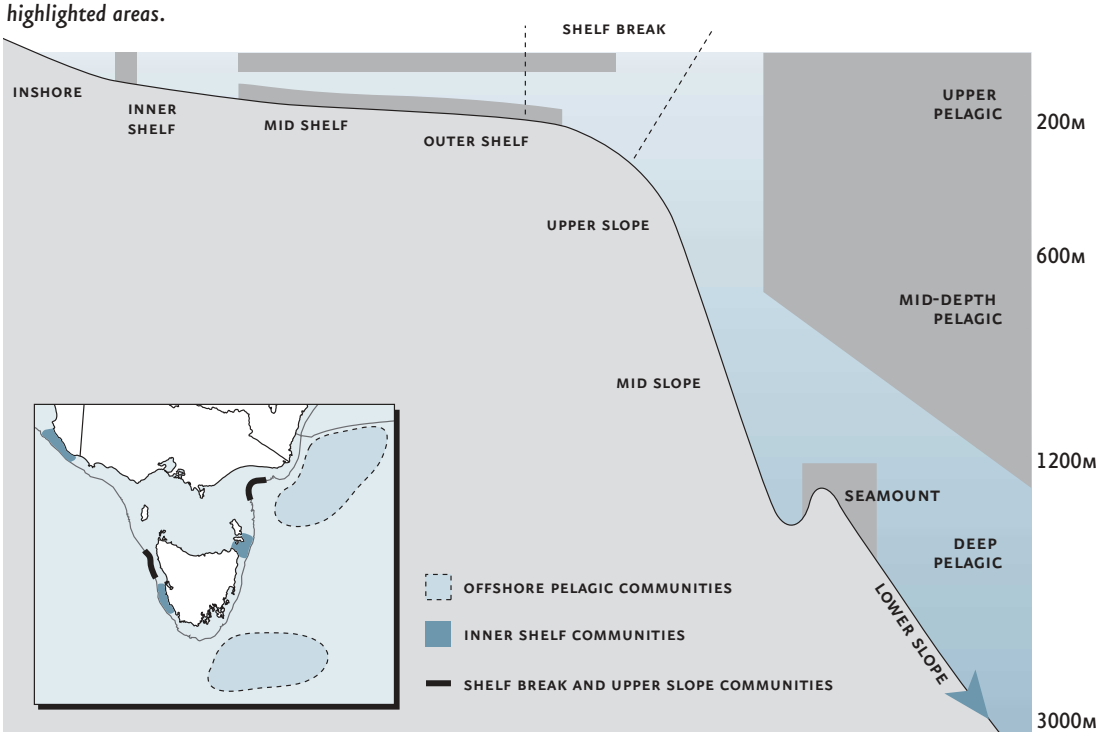
We identify and describe broad environment types based on their depth, distance from the coast and the processes that create them (see Figure 2):

- benthic (seafloor) inshore and inner-shelf (between 0 and 60 m depth)
- benthic mid- and outer-shelf (between 60 and 200 m depth)
- benthic slope (200–3500 m depth)
- pelagic (open ocean) – over the shelf, shelf-break, and slope
- relevant terrestrial environments.

A range of ecosystem processes operate within and between each environment type, and can be broadly classified into themes (some of these themes are illustrated in the Conceptual Models in Box 2):

- energy sources, nutrient flows and biological production
- energy flows and food webs
- population dynamics and life-history strategies
- migration and dispersal
- structural complexity.

Figure 2: *Broad types of environments in the South-east Marine Region. Conceptual Models have been developed for the highlighted areas.*



Seascape of the Region

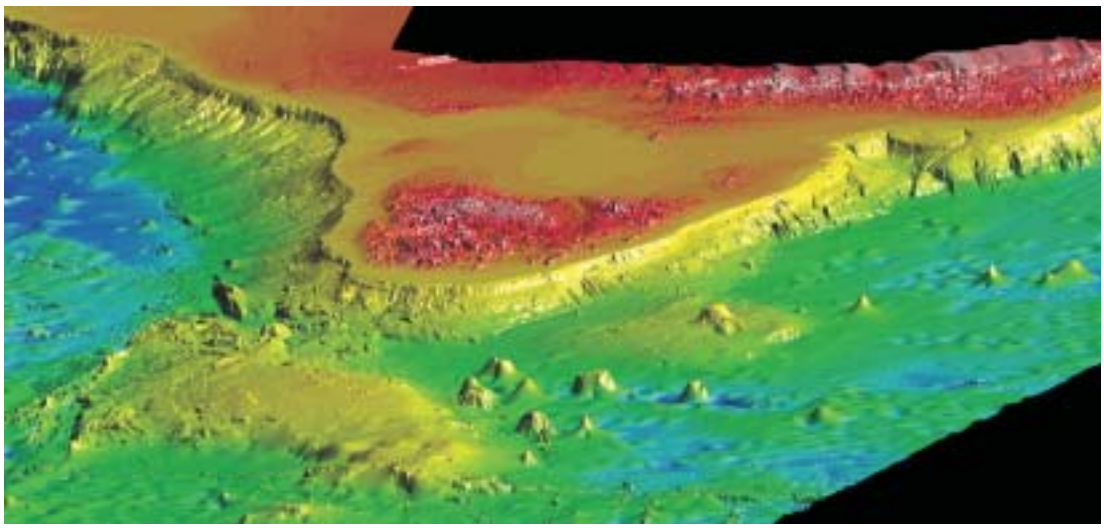
The complex structure of the seafloor provides the physical background for all of the life and biological activity in the South-east Marine Region (see Figure 3).

Macquarie Island forms part of the Region, located 1500 km southeast of Tasmania and 1300 km north of the Antarctic continent at latitude 54°30S and longitude 158°57E. The Island is the exposed crest of the Macquarie Ridge, a spreading north–south ocean floor ridge raised during the integration of the Indian-Australian and Pacific tectonic plates. The Hjort Trench along the western side of the Macquarie Ridge is the deepest part of the Region at greater than 6000 m below sea level.

Oceanographic characteristics

Currents and water properties such as temperature and nutrient content play a vital role in the ecosystems of the South-east Marine Region. Waters throughout the Region are constantly moving and changing with daily, seasonal and yearly patterns (see Figure 4). Ocean currents link marine ecosystems, while fronts and upwellings structure the open-ocean pelagic environments, and tides and local currents determine the living conditions for near-shore species.

Figure 3: *The seafloor contains many spectacular features that are illustrated by the bathymetry (water depths) of the South-east Marine Region, prepared for the National Oceans Office by Geoscience Australia. Dry land is indicated by red, with Tasmania in the middle of the image. Bass Strait and the continental shelf around the Region stretches from the land to the shelf break, where the seafloor slopes away toward the abyssal depths. Large seamounts (underwater volcanoes) dot the deep seafloor in the southeast of the Region and the continental block of the South Tasman Rise appears in the lower left of the image (south of Tasmania).*



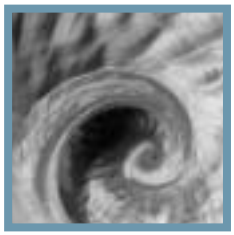
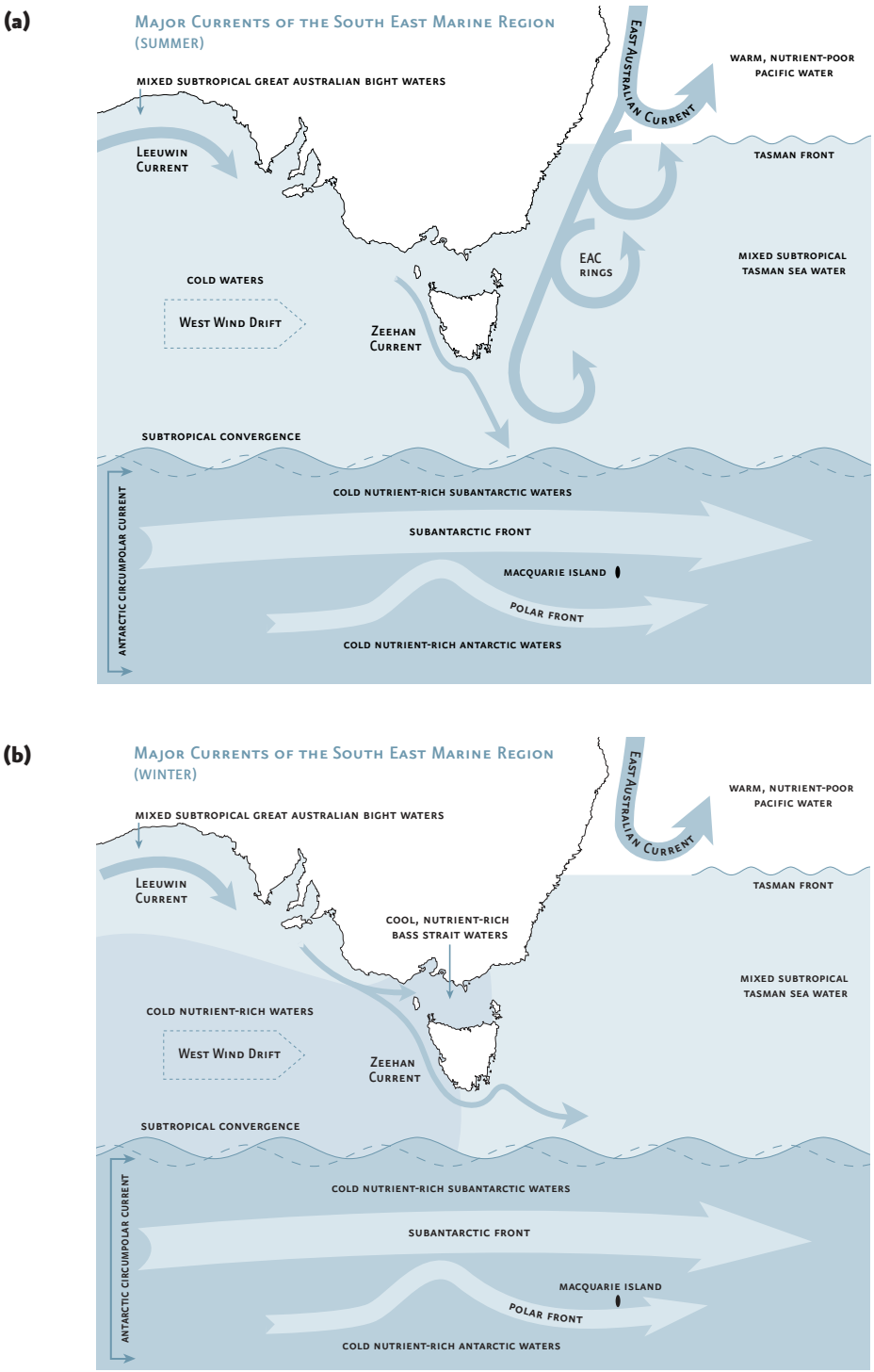


Figure 4: *The main surface currents and water masses of the South-east Marine Region in (a) summer and (b) winter. The darker-shaded areas are typically high in the nutrients needed for primary productivity (nitrates and phosphates). Cold Southern Ocean waters are much higher in nutrients than the warmer waters of the tropics and subtropics. The size of the arrows represents the strength of the currents.*



Life in the South-east Marine Region

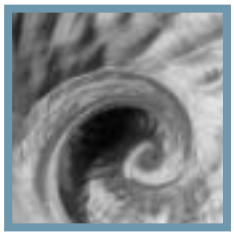
The diversity of marine life in the South-east Marine Region is remarkable by global standards. Southern Australia is also notable for the large numbers of endemic organisms – species that are found nowhere else in the world. For example, the fish fauna of southern temperate Australia consists of about 600 species, of which 85% are believed to be endemic and 11% are shared only with neighbouring New Zealand.

The flora of the Region includes microalgae (single-celled plants), macroalgae (seaweeds) and seagrasses (marine flowering plants). Southern Australia has the most diverse marine benthic flora in the world with 62% of macroalgae thought to be endemic.

Marine invertebrates (animals without a backbone) include a great variety of groups such as sponges, crabs, seastars, anemones, octopus, squid and molluscs. Collectively, their species considerably outnumber the vertebrates (animals with a backbone). Vertebrates include some of the best-known marine animals of the Region including whales, dolphins, seals and many fish of commercial significance.

Within the Region more than 120 species are listed as having conservation significance under either State or Commonwealth legislation.

Introduced marine species are those that occur outside their natural or historical ranges. In the South-east Marine Region, 115 species are recorded as being introduced. In some cases, these species have a competitive advantage over native species because their natural predators and parasites are absent.



Box 1: Classifying the Region

Recent attempts to describe the hierarchical structure of the marine ecosystem in Australia include the:

- Interim Marine and Coastal Regionalisation of Australia (IMCRA)
- Large Marine Domains (LMDs).

These two major classification systems have provided a basis for additional studies to refine our understanding of the Region.

IMCRA

IMCRA (Version 3.3, 1998) focuses on the continental shelf (waters less than 200 m deep). At the largest scale, the provinces and associated biotones (areas that contain a mix of elements from adjacent provinces) encompass the inshore areas of the Region. There are two boundaries between provinces:

- one based on the demersal environment (demersal organisms live close to the seafloor and benthic organisms live on, or burrow into, the seafloor)
- a second based on the pelagic environment (pelagic organisms live in the water, sometimes far above the seafloor).

IMCRA relies primarily on information about fish species distribution and physical characteristics (seafloor topography and oceanographic data) to identify provincial boundaries. IMCRA includes bioregions within the provinces and biotones; the area of these bioregions is typically hundreds to thousands of square kilometres. Bioregions are areas whose characteristics (geological features, plants and animals and water properties) are more similar than those of adjacent areas.

LMDs

The provinces and associated biotones identified as part of the IMCRA project have since been merged into major ecological domains (LMDs) – seven around mainland Australia, five domains in the external territories and one subantarctic domain in the waters directly to the south of Tasmania. These LMDs are identified by characteristics including bathymetry and ocean properties such as temperature, salinity and the age of the seafloor plate.

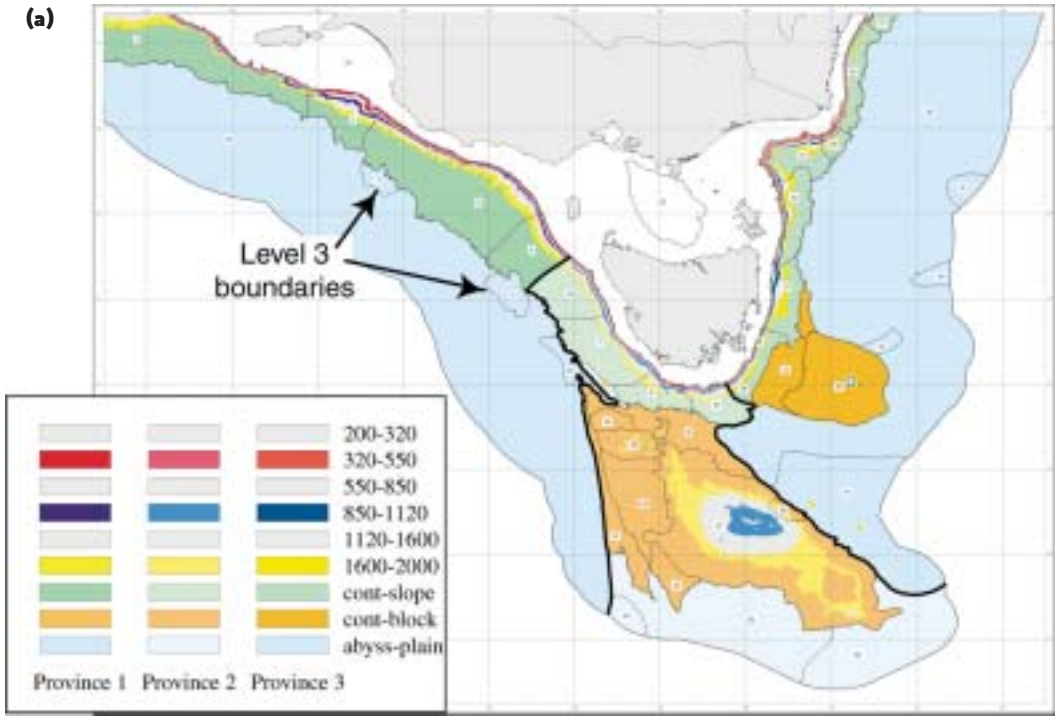
Interim Bioregionalisation

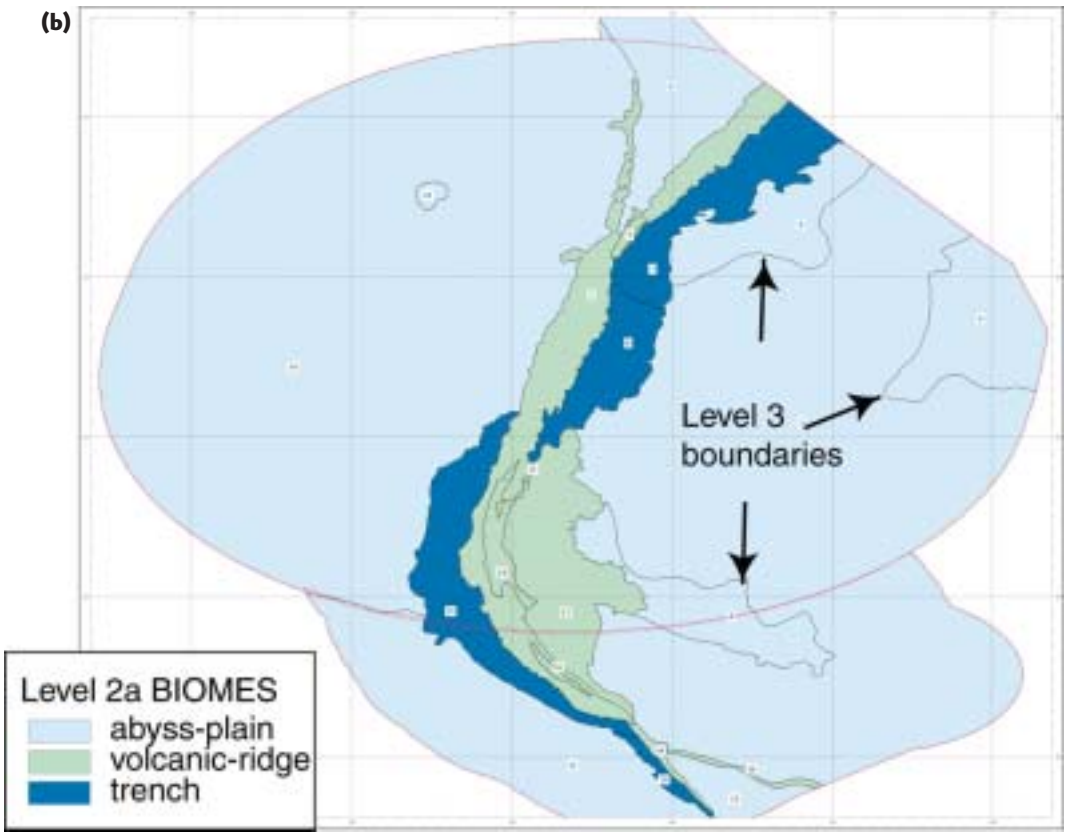
The Interim Bioregionalisation identifies bioregions based on ecological attributes, encompassing benthic and demersal areas deeper than 200 m within the South-east Marine Region, including around Macquarie Island (see Figure 5). In this way, the Interim Bioregionalisation complements the earlier IMCRA definitions of bioregions on the continental shelf.

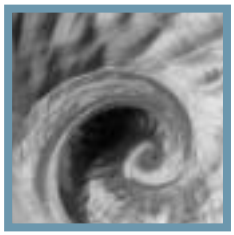
Together IMCRA and the Interim Bioregionalisation cover the entire South-east Marine Region, from the coast to the Exclusive Economic Zone boundary. How these two regionalisations complement each other and how they can be applied in regional marine planning will need to be considered when we are developing management options as part of the regional marine planning process.

IMCRA currently provides the national and regional planning framework for developing the National Representative System of Marine Protected Areas, and it is likely that the planning units based on the Interim Bioregionalisation will have similar application for the deeper waters of the Region. However, additional work may be required to understand how the bioregions are linked and depend on each other, and to refine knowledge of the Region's habitats. This will help us to design management options that maintain the health of the marine ecosystem, ranging from identifying areas that may be suitable for marine protected areas to suggesting how a resource use should be managed.

Figure 5: *Interim Bioregionalisation of (a) Waters around the Australian continent including Tasmania and (b) waters around Macquarie Island.*







Box 2: Conceptual models

The ecosystem Conceptual Models give an overview of our current understanding of the key physical and ecological processes that drive the different ecosystems in the Region. The Models allow us to describe the potential vulnerability of these processes to different human activities, and provide a basis for developing objectives for ecosystems and indicators of ecosystem health and integrity. These objectives and indicators will be used to monitor the status of the ecosystem, along with impacts of human activities and the effectiveness of management.

We have designed two levels of ecosystem Conceptual Models that illustrate:

- the large-scale processes that drive the dynamics at a range of time and space scales in the Region
- examples of the different ecosystem types and the links between them.

Models of the two large-scale processes are included in Figures 6 and 7. We have produced Conceptual Models for several broad environment types – rocky reefs of the inner shelf, benthic shelf, seamounts of the mid slope, pelagic shelf, pelagic over the slope and Macquarie Island (see Figures 8 and 9 as examples).

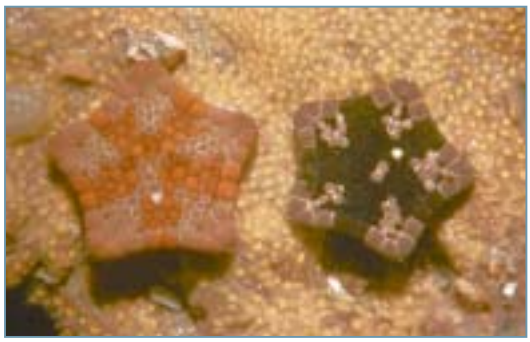
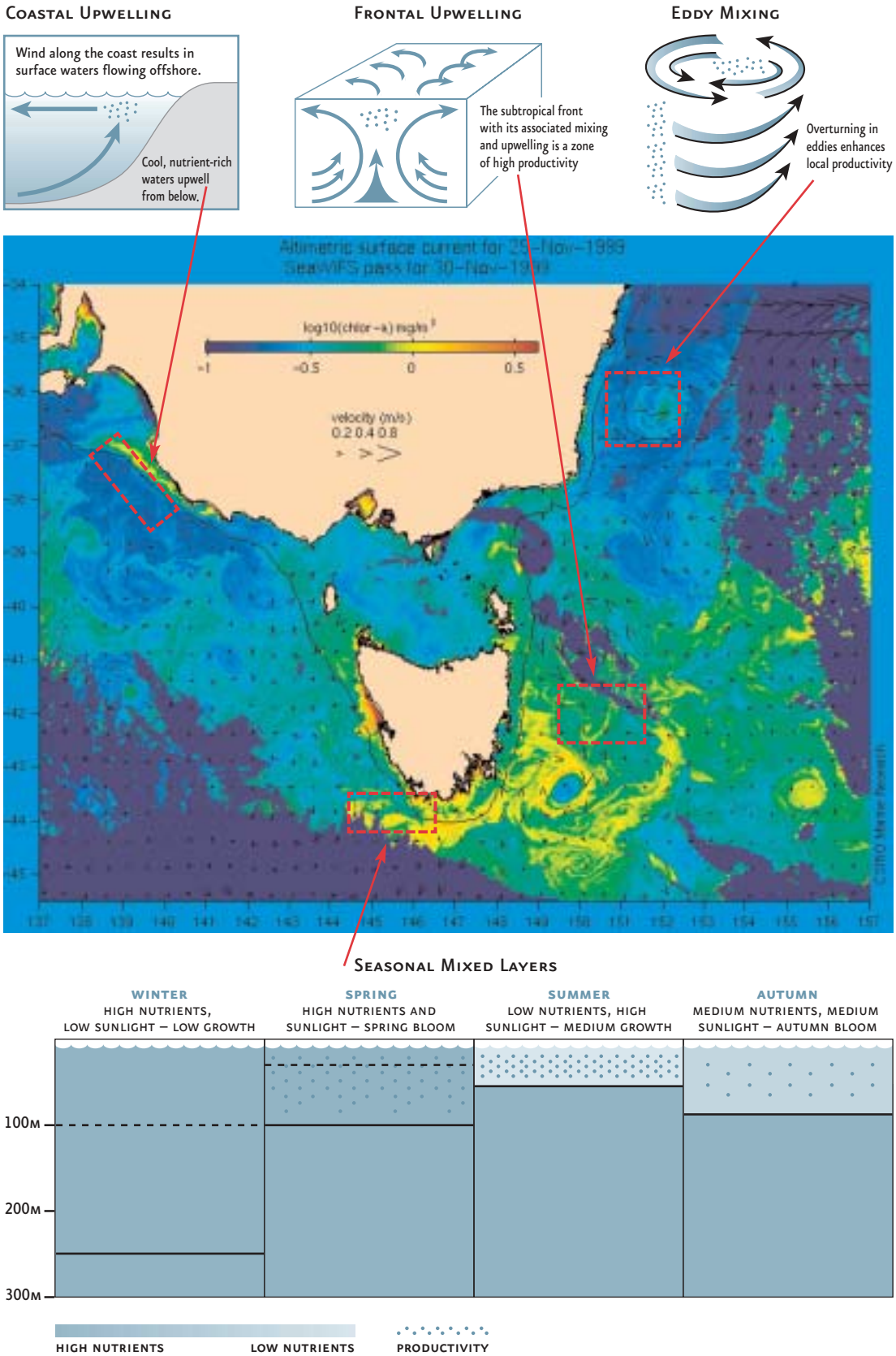


Figure 6: *Large-scale process Conceptual Model – primary productivity. Satellite measurements of sea surface productivity. Blue-green colours indicate low levels of productivity; the East Australian Current imports a low-nutrient, low-productivity water mass into the northeastern part of the Region. Yellow-red colours indicate higher productivity; evidence of local plankton blooms can be seen in an East Australian Current eddy east of New South Wales, along the Bonney Coast of southeastern South Australia/western Victoria, and in the Subtropical Front around Tasmania. Reproduced with permission from David Griffin, CSIRO Marine Research.*



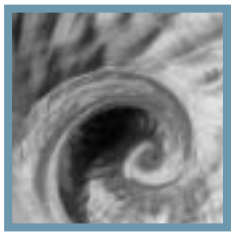


Figure 7: *Large-scale process Conceptual Model – migration and dispersal. Ocean ecosystems are connected in a variety of ways including links between the land and sea, shallow and deep waters and links between regions. This means that impacts in one area can effect large areas in complex and unsuspected ways (eg land-based pollution sources or outbreaks of disease in marine species). Migration and dispersal are two examples of such connections. Others include nutrient upwellings and surface circulation (eg East Australian Current).*

Figure 7a: *Ocean currents and water temperature at 1.5 m depth during January, April, July and October. Temperatures are from shipboard observations normalised over a grid. Currents are from a computer model driven by averaged observed winds and temperatures. Figure provided by CSIRO.*

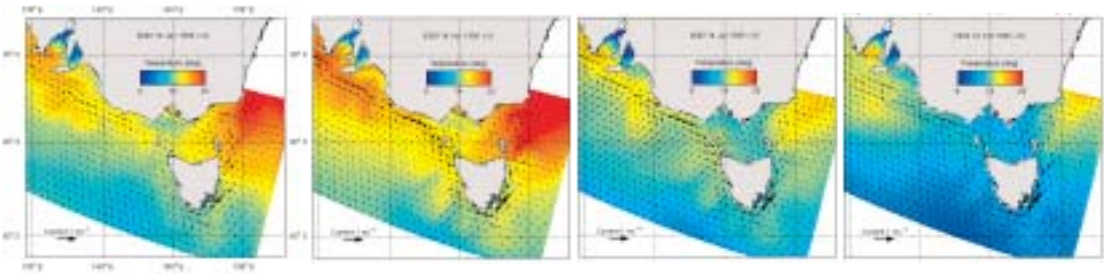


Figure 7b: *An illustration of larval dispersal with particle trajectories at 1.5 m depth in a numerical model of ocean currents. Examples of larvae that are carried by currents throughout the Region include blue grenadier (larvae originating from western Tasmania found in eastern Tasmania) and jackass morwong (larvae spawned at the shelf-break found 250 km offshore). Dispersal is linked to offshore oceanographic processes.*

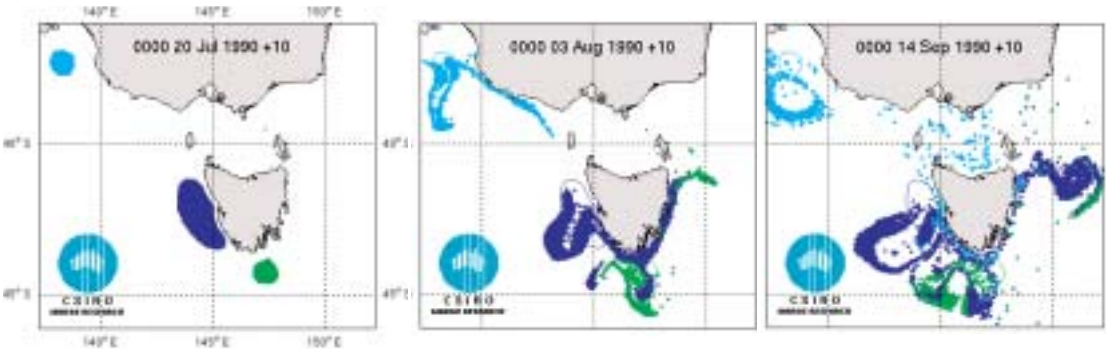


Figure 7c: *Species that enter and leave the Region annually during breeding and feeding migrations include: whales, southern bluefin tuna, tropical yellowfin tuna, school shark, Australian fur seal, New Zealand fur seal, Australian sea lion, albatross and shearwaters (eg muttonbird). Left box schematic of typical migration paths for tuna and whales around Australia. Right boxes: tracks of winter foraging trips made by lactating female Australian fur seals from (middle) all four Victorian breeding colonies (Lady Julia Percy Island, Kanowna Island, The Skerries), and from (right) Seal Rocks only. Lactating females make regular foraging trips and return to the breeding colony to nurse their pup for 10 months of the year. Images from John Arnould, University of Melbourne and Roger Kirkwood, Phillip Island Nature Park.*

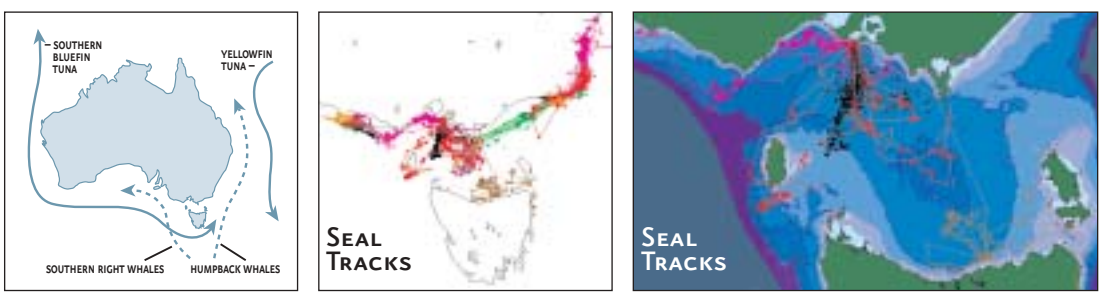
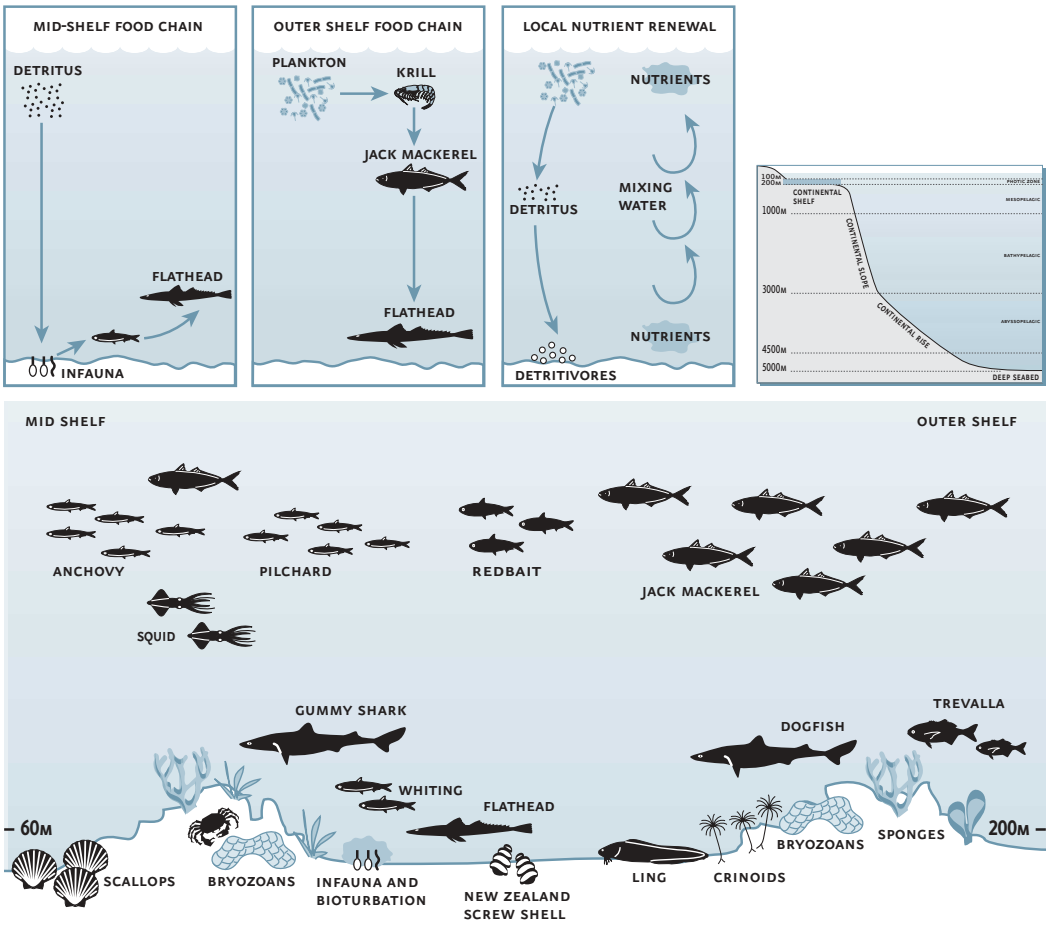
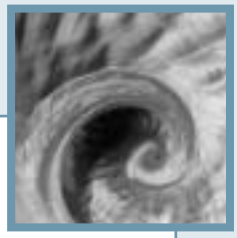


Figure 8: *DRAFT conceptual model of benthic and demersal continental shelf ecosystems.*



Key ecosystem features and functions

- Food energy from pelagic to benthic via detritus and vertical movement of demersal species
- Local nutrient cycling through falling detritus, renewal by detritivores, and physical mixing back up to surface
- Assemblages of species depend on latitude, depth, substrate type and water currents
- Shelf communities may depend on food energy from further inshore (seagrass detritus) and further offshore (movement of species onshore from the shelf-break).



An example of a continental shelf ecosystem: soft and hard grounds

The picture of the continental shelf habitats that emerges from our preliminary knowledge is of a mosaic of habitats that provide varied seabed surfaces for a variety of animal assemblages. The structure and distribution of the geological features, besides being important for benthic communities, also influence the distribution and abundance of demersal fish species. Recent research indicates that bottom topography influences local currents, which in turn influences local feeding conditions and composition of fish assemblages. Hard grounds provide both attachment sites for benthic organisms and structural complexity that promotes the diversity of both attached and mobile fauna, and refuge for reef-associated animals.

Another example of structural complexity is the formation of sponge dominated communities, which include sea whips and encrusting animals. The composition of these communities varies on the shelf depending on the local conditions, some areas have relatively simple and distinctive communities, such as those with large stalked crinoids on cemented sediments and bryozoan reefs.

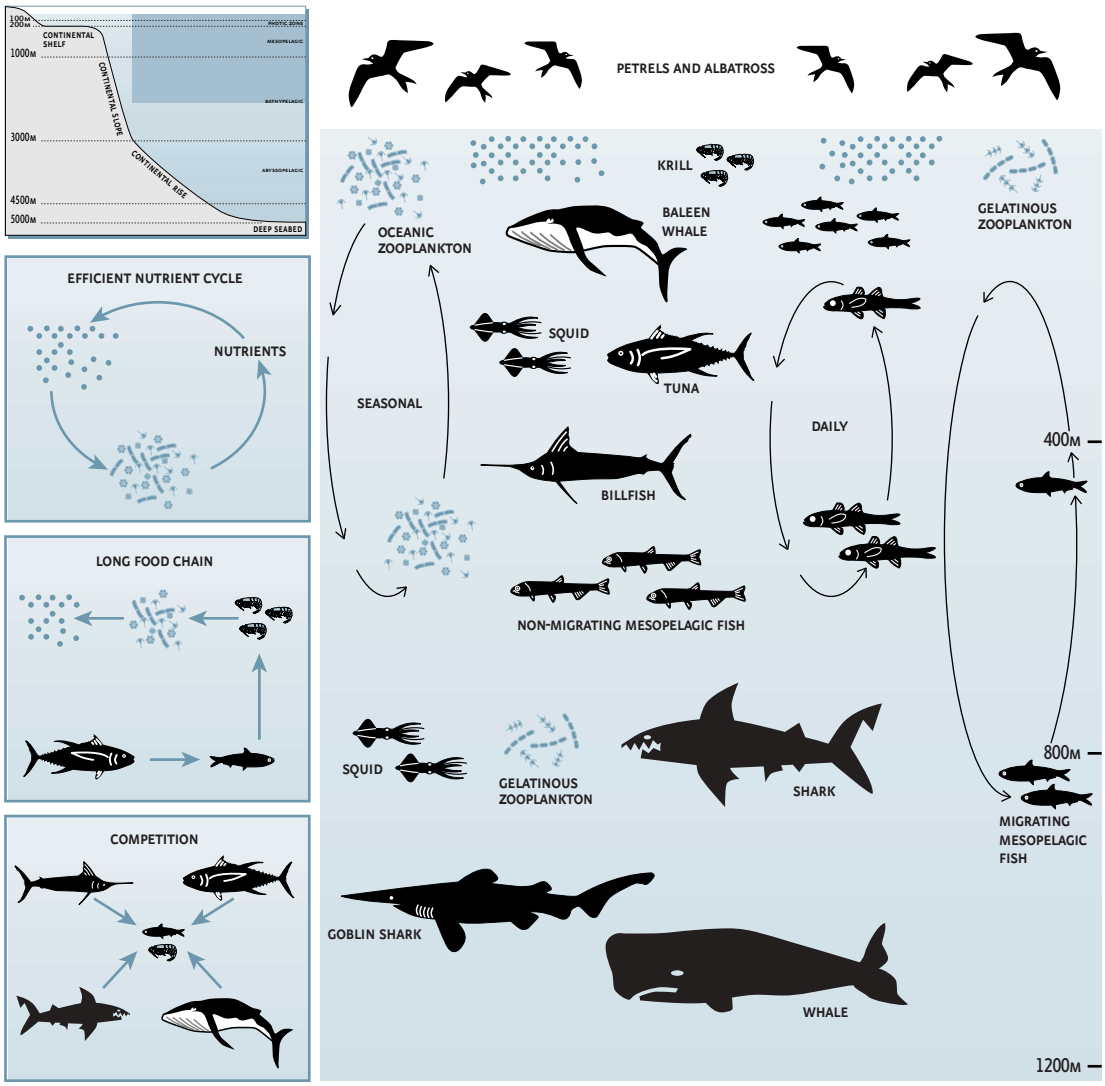
Food from offshore

In addition to structural complexity, other ecosystem processes include the type and amount of primary productivity, the cycling of nutrients to support primary productivity and the flow of food to higher predators. Recent research indicates that transport of primary and secondary productivity from inshore and offshore to different parts of the shelf is important, and that links between the benthic and pelagic systems on the shelf are extensive.

A large study of demersal fish communities on the shelf off southern NSW found that many benthic or demersal species relied on pelagic prey, while others relied on benthic prey (study from 25 m – 200 m). Even within the same family, species took prey from different sources. Of 70 species, over half relied on benthic prey, while 18 of the 28 commercial or abundant species, relied on pelagic prey. This means that pelagic production undperpins a significant proportion of the productivity of the demersal fishery. Researchers suggest that benthic prey are more common food for fishes in shallower water and fishes of deeper waters further out on the shelf, are more generalist, and opportunistically feed on pelagic prey. A similar dependence on pelagic prey was found in a study on the upper mid slope off eastern Tasmania and in studies of similar regions around the world.

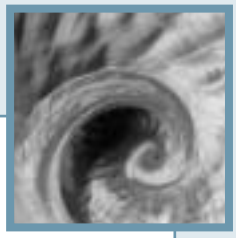
The relative importance for shelf communities of benthic and pelagic primary productivity is not clear and may vary with local conditions. Both detritus and direct food chains carry surface primary productivity down to the benthic communities, as illustrated in the two boxes on the top left of Figure 8. A recent study of links between primary productivity and fishery productivity in the South East Fishery found that the main source of productivity supporting the fishing grounds of the continental shelf is the oceanic plankton and micronekton brought to the shelf by physical processes including upwelling events near the shelf break. In contrast, seagrass detritus drifting offshore from the inner-shelf may be the main source of production for the food chain supporting larvae of blue grenadier, the principal mid-water predator off the western Tasmanian coast. Local primary productivity is supported by nutrients that are cycled from the seafloor sediments back into the water column by bioturbators. These nutrients are brought toward the surface by local mixing events such as internal waves and convective overturning, this full-water column local nutrient cycling is quite different from the nutrient cycling further offshore.

Figure 9: *DRAFT conceptual model of pelagic offshore ecosystems.*



Key ecosystem features and functions

- Long food chains based on small, surface-layer phytoplankton
- Nutrients are patchy – low in general, high in particular locations – and may be efficiently recycled in a surface plankton loop
- Energy moves inefficiently to higher predators due to many steps in food chains
- Production in surface photic zone feeds species in greater depths via falling material (detritus) and vertical migration of predators and prey
- Large proportion of biomass is in the high trophic levels – competition is high and many species migrate (horizontally) over large distances.



An example of a pelagic ecosystem
The open ocean above the slope

A fluid environment

Offshore of the shelf where the ocean rapidly deepens, oceanic water masses exert their influence most strongly. The Region's open-ocean ecosystems exist throughout these depths: surface layers dominated by East Australian Current and Leeuwin waters (<250 m); middle layers of Subantarctic Mode Water (300–600 m) and Antarctic Intermediate Waters (800–1200 m); and deep waters of various origins. Distinct fish assemblages inhabit these water masses, although many species move between water masses on large-scale horizontal migrations and daily or seasonal vertical migrations.

Patchy nutrients and patchy productivity

Large expanses of the open ocean can be considered deserts in terms of their primary productivity. Although light can penetrate to considerable depth in clear oceanic waters, nutrients are sparse and limit primary productivity, especially in the warm sub-tropical waters of the Region. Subantarctic waters refresh nutrient levels in the Region with the irregular, meandering Subtropical Front carrying nutrients north, and supporting extensive, but patchy, plankton blooms in the Region's open ocean. Offshore phytoplankton species have evolved to capitalise on these occasional enrichments – they can recycle nutrients by transforming the methane emitted by zooplankton into the nutrients they need for photosynthesis.

Open ocean inhabitants

Surface waters host complex communities of phyto- and zooplankton and the many species of fish, squid, mammals and seabirds that feed on them. Below the photic zone live mid-depth species, including some zooplankton, and squid, fishes and large mammals, such as the sperm whale. Some of these are vertical migrators, journeying up to shallower waters each night to feed, while others live permanently in the deeper waters.

Phytoplankton species in the open ocean pelagic ecosystems are generally smaller than those over the shelf. Zooplanktons (krill, copepods, decapods and gelatinous zooplankton) feed on phytoplankton, zooplankton and other material. Some of the zooplankton species, such as copepods, migrate vertically on a seasonal cycle and in doing so transport food and nutrients from the surface to the deep and vice versa. Krill is a particularly important food source for larger species, and the size and distribution of krill populations can fluctuate considerably seasonally and inter-annually. Most of the mid-size fishes and squid are different species from those found over the shelf. Many move between overlapping vertical levels to feed on zooplankton, smaller fishes and squid. Their preferred depths generally vary with the stage of life-cycle, and migratory patterns may vary seasonally and with breeding conditions. Except for those caught commercially, many of the species from these ecosystems are not well understood. Myctophids (lanternfish) are the most common and diverse fish group – at least 48 species have been found in the Region. Larger species (including tuna, oceanic sharks, billfish, dolphins, and seabirds such as petrels and albatrosses) travel over the shelf and open ocean waters on large-scale feeding and breeding migrations. Competition for food between these species is thought to be high.

Energy Flows

The Region's open-ocean ecosystems revolve around food chains that are long relative to those over the shelf: small phytoplankton are eaten by small zooplankton, which are in turn eaten by larger zooplankton or small fish. The top predators are therefore at higher trophic levels than they are over the shelf and energy transfer is less efficient. These food chains are also flexible – species adjust their diet based on food availability, which varies with location, depth and season. Energy flows from the surface to the depths by way of vertical migrations and sinking detritus, and in and out of the Region by way of migratory predators (eg southern bluefin tuna and whales).

Connecting with the sea

Communities – connecting with the ocean

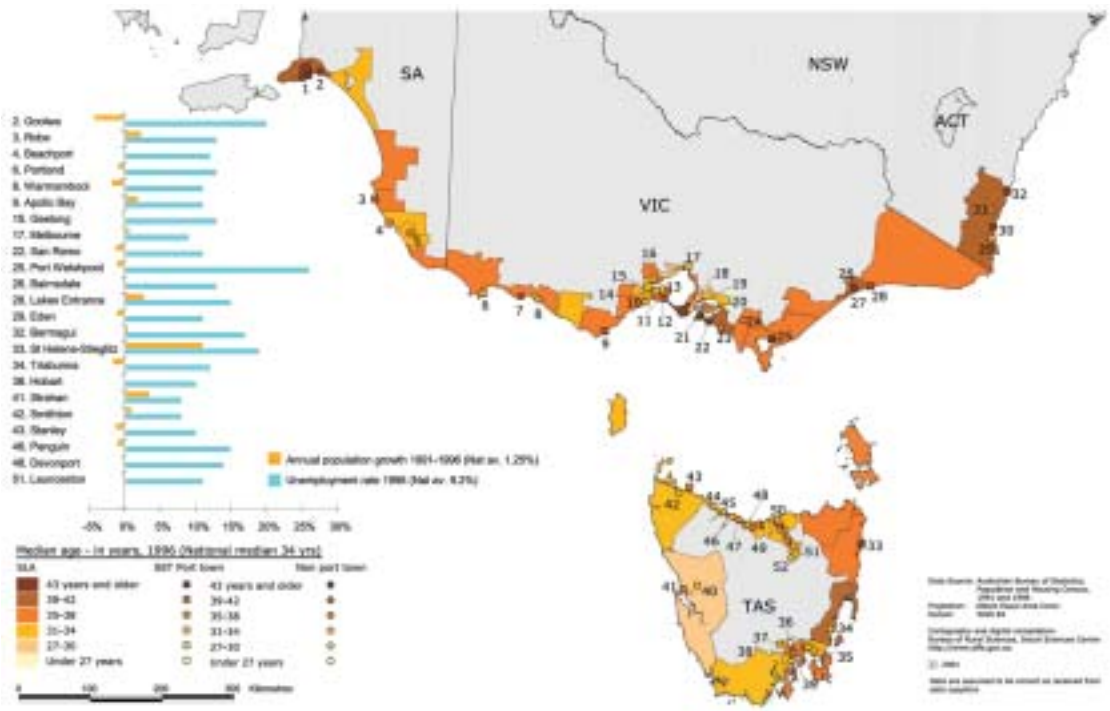
The assessment of community and cultural links with the marine environment provides a snapshot of the community's values and aspirations for the deeper waters of the Region. For the purposes of this assessment, people living within 50 km of the coast of the South-east Marine Region, key national and regional conservation groups, and marine-focused community interest groups were consulted. The coastal community's level of knowledge about the Region and its broad demographic data were also collected.

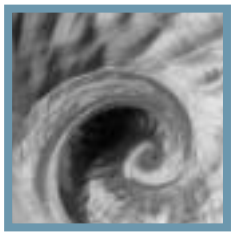
The coastal area of the Region is home to around 1.4 million people. Its communities are socially and economically diverse (see Map 1), and specific demographic findings indicate that:

- parts of the Region, particularly in the east, have high unemployment, low population growth and an ageing population
- coastal communities to the west of Melbourne and Hobart (when compared to those of the east) have lower unemployment and higher average weekly incomes
- there are strong links between the coastal communities in the Region and how the surrounding marine environment is used.

Marine-based industry plays an important role in many communities throughout the Region. Along with marine and coastal tourism, which is a major source of income, over 30 commercial fisheries operate in the Region (see Map 2).

Map 1: *Population growth, unemployment rates and median age in the South-east Marine Region.*





A random telephone survey of 1306 individuals revealed that respondents who reported 'knowing a lot' about the marine environment, placed a higher importance on community involvement in planning. Those who said they 'knew a moderate amount' were generally more interested than others in caring for the marine environment, spending more on reefs and banning foreign fishing. Respondents who reported that they 'knew basically nothing' had less desire for additional government expenditure on the Region and were less likely to care as much about the deeper ocean as the land.

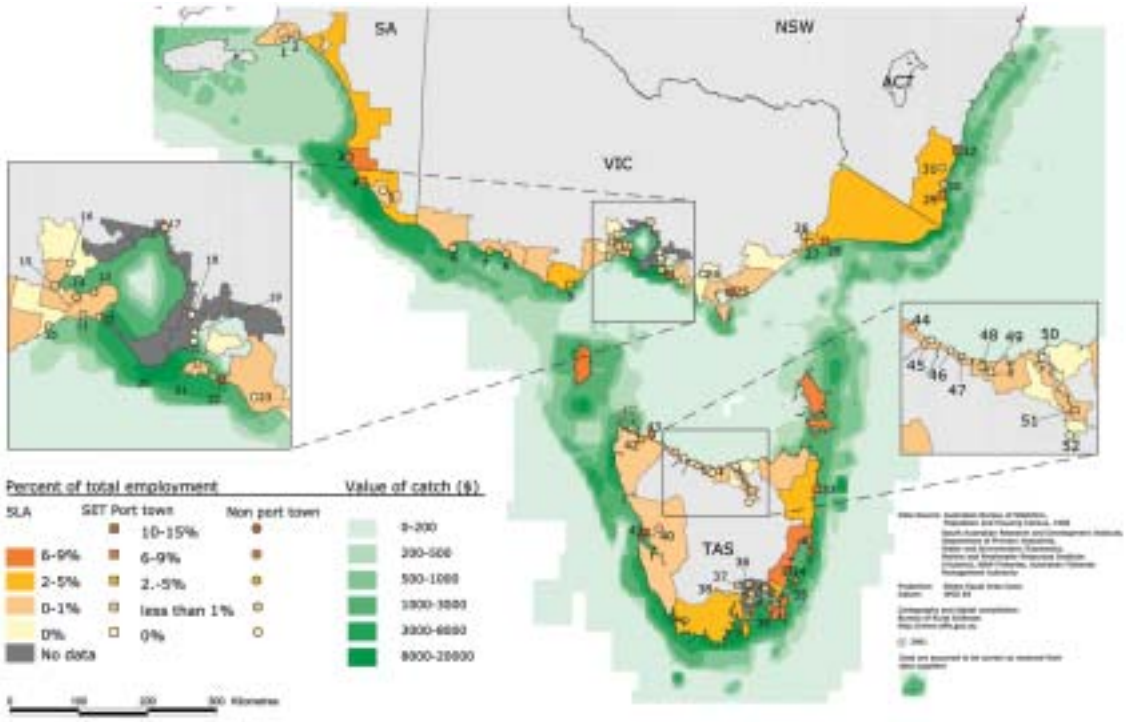
A survey and workshop of marine-focused community groups identified their vision for the Region, which includes:

- better management of the marine environment through use of management tools, including marine protected areas
- protection of endangered species
- a reduction in pollution
- resource and environmental sustainability
- increased education to promote a greater sense of community stewardship.

Participants at a workshop for key regional and national conservation organisations also saw education, appropriate management and community participation as the key to maintaining marine biodiversity. They identified a number of measures that they considered most important for the Region, including:

- a comprehensive, adequate and representative (CAR) system of large (no-take) marine protected areas
- biodiversity conservation as a non-negotiable cornerstone of planning and management
- a pollution-free marine environment
- an informed and engaged community that actively cares for the marine environment
- regulated standards for environmental quality and industry activity
- ecosystem-based management linked to catchments
- comprehensive ecosystem monitoring and assessment.

Map 2: *Employment in commercial fishing and average annual value of catch.*



Sea Country – an Indigenous perspective

In assessing the Indigenous uses and values of the Region, the underlying message received was that Indigenous people do not distinguish between land and sea. Instead, land and sea exist irrespective of the boundaries put in place over the last 200 years. Together land and sea form 'Country' – a country of significant cultural sites and 'Dreaming Tracks' of the creation ancestors.

At least 17 distinct Indigenous language groups owned, occupied and used coastal land and seas in the Region. Within these language areas Indigenous society was made up of smaller groups with inherited rights and responsibilities over land and marine environments and resources.

Coastal areas in the Region have provided an abundance of marine and other resources for many thousands of years. Coastal shell middens and the many sacred sites along the coast are stark reminders of the long relationship Indigenous people have with the ocean. Many cultural sites are listed on the Register of the National Estate, others are recorded in State-based heritage registers, while many others are known only to Indigenous people and are not formally recorded.

Indigenous community consultations during the assessment confirm that this uniquely Indigenous view of the sea is a reality for Indigenous people today. The continuing regular use of marine resources by Indigneous people around the Region highlights the importance of the sea to the domestic economies of many Indigenous households. Other clear messages include the importance of protecting their cultural heritage and their assertion of continuing inherited rights and responsibilities to their land and sea country.

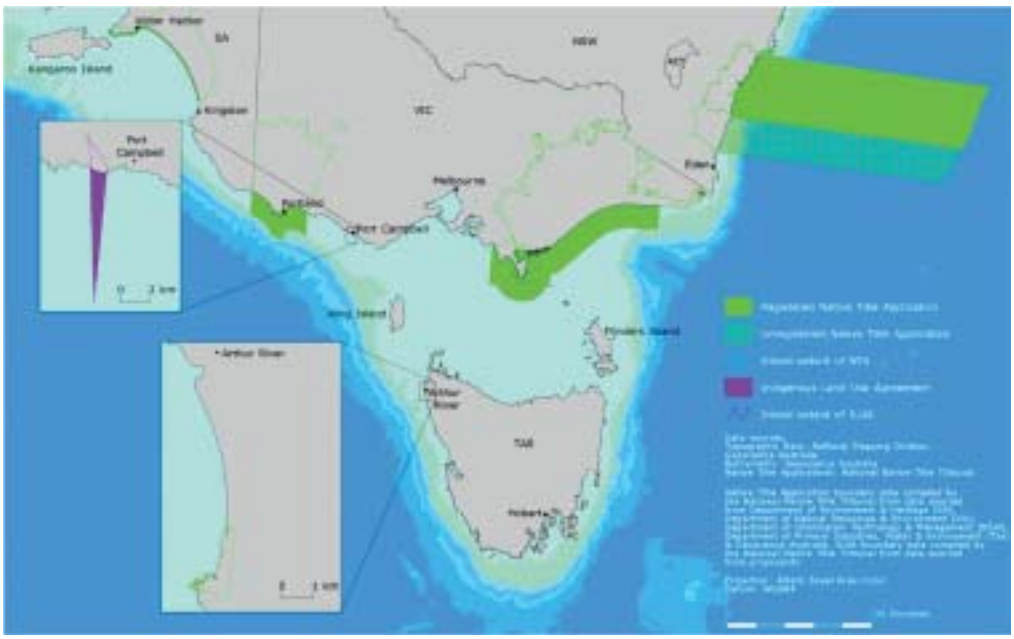
During the consultation process, the Croker Island Case (*Yarmirr*) on the existence of native title rights in the sea was being considered in the High Court. The report for the management and institutional arrangements assessment *Ocean management – the legal framework* provides an analysis of native title legislation. Map 3 illustrates native title applications and Indigenous land use agreements within the Region.

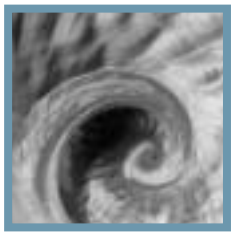
At the Commonwealth and State level, recognition of Indigenous rights and interests in marine environmental and resource management legislation varies considerably. In some situations, Indigenous people have a statutory advisory role in fisheries and marine protected area management, while in others they do not. Despite this, there is still a lack of understanding of Indigenous trading and commercial marine resource interests.

For Indigenous people, the issues raised during the consultation were about improving the health and well-being of Indigenous people, including:

- recognition and respect for culture
- co-management and resource sharing
- culturally appropriate education and training
- employment opportunities that are economically, environmentally and culturally sustainable.

Map 3: Native title applications and Indigenous land use agreements.





Our use of ocean resources

Resources – using the ocean

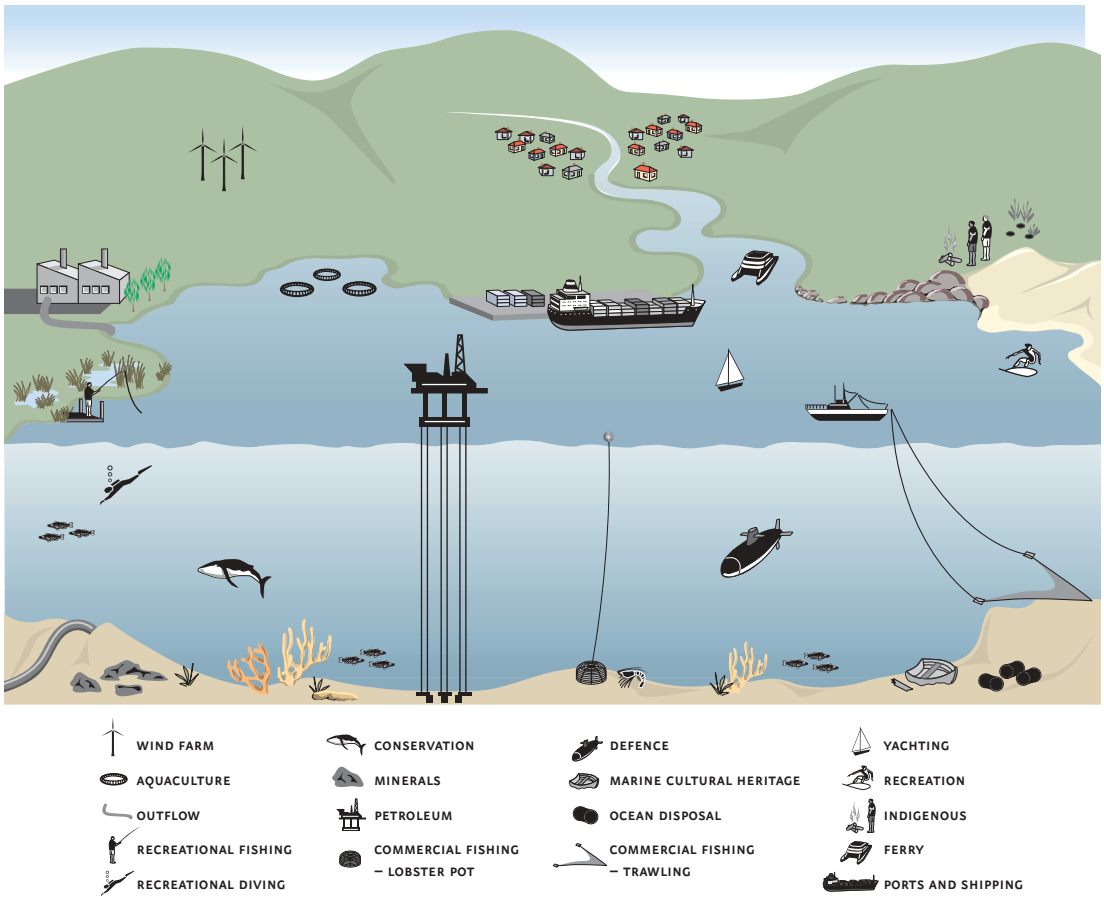
The uses assessment aims to provide an understanding and appreciation of the current uses and pressures in the Region, along with future uses and opportunities, and the value of the marine resources. The two assessment reports *Resources – using the oceans* and *Resources – Macquarie Island's picture* include extensive information about the wide variety of activities occurring in the South-east Marine Region (see Table 1).

The most important uses in terms of their financial and employment contributions are the petroleum, tourism, shipping, ports and fisheries industries. There are many other uses which may be either becoming more important or are of specific importance to local communities or to Australia's cultural identity (see Figure 10). For a full description of the uses in the Region, see the uses assessment reports *Resources – using the ocean* and *Resources – Macquarie Island's picture*, and *Marine Matters: Atlas of marine activities and coastal communities in Australia's South-East Marine Region* (BRS 2002).

As well as considering financial values of uses within the Region, the assessment extends economic analysis to include a discussion of non-market economic values. Non-market economic values are those values that, while not signalled through a market, are important for social, cultural and environmental reasons. For instance, the values people place on the natural beauty and mystery of the ocean generally have no associated monetary values.

The Region's ecosystems provide a number of environmental services such as carbon storage, waste recycling and habitat for commercially significant fish. While these services are traditionally not expressed in dollar terms, they are of substantial value to society.

Figure 10: *Pictorial representation of the diversity of uses occurring within the South-east Marine Region.*

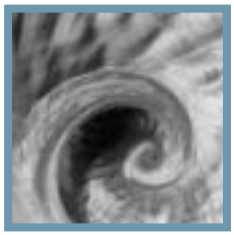


Consideration of non-market economic values is an attempt to reflect that all values are important for society, not just those values that have a functioning market and are expressed in terms of money. It allows policy-makers and the general community to make informed choices about the relative costs and benefits of different management options.

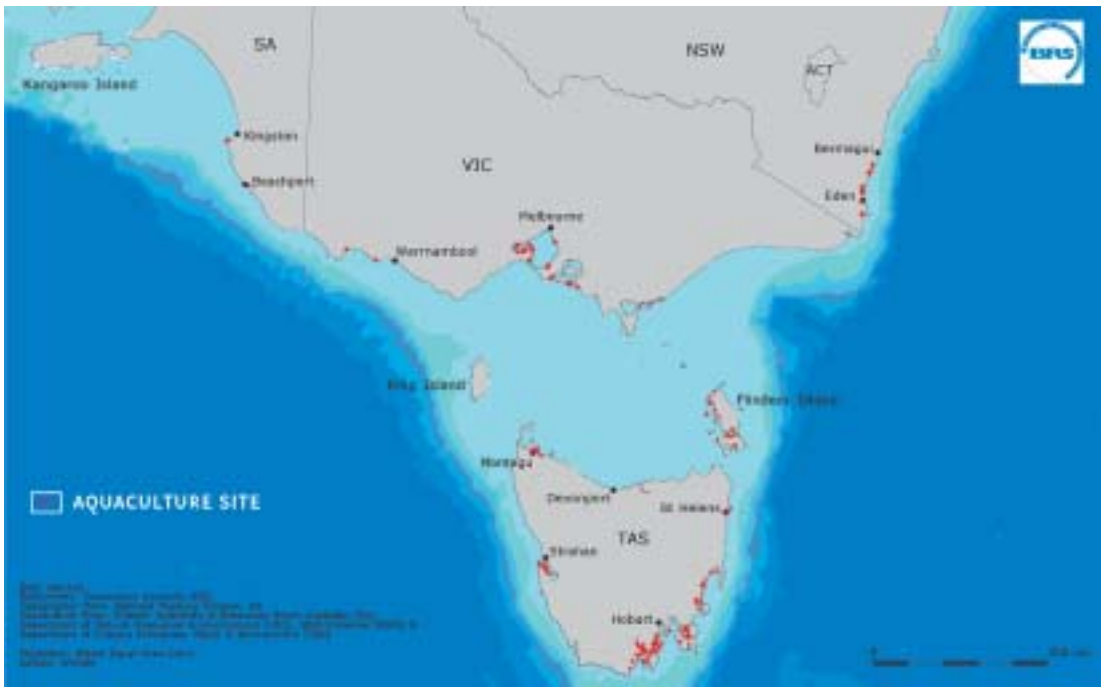
The users of our oceans and its resources are faced with many challenges, and these pressures can be categorised as follows:

- economic and market-based – those affecting users including changes in demand for products and costs of inputs
- lifestyle – those brought about through changes in peoples' preferences or attitudes
- resource use – impacts of resource use on the environment and the provision of environmental services
- institutional – those arising from legal, regulatory or other institutional requirements, including resource management arrangements
- cross-cutting – those that arise when one use affects a number of others or where a particular issue, for example native title, has potential implications across a range of uses.

There are also opportunities for expanding current activities and for new uses. The report *Resources – using the ocean* investigates how uses may develop within the Region in the future, for example petroleum and minerals have discovered new areas of known economic potential which, depending on market forces, may come under production within the next 25 years. The major commercial fisheries in the Region are in a period of consolidation with target species being managed to ensure the recovery of stocks to sustainable levels (eg orange roughy, school shark). For other industries such as shipping, new technologies such as larger ships may necessitate changes to the ports of the Region. Changes in consumer demands could well see increased tourism activity in the Region's offshore areas.

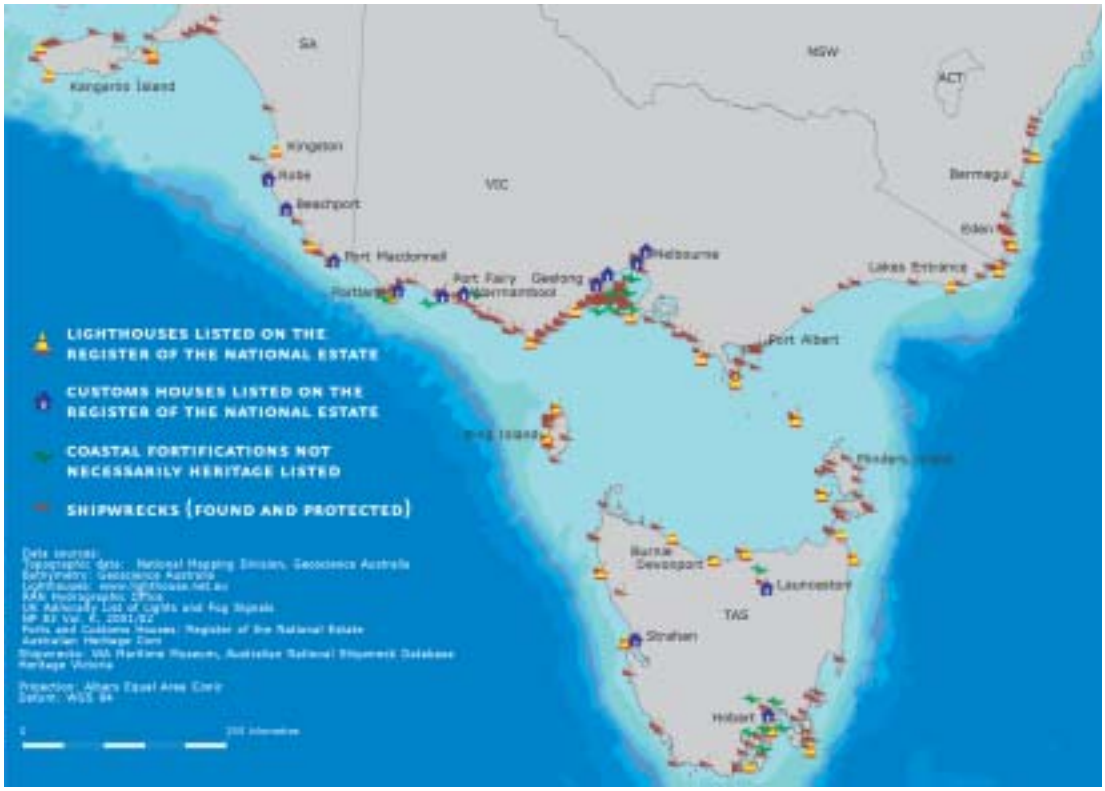


Map 4: *Aquacultural production in the South-east Marine Region.* *Source: BRS 2002.*

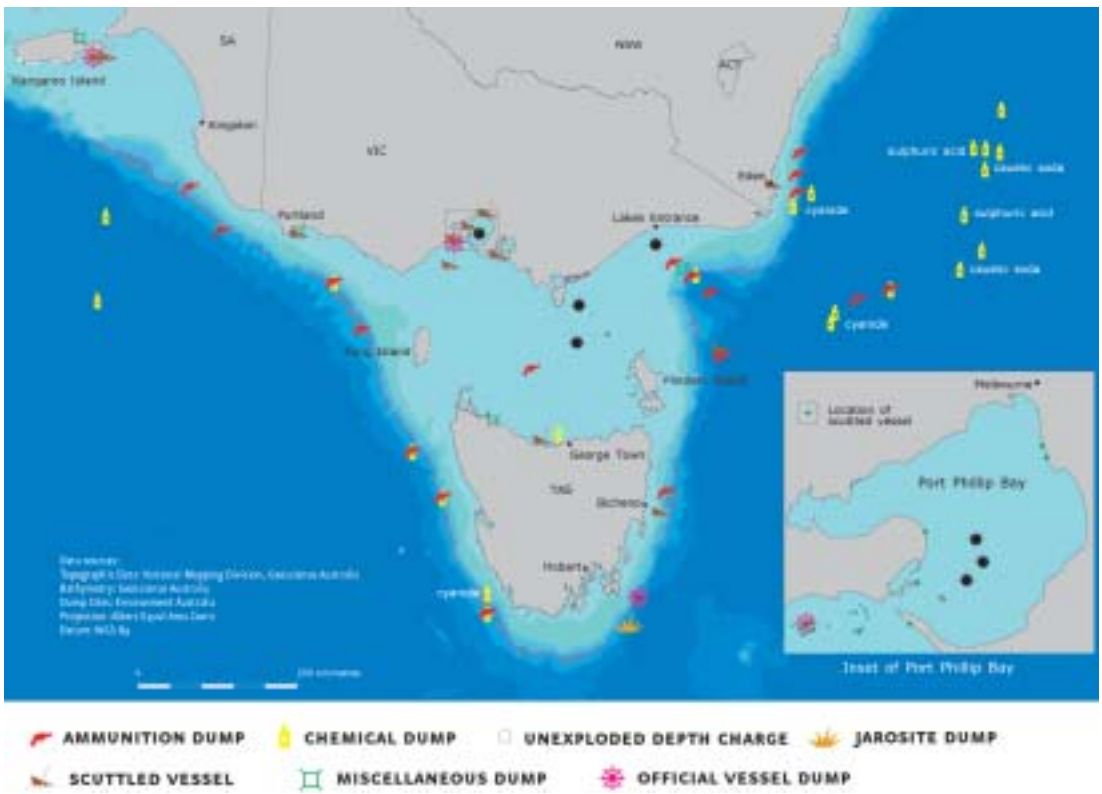


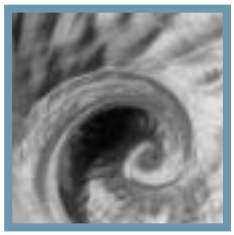
Map 5: *Gazetted defence training areas 2001.* *Source: Larcombe et al. 2002.*

Map 6: *Marine cultural heritage sites within the South-east Marine Region.* *Source: Larcombe et al. 2002.*

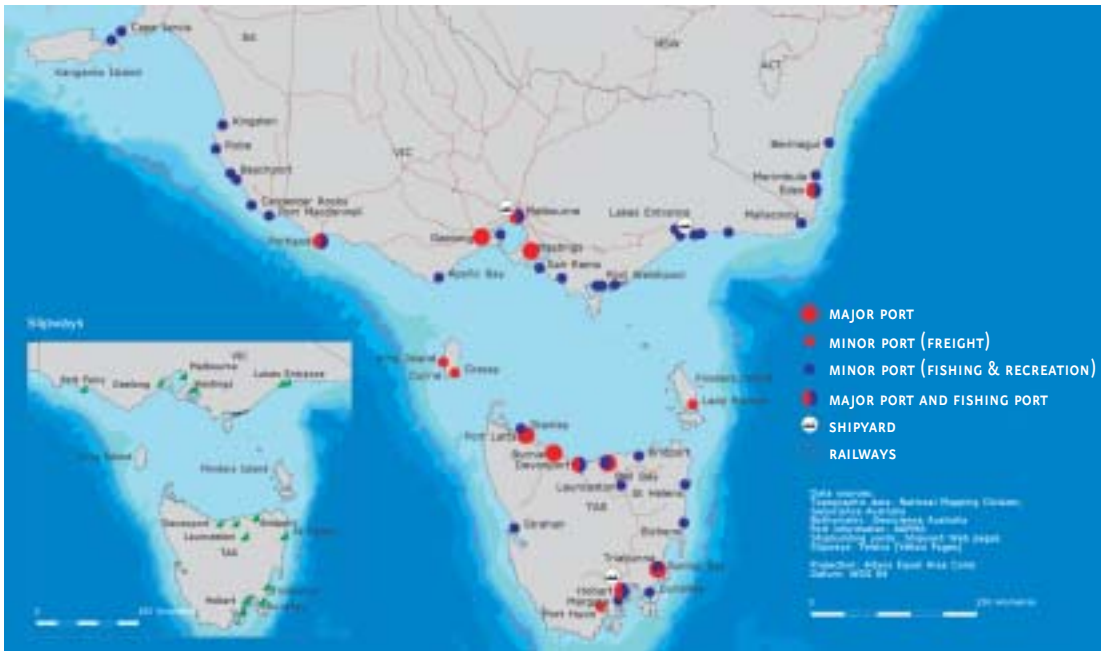


Map 7: *Ocean dumping sites (past and present) in the South-east Marine Region.* *Source: Larcombe et al. 2002.*

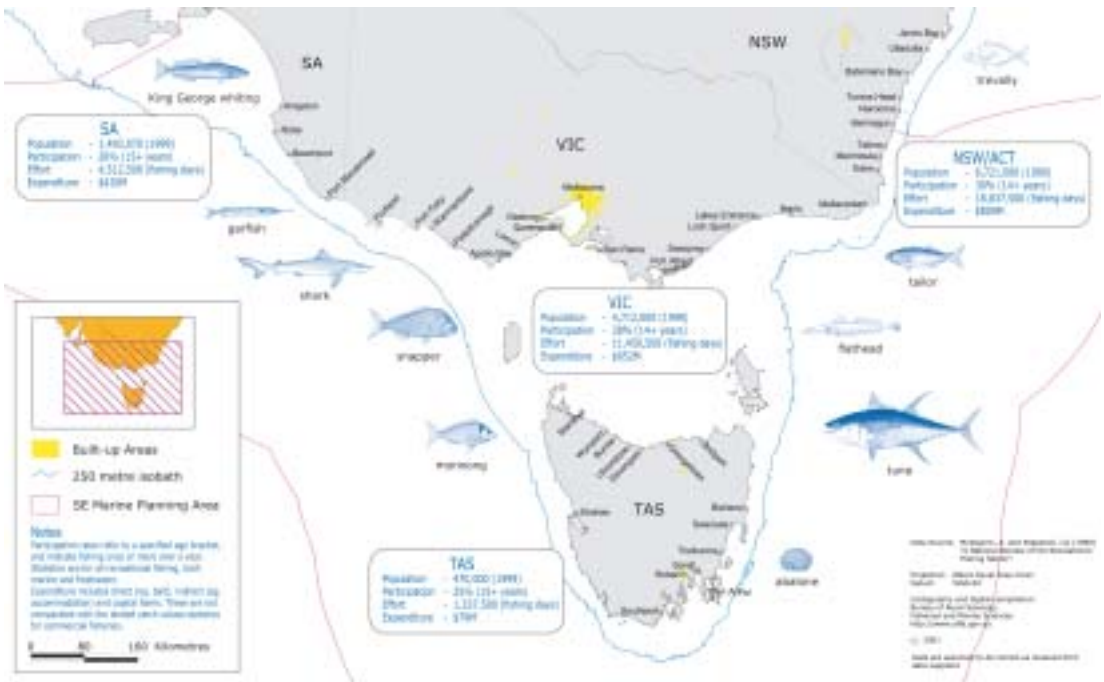




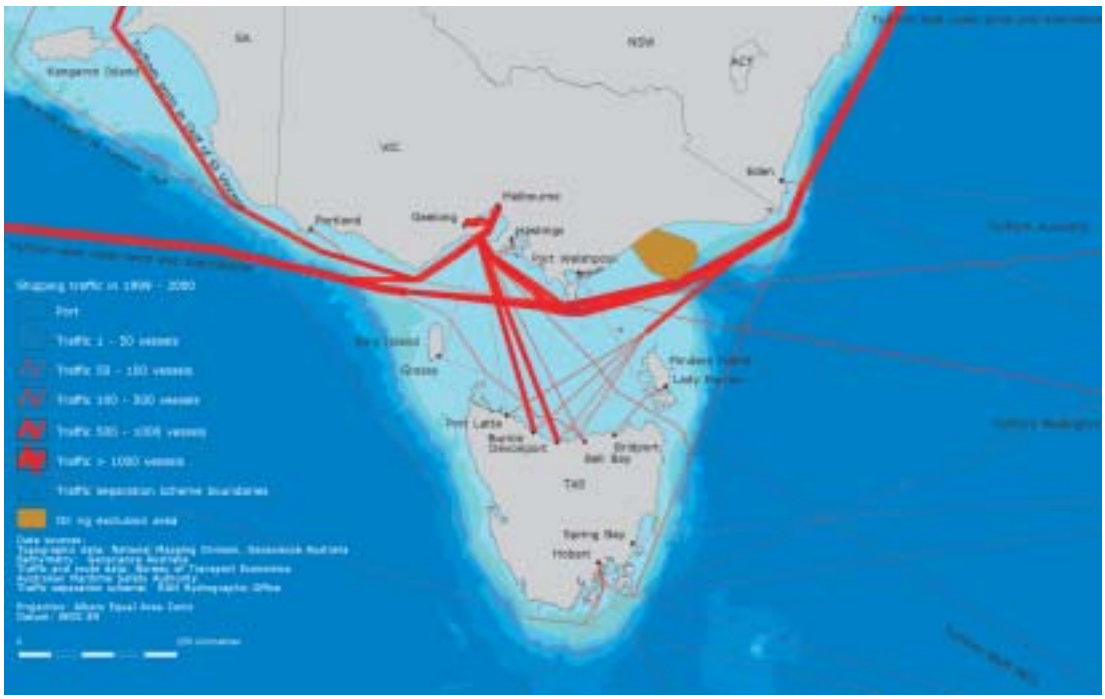
Map 8: *Ports in the South-east Marine Region.* *Source: Larcombe et al. 2002.*



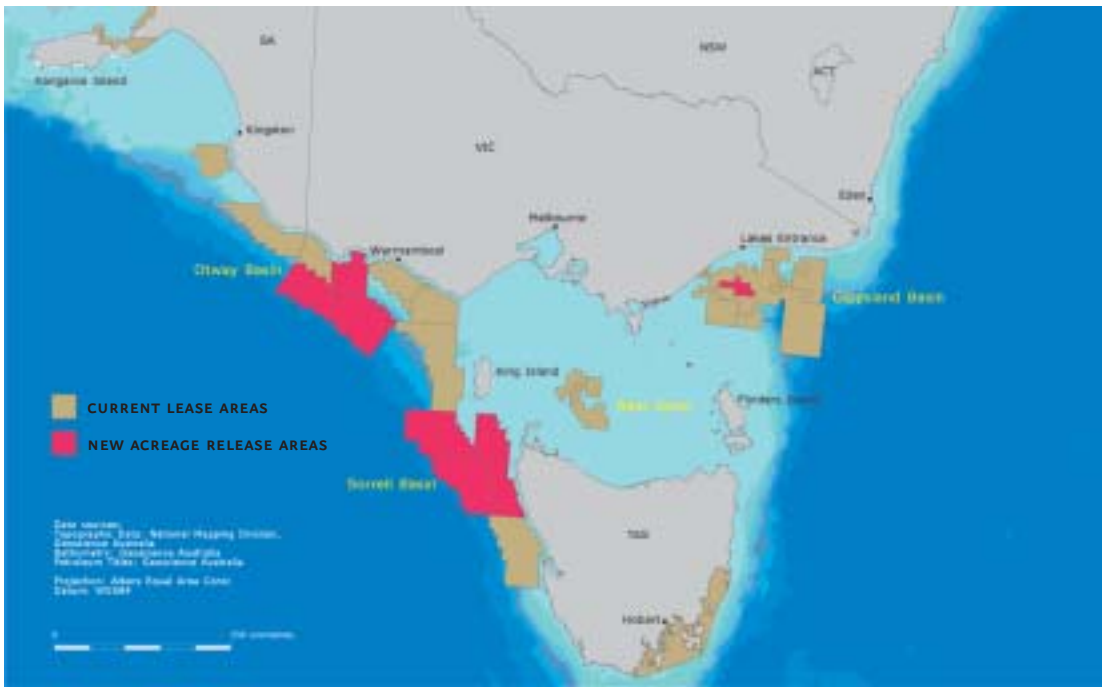
Map 9: *Recreational fishing in the South-east Marine Region.* *Source: Larcombe et al. 2002.*



Map 10: *Shipping routes and traffic in the South-east Marine Region.* *Source: Larcombe et al. 2002.*



Map 11: *Offshore petroleum titles 2001 and 2D seismic surveys 1990–2001.* *Source: Larcombe et al. 2002.*



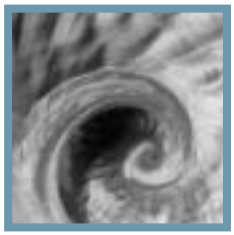


Table 1: *Range of uses described in the report* Resources – using the ocean *and a brief explanation of each use (in alphabetical order).*

Use	Brief explanation
Aquaculture (see Map 4)	There is currently no aquaculture activity in Commonwealth waters in the Region. Only Victoria and Tasmania have significant aquaculture activities within inshore State waters. The main aquaculture products are Atlantic salmon, Pacific oysters and mussels. Aquaculture production in the Region was worth over $100 million in 1999-2000 and is growing at an annual rate of around 13%.
Biotechnology	Biotechnology is a broad term for a group of technologies based on applied biological science and includes any technique that uses living organisms (or parts of organisms) to make or modify products; to improve plants and animals; or to develop micro-organisms for specific uses. It has diverse existing and potential applications in medicine, agriculture, food processing, manufacturing, energy production and environmental management. The estimated value of the international biotechnology industry (pharmaceuticals, nutriceuticals, agrochemicals and industrial or biomedical agents) was in excess of $US200 billion in 2001. The Australian biotechnology industry is comparably small (but expanding rapidly) with a market capitalisation of almost $15.5 billion. There are over 120 biological sample collection sites in the Region for the biotechnology industry.
Commercial fisheries	The Region encompasses 32 Commonwealth, State or jointly managed open ocean fisheries and an array of fishing methods and gear types (see Box 3).
Conservation	The conservation section of the uses assessment report focuses on three important aspects of conservation in the South-east Marine Region – marine protected areas, threatened species and an overview of conservation measures applied in each sector using the Region (see Box 4).
Defence (see Map 5)	The Australian Defence Force operations span three broad categories – military, constabulary and diplomatic. Australian Defence Force activities in the Region include transit of naval vessels; training exercises; ship building/repairs; hydrographic surveys; surveillance and enforcement; and search and rescue. There are currently no Royal Australian Navy vessels based in the South-east Marine Region. The Region is host to one commissioned establishment (HMAS *Cerberus*, Crib Point Victoria) and two non-commissioned establishments (the East Coast Armaments complex, Port Wilson, Victoria and Naval Headquarters, Tasmania, Hobart). HMAS *Cerberus* is Australia's largest Naval Training Base.
Emerging industries	Clean renewable energy resources are becoming increasingly attractive, not just for environmental reasons but also because hydrocarbon resources are finite and are likely to become increasingly expensive. A number of renewable energy resources are being explored around the world, and those applicable within the Region include wave and wind power.
Indigenous	Traditional uses such as fishing are important components of Indigenous use within the Region (see Box 5).
Marine heritage (see Map 6)	The South-east Marine Region has many natural, cultural and maritime heritage places, including coastlines, islands and reefs; Indigenous clan estates and coastal middens; and shipwrecks, lighthouses, customs houses, coastal fortifications and penal settlements.

Table 1: *Range of uses described in the report* Resources – using the ocean *and a brief explanation of each use (in alphabetical order). ctn…*

Use	Brief explanation
Marine heritage (see Map 6) *ctn…*	Conservation and interpretation of this heritage helps us to understand and appreciate our culture and history. Macquarie Island, including the waters out to 12 nautical miles, was listed for its natural values as a World Heritage Area in 1997 on the basis of its outstanding marine natural heritage, including unusual geological features and aesthetic values.
Marine education	Formal education facilities in the Region include universities and colleges in Tasmania and Melbourne that offer courses and research opportunities in areas such as marine biology and ecology; aquaculture; maritime transport and marine engineering; marine resource management; and related areas such as law, economics and the social sciences.
Marine research	A broad range of field science is carried out in the Region aboard a diverse array of research vessels, from small dinghies, motor boats and inflatable craft to larger, sea-going vessels for offshore biological, oceanographic and geological research. Commonwealth and State government research agencies, museums and universities are active in the Region undertaking inshore surveys, offshore biological research, seafloor mapping and physical oceanography. Recent surveys sponsored by the National Oceans Office have extended the coverage of seafloor maps of the Region and our understanding of the structural features of the deep-sea habitats. These expeditions, named Austrea–1 and Austrea–2, have surveyed and mapped 260 000 km^2 of seafloor, unveiling previously unmapped and spectacular features, such as canyons, seamounts and fractures.
Offshore minerals	There has been limited exploration for minerals in the Region since the 1960s. Exploration licences have been granted in the past for areas off northern, western and southern Tasmania, Flinders Island, King Island, and Great Oyster Bay. No commercial exploitation followed this exploration activity. The single current exploration licence for offshore minerals in the South-east Marine Region is for cassiterite (tin) in Ringarooma Bay off northeastern Tasmania.
Oceans waste disposal (see Map 7)	Materials have been dumped in the South-east Marine Region including chemicals, ammunition and industrial waste, as well as nearly 50 vessels that have been either abandoned or deliberately scuttled. Dumping of about six million tonnes of jarosite occurred from Pasminco's zinc smelter in Hobart from 1966 to 1997.
Oil and gas	There has been exploration activity in various parts of the Region since the late 1950s in four major basins: Gippsland, Otway, Sorrel and Bass (see Box 6).
Ports and marinas (see Map 8)	In 1998-99 the ports of the Region accounted for 23% of Australia's total exports from ports and 5% by volume – a total of over $23 billion and 25 400 million tonnes respectively. They also accounted for around 37% of imports by value and 25% by volume – over $30 billion and 13 million tonnes respectively. In 1998-99 the Port of Melbourne alone handled international cargo to the value at over $3.6 billion.
Recreational fishing (see Map 9)	Research suggests that between 25 and 35% of Australians aged over 14 years undertake recreational fishing activities at least once a year, and that recreational anglers undertake approximately 50 million fishing days per annum. Over three million people living in the

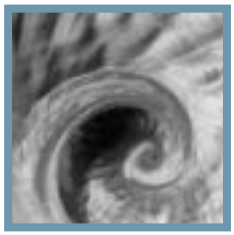


Table 1: *Range of uses described in the report* Resources – using the ocean *and a brief explanation of each use (in alphabetical order).*

Use	Brief explanation
Recreational fishing (see Map 9) *ctn...*	States bordering the Region regularly engage in recreational fishing activities. A national survey of recreational fishing is due for completion in early 2002 that will provide a valuable, national information base. Some of the most popular locations for recreational fishing in the Region are: • New South Wales – Twofold Bay, Eden, Wonboyn • Victoria – Mallacoota, Gippsland Lakes, Corner Inlet, Western Port Bay, Port Phillip Bay, Portland Bay • Tasmania – Tamar River, Great Oyster Bay, D'Entrecasteaux Channel, Storm Bay, Derwent River, Huon Channel • South Australia – The Coorong, Victor Harbor. For the States bordering the Region, the most recent reliable data for the number of people engaging in recreational fishing at least once a year is: • Victoria – around 916 000 (1987) • South Australia – around 360 000 (1997) • Tasmania – around 107 000 (1983) • New South Wales – around 1 508 000 (1995).
Shipping and ship/boat building (see Map 10)	Shipping activity in the Region encompasses cargo shipping, passenger shipping, and ship/boat building/repair activity. The Region is home to some of Australia's busiest shipping routes: Bass Strait, east-west and west-east international trading routes. This traffic includes international and coastal cargo trade, passenger services and cargo and vehicular ferry services across Bass Strait. Cargo shipping alone accounted for nearly 9000 ship movements in the Region in 2000–2001.
Submarine cables and energy transmission lines	Submarine cables in the Region are limited to the sub-sea floor of Bass Strait between Tasmania and the Australian mainland. In Bass Strait there is currently in place one operational submarine cable (a Telstra fibre optic cable installed in 1995) as well as several obsolete telegraph and telephone cables. Duke Energy International's natural gas transmission pipeline project features a 744 km sub-sea and underground pipeline that will transport natural gas from Victoria across Bass Strait to Hobart in Tasmania's south and Port Latta on Tasmania's north west coast.
Surveillance	There have been several surveillance flights conducted by Coastwatch aircraft in the past two years. The majority of identified sightings are Australian fishing vessels, foreign fishing vessels, cargo vessels and yachts. There have been no significant incidents, other than fisheries infringements, in the Region during the past five years. There were no apprehensions or arrests resulting from aerial surveillance in the area during that period.
Tourism and offshore charter	Tourism in the Region and adjacent coastal waters and lands involves both domestic and international tourists. The Region is diverse with visitors participating in a wide range of activities including diving; charter boating; recreational boating; whale/dolphin watching; cruise ship visitations; yacht racing; going to the beach/surfing/coastal sightseeing/swimming; fishing and penguin watching. Initial calculations indicate that nationally the direct value of marine tourism was around $9.1 billion in 2000–2001, with marine tourism directly employing around 210 000 people. The indirect value added of marine tourism and employment is estimated at about $23 billion and 497 000 people, making it and the petroleum industry the two most valuable marine-based industries in Australia. Within the Region, marine tourism generated over $2.6 billion in value added in 2000–01. In addition it directly generated over 60 000 jobs.

Box 3: Commercial fisheries

Some 13% of the Region's continental shelf waters are less than 200 m deep. A further 16.5% is shallower than 1500 metres and comprises seabed potentially accessible to bottom fishing gears such as bottom longline and trawl. The whole area is potentially accessible to pelagic fishing gear that operates in the water column, such as purse seine and pelagic longline. There are 32 Commonwealth, State or jointly-managed open ocean fisheries in the Region using an array of fishing methods and gear types.

As of 1999, total fisheries production from the South-east Marine Region, in both Commonwealth and State waters was approximately 46 000 tonnes of fish (including molluscs and crustaceans) worth around $321 million – made up of $253 million from State waters and $63 million from Commonwealth waters. By volume this total was made up of around 34 000 tonnes from Commonwealth waters and around 12 000 tonnes from State waters. In addition, production value is not evenly spread across the Region's fisheries. For instance, just two fisheries, the abalone fishery and the rock lobster fishery, were worth over $241 million in 1999 – 73% of the Region's total earnings in that year.

Commercial fishing in the Region is not spread evenly across all waters but is concentrated in inshore coastal waters (mainly State fisheries) and along the continental slope (mainly Commonwealth fisheries) (see Map 2). The Commonwealth fisheries within the Region are the:

- Bass Strait Central Zone Scallop Fishery
- South East Trawl Fishery
- South East Non-Trawl Fishery
- Southern Shark Fishery
- Southern Squid Jig Fishery
- Jack Mackerel Fishery
- Eastern Tuna and Billfish Fishery
- South Tasman Rise Fishery
- Macquarie Island Fishery.

The combination of the South East Trawl and South East Non-Trawl Fisheries is referred to as the South East Fishery. In addition, parts of the Southern Tuna and Billfish Fishery, the Southern Bluefin Tuna Fishery and the Great Australian Bight Trawl Fishery exist within the South-east Marine Region, but only minimal catches are taken from these fisheries in the Region.

Commercial fishing is also an important component of the Region's coastal economy. Activities such as repair yards, dockhandling, transportation, boat construction, fish processing and commercial trade and the supply of marine gear – such as nets and rigging – add significantly to the Region's employment and economic activity.

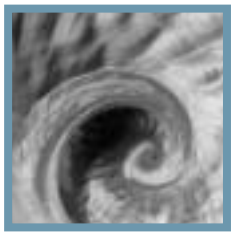
Box 4: Conservation

Conservation is the protection, maintenance, management, ecologically sustainable use, restoration and enhancement of the natural environment. The Australian Committee for the International Union for the Conservation of Nature and Natural Resources (IUCN) expands this definition to include the understanding and enjoyment of Australia's natural and cultural heritage.

There are numerous inshore, State-managed MPAs and two Commonwealth MPA's in the Region:

- the world's largest highly protected zone is contained within the 16.2 million hectare Macquarie Island Marine Park
- the Tasmanian Seamounts Marine Reserve was declared in May 1999 following voluntary closure of the area by the South East Trawl Fishery operators.

The Region is part of the Australian Whale Sanctuary which covers all Commonwealth waters and there are recovery plans in place covering such species in the Region as blue and southern right whales, and great white sharks. Sectors within the Region apply conservation measures either through legislation or industry-initiated Codes of Practice to ensure the long term sustainability of their resources and the supporting environment.



Box 5: Indigenous use

The continuing importance of marine resources to indigenous people in southern Australia is summarised in the following quote:

"Aboriginal practices still continue. I have been collecting and harvesting food from the seashore since childhood and now teach my grandchild the Aboriginal way of doing things." (Interview with Ms Faye Tatnell, Manager, South-east Tasmanian Aboriginal Corporation, Cygnet, Thursday 17 October 2001.)

Most parts of coastal Australia are of continuing cultural and spiritual significance to Indigenous people, who engage in subsistence hunting, fishing and gathering. Fishing is an important part of Indigenous culture, using a variety of methods and equipment including hand gathering, lines, rods and reels, nets, traps and spears. Indigenous fishing targets a range of species of fish, shellfish, crabs and worms that are used for food, medicine or bait. Abalone, crab and lobster harvesting are recognised as an important part of the Indigenous fisheries. Indigenous people in southeastern Australia engage in fishing and shellfish collecting on a regular basis and are involved in commercial fishing activities.

Box 6: Oil and gas

Production in the Region occurs solely from the Gippsland Basin which has been Australia's dominant oil producing area for the best part of thirty years, though production has generally declined over the past couple of decades. Exploration activity is widespread throughout the Gippsland, Otway, Sorrel and Bass Basins (see Map 11).

The petroleum industry spent an estimated $34 million on exploration and development activities in 1999-2000 in the Region, including expenditure on:

- 798 square kilometres of seismic exploration
- three exploration wells totalling a drilling depth of 4951 m
- nine development wells totalling a depth of 25 894 m.

Since production in Bass Strait began in 1966, about 3.5 billion barrels of oil and condensate (85% of proven reserves) and five trillion cubic feet of gas (about 50%) has been produced (Esso-Mobil 2001). In June 2000 remaining proven reserves were estimated at 688 million barrels of oil and condensate and 4381 billion cubic feet of natural gas. In 1999–2000 199 977 barrels of oil valued at $3.6 billion and $490 million of gas was produced from the Gippsland Basin in Bass Strait.

There is a substantial submarine petroleum pipeline network of 500 km conveying petroleum products from offshore production facilities within Bass Strait to the Longford gas plant in Sale (Victoria) for processing and transmission.

Impacts – identifying disturbances

The impacts assessment aims to categorise human activities and actions and their effects on the marine environment in the South-east Marine Region.

Impacts are defined as any human activity, action or process that has an effect on the ecosystems in the Region. While natural processes such as severe storms can have profound effects on the ecosystem, these were not dealt with in this assessment. The purpose of this assessment is not to duplicate existing work on specific impacts, but to consider the range of impacts across the whole South-east Marine Region – an area of over two million square kilometres of water.

The assessment report *Impacts – identifying disturbances*, defines and describes 12 categories of disturbance, and provides an overview of where disturbances are known to occur in the environment (see Table 2). This analysis uses the same descriptions of environment types as those in the biological and physical characteristics assessment (see Figure 2). Two categories of ecosystem components were added: 'Bays and estuaries' (because a number of disturbances are evident in these parts of the Region) and 'Multiple ocean environs' (disturbances that affect species moving throughout the ecosystem, such as seabirds and whales).

The report also defines 13 categories of activities and describes those activities that are either 'known', or considered 'possible' to cause the disturbance (see Table 3). It includes impacts that may be negligible, temporary and/or localised, as well as impacts that are being mitigated by industry practices.

The two matrices developed as part of the assessment process are the first step in meeting the challenge of considering the range of impacts across the whole Region. The assessment of the impacts on the natural system analyses the information from the perspective of the ecosystem, rather than the more traditional approach of exploring the direct link between the activity itself and any potential disturbance. As such, the analysis describes which parts of the ecosystem are affected by each disturbance category. The outcome of this analysis is illustrated in the matrix 'Ocean environs and disturbances' (see Figure 11).

Direct links between each activity and the type of disturbance it causes are also explored. The outcome of this analysis is illustrated in the matrix 'Activity and disturbances' (see Figure 12).

The assessment process followed The 'Australian and New Zealand Standard for Risk Management' as a general methodology for analysing information about impacts on the ecosystem (see Figure 13). The matrices represent the initial stage of 'identifying the risks' and aim to identify the broad range of impacts that affect the ecosystem.

The work in this assessment so far concentrates on identifying the risks from activities in the South-east Marine Region. It does not yet make any judgements about the relative risk or importance or consequences of those risks, nor does it explain the mitigation mechanisms in place to counteract those risks. It also does not look at the cumulative impacts.

A large amount of work has already been done by industry, researchers and governments to understand and manage impacts within the South-east Marine Region. Environmental impact assessments are routinely carried out for many proposed activities, involving industry and local, State and Commonwealth Governments. For some industries, operations include the ongoing assessment of the environmental risks and effects. There are established processes for reporting on the 'state of the environment' and for considering the sustainability of specific industries.

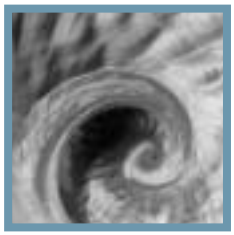


Table 2: *The 12 disturbance categories used to define impacts to the South-east Marine Region.*

Disturbance Category	Description
Chemical change	Changing the concentration or properties of compounds naturally occurring in the ocean, such as changes to salinity, nutrients, and dissolved oxygen
Contaminants	Introducing substances that are not normally found in the marine environment, such as heavy metals, PCBs and litter
Temperature change	Changing the marine environment's natural temperature range
Mechanical change	Removing or changing structural (biological and physical) components of the ecosystem, such as building dams
Nuclear radiation	Introducing radioactive isotopes into the marine environment
Electromagnetic radiation	Introducing radiation that consists of electromagnetic waves
Noise	Increasing the level or amount of sound in the marine environment beyond its natural range
Biological interaction	Removing or damaging organisms such as discarding bycatch
Introduced pathogens	Introducing disease-producing organisms to the marine environment, either from terrestrial or marine sources
Introduced marine species	Introducing species outside of their natural or historical ranges
Turbidity/light	Changing the extent to which light penetrates the water column
Artificial light	Introducing a source of light that would not naturally occur in the marine environment

Table 3: *Sources of disturbance in the South-east Marine Region.*

Source of Disturbance	Description
Aquaculture	Activities associated with cultivating the food resources of the sea or inland waters. Some specific activities include feeding, disposal of waste and physical location
Defence	Activities specific to defence activities in the marine environment (note: all shipping-related activities are included under shipping). Some specific activities include sonar, live firing exercises and underwater explosions
Emerging	Activities which are new or recent to the marine environment, such as biotechnology
Harvesting	Activities that relate to fishing activities, including discarding of fish, diving and fishing gear disturbance. Any shipping related activities are included under the shipping category
Human changes coastal zone	Activities by humans that cause changes to the coastal zone such as coastal construction and dredging
Indigenous customary use	Activities associated with Indigenous customary use, including customary harvest and ceremonial activities
Land-based	Activities that are distinguished from human changes by the types of input that they have to the environment, including industrial discharge, sewage and urban discharge
Ocean dumping	Activities that are associated with the disposal of waste and other products (such as ammunition) at sea
Petroleum	Activities that are associated with petroleum exploration and production in the marine environment, for example, seismic survey, rig establishment and produced formation water disposal. Ship-related activities are included in the shipping category
Recreational activities	Recreational activities that do not fit into the tourism category, including collecting species and diving
Shipping	All shipping-related activities, including those from harvesting, petroleum and defence. Shipping activities include hull-fouling, ballast water discharge and shipping maintenance
Submarine cables	Activities associated with submarine cables including the physical presence of cables
Tourism	Activities associated with tourism (not including shipping, since these are covered under shipping) including interactions with wildlife, and the development of tourism sites

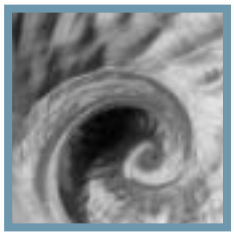


Figure 11: *Matrix A: Ocean environs and disturbances.*

Ocean Environs	Ocean Lifeforms	Chemical changes	Contaminants	Temperature	Mechanical	Nuclear radiation	Electromagnetic radiation	Noise	Biological interactions	Introduced pathogens	Introduced species	Turbidity/light	Artificial light
Bays and estuaries	Flora												
	Fauna												
Inshore (0-20m)	Flora												
	Fauna												
Inner shelf (approx 20-60m)	Flora												
	Fauna												
Mid shelf (approx 60-150m)	Flora												
	Fauna												
Outer shelf (150-200m)	Fauna												
Slope	Fauna												
Pelagic inner shelf	Planktonic												
	Nekton												
Pelagic shelf (inc shelf break)	Planktonic												
	Nekton												
Pelagic offshore	Planktonic												
	Nekton												
Seamount	Fauna												
Multiple ocean environs	Cetaceans												
	Pinnipeds												
	Seabirds												

Key

Known to occur		The disturbance is known to have an effect on this part of the ecosystem.
Possible		Possibly causes a disturbance, but there is no example in the South-east Marine Region.
Unknown		It is unknown if the disturbance has an effect on this component of the South-east Marine Region.
Known not to occur		The disturbance is known not to effect this component of the South-east Marine Region.

Please note: *This report lists the range of impacts on the natural system that occur in the South-east Marine Region, but does not make any judgements about the relative importance or consequence of those impacts or the activities that cause those impacts, nor does it explain the many mitigation mechanisms in place.*

Figure 12: *Matrix B: Activity and disturbances.*

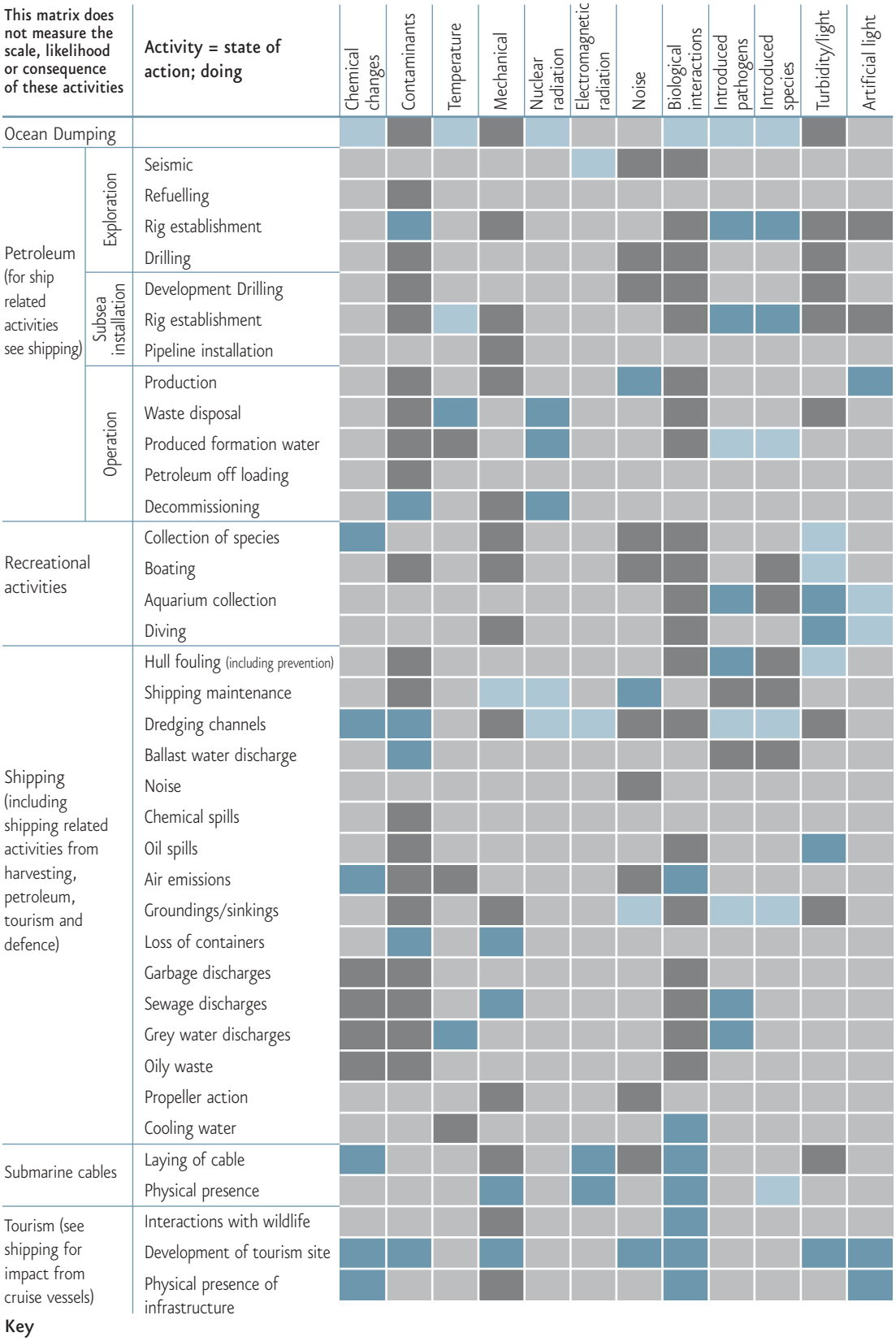
This matrix does not measure the scale, likelihood or consequence of these activities	Activity = state of action; doing	Chemical changes	Contaminants	Temperature	Mechanical	Nuclear radiation	Electromagnetic radiation	Noise	Biological interactions	Introduced pathogens	Introduced species	Turbidity/light	Artificial light
Aquaculture	Feeding												
	Disposal of waste												
	Physical location												
	Stock escape												
	Translocation of pens												
	Sourcing stock												
	Maintenance												
	Sourcing feed												
Defence (for ship related activities see shipping)	Radar/radio transmissions												
	Sonar												
	Underwater explosions												
	Live firing exercises												
	Laser emitters												
	NPW passive radiation												
Emerging	Bioprospecting												
Harvesting (for ship related activities see shipping)	Fishing gear disturbance												
	Stock exploitation												
	Discarding of fish												
	Introduction of fish bait												
	Harvesting												
	Diving												
Human changes coastal zone	Dredging												
	Dam + weir contruction												
	Alter tidal flow												
	Coastal construction												
	Erosion												
	Acid-sulphate soils												
Indigenous customary use	Customary harvest												
	Ceremonial												
	Commercial harvest												
	Aquaculture												
	Ecotourism												
Land based	Industrial discharge												
	Urban discharge												
	Agricultural discharge												
	Sewage												
	Domestic waste disposal												

Key

Known to occur	The activity is known to cause this type of disturbance in the South-east Marine Region.
Possible	Possibly causes a disturbance, but there is no example in the South-east Marine Region.
Unknown	It is unknown if the activity caused this type of disturbance in the South-east Marine Region.
Known not to occur	The activity is known not to cause this type of disturbance in the South-east Marine Region.

Please note: *This report lists the range of impacts on the natural system that occur in the South-east Marine Region, but does not make any judgements about the relative importance or consequence of those impacts or the activities that cause those impacts, nor does it explain the many mitigation mechanisms in place.*

Figure 12: *Matrix B: Activity and disturbances ctn...*

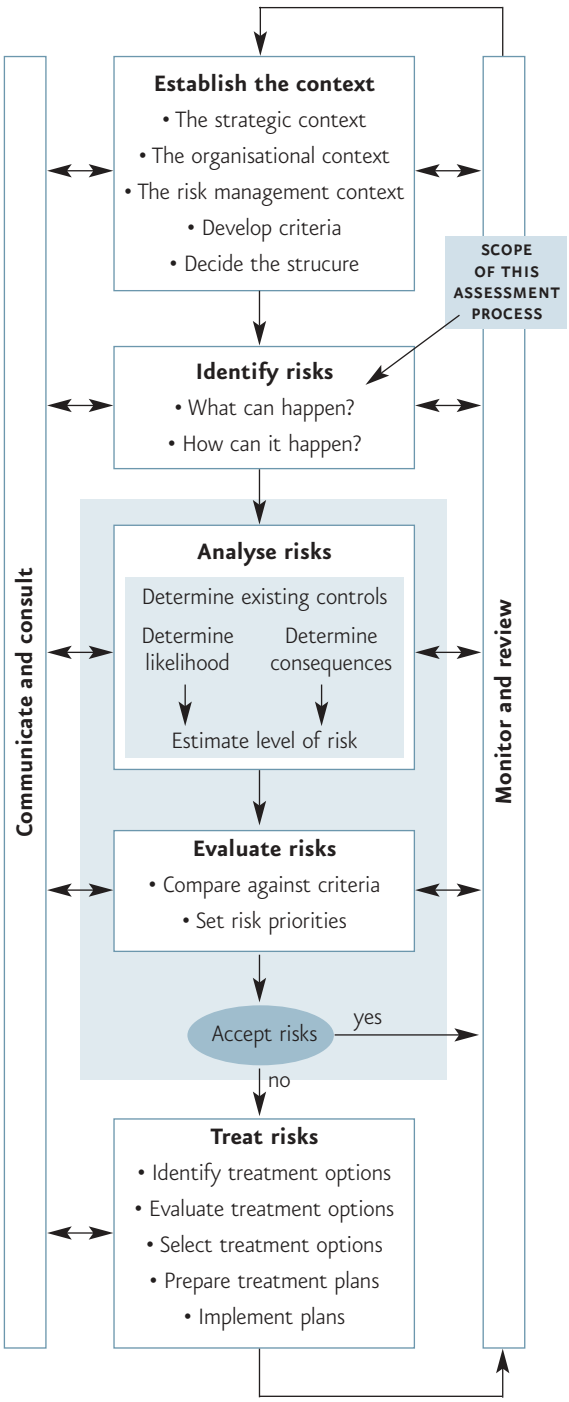


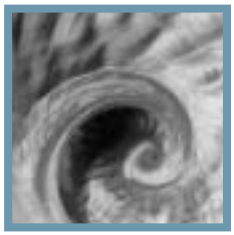
Key

Known to occur	The activity is known to cause this type of disturbance in the South-east Marine Region.
Possible	Possibly causes a disturbance, but there is no example in the South-east Marine Region.
Unknown	It is unknown if the activity causes this type of disturbance in the South-east Marine Region.
Known not to occur	The activity is known not to cause this type of disturbance in the South-east Marine Region.

Please note: *This report lists the range of impacts on the natural system that occur in the South-east Marine Region, but does not make any judgements about the relative importance or consequence of those impacts or the activities that cause those impacts, nor does it explain the many mitigation mechanisms in place.*

Figure 13: *The risk assessment process.*





Ocean management – the legal framework

The management and institutional arrangements assessment broadly describes the Commonwealth legislation affecting how we use and protect our oceans in the South-east Marine Region. The management arrangements for oceans use in Australia arise from historical management based on individual sectors in various State and Commonwealth waters, and these are characterised by a complex system of legislation (see Table 4).

The overarching framework of marine regulation in Australia is dominated by international law, principally the Law of the Sea, and Australia's constitutional structure. International law, as contained in the *United Nations Convention on the Law of the Sea* (LOSC), sets out the basic rules for the exercise of jurisdiction by a coastal nation State. This varies according to the zone of jurisdiction, but usually extends to the limit of the Exclusive Economic Zone (200 nautical miles from the coast).

The sovereignty and sovereign rights of Australia under the LOSC are given force in Australia by the *Seas and Submerged Lands Act 1973*, which vests such rights in the Commonwealth for all waters except those within the limits of State or Territory waters.

In 1979 an agreement, the Offshore Constitutional Settlement (OCS), was reached between the Commonwealth and the States to provide arrangements for the management of offshore areas. This agreement was given force by the *Coastal Waters (State Powers) Act 1980* and the *Coastal Waters (State Title) Act 1980*.

The report presents issues regarding the current framework and suggestions for implementing regional marine plans as raised by stakeholders during a workshop convened by the National Oceans Office. At the workshop, the Management and Institutional Working Group met with representatives from the petroleum, commercial and recreational fisheries, conservation, shipping, ports, tourism and Indigenous custodian sectors. The representatives raised some concerns relating to the gaps and duplications in the existing management arrangements of each sector. A wide variety of preferences were expressed for implementing the future directions of regional marine planning, ranging from the use of guidance notes to legislation.

Table 4: *Regulatory framework for different activities within the South-east Marine Region.*

Activity	Regulatory framework
Shipping	Large commercial shipping operations are governed by international law and maritime conventions, which have been enacted into Australia's domestic law. International maritime conventions deal with all aspects of ship safety and environment protection. The primary international organisation dealing with maritime safety and environment protection conventions is the International Maritime Organisation (IMO) and Australia is party to most of its conventions. Domestically, the Shipping and Navigation Agreement under the OCS establishes the division of responsibility between the Commonwealth and State governments. The Commonwealth has responsibility for: • trading vessels on an international or interstate voyage • fishing vessels and fishing fleet support vessels on an overseas voyage • ships belonging to the Commonwealth or a Commonwealth authority • offshore industry mobile units and vessels, other than those confined to a State or Territory. State and Territory Governments are responsible for trading ships on intrastrate voyages, fishing vessels, pleasure craft and inland waterways vessels. The primary Commonwealth legislation regulating ship safety and environment protection are the *Navigation Act 1912* and the *Protection of the Sea (Prevention of Pollution from Ships) Act 1993*. The *Navigation Act 1912* provides the legislative basis for many of the Commonwealth's responsibilities with respect to shipping matters including most aspects of ship safety and environment protection, the coasting trade, employment of seafarers, coastal pilotage in the Great Barrier Reef and Torres Strait and ship construction and equipment. It also regulates wrecks and salvage operations, tonnage measurement of ships and the survey, inspection and certification of ships. The *Navigation Act 1912* is the primary means for Australia implementing IMO international maritime conventions. The *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* implements the IMO's *International Convention for the Prevention of Pollution from Ships* (MARPOL) and it is therefore the principal Commonwealth Act for prevention of pollution from ships.
Indigenous	The primary Act in relation to Indigenous use of offshore areas is the *Native Title Act 1993*, which provides the framework for the recognition and protection of native title and seeks to regulate transactions that impact on native title. Native title or native title rights and interests are the communal, group or individual rights and interests of Aboriginal peoples and Torres Strait islanders which are possessed under traditional laws and customs. Native title rights and interests are held by Aboriginal peoples or Torres Strait Islanders who, by their laws and customs, have a connection with the relevant land or waters. There is also a requirement that native title rights and interests be recognised by the common law of Australia. The Act applies to any areas (including offshore areas) over which Australia asserts sovereign rights. The ability of the common law to recognise native title offshore was

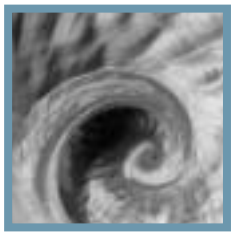


Table 4: *Regulatory framework for different activities within the South-east Marine Region* ctn...

Activity	Regulatory framework
Indigenous ctn...	confirmed by the High Court in the Croker Island (*Yarmirr*) case. However, native title in such areas cannot be exclusive, and can only be recognised to the extent that there is no inconsistency with other rights, such as the public rights to navigate and fish, and the international law rights of the innocent passage of ships. In relation to the conduct of activity offshore, the Act creates a regime that ensures the validity of future acts done by governments that 'affect' native title. A 'future act' is an act done now or in the future that affects native title by extinguishing or being otherwise wholly or partly inconsistent with its continued existence, enjoyment or exercise. The purpose of the future act regime is to strike a balance between enabling future activity to progress, while at the same time ensuring that the rights of native title holders are taken into account. In part, the Act does so by providing procedural rights to native title holders or claimants that vary according to the circumstances of the act affecting native title.
Maritime security	Maritime security is a broad concept, embracing traditional naval operations and extending beyond to include crime prevention, and offences in relation to customs, migration, quarantine and fishing laws. The primary legislation that impact on activities of other ocean users are the *Control of Naval Waters Act 1918* and the *Defence Act 1903*, which provide for the declaration of 'naval waters', under the former, and 'defence practice areas' under the latter. These are zones in which the activities of other users can be restricted. The military activities of the navy are regulated under the *Defence Act 1903*, the *Defence Force Discipline Act 1982* and the *Naval Defence Act 1910*. The Australian Defence Force undertakes enforcement actions in relation to other aspects of maritime security under instruments such as the *Fisheries Management Act 1991*, *Migration Act 1958*, *Customs Act 1901* and *Quarantine Act 1908*. State law enforcement agencies, such as the Water Police detachments in each State, play a role in maritime enforcement, essentially dealing with search and rescue operations and inshore criminal activities. Specialised Commonwealth agencies also play enforcement roles, such as the Customs Service under the *Customs Act 1901* and fisheries officers under the *Fisheries Management Act 1991*. Coastwatch, a branch of the Customs Service, provides surveillance (not enforcement) services to a variety of government agencies.
Environment protection	International laws and institutions play a major role in the formulation and operation of Australian, especially Commonwealth, environmental regulations. There are many international conventions and other instruments relevant to the protection of the Australian marine environment. Domestically, the OCS makes some provision in relation to the division of responsibility for environmental management between the Commonwealth and States. The division of responsibility in relation to ship-based marine pollution is provided for under the Shipping and Navigation Agreement under the OCS. The division of responsibility is further elaborated upon by the Intergovernmental Agreement on the Environment (IGAE). The IGAE was further refined by the Heads of Agreement on Commonwealth/State roles and Responsibilities for the Environment,

Table 4: *Regulatory framework for different activities within the South-east Marine Region ctn...*

Activity	Regulatory framework
Environment protection *ctn...*	developed by the Council of Australian Governments (COAG). The latter establishes a framework for intergovernmental relations where Commonwealth responsibility is focussed on matters of national environmental significance. Key aspects of this Agreement are implemented by the lynchpin of environmental protection legislation, the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act). The EPBC Act crosses over several areas of marine environmental management, providing for environmental assessment and approval, protection for nationally threatened species, internationally protected migratory species, cetaceans and other marine species and protected areas. Environmental assessment and approvals are required for activities likely to have a significant impact on matters of national environmental significance. The principal Commonwealth legislation regulating marine pollution from ships and implementing Australia's international obligations in this regard is the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*. Other legislation provides authority to take action to prevent pollution and a liability and compensation regime in the event of pollution. These include *Protection of the Sea (Powers of Intervention) Act 1981*; *Protection of the Sea (Civil Liability) Act 1981*; and the *Protection of the Sea (Oil Pollution Compensation Fund) Act 1993*. Other significant environmental legislation includes the *Hazardous Waste (Regulation of Exports and Imports) Act 1989*; *Quarantine Act 1908*; *Petroleum (Submerged Lands) Act 1967*; *Offshore Minerals Act 1994*; *Sea Installations Act 1987*; *Australian Heritage Commission Act 1975*; *Historic Shipwrecks Act 1976*; and *Environment Protection (Sea Dumping) Act 1981*.
Living marine resources	At international law there are a number of instruments that establish both rights and duties of a coastal nation State, such as Australia, in relation to the use of living marine resources. In accordance with the OCS, four types of arrangements currently exist for the division of responsibilities between the Commonwealth and States and the Northern Territory in relation to the management of a fishery, which can be defined by criteria such as fish characteristics or fishing method. They are State/Territory; Commonwealth; Joint Authority and status quo management. The two main Commonwealth legislative instruments in relation to the use of living marine resources are the *Fisheries Management Act 1991*, which acts as a 'tool box' from which the management body can draw appropriate management tools for a fishery, and the *Fisheries Administration Act 1991*, which establishes the institutions responsible for managing Commonwealth fisheries.
Seabed and subsoil activities	The OCS sets out agreed arrangements between the Commonwealth and the States for the ownership and management of marine resources, including offshore petroleum and seabed minerals. It gives the States jurisdiction over activities to three nautical miles seaward of the territorial sea baseline (coastal waters) and the Commonwealth jurisdiction over activities from the three mile boundary to the outer limits of the continental shelf

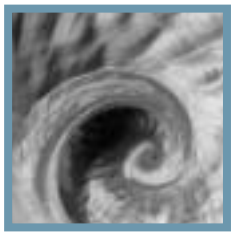


Table 4: *Regulatory framework for different activities within the South-east Marine Region* ctn...

Activity	Regulatory framework
Seabed and subsoil activities ctn...	(Commonwealth controlled adjacent areas). The OCS provides for the sharing of royalties and cooperative management arrangements in coastal waters and adjacent areas. The *Petroleum (Submerged Lands) Act 1967* is the Commonwealth component in a unified national scheme for the use of offshore petroleum resources, in which: • the States have sole resource control in coastal areas • administrative responsibility is shared between the Commonwealth and States in relation to the 'Commonwealth controlled adjacent area' off each State / Territory, ie beyond three nautical miles from the baselines • the corresponding State legislation contains broadly consistent provisions with the Commonwealth Act. The management in Commonwealth waters is conducted by a Joint Authority, consisting of the relevant Commonwealth and State Ministers. Routine administration is delegated to the State Minister as the 'Designated Authority'. Other Commonwealth legislative instruments that regulate seabed and subsoil activities include, the: • *Petroleum (Submerged Lands) (Management of Environment) Regulations 1999* • *Petroleum (Submerged Lands) Fees Act 1994* • *Petroleum (Submerged Lands) (Royalty) Act 1967* • *Offshore Minerals Act 1994* • *Offshore Minerals (Registration Fees) Act 1981* • *Offshore Minerals (Royalty) Act 1981* • *Sea Installations Act 1987* • *Sea Installations Levy Act 1987* • *Submarine Cables and Pipelines Protection Act 1963* • *Telecommunications Act 1997*. Other regulatory mechanisms and bodies include: • self regulation by the petroleum and offshore industries through codes of conduct and similar arrangements • the Ministerial Council on Energy • the Ministerial Council on Minerals and Petroleum Resources.
Tourism and recreation	There is a notable absence of Commonwealth legislation dealing specifically with tourism and recreation in Commonwealth waters. However, several Commonwealth Acts do regulate specific aspects of tourism, such as the: • *Environment Protection and Biodiversity Conservation Act 1999* • *Australian Heritage Commission Act 1975* • *Navigation Act 1912* • *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* • *Environment Protection (Sea Dumping) Act 1981* • *Historic Shipwrecks Act 1976* • *Sea Installations Act 1987*.

Applications for regional marine planning

The assessment phase of the South-east regional marine planning process has produced a large amount of information, including seven assessment reports, scientific project reports, records of consultations and workshops along with other specifically-commissioned work.

Most of the information, maps and figures from the seven assessment reports will be analysed and will feed directly into the next stage of the planning process. Some of the products will form the basis of further work. For example, a key step in developing an ecosystem-based regional marine plan for the Region is to use the Interim Bioregionalisation and Conceptual Models to:

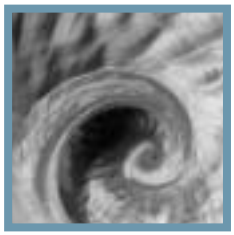
- define planning and management boundaries
- develop detailed objectives for ecosystems that can be monitored to check the progress of the Plan and improve management as necessary.

The work in the impacts assessment has so far concentrated on the initial stage of 'identifying the risks' from activities in the South-east Marine Region. The ongoing assessment will focus on prioritising, analysing and evaluating the impacts within the context of risk and current mitigating actions. Only then will we be able to determine the likelihood and consequences of the various impacts that have been identified in the report.

This final stage of the impacts assessment will be a significant input into the development of the South-east Regional Marine Plan, providing all stakeholders with a comprehensive analysis of the risks to the ecosystem from the various activities that occur in the Region.

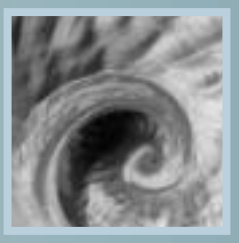
It is also likely that we will need to do further analysis during the next phase of the planning process depending on the types of planning issues we identify. This may include a more detailed analysis of the social and economic aspects of the Region.

The next phase of the South-east regional marine planning process is outlined in the Discussion Paper, including opportunities for direct participation of all stakeholders. Your input into the regional marine planning process is important. To register your interest or for more information about the South-east Regional Marine Plan, *Australia's Oceans Policy* and the National Oceans Office, visit www.oceans.gov.au, or phone (03) 6221 5000.



Notes

Notes



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

National Oceans Office

Level 1, 80 Elizabeth St, Hobart

GPO Box 2139, Hobart, Tas, Australia 7001

Tel: +61 3 6221 5000 Fax: +61 3 6221 5050

www.oceans.gov.au

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