

MINISTERIAL FOREWORD

Australia is responsible for around 60 000 kilometres of coastline and around 15 million square kilometres of ocean, an area almost twice the size of our continental land mass. As an island continent we have one of the biggest Exclusive Economic Zones of any country. The Australian people are known around the world for our connections with the ocean.

Australia's marine systems encompass the tropical seas of the north to the Antarctic ice-shelves of the south. The extraordinary natural diversity and biological richness of our oceans means that Australians are significant global stewards of marine biodiversity.

Our national record in marine conservation is a mixed one. We have certainly led the world in the protection of coral reef systems and in our protection of iconic marine animals such as whales, turtles and sea birds. Our marine protected area network, covering some 88 million hectares, is among the largest in the world. Our performance in other areas, such as halting the decline in ecologically important fish stocks and taking early action to address the cumulative impacts of human activities, including those onshore, has not been as effective.

The Government is committed to protecting the biological diversity in the oceans we manage and addressing the issues of ecologically sustainable use of ocean resources. This will benefit all Australians, both now and in the future. We have the opportunity to make a difference right now and lead the world in our approach to marine conservation. In so doing, we will also be one of the first countries to deliver a nationally representative network of marine protected areas by the internationally agreed goal of 2012.

Limited information about Australia's marine biodiversity, especially for the species and ecosystems of the more remote and deeper areas, has been a barrier to developing a strategic approach to the sustainable management of our oceans. Our lack of knowledge has also made it difficult to develop an effective response to both the large and small scale impacts of change in ocean ecosystems, such as those resulting from global warming.

Marine bioregional planning helps us to better understand and protect our marine environment, conserve biodiversity and deliver greater certainty to decision-makers and the wider community about Australia's marine conservation priorities. It also assists industries that rely on the oceans' natural resources, collectively worth billions of dollars each year to the Australian economy, to better plan and manage their activities.



The natural world carries profoundly strong cultural connections for Indigenous communities and sea country is an integral part of this world for coastal and islander communities. We will be working with Aboriginal people and Torres Strait Islanders to ensure their views and conservation goals are incorporated in the planning process.

This East Marine Bioregional Profile brings together, for the first time, the best available information for the East Marine Region. It consolidates our knowledge of the spectacular and varied features of the Coral and Tasman Seas, from Cape York Peninsula to southern New South Wales and stretching hundreds of kilometres from shore to include Lord Howe and Norfolk Islands. The East Marine Region is home to an amazing array of species, ecosystems and habitats including pristine coral reefs perched on broad undersea plateaus, deep canyons and trenches, quiet abyssal depths and whole ranges of seamounts beneath the ocean's surface.

The East Bioregional Profile is the starting point for developing a Marine Bioregional Plan for the Region, which I will be releasing in 2010. It is one of four Plans that together will identify the conservation values of our oceans and the actions we need to take to protect them, including the areas we will look to include in the national marine protected area network. Nowhere else in the world is marine conservation planning being undertaken at this scale and in this timeframe.

With the assistance and involvement of all stakeholders, I believe that bioregional planning can set a new standard in marine planning and management for Australia and the world.

A handwritten signature in black ink, appearing to read 'Peter Garrett'.

Peter Garrett

Minister for the Environment, Heritage and the Arts

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Snakestar on coral. Photo: NORFANZ, Department of the Environment, Water, Heritage and the Arts, CSIRO, New Zealand's Ministry of Fisheries and NIWA.

PREFACE

Marine bioregional planning is the Australian Government's world-leading approach to protecting Australia's marine environment. Marine bioregional planning is underpinned by the principles of ecologically sustainable development and takes an ecosystem approach in managing Australia's marine biodiversity and environment.

This Bioregional Profile has been prepared by the Department of the Environment, Water, Heritage and the Arts as the first step in the development of a Marine Bioregional Plan for Australia's East Marine Region. It establishes the information base upon which the East Marine Bioregional Plan will be further developed. In particular, it focuses on the natural assets of the East Marine Region, describes its ecological characteristics, outlines its conservation values and explains how new marine protected areas will be identified. Additionally, it provides a broad description of the human activities that take place in the Region.

The Bioregional Profile complements information available on the Department's website <www.environment.gov.au>. The reports that underpin this Profile are an important step in building our information base for this poorly known marine region. These reports are available on the internet at <www.environment.gov.au/coasts/mbp/east>.

While every attempt has been made to gather the best available information and provide a comprehensive picture of the East Marine Region, there will certainly be other information sources available that will be helpful in the next stages of the planning process. The Department of the Environment, Water, Heritage and the Arts welcomes

any contribution from the public about information and data that may be relevant to developing a Bioregional Plan for the East Marine Region.

Additional information, as well as any questions or comments you might have concerning this document, can be directed to:

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A glossary has been developed to assist with technical terminology used in the Bioregional Profile. The glossary is located at the back of this document.

Separate large-format maps of the geomorphic and key ecological features of the Region can be found in the envelope inside the back cover.

Appendices are available on compact disc, which is also inside the back cover.



Grey nurse sharks. Photo: Peter Hitchins.



EXECUTIVE SUMMARY

This Bioregional Profile is the first step in the development of a Marine Bioregional Plan for Australia's East Marine Region. Marine Bioregional Plans will provide strategic guidance for Government decision-makers and marine users by:

- describing each Marine Region's ecological processes and conservation values, including mapping sites of importance for protected species and communities;
- identifying regional priorities for action, based on an assessment of threats to conservation values and long-term policy goals; and
- developing strategic guidance for proponents and decision-makers. For example, by providing a regional context for national guidelines to help proponents within a Region consider whether their action might result in a significant impact on matters of national environmental significance.

Information on marine bioregional planning and the East Marine Region Bioregional Profile can be found in chapter 1.

Marine bioregional planning is also the process through which the Australian Government identifies areas within Commonwealth waters for inclusion in the National Representative System of Marine Protected Areas. The guidelines the Government is using to develop the National Representative System of Marine Protected Areas have been agreed with the States and the Northern Territory, and are summarised in chapter 4. They can be found online at <www.environment.gov.au/coasts/mpa>.

The Region comprises the Commonwealth waters from the Coral Sea and Tasman Sea, from the northern tip of Cape York to southern New South Wales, as far east as Norfolk Island. It covers some 2 400 000 km² of tropical and sub-tropical waters, not including the Great Barrier Reef Marine Park. Australia's most extensive areas of marginal plateaus are found in the Region, extending over more than 1 000 000 km². Two long seamount chains run north-south through the Region, with a combined area more than 40 000 km², located in depth ranges between 5000 m deep and sea level.

This Bioregional Profile describes the environmental and socio-economic characteristics of the Region.

The environment of the East Marine Region

The Region is characterised by deep-water pelagic tropical and sub-tropical marine ecosystems. The Region is important for endemism and is home to globally significant populations of internationally threatened species.

The Region is dominated by the East Australian Current, the largest ocean current close to the coast of Australia. The East Australian Current forms in the Coral Sea and flows south, ferrying up to 30 million cubic metres per second in flows up to 500 m deep and 100 km wide. The current is strongest in summer, peaking in February at up to five knots and weakest in winter by as much as half the flow, and dissipates east of Tasmania. Ocean eddies generated by the current can be as broad as 200 km across and one kilometre deep, rotating mainly anti-clockwise at up to four knots at the edge and can have a life of up to a year. The current frequently crosses the continental shelf and causes upwellings at place like Cape Byron, Smoky Cape and Sugarloaf Point, drawing up nutrient-rich waters from depths of 200 m or more.

The variability of the East Australian Current both season-to-season and year-to-year has a significant influence on biological productivity in the Region. Phytoplankton and fish distributions are linked to the current. Generally, waters of the Region are low in nutrients. Upwellings created by currents and gyres interact with islands and seamounts and are significant for biological productivity. There is a tropical-temperate transition in species distributions at the 30 degrees South latitude associated with the Tasman Front where subtropical and temperate water masses meet.

The *Integrated Marine and Coastal Regionalisation of Australia Version 4.0* (IMCRA V4.0) is an ecosystem-based classification of Australia's marine and coastal environments that was developed through the collaborative efforts of State, Territory and Commonwealth marine management and research agencies. IMCRA provides a regional framework for planning resource development and biodiversity conservation. Provincial bioregions were classified based on fish, benthic (seabed) habitat and oceanographic data at a scale that is useful for regional conservation planning and management. IMCRA V.4.0 identifies 14 provincial bioregions in the Region. These are:

The Cape Province

(area 62 520 km²; max. depth 4200 m).

This provincial bioregion extends offshore from the boundary of the Great Barrier Reef Marine Park to the edge of the Exclusive Economic Zone. The formation of the Gulf of Papua Gyre over this provincial bioregion from the Hiri Current, and sediment flows from Papua New Guinea river systems influence biological productivity. Ashmore Reef and Boot Reef are distinct from other coral reefs in the Region due to the influence of the north-trending Hiri Current and Papua New Guinea river sediments. Approximately 300 species of demersal fish inhabit this provincial bioregion including 24 endemic species. The Cape Province is important for commercial fisheries operations, Indigenous activities, and recreational fishing.

The Northeast Transition

(area 132 490 km²; max. depth 4600 m).

This provincial bioregion extends offshore from the boundary of the Great Barrier Reef Marine Park to the edge of the Exclusive Economic Zone between the Cape Province and Northeast Province. The biological productivity of this provincial bioregion is influenced by the formation of the north-trending Hiri Current and the south-trending East Australian Current, ocean gyres and by frequent and high intensity cyclones. The coral reefs of Osprey Reef, Shark Reef, and Bougainville Reef have important coral reef biological communities including populations of nautilus. Approximately 400 species of demersal fish inhabit this provincial bioregion. The Northeast Transition is important for shipping, commercial fisheries operations, tourism and recreational fishing.

The Northeast Province

(area 422 460 km²; max. depth 4700 m).

This provincial bioregion extends offshore from the boundary of the Great Barrier Reef Marine Park to the edge of the Exclusive Economic Zone between the Northeast Transition and Kenn Transition. The formation of the Hiri Current and East Australian Current over this provincial bioregion, ocean gyres and high cyclone activity influence biological productivity. The coral reefs emerge as islands and cays over the carbonate platforms of the Queensland Plateau, and are important breeding, nesting and foraging sites for a number of marine turtles and seabirds. Approximately 440 demersal fish species inhabit this provincial bioregion, including 70 endemic species. The Northeast Province is important for shipping, commercial fisheries operations, tourism and recreational fishing.

The Kenn Transition

(area 377 130 km²; max. depth 4800 m).

This provincial bioregion extends offshore beyond the boundary of the Great Barrier Reef Marine Park to the edge

of the Exclusive Economic Zone between the Northeast Province and Kenn Province. The formation of the Hiri Current and East Australian Current over this provincial bioregion, ocean gyres and the movements of a deep sub-Antarctic water mass influence biological productivity. There are regionally significant billfish populations associated with upwellings around the Cato Trough and seamounts. The Kenn Transition is important for shipping, commercial fisheries operations, defence, tourism and recreational fishing.

The Kenn Province

(area 57 420 km²; max. depth 2500 m).

This provincial bioregion extends offshore beyond the boundary of the Great Barrier Reef Marine Park to the edge of the Exclusive Economic Zone alongside the Kenn Transition. The formation of the Hiri Current and East Australian Current over this provincial bioregion, ocean gyres and the movements of a deep sub-Antarctic water mass influence biological productivity. Seamounts provide habitat for significant coral reef communities. The Kenn Province is important for commercial fisheries operations and recreational fishing.

The Central Eastern Transition

(area 44 840 km²; max. depth 4800 m).

This provincial bioregion extends offshore beyond Fraser Island and the boundary of the Great Barrier Reef Marine Park between the Central East Shelf Transition and the Kenn Transition. The biological productivity of this provincial bioregion is influenced by the movement of quartz sand from Fraser Island, ocean gyres and the movement of a deep sub-Antarctic water mass. The active canyons on the edge of the continental shelf provide unique habitat for benthic biological communities. Approximately 500 demersal fish species inhabit this provincial bioregion. The Central Eastern Transition is important for shipping, defence, commercial fisheries operations, tourism, sea dumping, and recreational fishing.

The Central Eastern Shelf Transition

(area 26 340 km²; max. depth 240 m).

This provincial bioregion extends over the continental shelf from the boundary of the Great Barrier Reef Marine Park around Fraser Island and offshore from Coffs Harbour. Upwellings around Cape Byron and Smokey Cape caused by the East Australian Current crossing the continental shelf and river sediments influence biological productivity. Tropical and temperate benthic species transition offshore from Tweed Heads. Few tropical species are found south of Coffs Harbour and few temperate species are found north of Fraser Island. The Central Eastern Shelf Transition is important for shipping, defence, Indigenous activities, sea dumping, commercial fisheries operations, tourism, and recreational fishing.



The Central Eastern Shelf Province

(area 14 470 km²; max. depth 240 m).

This provincial bioregion extends over the continental shelf from Nambucca Heads to Shellharbour. Upwellings caused by the East Australian Current crossing the continental shelf and river sediments influence biological productivity. Rocky caves and sand filled gutters around Forster provide habitats for regionally significant populations of critically endangered grey nurse shark (*Carcharias taurus*). The Central Eastern Shelf Province is important for shipping, defence, oil and gas, sea dumping, commercial fisheries operations, tourism and recreational fishing.

The Central Eastern Province

(area 233 820 km²; max. depth 5100 m).

This provincial bioregion extends offshore from the continental shelf between Brisbane and Ulladulla to the boundary of the South East Marine Region and Exclusive Economic Zone. Canyons along the edge of the continental shelf interact with currents and ocean gyres resulting in upwellings that influence biological productivity. Plankton blooms created by upwellings associated with ocean gyres attract populations of yellowfin tuna (*Thunnus albacares*), whales and albatross. Approximately 630 demersal fish species inhabit this provincial bioregion, including 56 endemic species. The Central Eastern Province is important for shipping, defence, sea dumping and commercial fisheries operations.

The Tasman Basin Province

(area 156 420 km²; max. depth 5100 m).

This provincial bioregion extends over the abyssal plains and seamounts of the Tasman Sea between the Central Eastern Province and Lord Howe Province. Interactions between currents, eddies and seamounts and the movements of the deep sub-Antarctic water mass influence biological productivity. The deep-reef coral communities on seamounts are dominated by filter-feeders and provide stepping stones for large oceanic species moving between breeding, nesting, calving and foraging sites. The Tasman Basin Province is important for shipping, defence and commercial fisheries operations.

The Lord Howe Province

(area 484 880 km²; max. depth 4500 m).

This provincial bioregion extends over the abyssal plains and seamounts of the Tasman Sea to the edge of the Exclusive Economic Zone. The mixing of warm-water and cold-water currents and eddies and their interactions with seamounts influence biological productivity. The southernmost coral reefs in the world are found in this provincial bioregion. The unique mix of tropical, sub-tropical and temperate species includes populations of Galapagos shark (*Carcharhinus galapagensis*) and black cod (*Epinephelus*

daemeli). The Lord Howe Province is important for shipping, commercial fisheries operations, tourism and recreational fishing.

The Norfolk Island Province

(area 430 790 km²; max. depth 4300 m).

This provincial bioregion extends over the basins and ridges of the Tasman Sea to the edge of the Exclusive Economic Zone. The mixing of warm-water and cold-water currents and eddies and their interactions with seamounts influence biological productivity. Seamounts provide habitat for migratory whale and shark species, and Norfolk Island is an important breeding, nesting and foraging site for the red-tailed tropicbird (*Phaethon rubricauda*). The Norfolk Island Province is important for commercial fisheries operations, tourism and recreational fishing.

The Southeast Shelf Transition

(area 4270 km²; max. depth 240 m).

This provincial bioregion extends over the continental shelf from Shellharbour to Bermagui. Upwellings caused by the East Australian Current crossing the continental shelf and river sediments influence biological productivity. The Southeast Shelf Transition is important for shipping, defence, sea dumping, commercial fisheries operations, tourism and recreational fishing.

The Southeast Transition

(area 8800 km²; max. depth 5200 m).

This provincial bioregion extends offshore from the continental shelf between Ulladulla and Bermagui to the South East Marine Region. Canyons along the edge of the continental shelf interact with currents and ocean gyres resulting in upwellings that influence biological productivity. The Southeast Transition is important for shipping, defence, sea dumping and commercial fisheries operations.

A description of each of the provincial bioregions is given in chapter 2.

Conservation values of the East Marine Region

Conservation values of the Region include protected species and protected places, as well as a number of key ecological features in the Commonwealth marine environment identified as part of this planning process.

A total of 106 species that are known to occur in the Region are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as either threatened, migratory, cetacean or listed marine species. Of these, 37 species are listed as threatened, including two critically endangered, eight endangered, 26 vulnerable species and 3 conservation dependent.

This Bioregional Profile identifies a number of key ecological features that are of conservation value because of the roles they play in the marine environment of the Region. They are given this value on the basis that they are:

- a species, group of species or a community with a regionally important ecological role (e.g. a predator, prey that affects a large biomass or number of other marine species); or
- a species, group of species or a community that is nationally or regionally important for biodiversity; or
- an area or habitat that is nationally or regionally important for:
 - a) enhanced or high biological productivity (such as predictable upwellings),
 - b) aggregations of marine life (such as feeding, resting, breeding or nursery areas),
 - c) biodiversity and endemism; or
- a unique seafloor feature with known or presumed ecological properties of regional significance.

Key ecological features of the Region include:

Regionally significant geomorphic and oceanographic features:

- East Australian Current (important ecological role; enhanced biological productivity; important for biodiversity; aggregations of marine life);
- offshore chains of seamounts and rises (unique seafloor feature; important ecological role; important for biodiversity and endemism; enhanced biological productivity; feeding, resting, breeding and nursery aggregations);
- assemblage of scattered and diverse reefs and cays of the Coral Sea (important ecological role; important for biodiversity; feeding, resting, breeding and nursery aggregations); and
- canyons of the eastern continental slope and shelf edge rocky reefs (unique seafloor feature, important ecological role; enhanced biological productivity).

Regionally important communities and habitats:

- **temperate (reef) corals and sponges** (important ecological role; important for biodiversity)
- **pelagic squid** (important ecological role);
- **large pelagic predators (sharks, tuna and billfish)** (important ecological role);

- **east coast humpback whale population** (resting, breeding and nursery aggregations); and
- **herbivorous fish of coral reefs** (important ecological role).

The Lord Howe Island Marine Park is the only listed heritage site within the Region. The two listed RAMSAR wetlands sites within the Region are Coringa-Herald National Nature Reserve and Elizabeth and Middleton Reefs Marine National Nature Reserve. There are likely to be hundreds of historic shipwrecks in the Region but the precise locations of those presumed to occur in Commonwealth waters are unknown.

A description of the conservation values and key ecological features is given in chapter 3.

Marine Protected Areas in the East Marine Region

The six existing marine reserves in Commonwealth waters of the Region are: Coringa–Herald National Nature Reserve; Lihou Reef National Nature Reserve; Elizabeth and Middleton Reefs Marine National Nature Reserve; Solitary Islands Marine Reserve; Lord Howe Island Marine Park; and Cod Grounds Commonwealth Marine Reserve.

New Marine Protected Areas will be established to meet national guidelines under which all Australian governments are developing a comprehensive, adequate and representative reserve system. The Australian Government’s goals for establishing the Marine Protected Area network are described in chapter 4, along with their application to the Region and an outline of the principles that will guide the identification, selection, design and zoning of representative Marine Protected Areas. Consideration of the socio-economic implications of potential Marine Protected Areas will inform the Government’s decision about a final regional Marine Protected Area network.

Human activities and the marine environment

The Region is adjacent to the most heavily populated coastline in Australia. The majority of human activity in the Region occurs closest to the major population centres in New South Wales and south-east Queensland. The Region supports a range of human uses and activities.

The waters of the Region have been culturally important for Indigenous people for many thousands of years. Archaeological evidence indicates that the Indigenous



people arrived in eastern Australia at least 20,000 years ago. Indigenous coastal communities continue to maintain special links with their sea country through occupation, resource utilisation and cultural practice.

Captain James Cook made landfall at Botany Bay in 1770 and claimed Australia for England. The first European settlement was established in 1788 at Port Jackson on Sydney Cove. The first colony on Norfolk Island was also established in 1788 and a permanent settlement on Lord Howe Island followed in 1834. The first colony in what would later become Queensland was established at Moreton Bay in 1824.

Today the major marine industries include shipping, commercial fishing, recreational fishing and tourism. Other uses of the Region include Indigenous activities, border protection, offshore oil, gas and mineral exploration, sea dumping and the laying of submarine communication cables.

Eighteen fisheries are licensed to operate within the Region. The East Coast Otter Trawl Fishery and the Eastern Tuna and Billfish Fishery are the largest fisheries targeting prawns, scallops, tuna, billfish and sharks. The Region is also a popular destination for recreational and charter fishing.

Marine-based tourism in waters off Queensland and New South Wales is important to the economy and includes activities such as snorkelling, scuba diving, whale watching, and cruising.

The Region includes some major international sea routes and the ports adjacent to the Region handle almost 45 per cent of Australia's sea freight trade and include Australia's largest importing ports which supply goods and services to major population centres. Major industrial ports in the Region export high volumes of raw minerals, notably coal.

Little is known about the extent of oil, gas and mineral deposits in the Region and offshore areas are largely under-explored. Recoverable offshore gas deposits have been identified and there is potential for expansion in the Region.

Chapter 5 describes human activities in and adjacent to the Region.

Next steps

This Bioregional Profile will guide development of a Draft Marine Bioregional Plan for the Region. The Draft Plan will be released for a period of formal public comment, as required under the EPBC Act. Conservation measures and potential implications for people and industries will be considered and resolved through a process involving consultation with stakeholders and the wider public. A final Marine Bioregional Plan will then be developed for consideration and approval by the Minister for the Environment, Heritage and the Arts. Once finalised, the Minister will be guided by the Marine Bioregional Plan in all decisions made under the EPBC Act for which the Plan has relevance.

Although marine bioregional planning is an Australian Government program undertaken under Commonwealth legislation, the planning process occurs in consultation with State and Territory governments. This consultation is important because the governments of Queensland and New South Wales are also undertaking planning and Marine Protected Area development processes in State waters.

Chapter 6 describes the next steps in the marine bioregional planning process for the East Marine Region.



Spanish Dancer Nudibranch. Photo: Ian Hutton.