



Australian Government

Department of Sustainability, Environment,
Water, Population and Communities

O U R A U S T R A L I A

One Place, Many Stories: *Oceans*



This publication draws on information from the Department of Sustainability, Environment, Water, Population and Communities' website.

For more information, visit **www.environment.gov.au**

Front cover: Humpback whales in Pacific Ocean

Photo credit: Richard Freeman, <http://aloneatseaphotography.com.au>

© Commonwealth of Australia 2011

ISBN 978-1-921733-39-0

This work is protected by copyright law. Apart from any use permitted by the *Copyright Act 1968* (including research or study) no part may be produced by any process, reused or redistributed for any commercial purpose or distributed to a third party for such purpose, without prior written permission from the Department of Sustainability, Environment, Water, Population and Communities.

Design: www.2b.com.au

All data included in this document are presumed to be correct as received from data providers. No responsibility is taken by the Commonwealth for errors or omissions, and the Commonwealth does not accept responsibility in respect to any information or advice given in relation to, or as a consequence of anything contained therein.

O U R A U S T R A L I A

One Place, Many Stories: *Oceans*





minister's foreword



Australia is surrounded by magnificent oceans that are the envy of the world. But we cannot afford to be complacent.

In the space of one lifetime, the world's oceans have gone from being relatively pristine to being under increasing pressure year after year.

Australia's marine planning process turns all of that on its head.

It is more than conservation - it's about making sure the future of our oceans is one of strength and resilience.

While iconic places such as the Great Barrier Reef and Ningaloo Reef draw much of the world's attention, our oceans are home to an abundance of marine life. Some of the marine life found in our nation's oceans is not found anywhere else in the world.

Australia's vast oceans provide many benefits to its people and its visitors alike — as a source of food and resources and as a place of recreation.

They support coastal communities and their marine industries. But while we are reliant on our oceans' richness economically and socially, we also need to conserve and protect this resource for current and future generations. We need to ensure we use our marine resources sustainably.

It's for this reason that our Marine Bioregional Planning Program is so important. For generations, Australians have understood the need to preserve precious areas on land as national parks. In the same way, our oceans contain fragile marine life that also deserves protection.

The Australian Government's marine planning program is designed to ensure that we have a sustainable marine environment that is both healthy and productive.

With this, Australia will deliver a world leading system of marine reserves.

This book will take you on a journey across Australia's oceans and give you a snapshot of our precious marine world.

THE HON TONY BURKE

Minister for Sustainability, Environment,
Water, Population and Communities

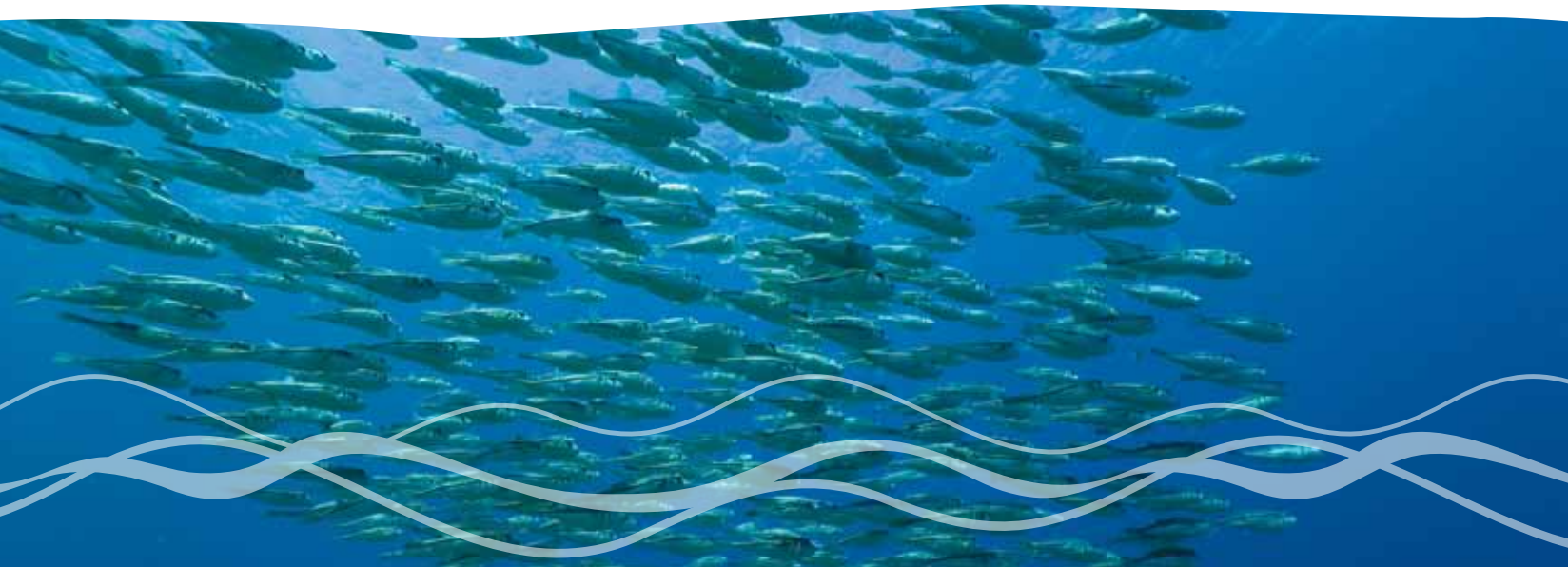
planet earth – or planet ocean?



Oceans cover nearly three-quarters of our planet's surface. Yet much of this underwater domain remains unexplored and unknown. In many ways, it is an alien world.

Beneath the ocean's surface lies a remarkable treasure trove of biodiversity – from tiny plankton to massive whales and every imaginable form of aquatic life in between. The undersea landscape is spectacular. Towering mountain ranges and volcanoes rise from the deep ocean floor, some breaking through the surface to form rocky islands or breathtaking coral reefs.

Our oceans also provide immeasurable benefit to humankind. They provide us with a major source of food and energy. We fish, surf, swim, dive and sail in the ocean, and it provides coastal living for hundreds of millions of people across the world.

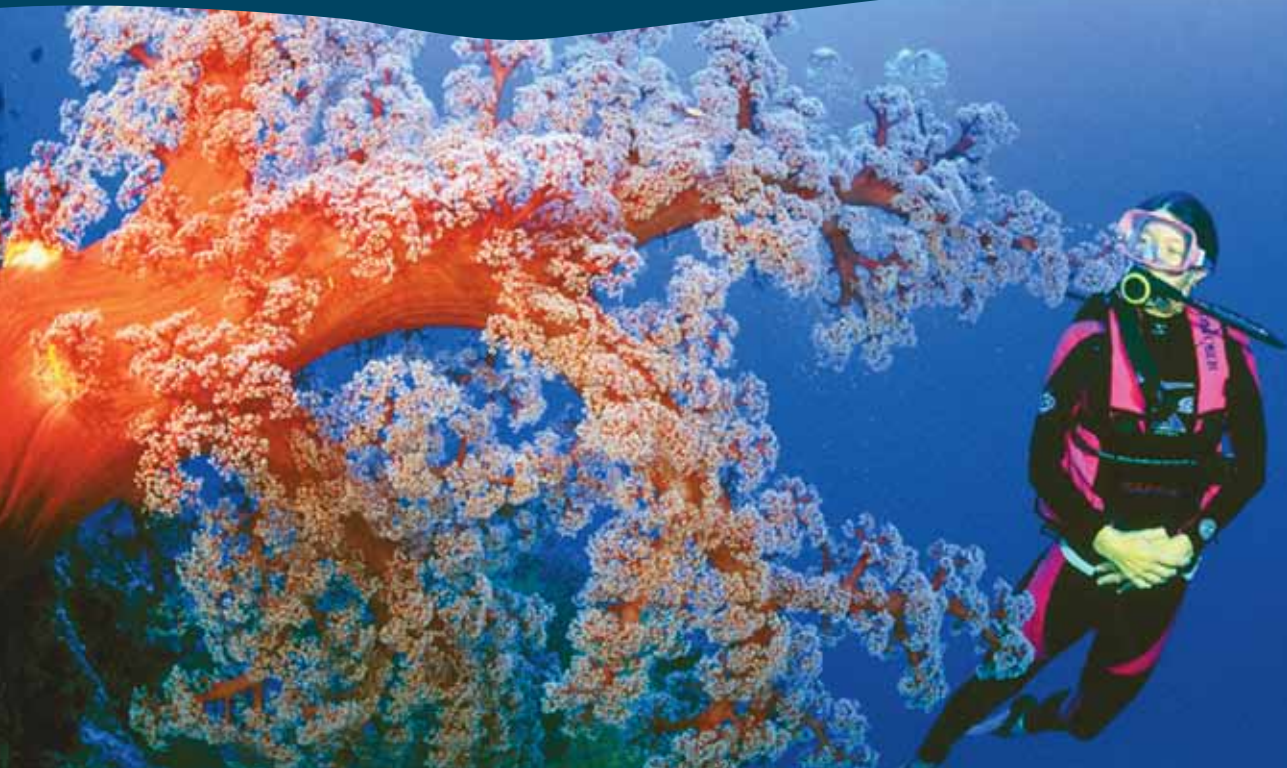


conserving and managing australia's oceans

The waters surrounding Australia are one of our most important and beautiful natural resources. A significant proportion of the marine life around Australia, particularly in the south, is found nowhere else in the world. The incredible diversity of life found in our oceans needs to be protected and allowed to thrive. At the same time, the benefits that oceans provide to humanity need to be enjoyed in a sustainable way.

To achieve both these aims, we need to understand more about the ocean. The Australian Government's process of marine bioregional planning has helped to build our scientific knowledge of Australia's oceans, and improve the way our oceans are managed – so that we can continue to use and appreciate them well into the future.

The task of identifying protected areas throughout Australia's oceans is being completed in 2012.





“ In the space of one lifetime, the world’s oceans have gone from being relatively pristine to being under increasing pressure year after year.

Australia’s marine planning process turns all of that on its head.

It is more than conservation – it’s about making sure the future of our oceans is one of strength and resilience. ”

The Hon Tony Burke

Minister for Sustainability, Environment, Water, Population and Communities

australia's marine regions



Marine reserves
help support the
sustainable use
of our oceans...

Marine reserves – also known as marine parks and marine protected areas – are being established all around Australia. These reserves help to protect different marine ecosystems and habitats, and the life they support. They help keep our marine environment healthy, resilient and productive – now, and for future generations. Marine reserves help support the sustainable use of our oceans as a source of food and energy, and as a place of recreation.

Australia's states and the Northern Territory are responsible for marine reserves in state waters close to the coast and around islands. The Australian Government is responsible for establishing and managing marine reserves in Commonwealth waters – the area of ocean that starts at the edge of coastal waters. This is usually 5.5 kilometres off the shore, but sometimes further.





Oceans on the move: the major currents



Ocean currents are the wildlife corridors of the sea. They carry massive volumes of water, as well as plant and animal life, all around the globe. By transporting warm and cold waters over vast distances, currents are also key drivers of our planet's weather and climate. The continuous flows in ocean currents can cover many thousands of kilometres, and pay no heed to country borders – currents are truly global travellers.

Where currents mix warm tropical waters and colder deep sea waters, the ocean springs to life. Tiny organisms such as plankton breed in their billions, forming the basis of a food web that goes all the way to the top ocean predators such as sharks and whales.





australia's major currents

There is a complex system of ocean currents that significantly affect Australia's marine environment, marine life and climate conditions. The four major currents are the East Australian Current, the Leeuwin Current, the Indonesian Throughflow and the Antarctic Circumpolar Current.

■ ■ ■ ■ ■ ■ ■ Seasonal current

east australian current

A variety of marine life uses the East Australian Current as a supersized conveyor belt...

The East Australian Current flows south along the country's east coast. Beginning in the Coral Sea adjacent to the Great Barrier Reef, the warm tropical waters of the current travel southward: eventually reaching Tasmania and the Tasman Sea. Along the current's journey, it spins off into a series of large ocean eddies, which are circular pools about 200–300 kilometres across. The eddies send masses of water from the main current out in different directions, causing variability in the main current's flow.

The East Australian Current is the largest ocean current that comes close to our coastline. In some areas, it is only a few kilometres offshore. It travels at different speeds on its journey down the coast, depending on the depth of the sea floor and the season – it is slowest in winter, and speeds up during summer.

A variety of marine life uses the East Australian Current as a supersized conveyor belt, spending different parts of their life cycles far apart. Many fish migrate north into warmer waters to lay their eggs, and the young then travel southwards on the current into cooler nursery areas. Baby loggerhead turtles also hitch a ride southwards on the current after they hatch out on the Queensland coast. As the current swings away from Australia, the turtles head eastwards across the southern Pacific Ocean to waters off South America.



leeuwin current

...the strength
and speed of the
Leeuwin Current
varies during
the year...

The Leeuwin Current runs south along the west coast of Australia, around the south-west corner, and all the way across the Great Australian Bight to Tasmania. Originating in the Indian Ocean, it is the longest coastal current in the world, travelling for about 5000 kilometres along a pathway less than 300 metres deep and 100 kilometres wide.

Like the East Australian Current, the strength and speed of the Leeuwin Current varies during the year – but in the opposite way. It's strongest in winter, and weakest in summer, when it barely reaches the Great Australian Bight.

The Leeuwin Current brings warm water to Western Australia, carrying with it tropical and subtropical species of marine life. By riding the Leeuwin Current, these warm water species can survive and become established in areas much further south than they would normally occur.



indonesian throughflow

Warm water transferred
by the Indonesian
Throughflow strongly
influences the climate
of Western Australia.

The Indonesian Throughflow moves westwards from the Pacific to the Indian Ocean, travelling through the Indonesian Archipelago. It transports warm water from the tropical western Pacific Ocean to areas off north-western Australia.

The mass of warm water transferred by the Indonesian Throughflow strongly influences the climate of Western Australia. Without it, our warm western coast would resemble the colder desert areas found along the western coasts of South America and south-west Africa.



antarctic circumpolar current

...this current is
150 times greater
than the combined
flow of every river
in the world.

South of Australia, the Antarctic Circumpolar Current flows from west to east around Antarctica. At 20 000 kilometres long, the Antarctic Circumpolar Current flows around the bottom of the Atlantic, Pacific and Indian oceans, mixing the waters as it travels.

The enormous mass of cold, heavy water that flows powerfully north from Antarctica pushes warmer water out of the way, causing new flows and currents and driving global climate conditions. The flow of this massive current is 150 times greater than the combined flow of every river in the world.



an ocean journey

From here this book takes you on a journey to some of the iconic places found in Australia's oceans. Travel through the country's five marine regions, from the tropical waters of the beautiful Coral Sea, down along the east coast to the colder southern waters, around into the Great Australian Bight, and up the west coast to the tropical north-west, then across the Top End. Along the way, see some of our amazing marine environments and meet some of our iconic species of marine life.



east marine region

The East Marine Region stretches from the northern tip of Cape York to Bermagui on the south coast of New South Wales. Significantly influenced by the flow of the East Australian Current, the region includes the waters surrounding Lord Howe and Norfolk Islands and the whole of Australia's Coral Sea territory. Dotted throughout the region are the peaks of volcanic seamounts – ancient remnants of extinct volcanoes that support an incredible diversity of life.



the coral sea



Australia's portion of the Coral Sea covers almost one million square kilometres of tropical ocean...



The birthplace of the East Australian Current, the Coral Sea is internationally recognised for its rich biodiversity and important heritage values. It is home to breathtaking coral reefs, sandy cays and islands. Australia's portion of the Coral Sea covers almost one million square kilometres of tropical ocean east of the Great Barrier Reef, and shares borders with Papua New Guinea, the Solomon Islands and New Caledonia.





CA
DD
DESTROYER

NEW
GUINEA

PORT MORESBY

CONSIST
MACHINE
ON P. MORESBY

817th DISCOVER JAP
OCCUPATION FORCE.
6th MAY

OCCUPATION FORCE
FIRE. PM 7/5

TORRES
STRAIT

1506/7. ADM. CRACE'S FORCE ATTACKED
BY 12 JAP TORPEDO BOMBERS OF WHICH
5 WERE SHOT DOWN. 1516/7. ATTACKED
BY 19 HEAVY BOMBERS - MANY
NEAR MISSES.

ADM. CRACE'S FORCE, CONTINUOUSLY
SHADOWED REMAINS IN THIS AREA
UNTIL NIGHT OF 8th MAY
HOBART FUELS PERKINS

CHINA STR.

ADM. CR.

YORKTOWN GROUP
BY JAP RECCE A
GROUP REMAIN
ATTACKING SHO
APPROX 1300

DAWN TO NOON, 9/5.
AUSTRALIA FUELS
FARRAGUT.

15°

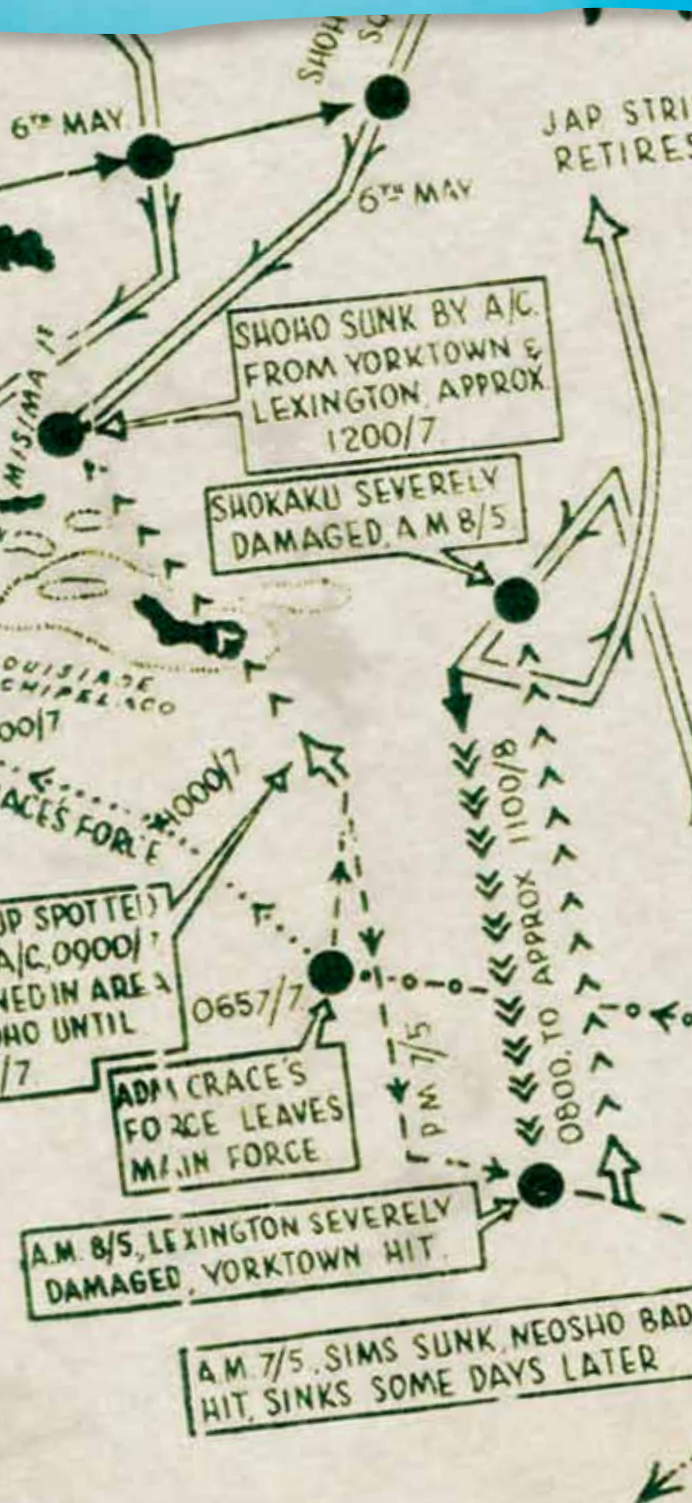
SUNSET,
10/5.

HARBOUR

WALKE
D FOR
G

TOWNSVILLE

AUSTRALIA



HERITAGE AND HISTORY IN THE CORAL SEA

Several historic shipwrecks rest in the waters of the Coral Sea, which was the site of a major naval battle during World War II.

The battle of the Coral Sea, the 70th anniversary of which takes place on 4–8 May 2012, was the largest naval battle fought near Australian shores.

A United States Navy task force, including two Royal Australian Navy cruisers—HMAS *Australia* and HMAS *Hobart*—intercepted a Japanese invasion fleet heading to mount an assault on Port Moresby. Both sides employed carrier-based aircraft to launch repeated aerial strikes against each other's ships, inflicting heavy losses, including the sinking of the American ships USS *Lexington*, USS *Neosho* and USS *Sims*, and the Japanese light carrier, *Shoho*.

Japanese losses led them to recall their invasion force and they were forced to attempt to capture Port Moresby by a land assault: and there the legend of the Kokoda Track was born. The battle of the Coral Sea was one of the decisive strategic victories that ultimately led to Allied victory in the Pacific in 1945.

conserving the coral sea's biodiversity

Covering an area more than half the size of Queensland, Australia's portion of the Coral Sea is recognised throughout the world for its unique physical, ecological and heritage values. It is a place of enormous environmental significance. This lies in its diverse array of species-rich ecosystems – including reefs, sandy cays, deep sea plains and canyons – and the extent to which these are relatively undisturbed by humans. The Coral Sea is a refuge for many iconic species under serious threat elsewhere in the world.

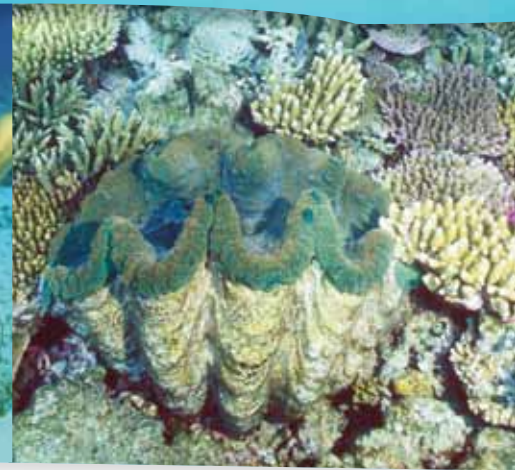
Extensive shallow reef systems support tropical communities abundant in hard and soft corals, sponges, algae and invertebrates such as sea snails and sea stars. Deep cold water troughs and deep sea basins support distinctly different seafloor communities, many of which are unique to the Coral Sea region.

The Coral Sea supports important breeding sites and habitats for marine turtles and species such as sharks, black marlin and nautilus. Several sites in the region attract a range of iconic protected species, including seabirds, whales and whale sharks.





the great barrier reef



...one of the seven
wonders of the
natural world...



Australia's Great Barrier Reef is justly described as one of the seven wonders of the natural world. With more than 2900 separate coral reefs, 600 continental islands and 300 coral cays, this awe-inspiring reef ecosystem runs for more than 2300 kilometres along Queensland's coast, from Cape York down to just north of Bundaberg.

The Great Barrier Reef's great diversity of species and habitats are internationally recognised, with the area having been inscribed on the World Heritage list in 1981.



coral reef wonderland

The only living thing on Earth visible from space, the Great Barrier Reef is also one of the world's most popular tourist destinations. This complex reef system is made up of more than 360 different types of hard coral and one-third of the world's soft corals. Its brilliantly coloured coral network provides safe haven for coral sponges, molluscs, crustaceans and more than 1500 species of fish. The Great Barrier Reef is also home to dolphins, dugongs, rays, sea snakes and giant clams, along with 22 seabird species that fly in to breed on the islands. Six of the world's seven species of marine turtle call the reef home, and it is also a breeding area for majestic humpback whales as they slowly migrate north from the Antarctic.

keeping the great barrier reef *healthy*



More than 230 schools and every council in the region are on board and committed to action to keep our reef a vibrant healthy ecosystem.

While the Great Barrier Reef continues to be recognised as one of the healthiest coral reef ecosystems in the world, it faces some challenges, including climate change, declining water quality from catchment run-off, loss of habitats from coastal development, illegal fishing and poaching. To help keep our reef safe from these threats, significant management efforts have been put in place.

The Reef Guardians Program is an exciting community stewardship initiative run by the Australian Government that aims to build the reef's resilience. More than 230 schools and every council in the region are on board and committed to action to keep our reef a vibrant healthy ecosystem. Industry and the agricultural sector are also helping. Voluntarily, farmers have reduced their use of chemicals and are installing trickle irrigation technology to reduce water use. Fishers are also using safe fuel transfer procedures to minimise fuel loss into the ocean.





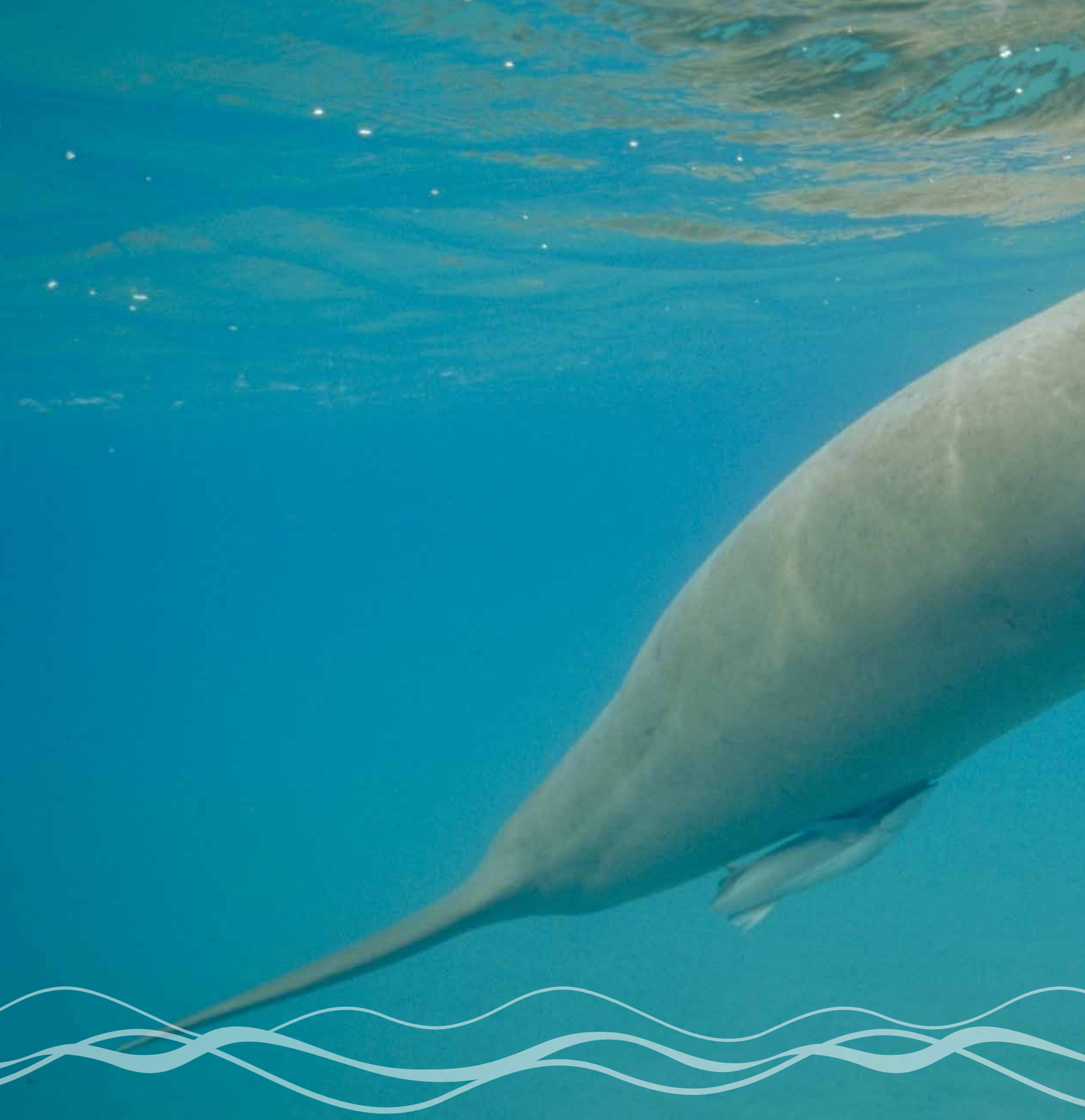
CULTURE MEETS CONSERVATION

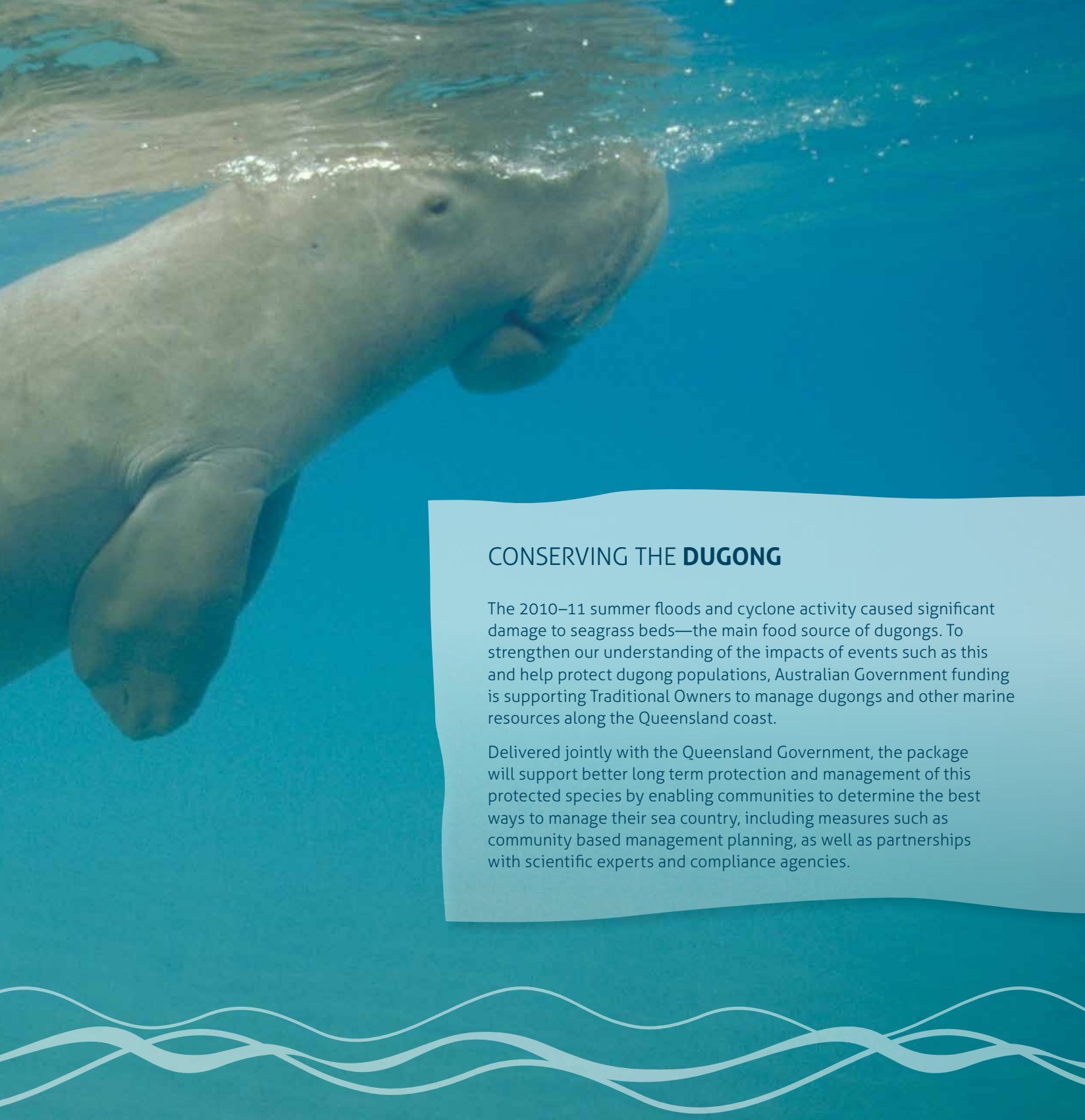
Across Australia, Aboriginal people and Torres Strait Islanders continue to maintain their connection to the sea – a connection that dates back more than 60 000 years. Many Aboriginal and Torres Strait Islander peoples continue to use marine resources for traditional and other purposes through activities such as hunting, collecting and fishing, with these activities recognised by the *Native Title Act 1993*.

Today, Traditional Owners continue to help protect many coastal areas including the Great Barrier Reef, Torres Strait, Gulf of Carpentaria and the waters of the 'Top End' of Northern Territory for future generations. They work in partnership with the Australian Government on a range of sea management programs, including those that help address the illegal netting of dugong and protect turtle nesting sites, as well as the development of junior rangers programs and environmental monitoring training.



“ Our land and sea country is everything to us. It nourishes and sustains us. It contains the story of our history that stretches back forever. It teaches us our law and it celebrates our ancestors. It connects today’s people to the past and holds the sites and signs that guide the men and women of our clans. ”





CONSERVING THE **DUGONG**

The 2010–11 summer floods and cyclone activity caused significant damage to seagrass beds—the main food source of dugongs. To strengthen our understanding of the impacts of events such as this and help protect dugong populations, Australian Government funding is supporting Traditional Owners to manage dugongs and other marine resources along the Queensland coast.

Delivered jointly with the Queensland Government, the package will support better long term protection and management of this protected species by enabling communities to determine the best ways to manage their sea country, including measures such as community based management planning, as well as partnerships with scientific experts and compliance agencies.



converging currents – wellsprings of *biodiversity*



Where warm and cold currents meet and combine, extremely diverse 'transition zones' can occur. Lord Howe Island, located in the East Marine Region 700 kilometres north-east of Sydney, is in one such transition zone. Lord Howe is a seamount, the steep walls of which speed up currents, bringing fresh supplies of food for life-forms such as myriad corals and sponges that jostle for space on the rocky walls. Seamounts such as Lord Howe are highly specialised centres of ocean biodiversity. They provide live-in niches for many species that are often unique to that spot.

Elizabeth and Middleton reefs, peaks of volcanic seamounts that lie about 150 kilometres north of Lord Howe Island, are the most southerly open-ocean coral reefs in the world. Their isolation in a remote area of ocean and exposure to converging tropical and temperate ocean currents and climates has given rise to a distinct, diverse mix of marine species. This colourful coral playground entices many species of turtles and fish that swim peacefully in the azure waters surrounding the reef.







“ I’m not really alone at sea. I have the company of wonderful creatures, like Dolly. We have been friends for more than twenty years now. ”

Richard Freeman

from Currimundi, QLD – a spanner crab fisherman for over 30 years

south-east marine region



As the East Australian Current flows down from the tropical waters of the Coral Sea, it starts to enter colder waters. The South-east Marine Region is home to many underwater canyons and seamounts that support a diversity of marine life, including many newly discovered species.

The region covers more than 1.6 million square kilometres of ocean, from southern New South Wales to eastern South Australia near Kangaroo Island, and includes waters adjacent to Victoria, Tasmania and Macquarie Island.



residents *and* travellers

The complex water flows that result when the East Australian Current, Leeuwin Current and Antarctic Circumpolar Current meet bring nutrients to the surface that support a wide range of marine life. More than half of the marine species found in the South-east Marine Region are unique to this area.

Residents of the region include Australian fur seals, school and gulper sharks, seabirds, little penguins and giant crabs. The threatened southern right whale and other migratory species such as southern bluefin tuna, great white sharks and the magnificent wandering albatross also travel through the South-east Marine Region on their long journeys across the ocean.



south-east seamounts: biodiversity hotspots



...many of these recently discovered species are thought to occur nowhere else in the world.

Rising sharply from the ocean floor around 170 kilometres south of Hobart are about 70 cone-shaped seamounts situated in unusually close proximity to one another.

Under ocean waters at depths of 1000–2000 metres, the seamounts support a high diversity of species, corals, sponges, seastars, anemones, brittlestars, crustaceans, fish and many others species yet to be fully identified. Scientific surveys of these underwater seamounts have revealed that many of these recently discovered species are thought to occur nowhere else in the world.

SOUTH-EAST MARINE RESERVES



The South-east Marine Region contains a network of 14 marine reserves covering a diversity of ocean habitats. Declared by the Australian Government in 2007, it was the first temperate deep-sea marine reserves network in the world.

One of the largest of these reserves lies in the southern ocean to the east of Macquarie Island. The reserve protects tracts of ocean that provide safe migration, feeding and breeding for marine mammals and seabirds. Macquarie Island itself has long been of interest to scientists, with its first scientific research station set up by Sir Douglas Mawson in 1911. His expedition also established the first radio link between Australia and Antarctica.

TRACKING THE HUMPBACK WHALE

In the mid twentieth century, Australia's humpback whale populations were close to extinction, following many decades of intensive industrial whaling. Happily, following protection established in the mid 1960s, these populations are recovering rapidly. Migrating whales are now a common sight off Australia's east and west coasts.

Scientists from the Australian Antarctic Division have used sophisticated satellite tracking instruments to follow humpback whales on their 5000 kilometre migration from the Great Barrier Reef to the krill-rich waters around Antarctica.

The tracks help scientists identify the whales' preferred calving areas, as well as important feeding grounds around Antarctica and along their migration routes. The research has identified key humpback habitats, and has shown that the many southern hemisphere humpback whale populations intermingle off the frozen continent during the summer months.



south-west marine region



The South-west
marine region covers
1.3 million square
kilometres.

Travelling from Victoria into South Australia beyond the influence of the East Australian Current, Australia's South-west Marine Region is shaped by the Leeuwin and the Antarctic Circumpolar currents. Here, species from temperate, cooler waters mix with subtropical and tropical species in diverse marine communities that are globally significant for their outstanding marine wildlife.

Covering about 1.3 million square kilometres, the South-west Marine Region extends from the eastern end of Kangaroo Island off South Australia, across the Great Australian Bight and around the corner of Western Australia, northwards to Kalbarri.



a place of *outstanding* marine diversity

The South-west Marine Region's mix of tropical, subtropical and temperate species form an astounding array of biodiversity. In some parts of the south of this region, as many as 90 per cent of species are found nowhere else on Earth. In the deeper, more remote areas, many more species are still to be discovered.

Threatened marine animals, such as Australian sea lions, southern right whales, blue whales, and white sharks all come to the region to breed and feed. The area also contains critical habitat for the world's largest sea turtle – the endangered leatherback.





“ Conservation of our oceans seems simple enough, but before we conserve, we have to understand what we have. With more than 8 million square kilometres of ocean surrounding Australia, there is much to learn about our oceans and those that inhabit them. ”

Curt Jenner

Managing Director, Centre for Whale Research (Western Australia)

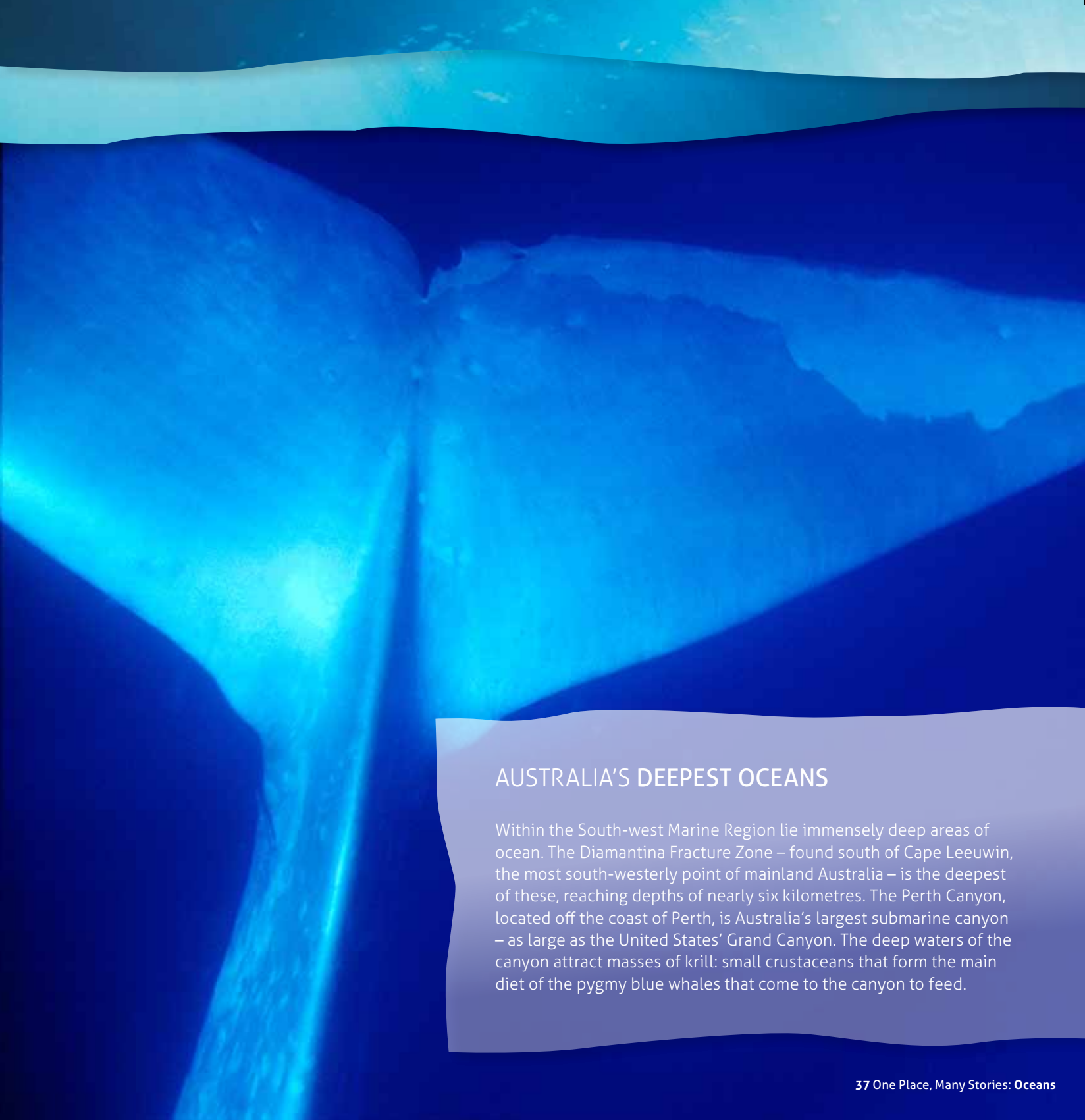
great australian bight

The park is a
globally significant
breeding area for the
Australian sea lion...

At the halfway point of our journey around Australia's ocean waters lies the Great Australian Bight Marine Park.

The park is a globally significant breeding area for the Australian sea lion, which occurs only in Australia's southern waters. Humpback whales, white sharks and several albatross species are also found in the park.





AUSTRALIA'S DEEPEST OCEANS

Within the South-west Marine Region lie immensely deep areas of ocean. The Diamantina Fracture Zone – found south of Cape Leeuwin, the most south-westerly point of mainland Australia – is the deepest of these, reaching depths of nearly six kilometres. The Perth Canyon, located off the coast of Perth, is Australia's largest submarine canyon – as large as the United States' Grand Canyon. The deep waters of the canyon attract masses of krill: small crustaceans that form the main diet of the pygmy blue whales that come to the canyon to feed.

north-west marine *region*



Moving north, the North-west Marine Region's waters are nourished by the warmth of the Leeuwin Current. The region extends north from Kalbarri around the top part of Western Australia to the border with the Northern Territory.

The region provides a refuge for the vulnerable humpback whale, which migrates from its Antarctic feeding grounds along the West Australian coast to tropical breeding waters every winter. Other species listed as vulnerable living in the region are whale sharks and flatback turtles.



SHARK BAY WORLD HERITAGE AREA



Adjacent to the southern end of the Northwest Marine Region lies Shark Bay – a World Heritage Area that is internationally recognised for its outstanding natural heritage values. The area is well-known for its friendly resident bottlenose dolphins, and the seagrass meadows of the area support a large dugong population—one of the largest in the world. The area also forms a nesting place for marine turtles and provides nursery grounds for many types of fish and crustaceans.

ningaloo – brimming with *biodiversity*

More than 460
types of reef fish
call Ningaloo home.



Within the warm waters of the North-west Marine Region lies one of the longest fringing coral reefs on Earth – Ningaloo – which stretches for more than 260 kilometres along the west coast, southwards from Exmouth.

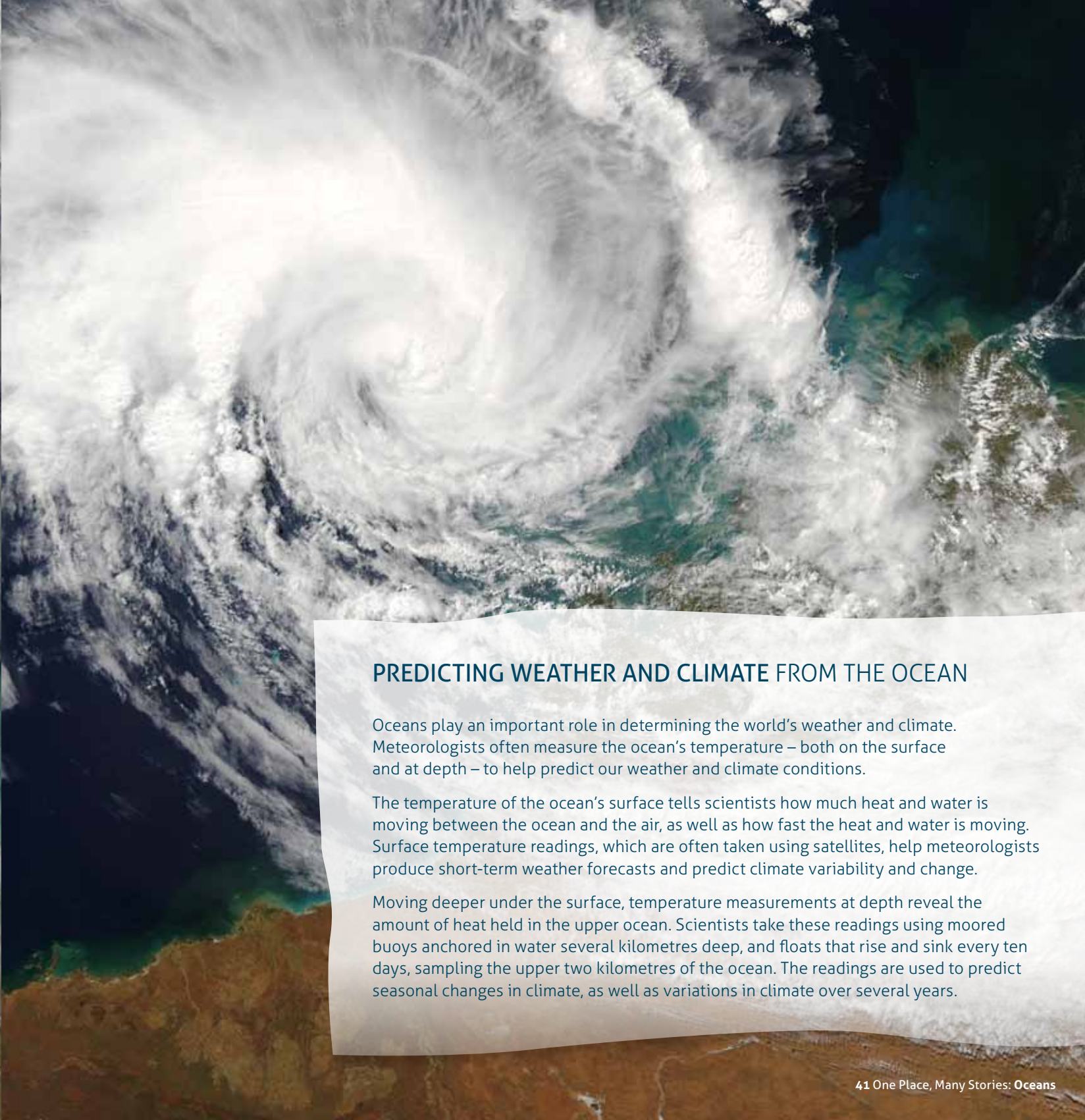
Awarded World Heritage status in 2011, the Ningaloo Coast's beautiful coral reefs protect a shallow lagoon that overflows with a wide diversity of marine life, including many unique types of sponge. More than 200 coral species, 600 mollusc species and more than 460 types of reef fish call Ningaloo home. Frequent visitors include dugongs and dolphins.

The world's largest fish – the plankton-eating whale shark – is another regular visitor, with up to 500 making an appearance each season. Nearby underwater canyons contribute to the reef's biodiversity by channelling currents, which carry nutrients from deeper waters to feed the microscopic organisms that form the foundation of this region's rich food web.

MERMAID REEF

Heading northwards from Ningaloo, Mermaid Reef Marine National Nature Reserve and the Rowley Shoals are found about 300 kilometres off the coast of Broome. The pristine environments of Mermaid Reef and the Rowley Shoals supports great numbers of molluscs, sea stars, sea urchins and finfish. Healthy populations of many shark species, including grey reef and silver tip whaler sharks, are also found in the Rowley Shoals.



A satellite image of a tropical cyclone, showing a dense, swirling cloud structure over a dark blue ocean. The cyclone's eye is visible in the center, surrounded by a thick ring of clouds. The surrounding ocean surface shows some greenish-brown patches, possibly indicating shallow waters or coastal features. The image is taken from a high angle, looking down at the storm.

PREDICTING WEATHER AND CLIMATE FROM THE OCEAN

Oceans play an important role in determining the world's weather and climate. Meteorologists often measure the ocean's temperature – both on the surface and at depth – to help predict our weather and climate conditions.

The temperature of the ocean's surface tells scientists how much heat and water is moving between the ocean and the air, as well as how fast the heat and water is moving. Surface temperature readings, which are often taken using satellites, help meteorologists produce short-term weather forecasts and predict climate variability and change.

Moving deeper under the surface, temperature measurements at depth reveal the amount of heat held in the upper ocean. Scientists take these readings using moored buoys anchored in water several kilometres deep, and floats that rise and sink every ten days, sampling the upper two kilometres of the ocean. The readings are used to predict seasonal changes in climate, as well as variations in climate over several years.





"...more than 460 types of reef fish call Ningaloo home. Frequent visitors include dugongs and dolphins."

north marine region



Finding refuge in this area are breeding populations of the threatened green, hawksbill and flatback turtles.

South-west of the waters of the Indonesian Throughflow, Australia's North Marine Region extends from the Northern Territory border with Western Australia to the western side of Cape York in Queensland. The Gulf of Carpentaria and parts of the Arafura Sea and the Timor Sea make up this region, which is heavily influenced by tides and winds.

An animal refuge

The tropical waters of northern Australia are likely to be the only home of the Australian snubfin dolphin, which is one of the rarest sea mammals on earth. Finding refuge in this area are breeding populations of the threatened green, hawksbill and flatback turtles. Sawfish are an important, iconic species group found in this region, and the area is also of vital importance to seabirds – it plays host to the world's largest colonies of breeding crested terns, which flock to the area in multitudes to lay their eggs.



wellesley island *rangers*, qld



The Carpentaria Land Council Aboriginal Corporation manages 25 full-time rangers in three groups funded through the Australian Government Working on Country initiative and the Queensland Government's Wild River Ranger program. Rangers have responsibilities that include looking after land and sea country using a combination of traditional knowledge and new technologies.

One of the three ranger programs managed by the Carpentaria Land Council is the Wellesley Islands Rangers who are based on Mornington Island, Queensland. The seven full-time Indigenous rangers and one full-time coordinator operate across an area of over 16 000 sq km including the 32 islands in the Wellesley Islands group, with a coast line in excess of 620kms.

Ranger activities are diverse and include survey and management of turtle and dugong populations and nesting areas; seagrass and reef monitoring programs and threatened and migratory bird monitoring; biodiversity monitoring, sea country patrols, cultural heritage site restoration and weed work. Mornington Island is a key nesting site for marine turtles, and is significant as nesting periods are not limited to summer months like other areas in Australia.

The group aspire to develop a coordinated and holistic approach to managing their land and sea country for Traditional Owners present and future.





“

The fellas are as proud as punch to put on their uniforms and go out and look after their country. Even though it's hard work they have a real sense of achievement. The whole community is proud of what they are doing.

”

Bradley Wilson

former Wellesley Islands ranger, Qld

image credits

(from left to right)

Pg Photo description

- | | | |
|--|---|---|
| <p>2 Underwater garden, Commonwealth of Australia (GBRMPA).</p> <p>3 Spanish dancer nudibranch, Lord Howe Island (Ian Hutton & DSEWPAC).</p> <p>Gannets feeding (Richard Freeman, http://aloneatseaphotography.com.au).</p> <p>4 Charter boat fishing off Western Australia (WA Tourism).</p> <p>Turrent coral, Ningaloo Marine Park (WA Tourism).</p> <p>School of fish (Glen Cowans).</p> <p>5 Soft coral and diver (Mike Ball).</p> <p>6 Trawlers, Western Australia (Anna Lee Stravens).</p> <p>Ray at Turquoise Bay, Ningaloo (Jane Ambrose).</p> <p>7 Marlin chasing sardines (www.boyceimage.com).</p> <p>8 Bronze whaler (Richard Freeman, http://aloneatseaphotography.com.au).</p> <p>Hingebeak Shrimp, Commonwealth of Australia (GBRMPA).</p> | <p>9 A map of the major currents around Australia.</p> <p>10 Baby loggerhead hatchlings, Commonwealth of Australia (GBRMPA).</p> <p>11 Snapper (DSEWPAC).</p> <p>12 Hawksbill turtle (DSEWPAC/Paradises Ink).</p> <p>13 Humpback whale display (Dave Paton, Blue Planet Marine).</p> <p>14 Diver with trevally in the Coral Sea (Mike Ball).</p> <p>15 Shearwaters at sunset (Richard Freeman, http://aloneatseaphotography.com.au).</p> <p>16 Masked booby (Ben Addison, DSEWPAC).</p> <p>Green turtle, Commonwealth of Australia (GBRMPA).</p> <p>17 Big eye trevally (www.photolibrary.com).</p> <p>18 Map reconstructing the battle of the Coral Sea (Australian War Memorial).</p> | <p>19 USS Sims (Australian War Memorial)</p> <p>Smoke billows into the air from the burning USS Lexington after attacks by Japanese torpedo aircraft (Australian War Memorial)</p> <p>USS Lexington under attack (Australian War Memorial)</p> <p>20 Lionfish, Commonwealth of Australia (GBRMPA).</p> <p>21 Dwarf minke whale (Matt Curnock).</p> <p>Nautilus (Gavin Leese, Qld Department of Primary Industries and Fisheries Fishery Observer program).</p> <p>Bright red soft <i>Dendronephthya</i> coral, with pale pink polyps surrounded by colourful Gorgonian fans, Commonwealth of Australia (GBRMPA).</p> <p>22 Diver with potato cod on the Great Barrier Reef, (Commonwealth of Australia, GBRMPA).</p> <p>Giant clam, (Commonwealth of Australia, GBRMPA).</p> <p>Red-and-black anemone fish, Commonwealth of Australia (GBRMPA).</p> |
|--|---|---|

- 23** Heart Reef, Great Barrier Reef, Commonwealth of Australia (GBRMPA).
- 24** Beaked coral fish Great Barrier Reef, Commonwealth of Australia (GBRMPA).
- Green turtle hatchlings, Commonwealth of Australia (GBRMPA).
- A Bwgcolman Community School student explores the intertidal zone on Palm Island (GBRMPA).
- St Marys Catholic School students in Bowen involved in a Reef Guardian program (GBRMPA).
- Palm Island students from St Michaels Catholic School learn about seagrass monitoring from a GBRMPA employee (GBRMPA).
- 25** Hunting Wanuwuy, Working on Country ranger, Djawulu Mumungurr hunting during a lunch break at Wanuwuy (Cape Arnhem), NT (Vanessa Drysdale, Dhimurru Aboriginal Corporation, NT)
- 27** Dugong – a popular creature in the Great Barrier Reef (Commonwealth of Australia, GBRMPA).
- 28** Elizabeth and Middleton Reefs from the air (Director of National Park).
- Lord Howe Island (Lord Howe Island Tourism Association).
- Red sea star (Matthew Lawrence).
- 29** Dolly, the dolphin (Richard Freeman, <http://aloneatseaphotography.com.au>).
- 30** Jewel anemone (Antonia Cooper, Reef Life Survey).
- Southern fan worm (Antonia Cooper, Reef Life Survey).
- White shark (Mike Ball and Rodney Fox).
- 31** School of southern bluefin tuna (Copyright: Australian Fisheries Management Authority).
- Wandering albatross (Michael Double).
- 32** Seastar and coral (CSIRO).
- Sea anemone, *Actinaria* (CSIRO).
- Fur seals on Macquarie Island (Melinda Brouwer).
- 33** Humpback whale off the east coast of Australia (Richard Freeman, <http://aloneatseaphotography.com.au>).
- 34** Native *Caulerpa* species – a type of seaweed (James Brook).
- Harlequin fish (Marine Life Society of South Australia).
- Leafy sea dragon (Marine Life Society of South Australia).
- 35** Vercos nudibranch (Antony King).
- 36** Australian sea lion in seagrass off Carnac Island (WA Tourism).
- 37** Pygmy blue whale diving (Micheline Jenner, Centre for Whale Research).
- 38** Surgeon fish (DEC WA).
- Blue-spotted fantail stingray (Naomi Woolfe).
- Whale shark, Commonwealth of Australia (GBRMPA).
- 39** Bottlenose dolphin (Ian Anderson, CALM WA).
- 40** Whale shark in the Ningaloo Marine Park (Tourism WA).
- 41** A storm brewing (image courtesy of MODIS Rapid Response Project at NASA/GSFC).
- 42** School of colourful soldier fish, in Ningaloo Marine Park (Tourism WA).
- 44** Green sawfish (S. Peverell).
- Green turtle (DEC WA).
- Common terns (Richard Freeman, <http://aloneatseaphotography.com.au>).
- 45** Gangalidda/Garawa rangers on a boat at sea (Carpentaria Land Council Aboriginal Association).

www.environment.gov.au

© Commonwealth of Australia 2011