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by

Tom Edwards

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ISSN 1325-5142

ISBN 978 0 7313 18391

September 2008

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EXECUTIVE SUMMARY

The oceans under Australian jurisdiction contain all temperature zones from tropical to polar, and this explains why they support a tremendous diversity of fish species and aquatic life. They are thought to contain many as yet undiscovered species.(Section 1)

Under international law Australia has jurisdiction over a vast area of sea, the third largest in the world. The vast majority of this is the responsibility of the Commonwealth Government. Under the Offshore Constitutional Settlement, States have jurisdiction out to 3 nautical miles from the coastline. (Section 2)

New South Wales' marine environment is of importance both economically, recreationally and culturally. There are a number of competing uses of the marine environment. Marine based tourism in New South Wales for the year 2002-03 was valued at \$4.5 billion, and was estimated to account for 82% of all jobs in marine related activities in the State. Landings from the NSW commercial fishing fleet were worth over \$30m in 2006. New South Wales has over 1 million recreational anglers, who spend over half a billion dollars annually on their sport. Aquaculture production in NSW is worth almost \$50m annually, and is dominated by oyster growing. New South Wales has 3 of Australia's top ten ports: Newcastle, Sydney and Port Kembla, and trade through these ports was worth over \$60 billion in 2005-06. Energy production from NSW seas is limited – there is no oil or gas production, although limited reserves are known to exist, and renewable energy production is limited to one wave generator at Port Kembla. No offshore mineral production takes place, although there are known to be reserves of sand, manganese and phosphates. Three strategically important communications cables run offshore of NSW, linking Australia to New Zealand, the United States and Japan. There are prospects for discovering novel uses for marine organisms, and some uses are already being developed by scientists, including a treatment for chronic pain. (Section 3)

The way we use the sea and its living resources clearly affects the marine environment. Threats to the marine environment include coastal development, introduction of invasive species, fisheries, pollution, and climate change. The proportion of NSW coast that has been developed increased by over 4% between 1980 and 2004, to 27% of the total coastline. Australia's State of the Environment Report 2001 identified maintaining and restoring water quality as being the most critical marine environmental issue. The most recent assessment of NSW fish stocks shows that although only a small proportion are known to be overfished, fishing pressure on most commercially important species is high. Besides the direct impact on fish stocks, fishing can have an impact on the marine environment through bycatch of other species, or by disturbance or damage to the sea-bed from fishing gear. The introduction of new species to the marine environment can pose a threat to native flora and fauna. Shipping is the main means by which exotic species are introduced, there is also a risk of damage from oil spills or spilled cargo. Climate change is expected to result in the warming of the seas around NSW, and a southwards shift in the distribution of some marine organisms has already been observed. (Section 4)

One way to protect the marine environment is to designate marine protected areas where the use of the environment is controlled. Alternative approaches include regulating activities which impact on the marine environment, for example, regulating fishing through

the use of quotas or regulating discharges to the marine environment to prevent pollution. Australian marine scientists support the creation of marine protected areas, although the lack of robust evidence for the benefits of some marine protected areas has led to calls for greater rigour in assessing candidate areas. The designation of marine protected areas is often controversial because of the impact it has on other uses of the marine environment. (Section 5)

Australian Governments are committed to completing a National Representative System of Marine Protected Areas by 2012. As part of this work, NSW state waters have been divided into six bioregions within which assessments are being carried out to identify the need for additional marine protected areas. There are two main types of marine protected area (MPA) within NSW state waters: marine parks and aquatic reserves. NSW has six marine parks, which together cover over a third of state waters. It has 12 aquatic reserves, which cover much smaller areas than marine parks. Additionally, 62 national parks and nature reserves include a marine component. (Section 5.1)

In the seas under Commonwealth jurisdiction, there are currently 26 Commonwealth Marine Reserves, and an additional five reserves which include land and marine components. The Commonwealth Government is implementing a system of Marine Regional Planning. So far a plan has been prepared for the South East Marine Region, and within it a network of 13 Commonwealth Marine Reserves has been proclaimed, the first example of such a network in the world. The world-renowned Great Barrier Reef Marine Park is also within Commonwealth jurisdiction. The revision of the Park's zoning plan in 2004 saw over a third of the Park being designated as no-take areas, a move which has been recognized as setting a new standard in world best practice. (Section 6.1)

New Zealand's marine environment is more than 15 times larger than its land area, and its Exclusive Economic Zone is the fourth largest in the world. However, only a small percentage of this environment is currently protected. The New Zealand Biodiversity Strategy (2000) includes a target of having 10% of the marine environment in a network of Marine Protected Areas by 2010. (Section 6.2)

The United States has the world's largest Exclusive Economic Zone. The US inventory records almost 1700 MPAs, ranging in size from fractions of a hectare to hundreds of thousands of square kilometres. The large number of sites, the number of bodies involved and the lack of a coordinated strategy for their management led to a Presidential request in 2000 to develop a national system of marine protected areas. (Section 6.3)

The United Kingdom has only three marine nature reserves. Implementation of European Habitats legislation has led to the creation of over a hundred marine protected areas. The UK also plans to designate a national network of marine protected areas to comply with international commitments it has made to conserve the marine environment. (Section 6.4)

1.0 INTRODUCTION – AUSTRALIA’S MARINE ENVIRONMENT

The oceans and seas under Australian jurisdiction include the full range of ocean temperature zones, from tropical to polar, ranging from the spectacular coral reefs of the tropical north to the majestic kelp forests of the temperate south. This environmental diversity explains the rich variety of life found in Australia’s oceans. Australia's marine environments contain more than 4,000 fish varieties and tens of thousands of species of invertebrates, plants and micro-organisms. Large areas have been little explored and new species are often discovered. Scientists estimate that about 80% of the species in Australia’s southern oceans occur nowhere else in the world.

Australia's unique marine environments contain:

- the world's largest areas and highest species diversity of tropical and temperate seagrasses;
- the largest areas of coral reef in the world;
- the highest diversity of mangrove species;
- exceptional levels of biodiversity for a wide range of marine invertebrates;
- high levels of endemism (unique species) in our temperate and sub-Antarctic waters.¹

2.0 REGULATION OF THE OCEANS

2.1 International law of the Sea

The International law of the sea is established by the United Nations Convention on the Law of the Sea (UNCLOS). The Convention was a response to growing conflict over the rights to exploit the living resources of the sea and the mineral wealth of the seabed which developed as countries began to assert unilateral claims to these resources in the mid 20th century. The Convention was negotiated between 1973 and 1982 and entered into force in 1994, when Guyana became the 60th country to ratify the convention. The Convention establishes coastal states rights over the seas at certain distances from baselines drawn around their coasts:

- The Territorial Sea: the outer limit of the territorial sea is 12 nautical miles seaward of the baseline. Within this limit, coastal states are in principle free to enforce any law, regulate any use and exploit any resource, although they must respect the right of vessels from other nations to innocent passage;
- The Exclusive Economic Zone (EEZ): coastal states have a right to exploit, develop, manage and conserve all resources to be found in the waters, on the ocean floor and in the subsoil of an area extending 200 nautical miles from their baseline.
- The Continental Shelf: This comprises the seabed and its subsoil of a coastal state that extend beyond the limits of its territorial sea to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the territorial sea is

¹ Department of the Environment, Water, Heritage and the Arts. *About Australian Marine Protected Areas*. <http://www.environment.gov.au/coasts/mpa/about/index.html>

measured, where the outer edge of the continental margin does not extend up to that distance. In cases where the continental margin extends further than 200 miles, nations may claim jurisdiction up to 350 nautical miles from the baseline or 100 nautical miles from the 2,500 metre depth, depending on certain criteria such as the thickness of sedimentary deposits. UNCLOS established a Commission on the Limits of the Continental Shelf to rule on states continental shelf claims.²

2.2 Australia's maritime jurisdiction

Australia's maritime jurisdiction extends over a vast area of the ocean — some 16 million square kilometres. Most of this area is the sole responsibility of the Commonwealth Government. For administrative and regulatory purposes Australia has declared a range of [maritime zones](#). The outer limits of all of these zones are measured from the territorial sea baseline, located for the most part at the low-water mark along the coast. The zones include:

- Coastal waters – the zone 3 nautical miles seaward of the baseline
- The territorial sea: the outer limit of the territorial sea is 12 nautical miles seaward of the baseline.
- The Exclusive Economic Zone (EEZ): Australia proclaimed its EEZ in July 1994. The EEZ surrounding the coast of Australia and its territories is the third largest in the world, and is larger than Australia's landmass³.
- The Australian Fishing Zone: declared in 1979, and now managed under the *Fisheries Management Act 1991*. The zone is the area of waters between 3 nm and 200 nm seaward of the baselines. It is exactly the same area as the EEZ but relates only to the use or protection of fisheries, whereas the EEZ relates to all types of resources in the zone (e.g. fish, oil, gas, minerals, etc.)
- The continental shelf: after supporting work by [Geoscience Australia](#), submissions were lodged with the Commission on the Limits of the Continental Shelf in 2004. In April 2008 the Commission adopted recommendations that confirmed the location of the outer limit of Australia's continental shelf in nine distinct marine regions. This decision gives Australia jurisdiction over an additional 2.5 million square kilometres of continental shelf that extends beyond 200 nautical miles from its territorial sea baseline.

Under the [Offshore Constitutional Settlement](#) (OCS), States have jurisdiction over coastal waters out to 3 nautical miles from the baseline.⁴⁵ One exception is the Commonwealth responsibility for the Great Barrier Reef Marine Park, which extends seaward from the low water mark. Specific arrangements for fisheries allow the Commonwealth and states/territories to change

² United Nations. *The United Nations Convention on the Law of the Sea (A historical perspective)*. http://www.un.org/Depts/los/convention_agreements/convention_historical_perspective.htm#The%20Future

³ Geoscience Australia. *Area of the Australian Exclusive Economic Zone*. <http://www.ga.gov.au/education/facts/dimensions/oceans.jsp>

⁴ Geoscience Australia. *Maritime boundary definitions*. <http://www.ga.gov.au/nmd/mapping/marbound/bndrs.jsp>

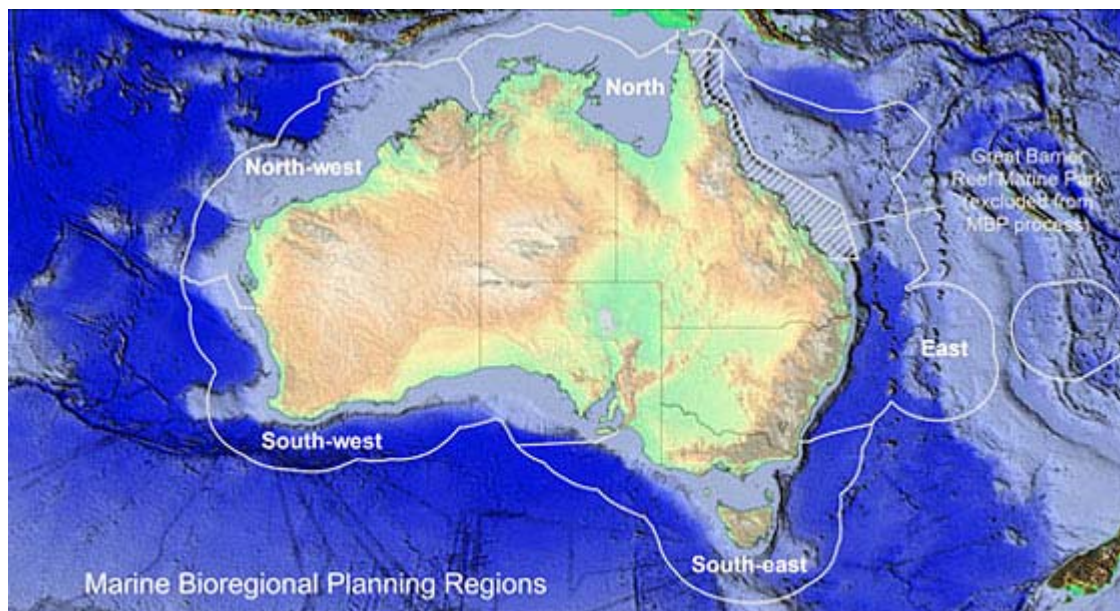
⁵ Attorney General's Department. *The Offshore Constitutional Settlement*. http://www.ag.gov.au/www/agd/agd.nsf/Page/InternationalLaw_TheOffshoreConstitutionalSettlement

fisheries jurisdictions so they better reflect fishing practices and where fish are caught. Under these arrangements a fishery may be managed by either the Commonwealth or a State/Territory or it may be jointly managed.⁶ In general, the Commonwealth Government then has responsibility the oceans from the State or Territory limit to the edge of Australia's marine jurisdiction.

2.3 Australia's Marine Regions

Australia's seas and oceans have been divided into regions based on their ecology and geography. The system is based on a classification called the [Integrated Marine and Coastal Regionalisation of Australia](#). This system divides Australia into 5 marine regions, these are the South-east, South-west, North-west, North and East Marine Regions, as shown in the figure below.

Figure 1 – Australia's Marine Regions



⁶ Department of Agriculture, Fisheries and Forestry. *Managing Australia's fisheries*. <http://www.daff.gov.au/fisheries/domestic/state-fisheries>

3.0 USE OF THE NSW MARINE ENVIRONMENT

In 2001 more than eight out of ten Australians lived within 50km of the coast. The coast and the sea are therefore important economically, recreationally, and culturally. The following sections map out the main uses and values of the seas around New South Wales.

3.1 Tourism & Recreation

Marine based tourism in New South Wales for the year 2002-03 was valued at \$4.5 billion, and was estimated to account for 82% of all jobs in marine related activities in the State. Marine based tourism and recreation comprise a range of activities, including:

- Water sports such as sailing;
- Scuba diving and snorkelling;
- Surfing;
- Wildlife watching, e.g. whale and dolphin watching;
- Cruises.

The table below has some information about participation in these activities in New South Wales by domestic and international visitors.

Table 1 – Participation in selected marine recreational activities in New South Wales

Activity	Number of participants among domestic visitors to New South Wales 2006 (unless otherwise stated)	Number of participants among international visitors to Australia 2006	Expenditure by participants 2004/5
Watersports	967,000	313,000	
Surfing	704,000	268,000	
Snorkelling	159,000	667,000	
Scuba diving	40,000	254,000	
Whale and dolphin watching (boat based, all visitors) 2003	320,000		
Cruise			\$110 m

Sources: Tourism Queensland. *Adventure Market Snapshot, year ended December 2006*.

http://www.tq.com.au/fms/tq_corporate/research/fact_sheets/adventure_tourism.pdf

Tourism New South Wales. *The NSW Cruise Market – a discussion paper*. February 2007.

http://corporate.tourism.nsw.gov.au/Sites/SiteID6/objLib28/cruise_discussion_paper1.pdf

Sinclair Knight Merz. *Non fisheries resource use activities in the East Marine Planning Region*. November 2007.

<http://www.environment.gov.au/coasts/mbp/publications/east/pubs/non-fisheries.pdf>

These data give an indication of the substantial number of people participating in marine based tourism activities in New South Wales. To their number must be added the substantial numbers of New South Wales residents who also enjoy taking part in marine based recreations, for example, the ABS estimated that 130,000 and 30,000 New South Wales residents took part in surf sports and sailing respectively in 2006.⁷

⁷ Table 10. Australian Bureau of Statistics. *Participation in Sports and Physical Recreation*,

3.2 Commercial fisheries

In 2003 there were 1900 fishers in NSW, and fishing accounts for between 0.1% and 2.3% of employment in NSW Statistical Local Areas⁸.

A profile of fisheries in the East Australian marine region describes three commercial fisheries. All three fisheries are carried out from coastal waters out to around 80nm offshore, and so their management by the New South Wales Department of Primary Industries is carried out under OCS arrangements. The table below shows some information about the fisheries.

Table 2 – Commercial fishery sectors in New South Wales

	Species targeted	2006 Landings	Proportion in coastal waters (within 3nm)	Number of businesses involved
Ocean trap and long-line	Mixed fishery targeting 11 main species and 14 secondary species with snapper, spanner crabs, kingfish, leatherjackets, bonito and trevally making up the bulk of catches	1399 tonnes, worth \$11.7m	40%	478 fishing businesses have endorsements for the fishery
Trawl fishery	Two fisheries – one targeting prawns and bugs off the Northern NSW coast, with bycatches of squid and fish. And the other targeting finfish off the Central coast	2102 tonnes worth \$16.2m	50%	271 fishing businesses
Rock lobster	Eastern rock lobster, with small amounts of tropical and Southern rock lobsters	52 tonnes worth \$2.4m		122 shareholders in the fishery in 2007

Source: Bureau of Rural Sciences. Regional Profile East Marine Region. Description of commercial, recreational and charter fishing activities. 2007. <http://www.environment.gov.au/coasts/mbp/publications/east/pubs/fishing-activities.pdf>

⁸ The Statistical Local Area (SLA) is the base spatial unit for collecting and disseminating statistics other than those collected in the census.

3.3 Recreational fishing

New South Wales has the largest number of recreational sea anglers of any State. A survey suggested that 1 million people in NSW had fished at least once in the 12 months prior to May 2000, and NSW recreational anglers were estimated to have spent \$554 million in the same time period. Recreational fishing in NSW tends to be concentrated offshore of the key ports of Sydney, Port Stephens, Coffs Harbour, Wollongong, Batemans Bay and Bermagui. The main target species for game fishermen are: marlin; tuna; swordfish; mako, tiger and whaler sharks; kingfish; and mahi mahi. Other species including snapper; morwong and flathead are also targeted, and fish such as blue mackerel and skipjack tuna are caught as baitfish.

A licensing scheme for recreational charter fishing boats is operated under the *Fisheries Management Act 1994*. The scheme came into operation in 2000, and there were 279 licensed charter boats in 2006. Recreational fishers must also pay a licence fee, which is currently \$30 annually. Fishing effort is controlled by limiting the number of lines that can be fished by each angler (four), setting minimum landing sizes, and setting bag limits.⁹

3.4 Aquaculture

Aquaculture is a rapidly developing industry in Australia, and represents around 30% of Australian fisheries production. Aquaculture in New South Wales is dominated by Sydney Rock Oyster production, accounting for around 2/3 of aquaculture output by value (\$33 million out of \$48 million). Oysters are produced in 41 estuaries on the NSW coast, with the Hawkesbury and Wallis lake being the main production areas. A lack of suitable sites, lack of a supply of juveniles, and the expense of feeds has held back the growth of other forms of marine aquaculture in NSW. a Production of other marine species is limited, with some cultivation of blue mussels, and one sea cage fish farm in Botany Bay, producing snapper and mullet.¹⁰

3.5 Ports and Shipping

Most of Australia's international trade is carried out by sea, and sea freight exports have shown a sustained increase over the last twenty years. New South Wales has three of Australia's top ten ports for freight volumes handled: Newcastle, Sydney and Port Kembla.. The table below has some information about the volumes and values of sea freight handled by these and other leading NSW ports.

⁹ Bureau of Rural Sciences. Regional Profile East Marine Region. *Description of commercial, recreational and charter fishing activities*. 2007.
<http://www.environment.gov.au/coasts/mbp/publications/east/pubs/fishing-activities.pdf>

¹⁰ New South Wales Department of Primary Industries. *Aquaculture Production Report 2006-06*.
http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/155749/aquaculture-production-report-2005-06.pdf

New South Wales Department of Primary Industries. *Marine fish aquaculture prospects*.
<http://www.dpi.nsw.gov.au/fisheries/aquaculture/publications/species-saltwater/marine-fish>

Table 3 – Imports and exports at the main ports of New South Wales 2005-06

Port	Imports (tonnes)	Exports (tonnes)	Value of imports (\$ '000s)	Value of exports (\$ '000s)	Total Value (\$ '000s)
Coffs Harbour	646	96	825	4,317	5,142
Newcastle	1,027,709	82,835,442	597,593	7,148,445	7,746,038
Port Kembla	1,909,559	13,954,890	284,831	3,785,370	4,070,201
Sydney	15,023,548	4,880,631	39,776,688	10,258,250	50,034,938
Other ports	1,012	8,858	1,329	13,640	14,969
Total	17,962,474	101,679,917	40,661,266	21,210,022	61,871,288

Source: Department of the Environment, Water, Heritage and the Arts. *Non Fisheries Resource Use Activities in the East Marine Planning Region*. November 2007. <http://www.environment.gov.au/coasts/mbp/publications/east/pubs/non-fisheries.pdf>

3.6 Oil & Gas

No major offshore oil or gas production occurs in the waters off the New South Wales coast, although there are potential petroleum reserves. The Lord Howe rise, which extends from South of New Caledonia to the west coast of New Zealand has been estimated to have potential petroleum reserves of 4.5 million barrels¹¹. There are also potential reserves in the Sydney basin. The offshore component of the basin extends to the edge of the continental shelf and has an area of 5,000 square kilometres (about a tenth of the basin's total area). Seismic investigations of one prospect in the Northern part of the basin have shown it could contain enough gas to meet Sydney's needs for a decade, with a value of around \$500m.

3.7 Renewable energy

There are three main potential sources of renewable energy available in the marine environment, offshore wind power, wave energy and tidal energy. The prospect of generating energy from waves was explored during the 1970s, but interest waned as oil prices fell, holding back the development and commercialisation of the technology. Tidal barrages use the energy of the tide rising and falling in an estuary. This is a proven technology which has been deployed in several sites around the world. Tidal stream is a newer form of the technology, which uses underwater turbines to generate electricity from strong tidal currents, such as around exposed headlands or in narrows. Wind turbines have been installed offshore, typically on shallow sand bars, in countries including Denmark, Holland, and the UK. The idea of installing wind turbines on redundant oil and gas infrastructure is also being explored.

A wave power device in the harbour wall at Port Kembla is the only such device currently operating in Australia. The [Oceanlinx](#) device was installed in December 2006 and is undergoing an extended testing period. To date no tidal generators or offshore wind-turbines have been installed in New South Wales.

3.8 Mineral exploration

No offshore mining or mineral extraction is currently taking place in the waters off the New

¹¹ Australia's total proven oil reserves have been estimated at over 4 billion barrels

South Wales coast, and there are no active Mineral Exploration Licences for exploration in coastal or offshore waters. There are potential resources of mineral sand, manganese and phosphates. There is a high demand for sand from the construction industry, and existing land based operations are unlikely to meet future demand. A company called Sydney Marine Sand Pty Limited has applied for a Mineral Exploration Licence to explore sand deposits 5km off the NSW coast. As demand for sand increases interest in nearshore and offshore resources is likely to grow. The exploitation of other offshore minerals is not economically viable at present, and future activity will depend on technological advances and the continued availability of cheaper terrestrial resources.¹²

3.9 Submarine cables

Australia's submarine communications cables are estimated to be worth more than \$5 billion yearly to the national economy. The submarine cables off the coast of New South Wales are used for communications. There are three active cables, all of which are linked to Sydney, and a number of old cables which are now obsolete. Two of the three active cables are considered cables of national significance and are protected from the risk of damage by fishing activities by a one nautical mile exclusion zone on either side. These are the Australia Japan Cable and the Southern Cross Cable, which links Sydney to USA via New Zealand and Sydney to the USA via Fiji. The third active cable is the Tasman 2 cable that runs from Sydney to Auckland.

3.10 Dumping of waste

In the past dumping at sea was relatively common, as it alleviated pressure on land-based disposal facilities, and the environmental impacts were not fully appreciated. Disposal of waste has become subject to increasingly strict regulation under the London Convention to which Australia is a signatory. A protocol to the Convention adopted in 1996, and implemented into Australian law in 2000, prohibits dumping apart from seven categories of waste. A permit is required to carry out any dumping, and nowadays most such permits are issued for the dumping of uncontaminated dredge spoil. Nonetheless there remain a number of dump sites both in coastal waters and offshore where potentially hazardous materials were dumped in the past.¹³

¹² Department of the Environment, Water, Heritage and the Arts. *Non Fisheries Resource Use Activities in the East Marine Planning Region*. November 2007. <http://www.environment.gov.au/coasts/mbp/publications/east/pubs/non-fisheries.pdf>

¹³ The full title of the convention is the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972, and the Protocol of 1996, implemented in Australia by the Environment Protection (Sea Dumping) Act 1981. The Convention does not apply to wastes produced on board vessels derived from their normal operations (e.g. food waste), to military craft, or to wastes arising from oil and gas extraction or other offshore mining operations. Department for the Environment, Water, Heritage and the Arts, *London Convention Newsletter*. February 2002. <http://www.environment.gov.au/coasts/international/pollution/newsletter-1.html>

3.11 Novel use of marine organisms

Biodiscovery is the investigation of biological resources such as plants or animals for properties that have a commercial value or other wider application. Marine organisms produce biochemical agents that may be used for commercial and biomedical applications. Their discovery may result in better vaccines, faster diagnosis of diseases, better quality foods and more environmentally friendly products. For example, sea sponges and marine algae have been used in pharmaceuticals. Heat loving microbes from hydrothermal vents may be suitable for use in oil, coal and waste-gas desulphurization as well as in the treatment of industrial effluents. The food, aquaculture, agriculture and nutritional supplement industries also use marine organisms.

The diversity of Australia's marine environment, the diversity of species it contains and the prospect of substantial numbers of undiscovered species mean there are good prospects for biodiscovery. For example, a chronic pain treatment has recently been developed using compounds derived from a species of sea snail. Scientists at the University of New South Wales are investigating a number of potential commercial applications for compounds derived from marine algae as diverse as reducing infection, antifouling paint and contact lens cleaning solutions.

4.0 IMPACTS ON THE MARINE ENVIRONMENT

The way we use the sea and its living resources clearly affects the marine environment. The seas off the coast of New South Wales adjoin the most heavily populated part of Australia, which increases the potential for human impacts. The following sections look at the way we impact on the marine environment.

4.1 Development

In 2001, 85% of people in New South Wales lived within 50km of the coast.¹⁴ Analysis of satellite imagery has shown the expansion of coastal development in New South Wales over the last twenty years. The proportion of NSW's coast that has been developed increased by over 4% between 1980 and 2004, to 27% of the total coastline. Nationally, 6% of Australia's coast has been developed. Certain stretches of Australia's east coast are even more developed – in 2004, one third of the coast between Noosa in Queensland and Nowra in NSW had been developed.¹⁵ Coastal development affects the marine environment by affecting the habitats of species such as seabirds which nest on the coast, and altering processes such as drainage. In particular, development can affect coastal water quality, especially when it occurs near existing centres of population, because of contaminated water running off buildings and roads.

4.2 Invasive species

The introduction of new species to the marine environment can pose a threat to native flora and fauna, and where there is an absence of natural predators or other factors to keep a population in check, can affect entire ecosystems. Introductions typically occur as a result of human activities, where species are carried in ships ballast water, or attached to their hulls, but can also occur naturally when organisms are carried long distances by ocean currents. A species of marine algae called *Caulerpa taxifolia* has been found in Port Hacking in New South Wales. In the Mediterranean, where it has also been introduced, it has spread rapidly, destroying seagrass beds and marine habitats. The European Shore crab is another species which has been introduced to New South Wales, and it competes with native crustaceans.¹⁶

4.3 Pollution

Australia's State of the Environment Report 2001 identified maintaining and restoring water quality as being the most critical environmental marine environmental issue.¹⁷ Water quality is important for the functioning of marine ecosystems, for fisheries, aquaculture and tourism, and for recreation and aesthetic value.

¹⁴ Australian Bureau of Statistics. *How many people live in Australia's coastal areas?* Yearbook Australia 2004. <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/1301.0Feature%20Article32004?opendocument&tabname=Summary&prodno=1301.0&issue=2004&num=&view=>

¹⁵ Department of the Environment, Water, Heritage and the Arts. *Length and area of coastal and estuarine foreshore altered for human purposes*. State of the Environment report, indicator 30. 2006. <http://www.environment.gov.au/soe/2006/publications/report/coasts-2.html>

¹⁶ Department of the Environment, Heritage and the Arts. *Introduced marine pests*. <http://www.environment.gov.au/coasts/imps/index.html> CSIRO. *Marine pest information sheets*. http://www.marine.csiro.au/crimp/Marine_pest_infosheets.html

¹⁷ Australian State of the Environment Committee. *Australia State of the Environment 2001*. <http://www.environment.gov.au/soe/2001/publications/report/index.html>

Water quality can be affected by pollution from point sources (e.g. an industrial site), diffuse sources (e.g. from run-off from agricultural land), spills from shipping accidents, land-based spills that reach coastal waters, and discharges from vessels. Pollution can occur directly or via rivers. Urban runoff is another source of pollution for estuaries and near-coastal marine environments. Runoff from urban areas often contains sediment, nutrients, hydrocarbons, heavy metals, pathogens, and other toxic, and occasionally persistent, chemicals. This contamination originates from roads, sewer overflows, spills, industrial activities, building sites and other sources. The impacts are reduced diversity of species, loss of pollution-sensitive species, and high levels of persistent toxic chemicals in sediments and marine species. One of the greatest threats to estuaries in NSW is the growth of nuisance algae and the consequent loss of seagrass. This has been strongly linked to nutrient enrichment of coastal waters.

The New South Wales State of the Environment 2006 reported on indicators of water quality that:

- Nutrient disposals to sea have increased in NSW in recent years, reflecting population growth.
- Measurements of bathing water quality have remained stable.
- Regulation has improved the quality of discharges from point sources.
- The number of major pollution incidents remained stable.¹⁸

4.4 Fishing

Fisheries biology is a challenging discipline. Assessments of fish stocks are made based on commercial catch records, which may be incomplete or unavailable, and on the results of surveys, which are expensive to carry out. The diversity of New South Wales' marine life is reflected in the range of species caught in NSW fisheries, ranging from sub-tropical to temperate. The table below shows a classification of the health of 92 species of importance to the NSW commercial fleet.

¹⁸

Department of Environment and Climate Change. *New South Wales State of the Environment 2006*. http://www.environment.nsw.gov.au/soe/soe2006/chapter5/chp_5.6.htm#5.6.58

Table 4 – Status of fish stocks of importance to the NSW fishing fleet 2006/07

Status	Meaning	Number of Key NSW fish stocks 2006/07
Recruitment overfished	Reproduction of the stock is being limited by the small size of adult fish The stock also has characteristics of an overfished stock	1
Overfished	Catches from fisheries are more than double natural removals from the stock (from predation etc.) The amount of fish is less than 30% of the potential amount if the stock was unfished	2
Growth overfished	The size of individual fish caught would increase if fishing pressure was reduced or more selective methods were used	6
Fully fished	Catches from fishing are about the same as natural mortality The amount of fish is more than 30% of the potential amount if the stock was unfished Fish are caught throughout their range	24
Moderately fished	Catches from fishing are less than half of natural mortality The amount of fish is more than 70% of the potential amount if the stock was unfished Non-fishing areas are known to exist	6
Lightly fished	Catches from fishing are less than a quarter of natural mortality The amount of fish is more than 90% of the potential amount if the stock was unfished The fish is only caught from a small part of the areas where it occurs	1
Uncertain	Considerable information has been collected and analysed but inconsistent or contradictory data mean the exact status cannot be determined	5
Unknown	Catch data are available but the population status has not been defined	47

Source: New South Wales Department of Primary Industries. *Status of Fisheries Resources in NSW 2006/07*.
http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0008/221012/Status-Of-Fisheries-Resources-In-NSW-2006-07.pdf

The table shows that although only a small proportion of NSW fish stocks are known to be

overfished, fishing pressure on most commercially important species is high, with most fish stocks whose conservation status can be assessed being classified as 'fully exploited'. The three overfished species are the Garfish, Gemfish, and the Mulloway. None of these species are important targets for the NSW fishing fleet.

4.5 Impacts on marine habitats and species

Fishing affects not only the target species but also the ecosystems from which the fish are captured, and other species that are caught or otherwise affected. Protected species such as turtles, sharks and seabirds may be caught or killed accidentally by fishing activities. A wide range of marine species may also be caught or affected in trawl nets and dredges. Trawling of the seabed for bottom-dwelling fish species can damage the plants and organisms that live on or under it. Lost or discarded fishing gear can continue to catch fish, so called 'ghost-fishing'.¹⁹

Shipping can also have an impact on the marine environment. There is a risk of collision between boats and whales, dolphins and other large sea creatures. Shipping is the main means by which exotic and invasive species can be introduced. Ships cargos of oil or other hazardous chemicals or materials also pose a significant threat to the marine environment. There has been one major oil spill in NSW waters, when 200 tonnes of oil was lost from a ship berthed in Sydney harbour. The spill was confined to Gore Cove and Balls Head as a result of southerly winds and a flood tide. Ships anchors can also damage fragile sea bed habitats, such as corals.

4.6 Climate change

Although the implications of climate change for Australia's marine environment are not fully understood, it is expected to result in the warming of the seas around New South Wales.

The East Australian Current originates in the Coral Sea and carries warm water south along the east coast of Australia. Climate change is expected to increase the southward flow of the current, raising sea temperatures. Increasing frequency of algal blooms and introductions of new species to the Tasman sea (e.g. green crab) have already been observed and attributed to increased water temperatures. As north New South Wales is currently the southernmost extent of the range of many subtropical species, a southward shift in their distribution is expected to occur. One expected impact is a reduction in zooplankton and an increase in jellyfish, which will also affect other species that feed on zooplankton.²⁰

¹⁹ Department of the Environment, Water, Heritage and the Arts. . *Pressures on Australia's coasts and oceans - fishing*. State of the Environment report. 2006. <http://www.environment.gov.au/soe/2006/publications/report/coasts-2.html#fishing>

²⁰ CSIRO. *Ecosystems of the East Marine Region*. October 2007. <http://www.environment.gov.au/coasts/mbp/publications/east/pubs/ecosystems.pdf>

5.0 PROTECTING THE MARINE ENVIRONMENT

Alternatives to Marine Protected Areas

Other approaches include regulating activities which impact on the marine environment, for example regulating fishing through the use of quotas or by regulating discharges to the marine environment to prevent pollution. Some marine species are migratory and move over large areas of sea, and extremely large areas would have to be designated to protect all the habitats they use, although protected areas could still be created to protect breeding areas or nursery grounds. The NSW Marine Parks Authority described the following alternatives to marine protected areas:

- Fishing closures under the *Fisheries Management Act 1994* are areas which prohibit fishing, or restrict fishing methods. They can be of any size, can be seasonal or permanent, and can be put in place for up to 5 years.
- Other fisheries management tools include regulating fishing gear, limiting the type, number or size of fish that can be taken, and the number of boats in the fishery
- Habitat protection plans can be developed under the *Fisheries Management Act 1994* for the protection of any fish habitat whether essential for a species' survival or to maintain sustainable fish stocks
- Threatened species of fish can be listed under the *Fisheries Management Act 1994* . Other marine species such as cetaceans and seabirds can be listed under the *Threatened Species Conservation Act 1995*. Recovery plans must be prepared for all listed threatened species.
- Under the *Environmental Planning and Assessment Act 1979* assessments may be required for certain types of developments, including an assessment of impacts on marine habitats and species. Before determining an application for development, authorities must consider the impact on threatened species. This can require a species impact assessment to be carried out, and in the case of fish or marine vegetation, consultation with the NSW Department of Fisheries.
- The NSW Environment Protection Authority carries out pollution control. Regulatory controls are supplemented by economic instruments; industry agreements and codes of practice. There are national initiatives to address marine pollution events such as the [National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances](#) and the [National Marine Oil Spill Contingency Plan](#).
- Marine and estuarine areas may be managed under estuary and catchment management plans which are designed to coordinate and integrate management of such areas and surrounding land uses which affect them.
- Voluntary Conservation Agreements are joint agreements between a landholder and the Department of the Environment and Climate Change that permanently protect the conservation value of an area of land. They could be used to benefit marine areas by protecting adjacent land.

- A number of voluntary initiatives exist whereby individuals and organisations are involved in the conservation and protection of the marine environment. Examples include [Oceanwatch](#), [Coastcare](#) and [Fishcare](#).²¹

Marine Protected Areas

The living resources of the marine environment are valuable, and depend upon an unpolluted physical environment. One way to protect the marine environment so that its resources can be sustained is to apply a similar approach to that which has been taken on land – and designate areas where the use of the environment is controlled.

Australia's definition of a marine protected area is:

an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources, and managed through legal or other effective means.

This definition was originally developed by the 1994 World Conservation Union (IUCN) and has been adopted by Australian governments.

As a result of the separate jurisdictions for the marine environment, depending on where they are located, marine protected areas in Australian waters may be managed by State, Territory or Commonwealth government agencies, or a combination of government agencies.

Each government has its own policies and laws to establish and manage marine protected areas. In addition, marine protected areas may be managed through a combination of fisheries and parks management laws administered by separate government agencies.

Australian governments coordinate their efforts on national and cross-jurisdictional issues relevant to marine protected areas through the [Marine Protected Areas Working Group](#). Under these arrangements, a single marine protected area can combine adjacent State or Territory waters and Commonwealth waters. The Solitary Islands Marine Reserve, off the coast of New South Wales, is an example of cross-jurisdictional management.

The Australian Governments agreed in 1992 to establish a comprehensive system of protected areas which would include representative samples of all major ecosystems, both terrestrial and marine.²² The Australian Government made a commitment at the World Summit on Sustainable Development to establish the network of marine reserves by 2012. The goal of the [National Representative System of Marine Protected Areas](#) (NRSMPA) is to create a system that is:

- Comprehensive – includes examples of the full range of Australia's marine ecosystems

²¹ NSW Marine Parks Authority. *Developing a Representative System of Marine Protected Areas in NSW – An Overview*. November 2001.

²² Department for the Environment, Water, Heritage and the Arts. *National Strategy for Ecologically Sustainable Development*. December 1992.
<http://www.environment.gov.au/esd/national/nsesd/strategy/natcons.html>

- Adequate – includes areas of appropriate size and configuration to ensure the conservation of marine biodiversity
- Representative – include marine protected areas that reflect the marine life and habitats of the area they are chosen to represent

The Australian Marine Science Association and the Australian Coral Reef Society, which together represent over 1500 marine scientists, support the initiative to create an NRSMPA. In a statement in 2007 they said that:

We support government initiatives to create representative MPAs on the basis of sound scientific evidence that MPAs (in particular sanctuary, conservation or no-take zones) protect and enhance marine biodiversity and are a useful tool for the sustainable management of some fisheries.²³

Compared to protected areas on land, marine protected areas have only existed for a relatively short period of time, and a scientific evidence base, which allows their value to be assessed, is still being built. This has led to questioning of their value in some cases. While not disputing the general thesis that marine protected areas can have conservation benefits, Kearney (2007) has questioned the science behind the designation of the Bateman Marine Park in New South Wales, and argued that there must be a sound scientific basis to all MPA designations.²⁴

The decision to designate marine protected areas is often controversial, especially the creation of no-take zones, because of the implications for other users of the marine environment, especially commercial and charter fishing activities.

²³ Australian Marine Science Association. *National Statement on Marine Protected Areas from Australia's Marine Scientists*. September 2007. http://www.amsa.asn.au/PDF-files/Submissions/AMSA-ACRS_MPA-stmt_Sept07.pdf

²⁴ Kearney, Professor B. *The Pros and Cons of Marine Protected Areas in New South Wales: Who's Been Hoodwinked?* September 2007. Address to the Australian Society for Fish Biology.

5.1 Marine Protected Areas in New South Wales

Creating a representative system of Marine Protected Areas in New South Wales

The NSW Government is committed to creating a network of marine protected areas in waters under its jurisdiction, as part of the process of creating a Nationally Representative System of Marine Protected Areas (NRSMPA) in all Australia's oceans. The NSW Marine Parks Authority and the Department for Fisheries set out how they proposed to implement the NRSMPA in 2001. They said that an integrated system would be developed, using marine parks, aquatic reserves, national parks and nature reserves to conserve marine biodiversity and protect marine habitats.²⁵

New South Wales' waters have been divided into six bioregions, as shown in the map overleaf. Bioregional assessments are being conducted in each of these regions to describe their conservation values and identify potential marine protected areas. Assessments have been conducted for three of the six bioregions: the Batemans; Manning; and Hawkesbury shelves. Following these assessments, the Port-Stephens-Great Lakes Marine Park was declared on the Manning shelf in December 2005, and the Batemans Marine Park was declared on the Batemans Shelf in April 2006.²⁶

²⁵ NSW Fisheries, NSW National Parks and Wildlife Service and NSW Marine Parks Authority. *Developing a Representative System of Marine Protected Areas in NSW – an Overview*. November 2001. <http://www.mpa.nsw.gov.au/pdf/developing-representative-mpa.pdf>

²⁶ Marine Protected Areas Working Group. *Progress in implementing the National Representative System of Marine Protected Areas (NRSMPA)*. April 2008. <http://www.environment.gov.au/coasts/mpa/publications/pubs/nrsmpa-report.pdf>

Types of Marine Protected Area in New South Wales

There are two main types of marine protected area within NSW state waters, marine parks and aquatic reserves. Two other types of marine protected area which exist in New South Wales are the seaward extension of National parks, and Intertidal Protected Areas.

Marine Parks

Marine Parks are established under the *Marine Parks Act 1997*, and regulated under the Act and the Marine Parks Regulation 1999. New South Wales currently has six marine parks²⁷. Together these parks cover about 34% of NSW waters, more than 345,000 hectares, and are adjacent to one third of New South Wales' coastline.²⁸

Marine parks can include the foreshore (the area between low and high tide marks), islands, and land above the high tide mark with the permission of the owners. Once declared a marine park can only be removed by an Act of Parliament. Marine parks replace any aquatic reserves within their boundaries, but can include national parks or nature reserves. Activities within a marine park are controlled by specific park regulations. Regulations may require a permit for carrying out an activity e.g. fishing.

Regulations can establish a zoning plan for the park. There are four types of zone:

- Sanctuary zones allow for total protection of marine animals and plants and their habitat.
- Habitat protection zones protect habitats but allow limited taking of specified fish and plants, so long as the impact is negligible.
- General use zones allow multiple use, so long as these are ecologically sustainable. Activities in general use zones are subject to generic regulations which apply across the whole park.
- Special purpose zones are used when special management systems are required, including protection of Aboriginal and other cultural features, marine facilities, or for specific park management reasons.

On 6 June 2008 Parliament agreed to the Marine Parks Amendment Bill 2007 which amends the *Marine Parks Act 1997*. One of the main amendments made by the Bill is to create a statutory mechanism for reviewing the zoning plans for marine parks. No such power existed in the initial legislation.

There is a general prohibition on mining within a marine park. The existence of the marine park and any zoning plan must be taken into account when assessing a planning application for development within the park. The Minister may also make regulations to close part or all of a

²⁷ These are in order of designation: Solitary Islands (1998); Jervis Bay (1998); Lord Howe Island (1999); Cape Byron (2002); Port Stephens – Great Lakes (2005); and Batemans (2006)

²⁸ Marine Protected Areas Working Group. *Progress in implementing the National Representative System of Marine Protected Areas (NRSMPA)*. April 2008. <http://www.environment.gov.au/coasts/mpa/publications/pubs/nrsmpa-report.pdf>

NSWPD. Marine Parks Amendment Bill 2007. Hon Verity Firth MP. Page 5333, 7 December 2007.

marine park.

The *Marine Parks Act 1997* established the NSW Marine Park Authority, whose role is to:

- investigate and recommend where marine parks should be established;
- make recommendations on zoning of marine parks;
- manage activities in marine parks;
- tell the public about marine parks;
- carry out research on how marine parks affect the marine environment and nearby communities.

Once a marine park has been established, and a zoning plan has been prepared, the Marine Park Authority is responsible for preparing an operational programme for the park, setting out the strategy for the park over a five year period.

The Act also provides for the establishment of a Marine Parks Advisory Council. The Council is composed of representatives of different interest groups e.g. commercial fishermen, scuba divers, and its role is to advise Ministers and the Marine Park Authority on proposals for parks, and the conservation and use of existing parks. To provide local advice on park management, the Act also requires a marine parks advisory committee to be established for each park with members drawn from a range of interests.

Case study – the Solitary Islands Marine Park

The Solitary Islands Marine Park was the first marine park to be established in New South Wales, on the 2 January 1998. It extends along 75km of coastline to the North of Coffs Harbour. The park incorporates estuaries to their tidal limit, foreshores to the mean high water mark and extends offshore to the 3 nautical mile state waters boundary. It covers an area of 71,000 hectares.

The park contains a diverse range of habitats including estuaries, sandy beaches, rocky shores, reefs and open oceans. It also contains the Solitary Island group from which it takes its name. Over 550 species of fish, 90 species of coral and 600 species of molluscs are found in the marine park. It also supports threatened and protected species such as the grey nurse shark, black cod, turtles, whales, shore birds and rare marine algae.

A zoning plan, finalised in 2002, divides the park into:

- Sanctuary zones (or no-take areas) which provide the highest level of protection by prohibiting all forms of fishing and collecting activities, and anchoring on reefs. Activities that do not harm plants, animals and habitats are permitted. Sanctuary zones make up 12% of the park.
- Habitat protection zones allow tourist activities, recreational fishing and some forms of low impact commercial fishing (such as trapping) but prohibit high impact activities such as bottom trawling.
- General use zones allow a wide range of activities, including all forms of commercial and recreational fishing, and fish farming. 34% of the park has been designated as a general purpose zone.

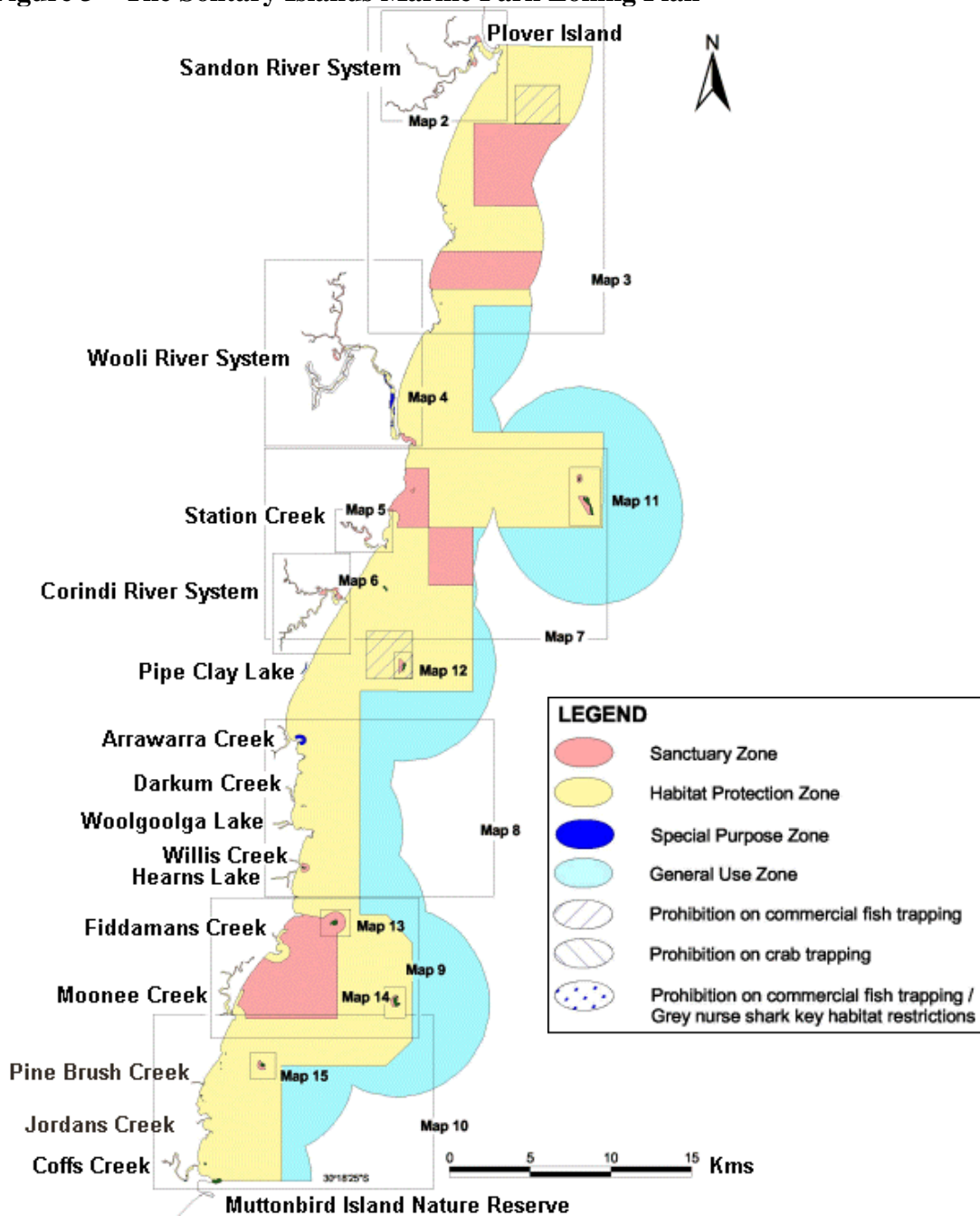
- Special purpose zones, of which there are four, covering a very small proportion of its total area (0.1%). The zones have been set aside for oyster farms, Aboriginal cultural use; research; and habitat rehabilitation.

The zoning of the park is shown in the map below. The zoning plan for the park is currently being [reviewed](#). An [Operational Plan](#) setting out the way the Marine Park Authority's objectives for managing the park was published in October 2003.

The park is adjacent to the [Solitary Islands Marine Reserve](#), which is under Commonwealth jurisdiction and extends from the boundaries of the park to the 50m depth contour. The reserve covers about 13,000 hectares. Under arrangements between the Commonwealth Department for the Environment, Water, Heritage and the Arts and the NSW Marine Park Authority, the day to day management of the reserve is carried out by the park authority.²⁹

²⁹ New South Wales Marine Park Authority. *Solitary Islands Marine Park*. <http://www.mpa.nsw.gov.au/simp.html>

Figure 3 – The Solitary Islands Marine Park Zoning Plan



Aquatic reserves

Aquatic reserves are generally smaller than marine parks. They are declared under the *Fisheries Management Act 1994* (NSW). There are 12 aquatic reserves in NSW. They can be designated to protect either fish or marine vegetation, or for education or scientific research. Although the existence of a reserve may benefit other species, the legislation specifies that the primary motivation for the designation of a reserve cannot be to protect whales, mammals, reptiles, birds, amphibians or animals. Local regulations can be made which prohibit fishing or removal of marine vegetation in an aquatic reserve, or to zone areas of a reserve for different uses. The Act provides that a management plan may be prepared, which can include targets or indicators to assess whether the objectives of the reserve are being met. There is a general prohibition on mining in aquatic reserves. As with marine parks, the existence of the reserve, and the objectives

for its management must be taken into account in considering a planning application for a development within a reserve. Ministers may make aquatic reserve notifications which prohibit the carrying out of any activity within a reserve to the extent specified in the notification. Aquatic reserves are managed by the NSW Department of Primary Industries.

Case study – Long Reef Aquatic Reserve

Long Reef Aquatic Reserve on Sydney's northern beaches extends from Collaroy rock baths south to Long Reef Surf Lifesaving Club, and from mean high water to 100 metres out from mean low water. The reserve includes two main rocky shores. The northern rocky reef area is protected from southerly swells by the prominent eastern headland, while the larger eastern platform is more exposed. Different organisms occur in these two areas. Long Reef Aquatic Reserve protects the marine invertebrates on the rock platforms as well as subtidal marine plants and animals. It is also an important site for marine education.

Fishing by line or spear is allowed for finfish, but bait collection is not allowed. Bag limits apply to both the numbers and sizes of fish caught. No marine plants or animals can be collected or damaged. This includes the collection of empty shells and dead plants or animals because they provide important habitat or food for living invertebrates.

Source: Department of Environment and Climate Change. [*Long Reef Aquatic Reserve*](#)

Seaward extension of national parks

The *National Parks and Wildlife Act 1974* (NSW) provides that national parks and nature reserves may both be created on land including Crown lands. The definition of Crown lands given in section 5 (b) of the Act includes “those parts of the seabed and of the waters beneath which it is submerged as are within the territorial jurisdiction of New South Wales...”. The first national park to have a seaward extension was Bouddi National Park on the Central coast. A total of 62 National Parks and Nature Reserves in NSW have seaward extensions.³⁰ A problem with the Act from the point of view of creating marine protected areas is that the protection given to animals within a park or nature reserve does not include fish, because of the way “animal” is defined in the Act. Furthermore, although the Act allows regulations to be made to protect “animals” within a park or nature reserve, again this would not apply to fish. Since the protection of fish is clearly an integral reason for creating many marine protected areas, the *Marine Parks Act 1997* provides a more suitable method of designating them, with its provisions having been tailored for that purpose.

Intertidal Protected Areas

Intertidal Protected Areas are a particular type of fishing closure made using the powers in section 8 of the *Fisheries Management Act 1994* (NSW). Intertidal reserves extend from the High Water Mark to 10 metres seaward of the Low Water Mark. Collection of seashore animals is prohibited within these areas. Fourteen Intertidal Protected Areas were originally designated

³⁰ Marine Protected Areas Working Group. *Progress in implementing the National Representative System of Marine Protected Areas (NRSMPA)*. April 2008. <http://www.environment.gov.au/coasts/mpa/publications/pubs/nrsmpa-report.pdf>

around Sydney, six of which have subsequently been converted into aquatic reserves.

6.0 MARINE PROTECTED AREAS UNDER OTHER JURISDICTIONS

6.1 Commonwealth jurisdiction

Unless otherwise agreed between the Commonwealth and the States the Commonwealth Government has jurisdiction for marine protected areas from three miles from the coastal baseline to the limit of the Australian Exclusive Economic Zone. The main Commonwealth statute protecting the marine environment and providing for the creation of marine protected areas within these waters is the *Environment Protection and Biodiversity Conservation Act 1999*.

The Act places a high level of general protection on the marine environment by extending the environmental assessment provisions of the Act to the whole of the “Commonwealth Marine Area”. The Commonwealth Marine Area includes all waters within the Exclusive Economic Zone and over the Continental Shelf, apart from those within State or Territory jurisdiction. The Act makes it an offence to carry out an action which would have a significant impact on the marine environment both within this area, and outside it within the Australian jurisdiction, without prior authorisation under the environmental impact assessment procedure set out in the Act.

The main powers to create marine protected areas are in Part 15 of the Act, specifically Division 4 which allows the creation of Commonwealth Marine Reserves. There are currently 26 Commonwealth Marine Reserves, and an additional five reserves which include land and marine components. The Commonwealth Government also has responsibility for the Great Barrier Reef Marine Park and one Antarctic Special Protection Area.

Case Study – The South East Marine Regional Network

Seas around Australia have been divided into five Bioregions under the system of regional marine planning brought in under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). The Commonwealth Government is implementing its commitment to establish a network of marine reserves by designating them within these bioregions. The first such network of reserves was declared in the South East bioregion in 2007. The thirteen reserves that form the network together cover 226,458 hectares and are the first network of deep sea reserves in temperate waters in the world. The reserves include features such as underwater canyons and mountains, and the diverse marine life associated with them, some of which is new to science and is not found anywhere else in the world.

The cooler temperate oceans south of Australia have a high diversity of marine life. They are home to a great variety of invertebrates, fish and marine animals, including whales, dolphins and seals. Southern Australia is notable for the large numbers of endemic organisms - species found nowhere else in the world.

Around 85 per cent of the known fish fauna (600 species), and 62 per cent of the known seafloor flora in the SE region are believed to be endemic. Migratory whales pass through the region on their journey to and from Antarctica along Australia's east coast twice a year. The regions seas also contain iconic species such as great white sharks, and southern bluefin tuna.

The SE marine region includes shallow shelf, slope and deep water ecosystems that provide important habitats for a variety of bird and sea life. The network covers all these depth ranges because the plants and animals that inhabit our seas vary markedly according to the depth of the ocean.

In the deep sea there is a diverse range of fishes and other creatures, such as crabs, coral, sea urchins and sponges that are uniquely adapted adaptations to survive in the challenging environment of the deep ocean.

Case study: The Great Barrier Reef

The Great Barrier Reef is the world's largest coral reef system. It can be seen from outer space and is the world's largest structure made by living organisms. The reef is composed of and built by billions of tiny organisms, known as coral polyps. Coral deposits found on the reef are thought to date back 600,000 years. It includes over 2,900 individual reefs, around 940 islands and cays, and stretches for 2,300 kms along the Queensland coastline. The reef is home to an incredible diversity of life including over 1,500 species of fish, 400 species of coral, 4,000 species of mollusc and 242 bird species, plus a great diversity of sponges, anemones, marine worms and crustaceans. The site includes major feeding grounds for the threatened dugong, and has six of the world's seven species of marine turtle. Several cetaceans are present, including humpback whale, minke whale and killer whale.³¹

The form and structure of the individual reefs show great variety. There are two main types: platform or patch reefs, resulting from radial growth; and wall reefs, resulting from elongated growth, often in areas of strong water currents. There are also many fringing reefs around islands and cays.

The economic value of the reef to the Australian economy was estimated at \$5.4 billion in 2006-07 and supports 54,000 jobs. The majority of this value comes from tourism (94%), with the bulk of the remaining value being accounted for by commercial and recreational fishing.³²

A number of threats to the reef were identified in the 1960s and 1970s including: oil prospecting (particularly with the rising oil prices of the 1970s) and damage to large areas of coral by the Crown of Thorns starfish.

The need to better protect the reef led to the passage of the *Greater Barrier Reef Marine Park Act 1975*. The Act made provision for "the establishment, control, care and development of a marine park", defined the area known as Great Barrier Reef Region, and created the Great Barrier Reef Marine Park Authority. The first section of the Park, the Capricornia section was proclaimed in 1979, the Cairns and Cormorant Pass sections in 1981 and the remainder of the park was added in subsequent years. The reef was designated as a World Heritage Site in 1981. The World Heritage Site covers 348,000 km², of which 344,000 km² is within the Great Barrier Reef Marine Park. This is larger than the States of Victoria and Tasmania put together.³³

³¹ WWF Australia. *Great Barrier Reef*. <http://www.wwf.org.au/ourwork/oceans/gbr/>

³² Great Barrier Reef Marine Park Authority. *Economic contribution of the GBRMP 2006-07*. http://www.gbrmpa.gov.au/_data/assets/pdf_file/0004/29272/AE_GBRMP_19MAR08.pdf

³³ Great Barrier Reef Marine Park Authority. *A Brief History of the Great Barrier Reef Marine*

The respective roles and obligations of the Commonwealth and Queensland Governments in relation to the Park were originally outlined in the 'Emerald Agreement' of 1979. The agreement that the reef would remain under Commonwealth jurisdiction was preserved by the *Coastal Waters (State Title) Act 1980* (Commonwealth of Australia) which otherwise gave responsibility for the marine environment in coastal waters to State governments. While the Great Barrier Reef Marine Park Authority (GBRMPA) has overall responsibility for management of the Park under the GBRMP Act, day-to-day management is primarily delivered by Queensland Government marine parks officers. A Commonwealth / Queensland Great Barrier Reef Ministerial Council coordinates government policy for the park.³⁴

The park is managed by a zoning system which defines what activities can be carried out where. A new zoning plan came into effect on 1 July 2004. There are seven main zones in the park together with a Commonwealth Islands Zone which includes all the islands within the park owned by the Commonwealth Government. The table below summarises what can be carried out in each zone.

Park – Major Milestones.

http://www.gbrmpa.gov.au/_data/assets/pdf_file/0019/9163/authority_major_milestones.pdf

³⁴ United Nations Environment Program. *Great Barrier Reef World Heritage Area*. <http://www.unep-wcmc.org/sites/wh/gbrmp.html>

Parliament of Australia, Parliamentary Library. Bills Digest No 128, 2000-01. *Great Barrier Reef Marine Park Amendment Bill 2000-01*. <http://www.aph.gov.au/library/pubs/bd/2000-01/01BD128.htm>

Table 5 – Zoning of Activities in the Great Barrier Reef Marine Park

Activity	General use	Habitat protection	Conservation park	Buffer	Scientific research	Marine National Park Zone	Preservation
Trawling	yes					no take	no go
Netting	yes	yes					
Crabbing	yes	yes	yes				
Spearfishing, line fishing	yes	yes	yes				
Limited collecting	yes	yes	yes				
Trolling	yes	yes	yes	yes			
Boating, diving, photography	yes	yes	yes	yes	yes	yes	
Traditional use of marine resources	yes	yes	yes	yes	yes	yes	
Limited impact research	yes	yes	yes	yes	yes	yes	permit
Dive-based fishing (sea cucumber)	permit	permit					
Aquaculture, dive based fishing (aquarium fish, coral)	permit	permit	permit				
Tourist operations	yes	permit	permit	permit	permit	permit	
Research (other than limited impact)	permit	permit	permit	permit	permit	permit	permit

The major outcome of the 2004 changes was an increase in the proportion of the GBRMP classified as ‘no-take areas’, from around 4.5% to 33.3% of the Park. This was in response to scientific studies that showed that the reef was under increasing pressure.

The Preservation Zone provides high-level protection for special and unique places, habitats, plants and animals within the Marine Park and provides a baseline for comparison with other zones. It makes up less than 1% of the park area. A person cannot enter a Preservation Zone unless they have written permission and extractive activities are strictly prohibited. Scientific research is allowed with a permit. The Marine National Park Zone is a 'no-take' area and

extractive activities like fishing or collecting are not allowed without written permission from Marine Park authorities. Anyone can enter a no-take area, and boating, swimming, sailing and snorkelling are allowed. Anchoring is also allowed in a Marine National Park Zone. However, in high use and sensitive areas use of a mooring may be necessary or there may be a no anchoring area defined by buoys. The zone makes up about 33% of the park.³⁵ The re-zoning of the Great Barrier Reef Marine Park has been recognised as setting a new standard in world best practice in coral reef resource management, and the most comprehensive and innovative global advance in marine conservation and the systematic protection of marine biodiversity in recent decades.³⁶

6.2 New Zealand

New Zealand's seas extend over 30 degrees of latitude from sub-tropical to sub-Antarctic. This together with NZ's geographical position provides a rich diversity of marine habitats, which are home to over 15,000 known species. Scientists estimate that there may be as many as 65,000 marine species in New Zealand waters. Its isolation means that many of these species are not found anywhere else in the world. As much as 80% of New Zealand's indigenous biodiversity may be found in the sea, although less than 1% of the marine environment has been surveyed.

New Zealand's marine environment is more than 15 times larger than its land area, and its Exclusive Economic Zone is the fourth largest in the world. However, only a small percentage of this environment is currently protected.

New Zealand aims to establish a network of Marine Protected Areas to protect a full range of marine habitats and ecosystems to effectively conserve marine biodiversity. The New Zealand Biodiversity Strategy (2000) includes a target of having 10% of the marine environment in a network of Marine Protected Areas by 2010.

In New Zealand, marine reserves are designated under the *Marine Reserves Act 1971*. Within a reserve, all marine life is protected and fishing and the removal or disturbance of any living or non-living marine resource is prohibited, except as necessary for permitted monitoring or research. This includes dredging, dumping or discharging any matter or building structures. Recreational activities (apart from fishing) are permitted.

New Zealand's first marine reserve (Cape Rodney – Okakari Point Marine Reserve) was established in 1975 and was one of the world's first no-take marine reserves. There are now over 30 marine reserves established in New Zealand waters.

Together, these reserves protect 7.6% of New Zealand's territorial sea (within 12 miles).

³⁵ Great Barrier Reef Marine Park Authority. *Zoning guide to using the Marine Park*. http://www.gbrmpa.gov.au/corp_site/management/zoning/guide_to_recreational_fishing_and_boat_ing/interpreting_zones

³⁶ Global Coral Reef Monitoring Network. *Status of Coral Reefs of the World 2004*. Chapter 11 Status of Coral Reefs in Australia and Papua New Guinea. http://www.reefbase.org/download/gcrmn_download.aspx?type=10&docid=9537

Global Coral Reef Monitoring Network. *Status of Coral Reefs of the World 2004*. http://www.reefbase.org/download/gcrmn_download.aspx?type=10&docid=9526

However, almost all of this is in two marine reserves around isolated offshore island groups (Auckland and Kermadec), and very little is in the mainland territorial sea.

Of New Zealand's total marine environment, just 0.3% is protected in marine reserves. Currently the highest level of protection outside of the Territorial Sea is through fisheries closures on trawling for 18 seamounts. The inclusion of these closures brings the area of marine protection in New Zealand's marine environment to just over 3% of the total area.

The Government proposed changes to the *Marine Reserves Act in 2000*, a Marine Reserves Bill was introduced in 2002 and remains before the NZ Parliament.³⁷

6.3 United States

The United States has the world's largest Exclusive Economic Zone. In the United States, marine protected areas are established at different levels of government.

At the Federal Level, two agencies are the main managers of MPAs: the Oceans Service of the National Oceanic and Atmospheric Administration (NOAA) manages national marine sanctuaries and fishery management zones; and the Department of the Interior manages MPAs through national parks and national wildlife refuges.

At State level, there are more than 100 agencies that designate and manage MPAs. Sovereign land rights also allow some tribal authorities to designate areas or co-manage them with States.

The US inventory of Marine Protected Areas records almost 1700 MPAs, ranging in size from fractions of a hectare to hundreds of thousands of square kilometres.

The large number of sites, the number of bodies involved and the lack of a coordinated strategy for their management led to a Presidential Executive Order made by President Clinton in 2000 which requested that a national system of marine protected areas be developed. A National Marine Protected Areas Centre has been established to take forward this work, in partnership with other Federal departments and State governments.

Initially, work has involved auditing the extent of MPAs, and developing a national framework for their management. NOAA and the Department of the Interior are building a database of federal, state, commonwealth, territory, and tribal marine managed areas in the United States. Once the inventory is complete, it will be used to form a pool from which sites may be considered for placement on a list of MPAs. Once the list of MPAs has been made, a national system of MPAs will be put in place. Although the initiative may result in the designation of additional protected areas, the main theme is to coordinate the management of existing MPAs to achieve conservation goals which might not be achieved from managing sites in isolation. A pilot project is also being carried out with the states of California, Oregon and Washington on developing a network of MPAs on the West coast.³⁸

³⁷ Department of Conservation. *Marine Reserves and other protected areas*. <http://www.doc.govt.nz/templates/summary.aspx?id=33756>

³⁸ National Marine Protected Areas Center. <http://mpa.gov/>

Several pieces of Federal Legislation allow the creation of Marine Protected Areas, the main statutes are the *National Marine Sanctuaries Acts* of 1972 to 2000 and the *Antiquities Act 1906*. Under the 1972 Act, sanctuaries can either be designated by the Secretary of the Department of Commerce or by Congress. The President can use the *Antiquities Act 1906* to establish Marine National Monuments to be managed as part of the National Marine Sanctuary System.

The first sanctuary to be established was the wreck of the USS Monitor off the coast of North Carolina in 1975. Since then a further twelve sanctuaries have been designated. The Northwestern Hawaii national monument (Papahānaumokuākea) was designated by President Bush in 2006 and consists of approximately 362,061 square kilometers of Pacific Ocean in the northwestern extent of the Hawaiian Archipelago. This makes it the largest protected marine reserve in the world. It is larger than all of the USA's terrestrial national parks combined.³⁹

6.4 United Kingdom

The UK has the largest Exclusive Economic Zone within European Union waters⁴⁰. The *Wildlife and Countryside Act 1981* allows Marine Nature Reserves to be designated within 3 miles of coastal baselines. To date only 3 small reserves have been designated.

The European Union has passed laws protecting habitats and threatened bird species, which require Member States to designate protected areas. So far 148 Marine Protected Areas have been designated under these laws within the UK's territorial waters (within 12 miles of the coast).

The UK Government has proposed to designate 8 Marine Protected Areas in offshore waters, beyond the 12 mile limit. These sites are going through the designation process, which requires them to be approved by the European Commission.⁴¹

A number of areas are closed to fishing under national fishing policy, and under the European Union's Common Fisheries Policy. For example, an offshore area known as the Darwin Mounds that contains cold-water corals has been closed to bottom trawling since 2002 because of concerns over the damage being done to the corals by trawlers fishing for deepwater fish like the Orange roughy. This site has also been proposed as an offshore marine protected area.

The UK is also a signatory to the Oslo Paris Convention for the Protection of the Marine Environment in the North East Atlantic (OSPAR). The parties to OSPAR agreed in 1998 to implement a network of Marine Protected Areas in the NE Atlantic. In 2003, it was agreed that this network would be created by 2010, and would:

³⁹ National Oceanographic and Atmospheric Administration. *National Marine Sanctuaries*. <http://sanctuaries.noaa.gov/about/welcome.html>

⁴⁰ France's overseas departments and territories mean it has a much larger EEZ than the UK overall, the second largest in the world.

⁴¹ Joint Nature Conservation Committee. *Special Areas of Conservation in UK Offshore Waters*. http://www.jncc.gov.uk/protectedsites/sacselection/SAC_list.asp?Country=OF

- protect, conserve and restore species, habitats and ecological processes which have been adversely affected by human activities;
- prevent degradation of, and damage to, species, habitats and ecological processes, following the precautionary principle;
- protect and conserve areas that best represent the range of species, habitats and ecological processes in the maritime area.⁴²

The UK Royal Commission on Environmental Pollution considered the impact of fishing on the marine environment in a report published in 2004. The Royal Commission recommended that 30% of the UK's EEZ should be designated as no-take zones as part of a network of marine protected areas.⁴³ Responding to the report, the UK Government agreed that it would develop such a network, and would create powers to allow one to be created as part of a Marine Bill.⁴⁴

The UK's marine environment is subject to a complicated system of regulation that has evolved around the control of individual sectors. This has led to calls for a Marine Act to bring together a more comprehensive system for managing and protecting the marine environment. The UK government published its initial proposals for a Marine Bill in 2006. The proposals were centred on five areas:

- Improving the management of marine fisheries;
- Introducing a system of marine spatial planning for regional seas around the UK and zoning areas for particular uses;
- Streamlining the licensing of activities in the marine environment by bringing together all the currently separate licensing regimes under one system;
- Improving marine nature conservation;
- Creating a Marine Management Organisation.

Included in the proposals for marine nature conservation was the creation of a new power to designate sites in the marine environment to form a network of nationally important marine protected areas. Such a power does not presently exist in UK law.

A draft Bill was published for consultation in April 2008, and a Bill is expected to be introduced to Parliament in the 2008-09 session.⁴⁵

⁴² OSPAR. *OSPAR Network of Marine Protected Areas*.
http://www.ospar.org/eng/html/MPA_eng.htm

⁴³ Royal Commission on Environmental Pollution. *Turning the Tide – Addressing the Impacts of the Impact of Fisheries on the Marine Environment*. December 2003.
<http://www.rcep.org.uk/fisheries.htm>

⁴⁴ Department of the Environment, Food and Rural Affairs. *The UK Government Response to the Royal Commission on Environmental Pollution's Twenty-Fifth Report Turning the Tide – Addressing the impact of fisheries on the marine environment*. May 2006.
<http://www.defra.gov.uk/marine/pdf/fisheries/turningtide-govresponse.pdf>

⁴⁵ Department of the Environment, Food and Rural Affairs. *Marine Bill – What happens next?*
<http://www.defra.gov.uk/marine/legislation/next.htm>

7.0 CONCLUSION

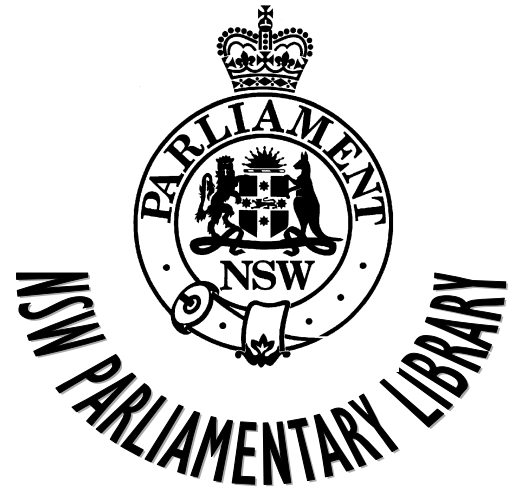
Australia has a unique and diverse marine environment, which Australian governments are committed to protecting and preserving. Since the creation of the Great Barrier Reef Marine Park in the 1970s, Australia has been in the vanguard of marine conservation. The creation of the first network of offshore marine reserves in the Commonwealth waters of the South East Marine Region provides a contemporary example. Australia's oceans are also of cultural and recreational value, and support a range of economic activities. Designating marine protected areas is one way of protecting the marine environment. Their creation is often controversial, especially when it impinges on other users of the sea.

The waters under the jurisdiction of the NSW government make up a small but significant part of Australia's marine jurisdiction. Over a third of these waters are already protected in marine parks, aquatic reserves, nature reserves and national parks. The NSW Government is committed to building a network of marine protected areas to comprehensively represent marine biodiversity⁴⁶, and to further contributing to Australia's National Representative System of Marine Protected Areas.

⁴⁶

NSW Government. *A new direction for NSW – State Plan*. Priority E4. Chapter 6. November 2006. <http://www.nsw.gov.au/stateplan/index.aspx?id=8f782cbd-0528-4077-9f40-75af9e4cc3e5>

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