

NATIONAL MARINE NATURAL RESOURCE MANAGEMENT

INTERIM PLAN



OCEANWATCH
AUSTRALIA

2017-2022

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Acknowledgement of Land and Sea Country

OceanWatch Australia respectfully acknowledges the Indigenous people on whose Land and Sea Country this Plan applies, pays its respects to Elders past and present, while recognising their important role as custodians of cultural and ecological knowledge for the benefit of all Australians.



About OceanWatch Australia

OceanWatch Australia Ltd (OceanWatch) is a not-for-profit company limited by guarantee, listed on the Register of Environmental Organisations (REO)¹.

In 2014 the Australian Government recognised OceanWatch as the national organisation responsible for the delivery of its marine Natural Resource Management (NRM) related programs².

OceanWatch has been protecting biodiversity and threatened species, and restoring important marine habitats for the benefit of the Australian marine environment, since 1989. With the adoption of best practices for fishing and aquaculture, the encouragement of stewardship actions amongst coastal and marine users, and advocacy and support for works to protect, rehabilitate, restore and enhance the marine environment as the core focus, OceanWatch now embarks upon its new role as Australia's Marine Natural Resource Management organisation.

“

At OceanWatch, we believe that if you fish in it, play in it, eat from it, or just love it, a healthy marine environment matters to you. Our challenge is to convert peoples' love for the marine environment into stewardship actions, and together ensure a healthy and productive marine environment both now and into the future. We hope you will join us on this journey, and make your actions count.

”

Geoff Blackburn
Chair, OceanWatch Australia

¹ Further information regarding OceanWatch is available at: www.oceanwatch.org.au/wp-content/uploads/2016/01/Corporate-Plan-Publication.pdf

² Australian Government media release 6/3/2014 http://www.richardcolbeck.com.au/clients/richard/downloads/item554/060314joyce_colbeck_support_for_oceanwatch.pdf

About this plan

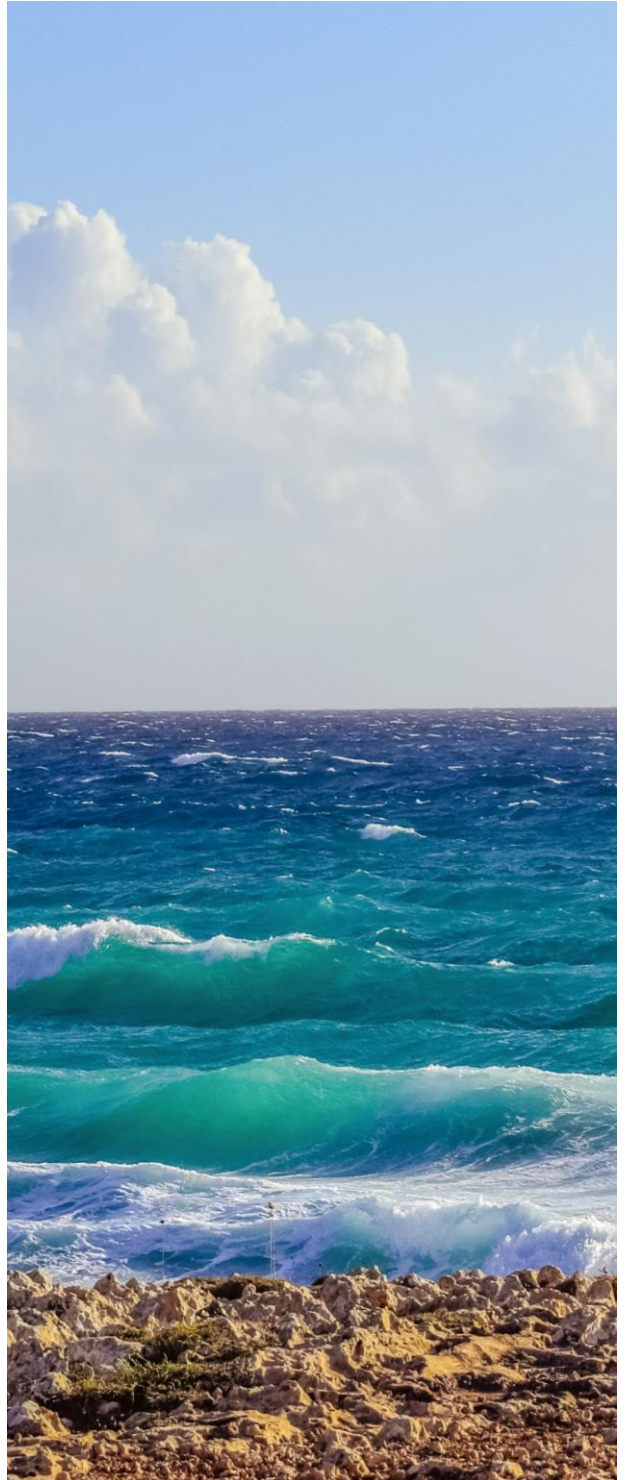
This National Marine Natural Resource Management Plan 2017–2022 (Marine NRM Plan or Plan depending on context) has been developed by OceanWatch, in collaboration with key marine stakeholders. Its development has followed engagement with a large number and diverse range of stakeholders who manage, impact or interact with marine natural resources, and has been informed by the guiding principles for marine NRM described on page 9, and the challenges identified from page 14.

This Plan complements existing regional NRM plans and aligns with Australian, state, territory and local governments' legislation and policy, and will be implemented by OceanWatch at a scale relevant to available funding.

See Annex A – Alignment with National and International Instruments.

This Marine NRM Plan is a call to action as well as a strategic document.

Its aim is to secure a prosperous future for Australia that maintains quality of life through ensuring the long-term health of the marine environment.



Definitions

For the purposes of this Marine NRM Plan, the following definitions apply:

Australians – includes all people living either permanently or temporarily in Australia regardless of their citizenship.

Blue economy – refers to sectors such as ports, offshore oil and gas, ecosystem services, tourism, ship building, fishing and aquaculture that bring economic and social benefits which are efficient, equitable and sustainable³. The Blue economy includes the flow on benefits to the wider economy.

Ecological sustainability – the use, conservation and enhancement of the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased⁴.

Ecosystem resilience – the capacity of an ecosystem to respond to changes and disturbances yet retain its basic functions and structures⁵.

Environmental best practice – operating using best available knowledge and technology to protect and conserve the environment.

Healthy marine environment – ecological processes are operating to ensure stable and sustainable ecosystems, critical habitats remain intact and water quality is appropriate for the plants and animals that live in or on it, and it is safe for human activities like swimming, boating, surfing or fishing.

Indigenous people – refers to Aboriginal and Torres Strait Islander people,

communities, knowledge holders and Elders.

Indigenous customary fishing – accessing and utilising seafood resources by Indigenous fishers according to custom. This includes ceremony, exchange, trade or barter and consumption.

Marine environment – from areas under tidal influence to the limit of Australia's Exclusive Economic Zone (EEZ).

Natural Resource Management (NRM) – the management of natural resources such as land, water, soil, plants and animals.

Productivity – the rate of production of new marine biomass.

Recreational fishing – the fishing of aquatic animals (mainly fish) that do not constitute the individual's primary resource to meet basic nutritional needs and are not generally sold or otherwise traded on export, domestic or black markets⁶.

Responsible use – legal activities which follow all prescribed laws and regulations and are ecologically sustainable. It implies respect for marine biodiversity and cultural heritage, permitted commercial activities, and the provision of social amenity for individuals and the community.

Saltwater community – includes the 80% of Australians who live within 50 km of the coast⁷. Recreational and Indigenous customary fishers, seafood consumers and recreational and tourism users are identified within the saltwater community stakeholder group.

Seafood industry – people involved in activities conducted in or from Australia concerned with the commercial taking,

³ Marine Nation 2025 – Marine science to support Australia's Blue Economy, Ocean's Policy Science Advisory Group 2013

⁴ National Strategy for Ecologically Sustainable Development, 1992. Ecologically Sustainable Development Steering Committee and Endorsed by the Council of Australian Governments. December 1992.

⁵ <http://www.environment.gov.au/biodiversity/publications/australias-biodiversity-conservation-strategy>

⁶ UNFAO Technical Guidelines for Responsible Fisheries. No. 13. Rome, FAO. 2012.

⁷ www.abs.gov.au/Ausstats/abs@.nsf/Previousproducts/1301.0Feature%20Article32004



culturing, processing, preserving, storing, transporting, marketing or selling fish or fish products. The industry comprises the following three sectors: commercial wild-catch, aquaculture and post-harvest.

Stakeholder Engagement – any activity that informs, consults, involves, collaborates with or empowers marine NRM stakeholders relevant to stewardship of the marine environment.

Stewardship – the responsible use and protection of the natural environment through conservation and sustainable practices.

Scope

Australia's marine domain is one of the largest in the world with a total marine area of around 10 million square kilometres⁸.

Australian species and our natural marine treasures such as the Great Barrier Reef in Queensland, Lord Howe Island in New South Wales, the Great Australian Bight in South Australia and Ningaloo Reef in Western Australia stand as icons of Australia's national identity and support important revenue from marine tourism⁹.

The extensive length of Australia's continental coastline (36,000 km, 7th longest globally) spanning 35 degrees of latitude creates great diversity in habitat, ecosystems and species. Shorelines include coral reefs, temperate rocky and sandy shores; more than 900 estuaries, 10,000 sandy beaches, and 8,000 diverse islands¹⁰. These marine, estuarine and associated terrestrial ecosystems provide habitat for a diverse range of species; about 4,500 finfish species, and perhaps tens of thousands of invertebrate species.

Marine ecosystems are highly connected, with many species utilising a variety of wetland, estuarine and marine habitats while migrating large distances as an integral part of their life cycle. An example is provided on page 6.

The health and productivity of the marine environment is subject to many pressures related to human activities both on land and on water. While for practical purposes the responsibility for management of the marine environment rests with the Australian, state and territory governments, it remains a community owned asset and ultimate responsibility for its stewardship lies with the community.

NRM planning and delivery plays a lead role in supporting stewardship of Australia's environmental assets. The National Landcare Programme regional funding stream invests through Australia's 56 NRM organisations, recognising the crucial role the organisations play in delivering NRM at a local and regional level¹¹.

Historically, the regional NRM planning and delivery model has been based on catchment boundaries, with resultant marine related activities focusing on reducing land-based impacts from catchments on the marine environment. This regional NRM model is ineffective in addressing many of the challenges for marine NRM (described from page 14) due to its innate inability to deal with seascape scale environmental, social, economic and cultural connectivity associated with many marine issues, from within a geographically constrained coastal catchment jurisdiction.

Consequently, to optimise marine NRM planning and delivery, this Plan will be implemented through an unconventional approach to marine challenges across multiple catchments, that enables and promotes connectivity across terrestrially focused regional NRM boundaries.

⁸ www.ga.gov.au/scientific-topics/national-location-information/dimensions/oceans-and-seas

⁹ www.soe.environment.gov.au/theme/marine-environment

¹⁰ National Marine Science Plan, 2014

¹¹ www.nrm.gov.au/regional

The wild-caught prawn industry of Australia

Australia's wild-caught prawn industry had a production value of \$272 million in 2014/15¹², with Eastern King Prawns providing a significant proportion of the catch.

Eastern King Prawns occur on the eastern Australian coast between Hayman Island in Queensland and north-eastern Tasmania (20–42°S respectively), and the species exhibit strong stock connectivity throughout their range. Undertaking northward migrations into deeper water as they grow, Eastern King Prawns utilise the East Australian Current to disperse larvae southward after spawning in offshore areas. Eastern King Prawns are harvested in Queensland and New South Wales fisheries, and are considered a single multi-jurisdictional biological stock¹³.

Juvenile and sub adult Eastern King Prawns leaving Tasmanian, Victorian, New South Wales and Queensland estuaries as part of their annual spawning migration can travel through numerous regional NRM jurisdictions, and then be caught as far north as central Queensland.

This example illustrates how impacts on water quality, fish habitat and connectivity in a regional NRM catchment can have implications for ecosystems and regional economies far removed from that NRM region's jurisdiction.



¹² Australian fisheries and aquaculture statistics 2015, ABARES.

¹³ Movements of juvenile eastern king prawns, *Penaeus plebejus*, and identification of stock along the east coast of Australia, Montgomery SS 1990

7th

LONGEST COASTLINE
IN THE WORLD

36,000 km

THE AUSTRALIAN COAST



Stakeholders

01

The saltwater community¹⁴

02

The seafood industry

03

The marine science community

04

Landholders and businesses in coastal catchments

05

Local government in coastal areas

06

Regional NRM organisations in coastal areas

07

Australian, state and territory governments and their agencies

08

Industries impacting marine health and productivity

09

Landcare and community environmental restoration groups

Vision

Australia's marine environment is healthy, productive, valued, and used in a responsible way.

¹⁴ Defined on page 36
See Annex B – Stakeholder Descriptions
See Annex C – Stakeholder Engagement

Vision values

These vision values provide the guiding principles for marine NRM.

1

The health of Australia's marine environment matters because...

the marine environment supports the Australian way of life and forms part of the national identity. Oceans and coasts also provide an estimated \$25 billion worth of essential ecosystem services, such as carbon dioxide absorption, nutrient cycling and coastal protection.¹⁵ Many Australians also get artistic and spiritual inspiration from the marine environment; including the enjoyment of swimming or surfing at the local beach, snorkelling on the Great Barrier Reef or fishing and boating on local waterways.

2

The productivity of Australia's marine environment matters because...

Australia's marine environment currently contributes approximately \$50 billion per year to Australia's overall economy. The marine environment directly and indirectly supports commercial industries such as fishing, shipping and resource extraction, and provides important revenue from recreational activities, including tourism and fishing. The economic value of resources provided by our marine environment is expected to contribute around \$100 billion each year to Australia's overall economy by 2025¹⁶.

3

Valuing Australia's marine environment matters because...

with over 80% of the population living within 50 km of the coast, Australians depend on the varied, social, economic¹⁷, cultural and ecosystem benefits¹⁸ that a healthy marine environment generates. Most marine-based recreation and tourism is nature-based and reliant on healthy and diverse ecosystems.

4

Responsible use of Australia's marine environment matters because...

Australians can ensure the marine environment is maintained and enhanced for future generations. Through understanding human impacts and the adoption of best practice for marine activities, all marine users can improve stewardship of the marine environment while maximising the benefits from its use.

¹⁵ www.soe.environment.gov.au/theme/marine-environment/key-findings?year=96#key-finding-120596

¹⁶ *ibid*

¹⁷ Valuing Coastal Fisheries FRDC 2014-301

¹⁸ Marine Nation 2025 Ocean Policy Science Advisory Group

Planned outcome

Australians have accurate and comprehensive knowledge of the marine environment and work collaboratively towards ensuring its health and productivity.

Performance Measurements

The ability to measure performance depends on the quantity and quality of available data, and the nature of the activity. For example, the performance of an activity with a strong public good component is generally more difficult to measure (usually qualitative) than one with a strong private benefit component (usually quantitative).

Key Performance Indicators (KPI)

The KPIs relevant to the priorities and marine NRM actions described below are a guide only to performance measurement at the planned outcome level. Specific measurable KPIs are detailed in all contracts and workplans.



Performance Framework for Regional NRM Organisations

OceanWatch's overall performance in areas including organisational and financial governance, NRM planning and delivery, local community participation and engagement and monitoring, evaluation, reporting and improvement is regularly assessed through the Australian Government Performance Framework for Regional NRM Organisations.

Monitoring Evaluation Reporting and Improvement Tool (MERIT)

Organisations and individuals that receive funding under Australian Government NRM programmes are required to report regularly on the progress of their projects. Developed in collaboration with the Atlas of Living Australia, MERIT provides consistent reporting across all programmes, collects data linked to Australia's biodiversity conservation work and displays aggregated program information in publicly accessible dashboards¹⁹.

¹⁹ www.nrm.gov.au/my-project/monitoring-and-reporting-plan/merit

Priorities and Actions

Three priority areas and associated marine NRM actions have been developed to progress towards the achievement of the planned outcome.

1 Brokerage of knowledge of the health and productivity of the marine environment

- a.** Support research and knowledge exchange related to marine health and responsible use.
- b.** Engage research, planning and decision-making processes to support the needs of the marine environment and its users.
- c.** Provide advice to coastal NRM organisations, coordinate the incorporation of marine NRM priorities into regional NRM plans, and integrate the needs of marine users into regional NRM actions.
- d.** Establish, support and extend new and innovative technical solutions as they relate to improving the health of the marine environment and growing the blue economy.
- e.** Encourage a national and consistent approach to marine baselines and long-term monitoring.
- f.** Integrate knowledge held within Indigenous communities, the saltwater community and seafood industry into research, planning, decision making and action.
- g.** Maintain, inform and engage a national marine NRM network that engenders a multi-disciplined and collaborative approach to marine NRM activities.
- h.** Develop relationships between marine resource users.
- i.** Communicate the marine rehabilitation activities of all stakeholders through the marine NRM network.

KPI: Significant and measurable improvement in access to knowledge about the health and productivity of the marine environment by 2022, as measured by, inter alia: increased engagement with OceanWatch digital media channels, numbers of regional NRM plans influenced by marine stakeholders, numbers of community engagement activities, and increase in engagement of marine stakeholders in research, planning and decision-making processes.

2 Advocacy of, and support for, stewardship of Australia's marine environment.

- a.** Support the saltwater community to develop and adopt best practice relevant to its marine activities.
- b.** Lead the development and adoption of best practice for the seafood industry through extension, training, recognition and support.
- c.** Provide incentives for seafood producers to improve practices by working in collaboration with businesses within the seafood supply chain and seafood consumers.
- d.** Engage and assist seafood consumers to make purchasing decisions which support the responsible use of marine resources.

KPI: Significant and measurable improvement in stewardship of the marine environment by 2022, as measured by, inter alia: numbers of Codes of Practice, Environmental Management Systems, seafood industry training workshops, and consumer engagement activities.

3 Advocacy of, and support for, works to protect, rehabilitate, restore and enhance the marine environment.

- a.** Engage and support the saltwater community, seafood industry and other NRM stakeholders in on ground works.
- b.** Promote marine use that can have environmental, social and economic benefits such as restoration of shellfish reefs.
- c.** Engage and support stakeholders on improvements to point and diffuse water quality.
- d.** Support the improvement of current and future structures of built environments.

KPI: Significant and measurable improvement in the health of the marine environment by 2022, as measured by, inter alia: increased investment in marine environmental rehabilitation, number and scale of on ground works, and improved condition of the marine environment reported through the State of the Environment report and other forms of reporting.



Challenges

The over-arching challenge for marine NRM is to garner further recognition from all levels of government of the need for a coordinated and strategic response to marine NRM, as well as a commitment to support the public good components of marine NRM activities at an appropriate scale.

The challenges described in Tables 1–3 below, identified through stakeholder engagement described at Annex C and related research²⁰, have contributed to the development of the priorities and marine NRM actions described from page 11.

Marine NRM actions, responding to each identified challenge, are also included in the tables.

Table 1. Economic Challenges		Marine NRM Actions
Promotion of an appropriate balance between marine protection and sustainable resource use	Ensuring marine environment resources are used responsibly and bring maximum economic benefit to Australia.	2: a, b, c, d
	Development and maintenance of sustainable levels of fisheries and aquaculture production.	1: a, d, e, f, h 2: b, c, d 3: a, b, c, d
	Development of support for sustainable production through purchasing choices.	2: b, c, d
	Increase in profitability for seafood producers.	2: c, d
	Realisation of the potential for aquaculture to meet the increasing demand for seafood, both in Australia and internationally.	1: a, b, d, f, h 3: c
	Extension of innovative technologies to grow the blue economy.	1: a, d, g



²⁰ Key sources include: State of the Environment report 2016, Australia's Biodiversity Conservation Strategy 2010–30, NSW Marine Estate Management Authority – draft Threat and Risk Assessment, Kearney, R., Farebrother, G., 2015. FRDC Project No 2013/029 Report, accessible [here](#).

Table 2. Social Challenges		Marine NRM Actions
Increase in stewardship of coastal and marine environments.	Improvement in access to, and understanding of, knowledge regarding the status of Australia's marine environment.	1: a, b, c, e, f, g, i 2: a, b, c, d 3: c
	Increase in community understanding and awareness of marine NRM.	1: c, f, g, i 2: a, d 3: a, c
	Reduction of risks to food security and regional economies.	1: a, b, c, d, f, g, h, i 2: a, b, c, d 3: a, c, d
	Increase in respect for, and understanding of, knowledge held within the Indigenous community, saltwater community and seafood industry.	1: a, b, c, f, g
	Extension and adoption of best practice for all marine activities.	1: a, c, f 2: a, b, c, d
	Increase in awareness and respect of, and support for, Indigenous customary fishing activities.	1: h
	Improvement in understanding of seafood production methods and impacts.	1: a, f, g, h 2: c, d
	Ensuring continuity of access to sustainably and responsibly produced Australian seafood for Australian consumers.	1: a, f, h 2: b, c 3: a
	Development of people and organisations to improve community participation in marine management.	1: a, b, c, f, h 2: a, b, c, d 3: a, b, c, d
	Promotion of recognition within science and management frameworks of knowledge and understanding held within the Saltwater community and seafood industry.	1: a, b, c, f, g, h
	Promotion of evidence-based decision making as the basis for marine environment policy and management decisions, including the allocation of resources between user groups and conservation interests.	1: a, b, c, f, g, h
	Contributing to balancing the needs and values of different stakeholder groups.	1: a, b, c, f, g, h
	Increase in transparency across all sectors to promote trust.	1: a, g, h, i
	Improvement in social license of the seafood industry.	1: a, h 2: b, c, d
	Reduction of anti social behaviour.	1: a, h
	Engagement with casual users who may not have English as their first language.	1: a, b, g, h 2: a
	Promotion of understanding, awareness and respect amongst all marine stakeholders.	1: a, f, g, h, i
	Development of a coordinated approach between industry, governments, regulators, NGOs and communities.	1: b, c, f, g, h, i

Table 3. Environmental Challenges See Appendix 1 – The Case for Marine Environmental Rehabilitation		Marine NRM Actions
Protection, rehabilitation, restoration and enhancement of the marine environment.	Promotion of planning and decision-making processes that integrate the needs of the marine environment.	1: a, b, c, f, h, i 3: d
	Improvement in quality of urban stormwater discharge.	1: a, b, c, e, g, i 3: c
	Reduction of agricultural diffuse source runoff.	1: b, c, d, e, g, i 3: ac
	Improvement in sewage and waste treatment practices.	1: a, b, c, e, g 3: c
	Conservation of biodiversity.	1: a, b, c, d, f, g, i 2: a, b, c, d 3: a, b, c, d
	Reduction of saltwater community and seafood industry impacts on marine habitats and water quality.	1: a, b, c, d, f, g 2: a, b, c, d 3: c
	Reduction of land-based impacts on marine habitats and water quality.	1: a, b, c, e, f, g, i 3: a, b, c, d
	Development and extension of biosecurity and animal disease knowledge and protocols.	1: a, b, c, f, g 2: a, b
	Reduction of pollution, plastic debris and oil spills.	1: a, b, c, e, f, g 2: a, b 3: a
	Reduction of impacts from shipping and harbour maintenance and dredging.	1: a, b, c, d, g 3: c
	Promotion of sustainable urban coastal development.	1: a, b, c, f, g
	Improvement in understanding of, and adaptation to, climate variability and change (See Appendix 2– Climate Change)	1: a, b, c, d, e, f, g 3: a, b, d
	Reduction of bycatch and interactions with Threatened, Endangered and Protected species.	1: a, d, e, f, g, h 2: a, b, c, d
	Development of a national approach to marine baselines and monitoring.	1: a, b, e, f, g
	Reduction of impacts from recreational boating.	1: a, b, c, d, f, g, h 2: a



Annex A

Alignment with national and international instruments

Observations of an internal review undertaken by OceanWatch of international, Commonwealth, state and territory legislation and policy applicable to activities undertaken on the coast and within the marine environment, are outlined in Appendix 3 – Legislative and Policy Review.

A brief description of a number of key instruments relevant to this Plan are below. Objectives, priorities and recommendations identified within those instruments and marine NRM actions in response are included in the Tables 4–10.

Case studies of relevant marine NRM activities undertaken by OceanWatch are included to illustrate the relationship between marine NRM and each instrument.

Environmental Protection and Biodiversity Conservation (EPBC) Act	National Landcare Program	National Biodiversity Conservation Strategy 2010–2030
National Marine Science Plan 2015–2020	National Fishing and Aquaculture Research Development and Extension Strategy 2015–2020	National System for the Prevention and Management of Marine Pest Incursions
United Nations Convention on the Law of the Sea	United Nations Food and Agriculture Organization Code of Conduct for Responsible Fisheries	

"Coral and fish, Great Barrier Reef" on page 17 by GreensMPs is licensed under CC BY 2.0

Environmental Protection and Biodiversity Conservation (EPBC) Act

The Environment Protection and Biodiversity Conservation Act 1999 (the EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined in the EPBC Act as matters of national environmental significance. The EPBC Act enables the Australian Government to join with the states and territories in providing a truly national scheme of environment and heritage protection and biodiversity conservation²¹.

In the marine context, the Australian Government uses the EPBC Act to protect and manage threatened, migratory and marine species. Protection and management of threatened marine species listed under the EPBC Act involves:

- determining the threats faced by marine species,
- preventing, mitigating and/or managing those threats, and
- supporting the recovery of the species until they can be removed from the EPBC Act list of threatened species.

Table 4. EPBC Act	Marine NRM Actions
Provide for the protection of the environment, especially matters of environmental significance	n/a
Conserve Australian biodiversity	1: a, b, c, d, e, f, g 2: a, b, c, d 3: a, b, c, d
Provide a streamlined national environmental assessment and approvals process	n/a
Enhance the protection and management of important natural and cultural places	1: a, b, c, e, f, g 2: a, b 3: a, c
Control the international movement of plants and animals (wildlife), wildlife specimens and products made or derived from wildlife	n/a
Promote ecologically sustainable development through the conservation and ecologically sustainable use of Australia's biodiversity	1: a, b, c, d, f, g, i 2: a, b, c, d 3: a, b, d
Recognise the role of Indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity	1: b, c, e, f, g, h
Promote the use of Indigenous people's knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.	1: a, f

²¹ <http://www.environment.gov.au/epbc/about>

Case Study 1

SeaNet – mitigating interactions with listed Threatened, Endangered and Protected species²²

Partners: Department of Agriculture, Department of Environment, Fisheries Research and Development Corporation, Australian Fisheries Management Authority, National Shark Recovery Group, National Turtle Recovery Group, CSIRO Marine Laboratories, Commonwealth Fisheries Association, Queensland Seafood Industry Council, New South Wales Seafood Industry Council, Seafood Industry Victoria, Tasmanian Seafood Industry Council, Wildcatch Fisheries South Australia, Western Australian Fishing Industry Council, Northern Territory Seafood Council, Seafood Services Australia.

Location: National

OceanWatch, through the SeaNet program (1999–2013) produced the Protected Marine Species Identification Guide and played a critical role in reducing fishing interactions with species listed as Threatened or Migratory under the EPBC Act 1999, assisting with the on-ground implementation of Threat Abatement Plans and Recovery Plans.

Marine turtles – introduction and uptake of turtle excluder devices (TED) in the Northern Prawn Fishery (prior to being regulated), the extension of the turtle smart crab pot for fisheries in Queensland, the introduction of deep setting techniques for long line fisheries to reduce interactions, the extension of circle hooks and supply of de-hookers and line cutters for quick release, marine turtle handling training, contributing to marine turtle tracking and monitoring programs, and development of the Go Slow for those Below boating campaign.

Whales and dolphins – introduction of underwater acoustic alarms in net fisheries to reduce interactions/entanglement with dolphins, development and extension of codes of practice to reduce whale entanglements and associated training for fishers in lobster and pearl fisheries in Western Australia and the Northern Territory.

Seals and Sea Lions – introduction of seal excluders in lobster fisheries in Victoria, South Australia and Western Australia.

Sea snakes – extension of innovative bycatch reduction devices resulting in 85 per cent reduction of sea snake by-catch in the Northern Prawn Fishery and 62 per cent reduction for the east coast Queensland trawl fishery.

Sea birds – dramatic reductions in sea bird capture in the eastern and western tuna and billfish longline fisheries through the extension of Tori lines and bait shutes, and changes to fishing practices.



²² www.oceanwatch.org.au/seafood/fishing/tep-species-interaction-mitigation-in-australian-fisheries

National Landcare Programme

The National Landcare Programme regional funding stream invests through Australia's 56 NRM organisations, recognising the crucial role the organisations play in delivering NRM at a local and regional level.

Regional NRM organisations have a significant role in the Programme's delivery, through regional funding, and are expected to:

- in collaboration with community, Landcare and farming system groups, lead regional NRM planning and prioritisation of NRM activities to support environmental protection and sustainable agricultural practices,
- deliver nationally important outcomes that assist Australia to meet its national and international obligations,
- broker partnerships, collaborate with networks and support local stakeholders in delivery of regional NRM activities,
- build local community and industry engagement, skills and capacity in NRM and sustainable agriculture,
- support Indigenous participation in delivering NRM outcomes, and
- report NRM outcomes at a regional level and contribute to Programme reporting at the national level²³.

Table 5. National Landcare Program	Marine NRM Actions
Communities are managing landscapes to sustain long-term economic and social benefits from their environment.	1: a, b, c, e, f, g, i 2: a, d 3: a, b, c, d
Farmers and fishers are increasing their long term returns through better management of the natural resource base.	1: a, b, c, d, f, g, h 2: b, c, d 3: a, b, c, d
Communities are involved in caring for their environment.	1: a, b, c, e, f, g, h 2: a, d 3: a, b, c, d
Communities are protecting species and natural assets.	1: a, c, e, f, g, i 2: a, b, c, d 3: a, c

²³ www.nrm.gov.au/regional

Case Study 2

Living Shorelines

Partners: OceanWatch, Australian government, Sydney Coastal Councils Group, Greater Sydney Local Land Services, Landcare New South Wales, New South Wales Recreational Fishing Trust, The Star Sydney.

Location: Nine sites across the Hastings River, Macleay River, Parramatta River and Sydney Harbour, New South Wales.

Shellfish reefs once formed the backbone of many temperate and subtropical estuaries, and whilst small populations continue to exist in most bays and estuaries, these are only a small fraction compared to the numbers seen pre-European settlement. In New South Wales, researchers estimate that over 99 per cent of natural shellfish reefs have been lost due to pollution, sedimentation, disease and habitat loss or degradation from coastal development.

Working alongside engineers and ecologists, OceanWatch is (current at the time of writing this Plan) combining shoreline protection with habitat creation. The Living Shoreline concept uses waste oyster shell in coconut fibre mesh bags. The bags are strategically pegged on eroded shorelines, providing habitat for marine species, and a surface on which free-swimming oyster larvae can settle. In areas where natural spat supply is limited, the bags can be seeded with hatchery-produced spat prior to installation. Over time, the oysters will grow together to form a reef, while the coconut fibre, being a natural material, breaks down.



National Biodiversity Conservation Strategy 2010–2030

Australia's Biodiversity Conservation Strategy 2010–2030 is a guiding framework for conserving our nation's biodiversity over the coming decades. The vision of this Strategy is that Australia's biodiversity is healthy and resilient to threats, and valued both in its own right and for its essential contribution to our existence. The resilience of marine ecosystems in Australia is currently being reduced by a number of threats, including:

- habitat loss, degradation and fragmentation,
- invasive species,
- unsustainable use and management of natural resources,
- changes to the aquatic environment and water flows, and
- climate change²⁴.



²⁴ www.environment.gov.au/biodiversity/publications/australias-biodiversity-conservation-strategy

Table 6. National Biodiversity Conservation Strategy		Marine NRM Actions
Mainstreaming biodiversity	<ul style="list-style-type: none"> • An increase in public awareness of biodiversity. • An increase in public participation in conservation activities. • An increase in participation by the private and primary industries sector in biodiversity conservation. • An increase in the cross-sectoral integration of biodiversity conservation in public and private sector planning and management. 	<p>1: a, b, c, e, f, g</p> <p>2: a, b, c, d</p> <p>3: a, c, d</p>
Increasing Indigenous engagement	<ul style="list-style-type: none"> • An increase in the employment and participation of Indigenous peoples in biodiversity conservation activities. • An increase in the use of Indigenous knowledge in biodiversity conservation decision making. 	<p>1: f</p> <p>3: a</p>
Enhancing strategic investment and partnership	<ul style="list-style-type: none"> • An increase in the use of markets and other incentives for managing biodiversity and ecosystem services. • An increase in private expenditure on biodiversity conservation. • An increase in public-private partnerships for biodiversity conservation. 	<p>2: b, c, d</p>
Protecting diversity	An improvement in the conservation status of listed threatened species and ecological communities.	<p>1: a, d, e, f</p> <p>2: a, b, c, d</p>
Maintaining and re-establishing ecosystem functions	An increase in the connectivity of fragmented landscapes and seascapes. An improvement in the provision of environmental water allocations.	<p>1: b, c, g, h, i</p> <p>3: a, d</p>
Reducing threats to biodiversity	<ul style="list-style-type: none"> • A reduction in the impacts of priority threatening processes, including habitat loss and climate change. • A reduction in the impacts of significant invasive species on biodiversity. • An increase in the use of strategic and early interventions to manage threats to biodiversity including climate change. 	<p>1: a, b, c, e, f, g</p> <p>2: a, b</p> <p>3: a, b, c, d</p>
Improving and sharing knowledge	<ul style="list-style-type: none"> • An increase in the accessibility of science and knowledge for biodiversity conservation. • An improvement in the alignment of research with biodiversity conservation priorities. • An increase in the application of knowledge of biodiversity conservation by all sectors and communities. 	<p>1: a, b, c, e, f, g, h</p> <p>2: a, b</p> <p>3: b, c, d</p>
Delivering conservation initiatives efficiently	<ul style="list-style-type: none"> • An improvement in the alignment of sectoral, regional and jurisdictional biodiversity conservation approaches with Australia's Biodiversity Conservation Strategy. • An improvement in the effectiveness and efficiency of biodiversity programs and investments. 	<p>1: a, b, c, e, f, g</p>
Implementing robust national monitoring, reporting and evaluation	<ul style="list-style-type: none"> • An increased representation of biodiversity and ecosystem services and goods within national accounts. • An increased use of monitoring and reporting in the evaluation and improvement of biodiversity conservation projects, programs and strategies. • An increase in the use of information from both the private and public sector in the adaptive management of biodiversity conservation. 	<p>1: a, b, e, f, g</p>

Case Study 3

Trialling and demonstration of square mesh codends and turtle exclusion devices in the Queensland Trawl Fishery

Partners: OceanWatch, Fisheries Research and Development Corporation, Queensland Department of Primary Industries and Fisheries (QDPI&F), Queensland Seafood Industry Association, Ecofish, North Queensland Trawl Fishers

Location: Cairns

The project, implemented by OceanWatch, showed trawler operators and net makers the benefits of using square mesh codends and turtle exclusion devices (TED). The project was a collaborative effort between the QDPI&F, OceanWatch and Ecofish, a non-profit regional economic development cluster representing the seafood and marine industry in Far North Queensland. The demonstrations showed that square mesh codends are very effective at reducing bycatch and regulating the size of target species. When the square mesh codends were used with a TED, bycatch was reduced by 78 per cent.

OceanWatch constructed several square mesh codends for prawn and scallop fisheries so that they can be made available for trialling by fishers before purchase, and arranged production of TEDs with Popeye Netmakers Queensland²⁵.



²⁵ www.oceanwatch.org.au/wp-content/uploads/2016/05/SeaNet-Brochure.pdf

National Marine Science Plan 2015–2020

The National Marine Science Plan (NMSP) draws together the knowledge and experience of more than 24 marine research organisations, universities and government departments and more than 500 scientists. The NMSP outlines the science needed to provide the knowledge, technology and innovation cornerstones that will grow a sustainable blue economy.

The NMSP is a call to action to the nation's marine scientists and also to all those who benefit from a strong marine science sector²⁶.

Table 7. National Marine Science Plan	Marine NRM Actions
Create an explicit focus on a sustainable blue economy throughout the marine science system.	1: a, b, c, d, f 3: b, d
Establish and support a National Marine Baselines and Long-term Monitoring Program to develop a comprehensive assessment of our estate, and to help manage Commonwealth and State Marine Reserve networks.	1: a, b, e, f
Facilitate coordinated national studies on marine ecosystem processes and resilience to enable understanding of the impacts of development (urban, industrial and agricultural) and climate change on our marine estate.	1: a, b, e, f
Create a National Oceanographic Modelling System to supply defence, industry and government with accurate, detailed knowledge and predictions of ocean state.	n/a
Develop a dedicated and coordinated science program to support decision-making by policymakers and marine industry.	1: a, b, f, g
Sustain and expand the Integrated Marine Observing System to support critical climate change and coastal systems research, including coverage of key estuarine systems.	1: a, e
Develop marine science research training that is more quantitative, cross-disciplinary and congruent with industry and government needs.	1: a, b, f, g, h
Fund national research vessels for full use.	n/a

²⁶ www.marinescience.net.au/national-marine-science-plan

Case Study 4

Culvert Research and Development Initiative

Partners: OceanWatch, Queensland Department of Agriculture and Fisheries, Queensland Department of Transport and Main Roads, New South Wales Department of Primary Industries, individual biologists and engineers.

Location: National

The Culvert Research and Development Initiative is (current at the time of writing this Plan) an outcome focused endeavour that seeks to resolve the key issues associated with fish passage restrictions at culvert crossings.

The core business of the initiative is to develop and progress a series of standard fish passage designs and systems for culverts based on science, that maintain and improve natural heritage, and can be widely applied with confidence aiding a succinct approval process. Central to the success of this vision is the delivery of balanced research outcomes supported by proven field-tested designs that can be applied across a wide range of habitats, operating conditions and culvert configurations; improving the long-term sustainability of both our catchment systems and valuable marine resources. In 2016 a field trial, including collaborative input from biologists and engineers, resulted in the publication of a proof-of-concept document that provides conclusions on the best direction of future trials under both laboratory and field conditions.

This trial highlighted the importance of testing theory in practice, the value in having cross-jurisdictional input, and the realistic incremental nature of achieving a national or regional blueprint against the need to hasten any further habitat loss through further restriction of fish passage.



National Fishing and Aquaculture Research Development and Extension Strategy 2015–2020

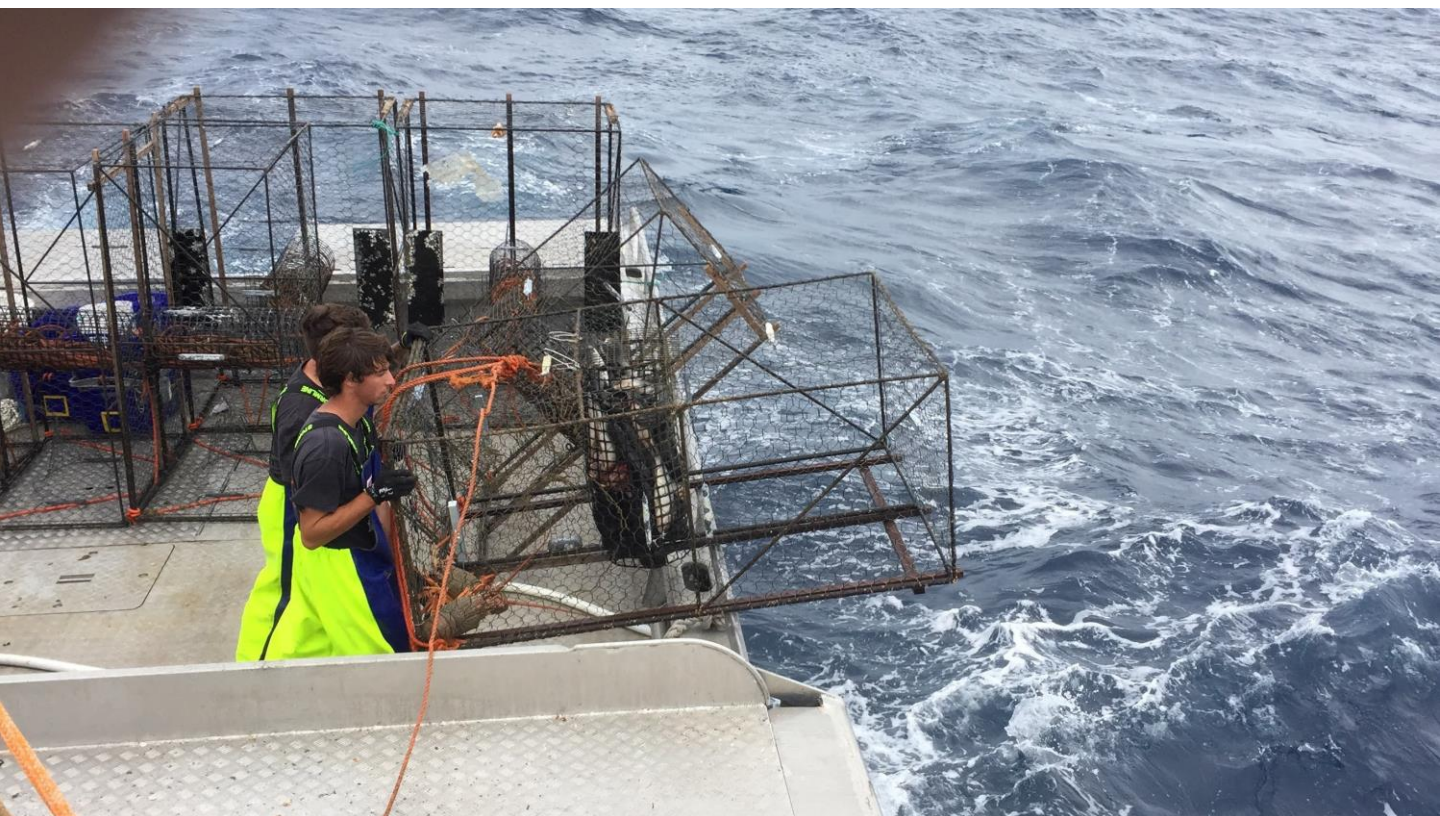
The National Fishing and Aquaculture Research, Development and Extension Strategy sets out a plan for how the research, development and extension that supports Australian fishing and aquaculture can become more focused, efficient and effective²⁷.

Table 8. National Fishing and Aquaculture Research Development and Extension Strategy 2015–2020		Marine NRM Actions
Australia's fisheries and aquaculture sectors are well managed and acknowledged to be ecologically sustainable.	Advance innovative and cost-effective methods for collecting data and improve assessment strategies for all sectors, particularly recreational, Indigenous and data-poor fisheries.	1: a, e, f, g, h
	Develop and adopt standardised fishery management best practices.	1: a, b, f 2: a, b, c, d
	Ensure harvest strategies address all sectors (including any social and economic indicators) and consider the wider impacts of their actions (e.g., on other marine industries operating in the same area).	1: a, b, f, g, h
	Improve methods to document and, where necessary, mitigate the environmental impacts of fishing and aquaculture including interactions with threatened, endangered and protected species (TEPs), bycatch and discarding.	1: a, b, d, f, g 2: a, b, c, d 3: b
	Build community engagement, understand what influences the perception of fishing and aquaculture operations, and determine how performance can be measured.	1: a, c, f, g 2: d
Security of access to, and allocation of fisheries and aquaculture resources is improved.	Conduct research on managing multiple uses of, and cumulative impacts on Australia's aquatic resources and define activities that will support informed debate on acceptable impacts, environmental standards and access for fishing and aquaculture.	1: a, b, e, f, g, h
	Develop spatial planning and management frameworks/tools for aquaculture that encompass environmental and social values, system selection, production methods, market demands and other uses of adjacent environments.	1: a, b

²⁷ www.frdc.com.au/research/RDEPlanningandPriorities/Documents/National%20Fishing%20and%20Aquaculture%20RDE%20Strategy%202015-2020.pdf

Table 8. National Fishing and Aquaculture Research Development and Extension Strategy 2015–2020		Marine NRM Actions
Security of access to, and allocation of fisheries and aquaculture resources is improved	Enhance the role of spatial planning in Ecosystem Based Fisheries Management, Ecosystem Based Modelling and Integrated Oceans Management and evaluate monitoring and performance.	1: a, b
	Define how fishery and aquaculture access rights are allocated, across and within sectors.	1: a, b
Benefits and value from fisheries and aquaculture resources are maximised, and aquaculture production increased.	Improve knowledge of global and domestic demand, supply chains, country-specific preferences for Australian seafood, traceability systems, food safety and access to markets.	n/a
	Identify the opportunities and constraints to the full and productive use of target species.	1: a, b, d, f, h
	Realise the economic potential (and broader ecosystem impacts) for discards, waste and under-utilised species.	1: a, d
	Communicate the health, nutrition, lifestyle and cultural benefits from fisheries and aquaculture.	1: a, g
	Develop new technologies and systems to improve the efficiency of production methods.	1: a, d
	Assess the environmental, economic and social benefits (and risks) of stock enhancement strategies, including restocking, translocation and artificial reefs.	1: a, b, d, g, h
Governance and regulatory systems are streamlined	Assess the real costs of regulatory systems, and investigate alternative cost-effective approaches.	n/a
	Develop cost-efficient, risk-based methods for effective compliance.	2: a, b, c, d
	Improve approaches to licensing and accreditation, including streamlining governance procedures and performance reporting systems.	n/a
	Provide alternative governance and consultative systems (including co-management) that involve all stakeholders.	1: b, f, g, h
	Acknowledge and allocate access rights to all fishing and aquaculture sectors.	1: a, b, f, h
Health of the habitats and environments on which fisheries and aquaculture rely are maintained	Fill information gaps about the effects of environmental variability on marine ecosystems, including the links between catchments, coasts and oceans, and their role in fisheries and aquaculture production.	1: a, f, g
	Understand the implications of climate variability on the range, movement and productivity of species and how ocean acidification will affect aquatic environments.	1: a, f, g
	Recognise the impacts of habitat loss for species within a community and fisheries productivity. Identify cost-effective approaches to habitat rehabilitation and enhancement.	1: a, b, f, g, i 2: a, b 3: a, b, c, d

Table 8. National Fishing and Aquaculture Research Development and Extension Strategy 2015–2020		Marine NRM Actions
Health of the habitats and environments on which fisheries and aquaculture rely are maintained	Enhance methods to rapidly detect and prevent exotic and endogenous invasive species and mitigate their impacts.	1: a, b, e, f, g 2: a, b
	Develop methods for ecological assessment and predictive modelling.	1: a
	Implement new technology (e.g. remote sensing) that will add to existing infrastructure (such as Integrated Marine Observing System) for sustained ecological observing.	1: a, d, e
Aquatic animal health management is improved.	Enhance the capacity to respond to disease, biotoxin or contamination events.	1: g, h 2: a, b
	Increase research into the causes of disease, origin and physiology of hosts and develop mitigation strategies for how to manage an outbreak.	n/a
	Expand data on the interaction between pathogens/hosts/ environments, what triggers disease, how it spreads within populations and what geographical regions are susceptible.	n/a
	Make veterinary medicines for the aquaculture industry more accessible so they support disease management, industry productivity and animal welfare. Develop effective biosecurity measures including on-farm plans that aim to improve aquatic animal health and performance.	1: a 2: b



Case Study 5

Effectiveness of larger mesh size in reducing the capture of juvenile target species in select NSW beach seine operations – FRDC 2008/036²⁸

Partners: OceanWatch, Fisheries Research and Development Corporation, New South Wales Department of Primary Industries, South West Rocks beach seine fishers.

Location: South West Rocks, New South Wales.

A trial to test the effectiveness of a larger than prescribed mesh size in reducing the capture of juvenile target species in the New South Wales Ocean Hauling Fishery was completed by OceanWatch and the South West Rocks beach seine fishers. The legislation at the time prescribed a maximum mesh size of 86 mm in the anterior wings, 65 mm in the posterior wings, and 65 mm in the bunt/codend. The trial examined the effectiveness of releasing juvenile target species – Yellowfin Bream, Luderick and Tarwhine – from the prescribed gear configuration compared with a net of equal length and depth, but constructed of 102 mm mesh. The proportion of less than minimum legal length Yellowfin Bream, Tarwhine and Luderick caught throughout the trial was reduced by 64 per cent, 66 per cent and 47 per cent respectively, compared with the legislated gear.

The significant reduction in the capture and subsequent mortality of juvenile fish is beneficial to the species biomass and to the sustainability of the fishery as a whole. In a practical sense, these changes also improve the efficiency of handling by reducing the time taken to sort catches and allowing any remaining juvenile fish to be returned to the water more quickly, thereby improving survivability.

The beaches on which these fishers operate, with a large majority of net deployments being carried out during daylight hours and at times within view of the general public, are popular holiday and recreational fishing destinations. The target species are also caught by recreational fishers, therefore optimal survival of juveniles is paramount to both user groups.

The recommendations made within the trial's final report were reflected in amendments made to the legislation governing the New South Wales Ocean Haul Fishery. In response to the trials, the regulated maximum mesh size in a seine net for ocean waters has been increased from a maximum of 65 mm to a maximum of 102 mm in the bunt/codend for the taking of fish other than Sea Mullet.

An important additional outcome is that commercial ocean beach seine fishers are able to operate with confidence in their gear, reducing the incidental capture and mortality of juvenile fish, and alleviating conflict between the resource users.



²⁸ www.frdc.com.au/research/Documents/Final_reports/2008-036-DLD.pdf

National System for the Prevention and Management of Marine Pest Incursion

Introduced marine pests threaten our enjoyment of many coastal recreational activities including fishing, sailing, boating and scuba diving. They also threaten the viability of our tourism and seafood industries and reduce the operating efficiency of vessels. To protect our marine environment and industries, the Australian, state and Northern Territory governments, along with marine industries and marine scientists are implementing Australia's National System for the Prevention and Management of Marine Pest Incursions (the National System). The National System aims to prevent new marine pests arriving, guide responses when a new pest does arrive, and minimise the spread and impact of pests already established in Australia²⁹.

OceanWatch has been a long-term member of the National Introduced Marine Pests Sectoral Group, and the Stakeholder Consultation Group linked to the Marine Pests Sectoral Group.

Table 9. National System for the Prevention and Management of Marine Pest Incursion		Marine NRM Actions
Prevention	Ballast Water	n/a
	Biofouling	2: a, b
	Aquarium Trade Import	n/a
Emergency Management	Emergency Marine Pest Plan	1: a, b, f, g, h
	Pest Trigger List	n/a
Ongoing Management and Control	National control plans	1: a, b 2: a, b
Monitoring	Australian Marine Pests Monitoring Manual	2: a, b
Communication	Communications to encourage uptake of the National System	1: g, h 2: a, b
	Sector Based Communication projects	1: g, h 2: a, b
	Marine pest management resources and tools	1: a, g
Research and Development	Research and Development priorities	1: a, f, g

²⁹ www.marinepests.gov.au/national-system/Pages/default.aspx

Case Study 6

Fighting Marine Pests

Partners: OceanWatch, Australian and state and Northern Territory government agencies, marine science community, Australian seafood industry.

Location: National

Over time, more than 250 exotic marine plants and animals been introduced into Australian waters. Some have taken over native habitats, damaging fishing and aquaculture industries, and impacting on marine health. Like cane toads and rabbits, getting rid of marine pests is virtually impossible. OceanWatch participated with governments, researchers and industry in developing a National System for the Prevention and Management of Marine Pest Incursions (National System). The National System is designed to prevent new pests arriving and to minimise the spread and impact of pests that are already established in Australian waters.

OceanWatch was also commissioned by the Australian Government to roll-out the introduction of the national biofouling management guidelines for commercial fishing vessels³⁰. These guidelines are designed to prevent further introduction or spread of marine pests. Through the roll-out of the guidelines, OceanWatch delivered face-to-face briefings to 1,419 fishers across 83 fisheries at 23 regional and remote fishing ports. The guidelines have also been incorporated into the OceanWatch Master Fisherman training program.



³⁰ www.marinepests.gov.au/marine_pests/publications/Documents/Biofouling_guidelines_commercial_vessels.pdf

"Common Atlantic Slipper snail (*Crepidula fornicata*)" by Dan Johnson is licensed under CC BY 4.0

United Nations Convention on the Law of the Sea (UNCLOS)

UNCLOS lays down a comprehensive regime of law and order in the world's oceans and seas, establishing rules governing all uses of the oceans and their resources. It enshrines the notion that all problems of ocean space are closely interrelated and need to be addressed as a whole. At the time of its adoption, the Convention embodied in one instrument traditional rules for the uses of the oceans and at the same time introduced new legal concepts and regimes and addressed new concerns. The Convention also provided the framework for further development of specific areas of the law of the sea³¹. Australia participated in all three United Nations conferences on the Law of the Sea (1958, 1960 and 1973–82) and became party to UNCLOS in 1994³².

UNCLOS recognises the right of coastal states to jurisdiction over their Economic Exclusion Zone (EEZ); over all resources in the waters, ocean floor and subsoil of an area extending 200nm from its shore. Within its EEZ, Australia has sovereign rights to explore and exploit, conserve and manage the natural resources, both living (such as fisheries and genetic material) and non-living (such as oil, gas, minerals), as well as responsibility for the protection and preservation of the marine environment.

UNFAO Code of Conduct for Responsible Fisheries

Australia is also a member of the United Nations Food and Agriculture Organization (UNFAO) Committee on Fisheries which is responsible for the long-term sustainable development and utilisation of the world's fisheries and aquaculture. The UNFAO Code of Conduct for Responsible Fisheries (the Code) was initiated in 1991 by the Committee on Fisheries and unanimously adopted on 31 October 1995 by the over 170 member countries including Australia.

The Code provides principles and standards applicable to the conservation, management and development of all fisheries. It also covers the capture, processing and trade of fish and fishery products, fishing operations, aquaculture, fisheries research and integration of fisheries into coastal area management³³.

In February 2011, the first global guidelines for bycatch management and reduction of fishing discards were agreed upon by members of the Committee on Fisheries. The guidelines also cover bycatch management planning, improvement of fishing gear, fisheries closures, economic incentives to facilitate uptake of measures, monitoring, research and development, building the capacity of states to follow the guidelines, and other relevant issues.

³¹ www.un.org/depts/los/convention_agreements/convention_overview_convention.html

³² www.ga.gov.au/scientific-topics/marine/jurisdiction/law-of-the-sea

³³ www.fao.org/docrep/005/v9878e/v9878e00.html

Case Study 7

OceanWatch Master Fisherman – formal training and recognition for responsible fishing practices

Partners: OceanWatch, Fisheries Research and Development Corporation, New South Wales Department of Primary Industries, Professional Fisherman's Association New South Wales, Sydney Fish Market, New South Wales Fisherman's Co-operatives Association, Master Fish Merchants Association of Australia, New South Wales Fishing Industry Training Council, South Coast Local Land Services (New South Wales).

Location: New South Wales

The OceanWatch Master Fisherman program is a vocational education and training (VET) recognised formal training and assessment program for commercial fishers, combined with recognition of commitment to best practice by OceanWatch. VET is designed to deliver workplace-specific skills and knowledge, covers a wide range of careers and industries, including trade and office work, retail, hospitality and technology³⁴.

The Program has been developed to train fishers in the implementation of their fishery specific Code of Practice. These Codes of Practice have been developed by OceanWatch, in partnership with the fishery sector and regulator, to conform with the UNFAO Code of Conduct for Responsible Fisheries as well as Australian societal expectation of responsible and sustainable practice. The training component is linked to a unit of competency within the Seafood Industry Training Package.

Fishers completing the formal training program, and able to meet additional further criteria including maritime competencies and food safety accreditation, are formally recognised as OceanWatch Master Fishermen. Recognised fishers are provided individualised web-based profiles that are easily accessible at point of sale through scanning quick response codes with a smart phone or tablet. Scanning the quick response codes give wholesalers, retailers and consumers access to a broad range of information related to the seafood product, including fisher profile and method of capture videos, species and fishery specific information including links to stock assessments and sustainability information, and seafood handling information and recipes.

The Program provides provenance information and a point of difference for responsibly and sustainably harvested Australian seafood in the marketplace, with the objective of promoting responsible practice amongst the seafood industry, combined with an improved return for recognised fisher's products.



³⁴ www.australia.gov.au/information-and-services/education-and-training/vocational-education-and-training.pdf

Annex B

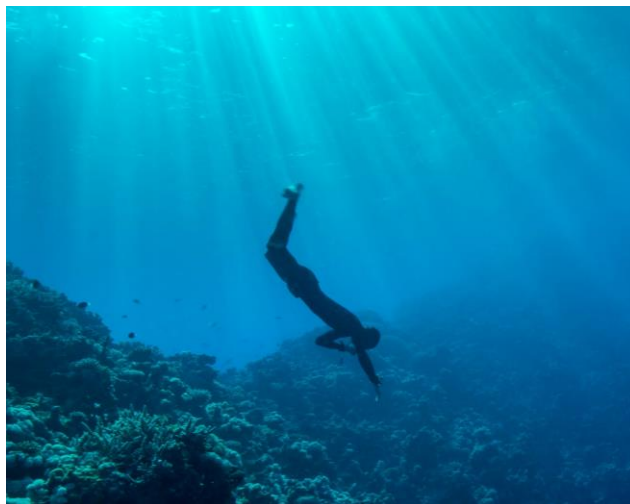
Stakeholder descriptions

The saltwater community

The saltwater community includes the 80% of Australians who live within 50 km of the coast³⁵ and represents all Australians who use and value the marine environment. It includes coastal Indigenous communities, recreational fishers, surfers, swimmers, boaties and tourists.

Many saltwater community members have unique experience and knowledge of the marine environment, and hold diverse environmental, social, economic and cultural values associated with its conservation and use.

Within the saltwater community, there is direct competition between recreational and Indigenous customary fishers and seafood consumers as beneficiaries of the extractive use of renewable marine resources, and recreational and tourism users as beneficiaries of non extractive use. These four key stakeholder groups all generate important social, economic and cultural value within coastal communities and are further described below.



Indigenous customary fishers

Indigenous people have developed a close, interdependent relationship with the land, water and living resources of Australia through customary fishing practices over tens of thousands of years. That relationship includes rights and responsibilities of particular Indigenous communities to areas of land and water. Indigenous people's stories and dance tell of times when there was abundant sea life, and their knowledge of marine NRM is many thousands of years old. In many places around Australia, this knowledge is shared with those who manage marine environments.

Many Indigenous people also participate in the commercial wild-catch and aquaculture sectors. The legal rights around Indigenous fishing are being refined over time and some aspects are now part of existing legislation and court decisions³⁶. OceanWatch has developed an Indigenous Participation Strategy³⁷ to further develop partnerships with Indigenous people and communities and provide them with opportunities to incorporate their significant and unique knowledge, skills and understanding in land and sea management into marine NRM.

As custodians of traditional ecological knowledge, and traditional owners of areas of land and water, Indigenous people can play a key direct role in the management and stewardship of marine resources.

³⁵ www.abs.gov.au/Ausstats/abs@.nsf/Previousproducts/1301.0Feature%20Article32004

³⁶ The Recreational and Indigenous Fishing Survey July 2003; FRDC Project No 99/158

³⁷ www.oceanwatch.org.au/wp-content/uploads/2017/06/Indigenous-participation-strategy.pdf

Recreational fishers

It is estimated that 3.5 million people participate in recreational fishing in Australia each year, driving an industry sector that spends \$650 million on tackle, \$2.5 billion on boats plus additional funds on general fishing expenses.

Recreational fishing is one of the few forms of nature-based recreation that can be enjoyed throughout childhood, adolescence, adulthood and into the senior years. Of recreational fishers aged 50 years and over, 75 % have been fishing for longer than 30 years, amassing a wealth of skills, techniques and knowledge built over the years of participation. For most people, the main reason for participating in recreational fishing is to relax and unwind³⁸.

Approximately 80% of the recreational catch is from salt water; in estuaries, off beaches, jetties and from the ocean³⁹. Many recreational fishing organisations also support and contribute to fish habitat restoration projects around Australia.

As direct beneficiaries of marine productivity and key contributors to environmental restoration projects, recreational fishers can play a key direct role in the stewardship of marine resources.

Australian seafood consumers

Seafood consumers desire access to a reliable and affordable range of seafood through retail and food service channels while also being concerned with the sustainability of wild-caught and farmed seafood both domestically and internationally. In some cases, this has led to seafood industry businesses and governments demonstrating their commitment to best production and management practices through independent assessment and third-party certification.

Seafood demand in Australia has steadily increased over the last decade. A key driver is the awareness of seafood's prominent role in a healthy diet. In 2012–13 Australians each consumed an average of 15 kg (processed weight) of seafood, compared with 13 kg in 2000–01⁴⁰. 72% of seafood consumed in Australia is imported⁴¹ to meet consumer demand.

As direct beneficiaries of marine productivity and potential key influencers of sustainable development through purchasing choices, consumers can play a key indirect role in the stewardship of marine resources.



³⁸ FRDC 2011/217 Identifying the health and wellbeing benefits of recreational fishing

³⁹ Australian Fisheries and Aquaculture Statistics, ABARES 2013

⁴⁰ Stephan, M., Hobsbawn, P., 2014. Australian fisheries and aquaculture statistics, ABARES 2013

⁴¹ www.frdc.com.au/knowledge/Factsheets/Factsheet_Imported_Seafood_in_Australia.pdf

Recreational and tourism users

Australia's marine environment is a focal point for recreation and tourism. Swimming, surfing, boating and sailing are iconic activities that directly connect people to the marine environment. Marine wildlife encounters through snorkelling, SCUBA and whale and dolphin watching enrich the lives of many Australians and international visitors, while raising awareness of the conservation status of those species.

Marine tourism, dependent on the health of the marine environment, underpins regional economies in some areas. Visitation to the Great Barrier Reef Marine Park for 2016 was approximately 2.62 million visitor days⁴², while around 70% of international visitors enjoy a world class aquatic or coastal experience as part of their trip to Australia⁴³.

There are also strong connections between tourism and the seafood industry. A recent study of the socio-economic impact of New South Wales commercial fisheries found, relative to regional tourism; 89% of New South Wales residents expect to eat local seafood when they visit the coast, 76% feel that eating local seafood is an important part of their coastal holiday experience and 64% indicated they would be interested in watching professional fishers at work while on holidays⁴⁴.

Recreational activities enjoyed by many Australians have the potential to impact environmental condition and water quality, including; increased turbidity and bank erosion caused by boat wake, non-compliance with regulations regarding disposal of wastes, and the use and disposal of antifoulant paints on boats and yachts. In addition, the mooring of boats continues to cause considerable direct physical damage to seagrass beds.

As direct beneficiaries of the health of the marine environment, Australians using the marine environment for recreation and tourism can be key advocates for the conservation and stewardship of the marine environment.

The seafood industry

Seafood industry enterprises range from low technology single-owner-operators for whom the lifestyle is important, to large vertically integrated companies that operate largely for profit. In 2012-13 the industry employed 13,813 people in the wild-catch (5,050), aquaculture (3,558) and post-harvest sectors (5,205)⁴⁵.

The seafood industry accesses approximately 120 wild-catch fisheries from which over 600 finfish and shellfish species are commercially harvested from marine and freshwater. There are also a large number of aquaculture species produced or in various stages of development; prawns, Southern Bluefin Tuna, salmonoids, edible oysters and pearl oysters accounted for over 80% of the value of aquaculture in 2012-13. In that year, the industry produced 237,000 tonnes of seafood of which 34% was from aquaculture; and was valued at \$2.4 billion⁴⁶. Australia's excellent international reputation for the quality, safety and environmental credentials of its exports of abalone, rock lobster, prawns, scallop, Southern Bluefin Tuna, tropical fish and pearls has maximised returns. In 2012-13, 49% of Australia's production was exported and valued at \$1.65 billion⁴⁷.

Management measures aimed at the sustainable development of commercial fisheries implemented during the past decade have decreased the number of fish stocks classified as overfished. Of 53 countries (making up 95% of global commercial fisheries catches) assessed based on 14 indicators of resource management, Australia's commercial fisheries management was ranked equal fourth overall and second in terms of sustainability⁴⁸.

There remains some prospect for increasing Australian production through improvements in fisheries management, aquaculture and to a lesser extent better utilisation of low value wild-catch species and processing waste.

⁴² www.gbrmpa.gov.au/visit-the-reef/visitor-contributions/gbr_visitation/numbers

⁴³ www.tourism.australia.com/news/Media-Releases-17782.aspx

⁴⁴ Social and Economic Evaluation of NSW Coastal Professional Wild-Catch Fisheries: Valuing Coastal Fisheries FRDC 2014-301

⁴⁵⁻⁴⁷ Ibid

⁴⁸ www.soe.environment.gov.au/theme/marine-environment/key-findings?year=96#key-finding-120566

However, Australia will continue to rely on imports, mainly from Thailand and China, to fill most of the seafood deficit which in 2012–13 was 66% of total consumption⁴⁹.

The seafood industry continues to seek social licence to undertake its core activities in public spaces. In a society that sees more and more people becoming coastal dwellers this pressure is set to increase. Furthermore, the seafood industry increasingly directly competes for access to resources with other marine NRM stakeholders. In this context, there is a stark difference between the seafood industry and other land based primary industries, providing further contrast for the differences between marine NRM and regional NRM.

As direct beneficiaries of marine productivity through extractive use, the seafood industry can play a key direct role in the stewardship of marine resources and their responsible use.

Landcare and community environmental restoration groups

For more than 25 years, Landcare and volunteer-based community groups have provided a unique approach to protecting, rehabilitating, restoring and enhancing Australia's natural environment. The Landcare movement is made up of more than 5,400 local groups across the nation. The groups that fall under the Landcare umbrella are varied in nature, including Coastcare, as well as productive farming groups, 'Friends of', Bushcare, Rivercare, Dunecare and Indigenous ranger groups⁵⁰.

Each of these groups actively cares for Australia's invaluable land and water assets; utilising assistance from interested volunteers to safeguard, rebuild, regenerate, and sustainably manage the natural environment.

In recent years, the Australian community in general has also become increasingly aware and responsive to the need to protect and restore natural aquatic resources (marine, estuary, river, wetland and other habitats) in order to maintain and promote biological diversity and processes.

Through implementation of this Marine NRM Plan, OceanWatch will complement, support and promote the activities of Landcare and community environmental restoration groups, and communicate the marine rehabilitation activities of all stakeholders through the marine NRM network.

Marine science community

Australia has only explored approximately 25% of its marine environment⁵¹ and the future could include innovative technologies and products which are marine environment related or dependent. Marine scientists are key influencers in the marine NRM community as they contribute to science-based decision making in the management of marine resources.

The inter connectedness of science disciplines requires biological, chemical, physical, engineering and social sciences to be included within this community if they are to influence downstream marine health and community well being.

As providers of knowledge of the health and productivity of the marine environment, the marine science community are key influencers with regards to the conservation and sustainable development of the marine environment.

⁴⁹ ibid

⁵⁰ www.landcareaustralia.org.au/about

⁵¹ National Marine Science Plan 2015–2025, National Marine Science Committee, 2015

Landholders and businesses in coastal catchments

Marine health and fisheries production are in decline around world as a result of diverse anthropogenic threats. These threats are intimately linked to biodiversity and conservation values because of the heavy dependence of both fisheries and high value marine and coastal wetlands on coastal ecosystem health. Consequently, if the widespread degradation of coastal ecosystems can be halted and remediated, there are substantial benefits to fisheries output, ecosystem resilience, food security, livelihoods, recreation and the protection of ecological assets of national and global significance⁵².

As core drivers of change in the condition of the marine environment, landholders and businesses impacting water quality and environmental connectivity in coastal catchments can play a key direct role in improving the health and productivity of the marine environment.

Australian, state and territory governments and their agencies

Australian, state and territory governments and their agencies play a lead role in responding to marine environment, seafood industry and saltwater community NRM challenges. They do this through development and implementation of policy and legislation, and establishing operational management and co-management arrangements. Governments also fund specific activities of non-government organisations to deliver outcomes in areas for which they have neither the capacity, expertise nor the responsibility. Of most relevance to marine NRM is governments' investment in NRM.

Through the development and implementation of policy and legislation, and as major funders of the public benefit components of marine NRM activities, Australian, state and territory governments and their agencies play a lead role the conservation and stewardship of the marine environment.

Regional NRM organisations in coastal areas

Regional NRM describes the planning and delivery of programs that support healthy and productive country, viable communities and sustainable industries. Regional NRM organisations work from the paddock to the regional scale to address issues that require a landscape perspective⁵³. 56 regional NRM organisations act as planning and delivery agents under the regional stream of the National Landcare Programme⁵⁴.

These regional NRM organisations have developed integrated catchment management strategies that recognise that the health of coastal and marine waters are significantly impacted by the condition of the catchment. These strategies have been guided by stakeholders that include local communities, primary producers, Australian, state, territory and local governments and their agencies, Indigenous organisations and other relevant NGOs. These regional NRM strategies must be considered in coastal and marine management.

As planners, influencers and investors in the management of natural resources, regional NRM organisations in coastal areas can play a key role in the rehabilitation and restoration of environmental connectivity at the landscape – seascape interface.

Local government in coastal areas

Local government is responsible for undertaking, managing, supporting and regulating a wide range of activities on both public and private land. This includes the development and implementation of land use planning schemes, managing public land, approving coastal development and regulating private activities⁵⁵. Local government also has a key role to play in translating the NRM policies of Commonwealth and State governments for local projects mitigating downstream impacts on the marine environment.

As holders of both statutory and non statutory responsibilities on behalf of local communities, local government in coastal areas can play a key role in the management and rehabilitation of the marine environment.

⁵² Sheaves, M., Brookes, J., Coles, R., Freckelton, M., Groves, P., Johnston, R., Winberg, P., 2014. *Marine Policy*, 47, 23–38

⁵³ www.nrmregionsaustralia.com.au

⁵⁴ www.nrm.gov.au/regional/regional-nrm-organisations

⁵⁵ www.lgns.w.gov.au/files/imce-uploads/39/Wha_%20are_LGs_responsibilities_re_NRM.pdf

Industries impacting marine health and productivity

Shipping and ports

Australia is the fifth largest user of shipping in the world with more than 11,000 vessels from 600 overseas ports visiting Australia's 65 major ports each year. About 98% of Australia's exports, in particular bulk mineral and agricultural commodities, are carried by ships.

The shipping operations and associated port activities that have been identified as having the greatest potential impact on the marine environment are discharge of ballast water, use of antifouling paints, disposal of marine debris, disposal of waste materials and sewage, dredging and the disposal of dredged waste (spoil), oil spills from routine activities or accidental incidents, spills of hazardous materials including chemical and radioactive materials, physical damage to marine habitats from anchoring, noise emissions, and air emissions. The potential impacts are usually greater for inshore waters and around port areas where complex ecosystems exist and there is a low water exchange rate⁵⁶.

Oil and gas

Numerous habitats, communities and species groups in the marine environment may be affected by oil and gas activities, including coral reefs, seagrass communities, fish and invertebrate species, and some species that are protected under national and international legislation and agreements⁵⁷. Impacts can include seabed disturbance from the physical footprint of subsea infrastructure and drilling discharges, underwater noise from seismic surveys, support vessels, drilling or pile-driving, artificial light and air quality effects from operating facilities and seabed and water quality effects from discharges of drilling waste or production discharges.

Regulatory reform of the oil and gas industry, and implementation of the National Offshore Petroleum Safety and Environmental Management Authority have increased the level of scrutiny of the sector, resulting in a better understanding of impacts of activities, greater levels of industry compliance and increased levels of preparedness for unplanned events⁵⁸.



⁵⁶ www.environment.gov.au/system/files/resources/8453a2da-8717-40f8-8ce7-636ae3ec64cf/files/impacts_shipping.pdf

⁵⁷ www.soe.environment.gov.au/theme/marine-environment/topic/2016/marine-oil-and-gas-exploration-and-production

⁵⁸ www.soe.environment.gov.au/theme/marine-environment/key-findings?year=96#key-finding-120571

"Ships at Beautiful Harbour in Sydney Australia" by freebie.photography is licensed under CC BY 3.0

Annex C

Stakeholder engagement

Previous Australian Government marine NRM investments, delivered by OceanWatch since 1999, have resulted in long term engagement with the seafood industry and identification and actioning of some of its marine NRM priorities⁵⁹.

Direct engagement relevant to the development of this Plan was guided by OceanWatch's Stakeholder Engagement Strategy⁶⁰ included face-to-face meetings with seafood producers and their representative organisations, a targeted cross sectoral fishing and aquaculture forum for saltwater community representatives, and National Marine NRM Expert Advisory Group (NMEAG) workshops.

On a broader scale, all marine stakeholders were invited to engage in the marine NRM planning process through a widely distributed national marine NRM survey.

The results of these engagements are summarised in the following sections.

National Fishing and Aquaculture Forum

Twenty-two seafood influencers participated in the first national forum on marine NRM. Each participant was invited based on their breadth of knowledge of the commercial, recreational, Indigenous customary fishing or aquaculture sectors.

The aim of the forum was to establish the values, benefits and key opportunities for marine NRM now and into the future. Forum participants undertook workshop activities to establish a baseline of the seafood industry and saltwater community's understanding, perceptions and expectation marine NRM.

The forum participants agreed:

- clean water and abundant marine life is vital for a healthy marine environment,
- effective marine stewardship today is desired above future rehabilitation of a degraded marine environment, and
- encouragement of stewardship, and improved awareness and better practice on land and on water, should be a key focus of marine NRM.

Fish habitat, water pollution and biosecurity were identified as the highest priorities to be addressed by marine NRM.

National Marine NRM Survey

An invitation was extended to all stakeholders to complete the 2015 National Marine NRM survey online. A total of 720 responses to the survey were received. Survey respondents listed conservation, coastal resident and science or research as the activity or sectors that they most identified with.

Information was sought through the survey to determine which aspects of the marine environment were valued by respondents, which threats did respondents believe the marine environment faced and what should be the future focus for marine NRM. In addition, OceanWatch also sought to determine the respondent's level of support for the marine NRM vision.

Respondents ranked clean water and abundant marine life as the highest value associated with the marine environment, with natural beauty and connecting people to nature also ranking as very important. Two key threats to those values were identified as loss of fish habitat and

⁵⁹ OceanWatch marine NRM outcomes: www.oceanwatch.org.au/wp-content/uploads/2016/05/SeaNet-Brochure.pdf, www.oceanwatch.org.au/glossary/tk

⁶⁰ Stakeholder engagement strategy <http://www.oceanwatch.org.au/wp-content/uploads/2017/02/OceanWatch-Marine-NRM-Stakeholder-Engagement-Strategy.pdf>

understanding of human impacts.

Consequently, they ranked improving land management practices, improving community understanding of human impacts and encouraging community stewardship as the highest priorities for the future focus of marine NRM. Over 80% supported the vision for marine NRM.

National Marine NRM Expert Advisory Group (NMEAG)

The purpose of NMEAG is to ensure strong working relationships with key stakeholders during marine NRM plan development, resultant operational activities, and review of progress towards the NRM outcome. Membership of the NMEAG includes individuals with knowledge and expertise in one or more of the following areas:

- marine science.
- recreational fishing.
- commercial wild-catch fishing.
- aquaculture.
- catchment health.
- Indigenous customary fishing.
- NRM practice.
- social science.
- coastal community.
- environmental non-government organisation.

Appendix 1

Climate Change

The oceans surrounding Australia have warmed, with the greatest surface warming to the west and south of the continent. As in the atmosphere, favourable conditions for marine heatwaves around Australia can occur due to natural variability, such as the warmer Pacific Ocean waters brought to the region by La Niña. However, attribution studies have shown that background warming of the global oceans has led to a greater prevalence of marine heatwaves. In recent years, major heat events have occurred to the west of Australia, off Tasmania's east coast and, with the 2015–16 El Niño, in the Coral Sea⁶¹.

It must be assumed that there will be widespread change resulting from ocean acidification and other impacts of climate change. The degree to which this change represents harm to the future of the total marine environment and the total quantity and diversity of the resources therein is, however, not well understood. To combat increased atmospheric greenhouse gas concentrations, several methods of carbon sequestration utilising the ocean have been suggested. These include deep ocean storage of liquefied CO₂, storage of CO₂ in geological structures beneath the ocean floor, the promotion of phytoplankton growth via iron fertilisation, and the farming and use of algae for bio-fuel production. In addition, certain forms of renewable energy such as offshore wind, that has been utilised since the 1990s and wave, current and tidal power, if implemented, do and will change habitat structure and dynamics⁶².

Changes to coastal habitat are occurring which create a challenge for local regulators to plan retreat options against rising tides and flood surges while protecting and maintaining saltmarsh and mangrove habitat.



⁶¹ State of the Climate 2016. CSIRO

⁶² Kearney, R. & Farebrother, G. 2015. The comparative performance of the management of the individual threats to marine environments and fisheries resources FRDC Project No: 2013/O29

"Extensive coral bleaching in Western Australia" by Morane Le Nohaic is licensed under CC BY-ND 2.0 and was cropped

Appendix 2

The case for marine environmental rehabilitation

Estuarine systems are focal points for the cumulative impacts of changed catchment land use, and increasing urbanisation and development in coastal zones⁶³.

"In the post WWII period, and particularly since the 1980s, there has been rapid industrialisation, large population increases, increasing affluence, increased levels of mining, increased demand for transport infrastructure, increases in globalised trade necessitating port developments, and expansion and increased demand for leisure pursuits. These increases have placed further pressures on resources such as water, land and recreational areas, and created increasing volumes of waste for disposal. Much of this rapid change, often associated with a preference for development in coastal regions and in particular those associated with estuaries, has affected river catchments, estuaries, coastal land and consequently the quality of water in rivers, estuaries and the open sea. It should be of no surprise that there have been accompanying large scale changes to riverine, estuarine and marine ecosystems, particularly where the linked marine ecosystems are close to shore or where marine biota readily move between the distinct systems or rely upon other species that either reside in or move between riverine, estuarine and marine areas.

Consequences of human activities on aquatic environments have included: increased sediment and nutrient loads, changed flows in most estuaries and coastal tributaries, increased run-off volumes and changed levels of catchment and riverine erosion and deposition. Human activity has also resulted in a great variety of pesticides and other chemicals entering the marine environment.

Engineered changes to the landscape include drainage, flood mitigation, the construction of dams, bridges, roads and railways, the dredging of shipping channels and the reclamation of aquatic areas as land. These activities have resulted in more than the visibly obvious changes that include the loss of saltmarsh habitats, and damage to seagrass beds and benthic habitat.

Less visible impacts include changed salinity, water pH changes such as those resulting from disturbance of acid sulfate soils, reduced dissolved oxygen levels from altered flood-plain use and altered inundation effects and patterns, and reduced connectivity in waterways resulting from both purposeful human-made changes to water drainage and flow, and indirectly from many forms of infrastructure developments."⁶⁴

As a result, marine ecosystems have become sensitive to nutrient enrichment and pollution, and degraded through habitat destruction and changes in biodiversity. Estuarine wetland drainage, which by definition changes a seascape to a landscape, is the catalyst for regular large-scale fish and associated biota kills and stress to associated ecosystems. The modification of flood plains is responsible for the discharge of nutrient rich, acidic and deoxygenated water into the estuaries and near shore waters of the east coast of Australia. Catchment run-off and associated water quality is identified as the second most significant pressure on the Great Barrier Reef and is expected to have significant compounding effects with climate change⁶⁵.

⁶³ Davis J.R & Koop, K. (2006). Eutrophication in Australian Rivers, Reservoirs and Estuaries – A Southern Hemisphere Perspective on the Science and its Implications. *Hydrobiologia* 559: 23–76

⁶⁴ *ibid*

⁶⁵ www.gbrmpa.gov.au/managing-the-reef/how-the-reefs-managed/water-quality-in-the-great-barrier-reef

The Great Barrier Reef Water Quality Protection Plan has been a significant initiative, and is making progress towards the goal of halting and reversing the decline in water quality entering the Reef. The progress towards this goal reflects the level of commitment by both the Australian and Queensland governments, which are investing in excess of \$375 million over five years on Reef Plan activities⁶⁶.

While the Great Barrier Reef is undeniably showing signs of stress from human driven environmental change, the situation is also critical on the northern rivers of New South Wales. The Clarence River is the largest riverine estuary system in New South Wales. Because of its great size and only moderate human population density throughout its catchment it could be expected to be in relatively good condition; but it is not. With approximately 92 per cent of its wetlands affected by drainage and 39 per cent of its catchment being described as disturbed it faces broad-scale pressures. The most specific and extreme threats to aquatic ecosystems and fisheries resources are presented in the form of drainage of riparian land and the resulting acidic and deoxygenated water run-off. Research on the Clarence River, New South Wales after recent floods showed that there were no benthos alive in the sediments from Grafton, just below the tidal limit, through to the ocean.⁶⁷ Similar large scale biota kills have also recently occurred in the Hunter, Manning and Richmond rivers.

A range of catchment management and water quality improvement activities have been undertaken in all states and territories over the last 15 years. The threat to marine environmental health and productivity from urban stormwater discharge and agricultural runoff should not be understated. However, it is time to rethink the focus and invest in repairing the habitats that have a positive impact on biodiversity and provide a buffer to improve water quality. Limited, but in some cases very beneficial works, have been undertaken in estuaries.

These investments often occur within the general terrestrial focus of regional NRM under the National Landcare Programme, without reference to, and inclusion of, the knowledge and understandings of marine stakeholders including Indigenous customary fishers and their communities, oyster farmers, and commercial and recreational fishers, who often have a unique, fine scale understanding of local waterways and are ultimate beneficiaries of improvements in environmental condition.

Ecosystem service values per hectare per year for mangroves and saltmarsh; wetlands and floodplains; and seagrass are estimated to be \$11,320, \$19,650 and \$21,730 respectively while the value of mangroves to commercial fishing alone is estimated to be over \$13,000 per hectare per year⁶⁸.

A coordinated investment in estuary repair, inclusive of marine NRM stakeholders, will provide multiple community benefits, including:

- improved coastal water quality,
- enhanced catchment hydrology,
- vibrant and resilient coastal biodiversity,
- fine-tuned flood control,
- re-established carbon sequestration,
- reinforced foreshore buffering against extreme weather events,
- increased fisheries production with flow on economic and social benefits, and
- enhanced recreational experience.



⁶⁶ Great Barrier Reef Marine Park Authority 2013, Great Barrier Reef Biodiversity Conservation Strategy 2013, Townsville

⁶⁷ Revitalising Australia's Estuaries- the business case for repairing coastal ecosystems to improve fisheries productivity, water quality, catchment hydrology, coastal biodiversity, flood control, carbon sequestration and foreshore buffering - FRDC 2012/036

⁶⁸ Ibid

Case Study 8

Tide to Table⁶⁹ – rehabilitating marine habitat

Tide to Table was adopted to reinforce the message that actions on land affect the productivity of waterways. The program integrated the seafood industry's needs into local natural resource management, actioning \$8 million in on-ground works between 2004 and 2013 in Queensland and New South Wales. The program's success was due to its ability to engage local farmers and seafood producers, businesses, communities and government agencies in a common cause; to rehabilitate a river system or estuary and improve its water quality, fish and seafood habitat and rebuild the health of the immediate environment. One project from the program is described below.

Restoring fish habitat at Bowling Green Bay to support Barramundi "The Aussie Icon"⁷⁰

Partners: OceanWatch, North Queensland Dry Tropics NRM, Australian Government, Paul Le Feuvre owner of Carrick Plains, local seafood industry.

Location: Bowling Green Bay, Queensland.



Prized by fishers and seafood consumers alike, over 800 tonnes of Barramundi is commercially harvested in Queensland each year to a value of \$6 million with hundreds of thousands more caught by recreational and Indigenous fishers. A network of well connected, healthy waterways and wetlands that Barramundi can utilise throughout their life cycle is essential for maintaining a healthy and abundant Barramundi population. Bowling Green Bay contains a network of mangrove lined creeks, backed by extensive saltmarsh and saltpan which provide food and shelter to young and adult Barramundi. During the wet season the young migrate upstream to freshwater wetlands, where they feast and grow until they are old enough to breed, at which stage they move back downstream to estuarine habitats to complete their life cycle.

Due to human development of the Bowling Green Bay catchment, creeks and wetlands have been significantly modified. Water quality has declined, and migration routes have been blocked, disrupting the natural lifecycle of Barramundi. Concerns have been raised by commercial, recreational fishers and scientists about these impacts on the sustainability of Barramundi populations. Research has shown that barriers to fish passage within the creek, including the thick growth of aquatic weeds and a road crossing were stopping young Barramundi from migrating upstream to Horseshoe Lagoon.

Under this project, weed control has been carried out by landowners, tackling the thick growth of *hymenachne* and water hyacinth in the creek and rubber vine strangling trees along the creek banks. A rock ramp fishway has also been installed by Queensland Primary Industries and Fisheries to provide fish passage over the road crossing.

⁶⁹ www.oceanwatch.org.au/glossary/tk

⁷⁰ www.oceanwatch.org.au/Backup/wp-content/uploads/2010/02/Tide2Table-Barramundi-Leaflet.pdf



Appendix 3

Legislative and policy review

There are often Commonwealth, state and territory laws applying to the same environment, consequently, marine NRM staff must work across multiple jurisdictions, taking into account numerous regulations and policies.

An internal review by OceanWatch of international, Commonwealth, state and territory legislation and policy as it applies to activities undertaken on the coast and within the marine environment is summarised below. Whilst limited, it provides a snapshot of the number and complexity of directions, which total over 270 instruments.

The key observations of the review are:

- Legislation is constantly evolving to meet the demands of current and future needs, eg, Carbon Rights Act 2003 projects forward to future policy directions. However, some legislation is very dated, eg, WA Wildlife Conservation Act 1950 only now is in the process of overhaul.
- The term “environmental law” refers to laws for protecting soil, air, water, the oceans and biodiversity, as well as laws which protect the environment as a whole. Environmental laws can protect areas of land or ocean (such as in national parks), individual species (such as wildlife conservation laws), require environmental impact assessment be done before approvals are granted for an activity, make it an offence to harm the environment, and require people to remediate any environmental damage they cause (such as contaminated sites laws).
- The Commonwealth has legislative powers to make laws which apply in both state, NT and Commonwealth waters if the law is necessary to implement one or more international treaties, eg, Environmental Protection Biodiversity Conservation Act 1999.

- Penalties for breaches of environmental legislation appear to be more severe where risk to human health is proven.
- State and NT laws that are inconsistent with Commonwealth laws are invalid to the extent of their legal inconsistency. Legislation in some areas is well defined, but in other areas terminology used invites subjective interpretation particularly where compliance with quantifiable limits is deemed to be a major economic impost.
- Advisory regulations may promote better/ best practices rather than set specific limits or actions. This appears to limit the ability to enforce tougher controls. Codes of practice are instruments designed to assist in compliance with the general environmental duty by clarifying and codifying what is accepted practice. They do this by closely examining an industry or activity, its various aspects and impacts and through a process of negotiation, formulate reasonable and practical outcomes and recommended practices to achieve such outcomes.

⁶¹ State of the Climate 2016. CSIRO

⁶² Kearney, R. & Farebrother, G. 2015. The comparative performance of the management of the individual threats to marine environments and fisheries resources
FRDC Project No: 2013/029



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