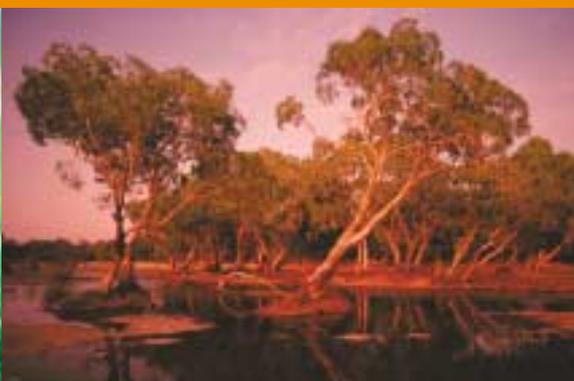
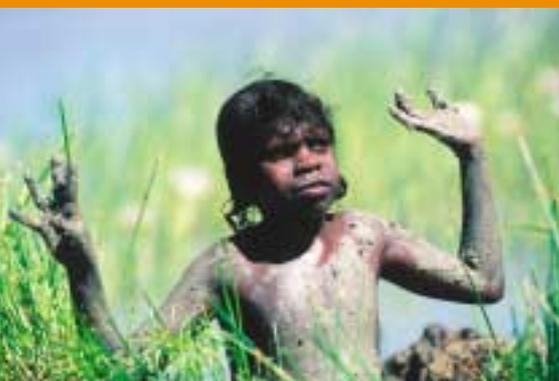




Snapshot

of the Northern Planning Area 

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NATIONAL OCEANS OFFICE



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© Steve Lovegrove

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PREFACE

Australia's Oceans Policy was launched in 1998 – the International Year of the Ocean. The Australian Government is committed to ecologically sustainable oceans management and *Australia's Oceans Policy* marks a significant step forward in the way Australia manages its marine domain – about 16 million km² of ocean.

Ecologically sustainable oceans management has four key components:

- ecosystem-based management of human activities;
- integrated multiple-use management in marine environments;
- maintenance of ecosystem health; and
- sustainable and internationally-competitive, marine-based industries.

To achieve the goal of ecologically sustainable oceans management we need to look at all ocean uses and resources collectively rather than in isolation, and our management decisions need to be informed by a sound understanding of natural systems and of the human interactions with them.

The Australian Government's commitment to ecologically sustainable oceans management is being implemented through regional marine planning. Planning is now underway in the Northern Planning Area – an area comprising the Gulf of Carpentaria, eastern Arafura Sea and Torres Strait.

A major incentive for the approach that the Australian Government is now taking is to avoid the mistakes we've made on land since European occupation of this continent. The ecosystems of the Northern Planning Area remain largely intact. We have a major opportunity to ensure that, as economic and social development occurs, it does so in a way that both maintains ecosystem health and meets the needs of the people of the region.

Ecosystems do not recognise the jurisdictional boundaries that we have imposed on land and seascapes. The flooding rivers of the north, for example, have impacts well beyond estuarine and coastal environments. Marine turtles also move through large areas of state, national and international waters as they feed and come to land to nest.

It is essential, therefore, that governments improve their capacity to work collaboratively towards shared goals if we are to achieve sustainability through ecosystem-based management of our activities.

The Australian, Queensland and the Northern Territory governments have agreed to work together to scope the northern marine plan. The scoping phase involves articulating the objectives to be achieved and identifying the key issues to be addressed through the marine planning process. The views of industry, Indigenous communities, the research community, conservation organisations and other interests are all important in identifying the issues and objectives to be progressed through regional marine planning.

Although Torres Strait is formally part of the Planning Area, it is important to note that marine planning in the Strait is being undertaken via a separate process to that in the rest of the Planning Area. This is in recognition of the distinct ecological, cultural and institutional arrangements that characterise Torres Strait.

While many who live there require no introduction to the Planning Area, many Australians have a strong interest in the area fostered by its remoteness, its Indigenous cultures and the grandeur of its scale. This Snapshot is designed to introduce readers to the Northern Planning Area.



Throwing bait net at Napranum

© Kerry Trapnell





1. INTRODUCTION

The Northern Planning Area is one of Australia's most distinctive coastal and marine regions, complemented by unique ecological and human values.

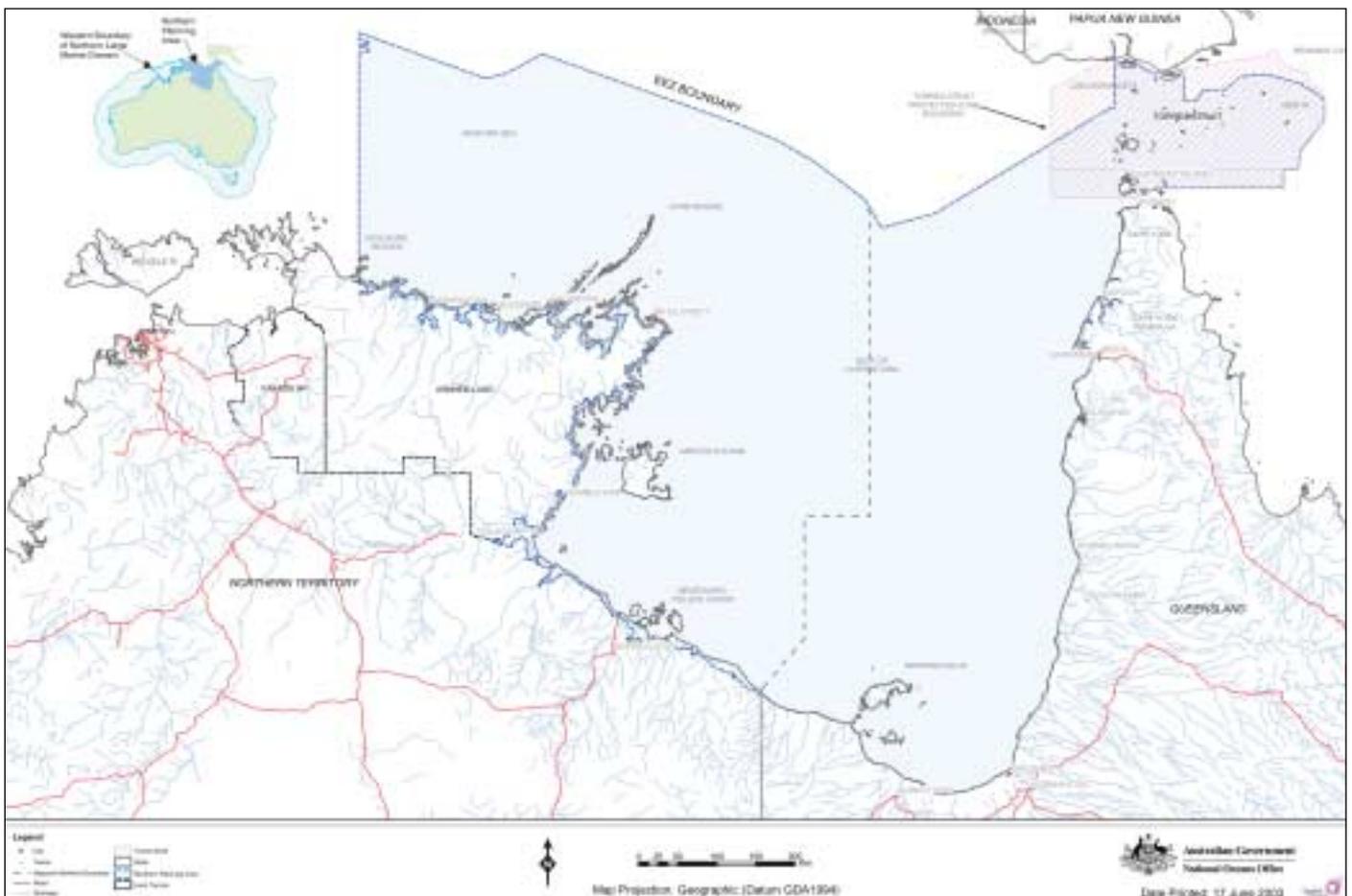
No region of mainland Australia has a greater reliance on the sea. Isolation and the lack of road infrastructure mean that communities are often dependent on sea transport for their wellbeing, particularly during the wet season. The key industries of fishing and mining are fundamentally dependent on the sea for produce and transport respectively, while the tourism industry has developed high-value niche markets in recreational diving, angling and sport fishing.

The Planning Area comprises waters off the Northern Territory and Queensland between the Goulburn Islands in the west and Cape York Peninsula in the east. These waters extend from the low-water mark to the limit of Australia's Exclusive Economic Zone. The total area is 700 000 km² including about 1600 km of the coastline of the Northern Territory and approximately 1300 km of the coastline of Queensland (not including Torres Strait).

Although Torres Strait is included in the Planning Area and is discussed in this Snapshot, it is important to note that marine planning in the Strait is being undertaken via a separate process involving particular arrangements between the Australian Government, Queensland and Papua New Guinea. While there will inevitably be links between marine planning in Torres Strait and elsewhere in the Planning Area, the separate process recognises the distinct ecological, cultural and institutional character of Torres Strait compared with the rest of the Planning Area.

The Planning Area is significant as one of the only marine regions where Australia shares international borders. Here, with Indonesia and Papua New Guinea, Australians also share an ancient history of geological, biological and cultural links. At the oceanographic level, these links extend even deeper into South East Asia, the Pacific and the Indian Ocean.

Figure 1.1: Map of the Northern Planning Area





Life in the region is dominated by a weather cycle so complex that the Yolngu people from Arnhem Land observe eight distinct seasons named according to natural signs such as the movements of migratory birds, the breeding cycles of sharks and rays, the temperaments of thunder and lightning, the flowering and fruiting of bush tucker, the heat of the soil, and the direction of winds.

In some parts of the Planning Area, tropical cyclones tear and drench the coasts and hinterlands for five months of the year. The churning rivers of three island nations (Australia, Indonesia and Papua New Guinea) drain their sediments into a common shallow sea. Here the currents are directed more by winds and tides than by the deep oceans that lie at the region's boundaries; and the tides themselves are a puzzle. At one place two high and two low tides occur daily, while at others a single tidal range, or little tide at all, is the norm.

Lush riverine, estuarine and wetland areas provide important nurseries for a wide range of wildlife, including fish species that form the basis of some of Australia's major commercial fisheries. Although the ecology of the Planning Area is relatively unexplored,

it is clearly an area of high biological diversity and provides internationally significant habitats for many species of conservation value, including dugong, marine turtles, estuarine crocodiles and migratory wading birds.

Compared with many other parts of the Australian coast, the Planning Area is sparsely populated, and here, significantly, Indigenous peoples make up the majority of the population.⁶ While cultural and economic links with the sea are extensive for Indigenous communities and more recent residents, traditional associations have been continuous for Aboriginal and Torres Strait Islander peoples for many thousands of years. Indigenous links with 'sea country' date back to before the last great rise in sea level that began about 18 000 years ago and stabilised about 6000 years ago, flooding the land bridge that had enabled migration between Papua New Guinea, Arnhem Land and Cape York Peninsula. Customary activities such as fishing, harvesting of turtles and dugong, and maintaining cultural sites now occur alongside mining, grazing, commercial fishing, aquaculture and increasing Indigenous involvement in tourism.

This Snapshot summarises the key physical, biological, cultural, social and economic features of the Planning Area. It also looks at how communities, industries and individuals value and interact and identify with the marine and coastal domains of the area.



Collecting bulbs and flowers

© Kerry Trapnell



2. HISTORY & HERITAGE

The Northern Planning Area differs from most other parts of Australia in that Aboriginal and Torres Strait Islander peoples constitute a majority (65%) of the population.

Archaeological evidence indicates that the region was one of the first areas of Aboriginal occupation of Australia and there are strong, continuous associations dating back many thousands of years with Arnhem Land, western Cape York Peninsula and many continental islands. Indigenous cultures generally maintain that their people have been on their land and sea-country from the beginning – a belief consistent with the fact that Indigenous peoples have occupied, used and managed these coastal and marine environments ever since they became shaped by the stabilisation of the current sea level about 6000 years ago.

For Aboriginal people, the region of the Planning Area embraces the physical and cultural manifestations of their traditional sea-country. Marine resources, including fish, dugong, sea-turtle, crab and shellfish, often provide the staple diet. This was, and to a significant extent still is, supplemented by hunting of land mammals and reptiles and the gathering of plant foods.

The Aboriginal people bordering the Planning Area comprise at least 48 interrelated linguistic groups, demonstrating great cultural diversity.⁴ Their ancestors are thought to have migrated from what is now Indonesia at times when the sea level was about 100 metres lower than it is today. Each Aboriginal cultural group, however, has its own stories and beliefs relating to its origins and ancestry. People and traded goods also moved freely between Australia and New Guinea until the land bridge was flooded by rising sea levels about 6000 years ago, leading to the formation of the reefs and island groups of Torres Strait.

The Torres Strait Islands are home to people of both Aboriginal and Melanesian descent. They are a seafaring people with distinctive cultures and lifestyles that revolve around life within a 'sea of islands'.

Torres Strait Islands

It is believed that people of Melanesian descent first settled the islands of Torres Strait more than 1000 years ago. Torres Strait Islanders, as they are now known, comprise four major cultural groupings centred respectively around the small volcanic eastern islands, the low-lying coral cays in the middle of the Strait, the small alluvial northern islands near the Papuan coast and the larger continental islands off the tip of Cape York Peninsula, some of which are also home to Aboriginal people.⁵⁶ Each of these four cultural groupings are seafaring people and all Torres Strait waters are part of the marine estate of one or more of the island groups. They harvest fish, hunt dugong and turtles, collect shellfish and engage in maritime trade, with their culture, livelihood and existence inexorably linked to the sea.

European settlement occurred in the mid-19th century and, from the 1860s onwards, commercial harvesting of trepang (also known as beche-de-mer or sea cucumber), pearl shell and trochus was undertaken. By 1900, Torres Strait, along with Broome in Western Australia, supplied more than half the world's pearl shell and, as commercial fishing grew, labour was recruited from around the world.⁵⁷ The pearl shell market went into a severe decline during the Depression years of the 1930s, but revived for a short period after the Second World War, until the availability of cheap new plastics put an end to the demand for pearl shell.

The initial British claim to Australia in 1770 did not cover Torres Strait. It was not until 1872 and 1879 that most of the islands and sea were annexed to the Colony of Queensland.⁵² Today, although virtually all the islands are Australian territory and the inhabitants are Australian citizens, management of Torres Strait marine environment and resources is shared between Australia and Papua New Guinea in accordance with the provisions of the Torres Strait Treaty, a bilateral agreement between the two countries signed in December 1978.



Throughout the Planning Area there are many sites of significance to Aboriginal and Torres Strait Islander peoples that often relate to creation beliefs concerning the origins of the sea, coast, islands and all their natural and cultural resources.

The rich history of the Planning Area has also left a legacy of important, but often little-known, European and Asian historical values.

Records of European exploration within the Planning Area date back to the early 1600s. In 1605, the Dutch East India Company sent Willem Jansz in the *Duyfken* to explore for new trade opportunities. The *Duyfken* sailed along the south coast of New Guinea and partway down the west coast of Cape York into the Gulf of Carpentaria. It was at Cape Keerweer (Dutch for 'turn around'), south of Weipa, that the first Europeans – sailors from the *Duyfken* – landed on Australia's shores. Jansz missed the Torres Strait entirely. That was explored and named in 1606 by the Spanish navigator Luis Vaez de Torres. Other Dutch explorers included Jan Carstensz in 1623, Abel Tasman in 1644 and Jean Etienne Gonzal in 1756. None of these voyages revealed lucrative trade opportunities and consequently Dutch interest in the area faded. Evidence has emerged recently that Chinese navigators may have sailed through Torres Strait and landed on the Arnhem Land coast in the 1420s.⁷²

Other early visitors to the Planning Area date back as far as the early 1700s. The Macassans, a distinctive linguistic group of traders from the south-western corner of the island of Celebes (now Indonesian Sulawesi) named the Northern Territory coast 'Marege'.³⁷ They travelled there in small wooden sailing vessels, or praus, in search of trepang and maintained trading links with coastal Aboriginal communities until the early 1900s. Dried trepang were returned across the Arafura and Banda seas to the Celebes and other South East Asian markets, eventually finding their way to China, where the delicacy remains a prized cooking ingredient. Goods traded between the Macassans and Aboriginal people were important to the early economy of the region and spread across the country, even to the south. Remains of trepang processing plants constructed and operated by Macassan traders during the 18th and 19th centuries can still be found at Anuru Bay and Groote Eylandt. The Macassan visits ended in 1906, as a result of legislation passed by the newly established Commonwealth Parliament seeking to protect Australia's territorial integrity.

Rock art and the Macassans

Indigenous communities in northern Australia have been influenced by contact with other cultures including Melanesians, Dutch, and Portuguese navigators and traders, long before European occupation began in 1788.

The influence of the Macassan traders from Sulawesi in Indonesia is perhaps most obvious. The Macassans visited the coast of northern Australia for over 300 years to fish and trade for trepang – a delicacy in cooking. Aboriginal rock and bark paintings reflect the visits of the Macassans. Their influence can also be seen in Macassan emblems and objects being used in Aboriginal ceremonies and the introduction of dugout canoes. The Macassan traders also introduced tobacco to northern Australia!⁷⁸



The pivotal moment for British annexation occurred within the Planning Area on 22 August 1770, when Captain James Cook, in the *Endeavour*, landed at Possession Island near Cape York. There he hoisted the English colours, claiming the east coast of Australia for England.

By 1802, Britain was anxious to have more detailed knowledge about Australia's northern coastline. Matthew Flinders set sail from Port Jackson in the refitted *Investigator*, with instructions to examine Torres Strait and the coasts of the Gulf of Carpentaria. During this voyage, the *Investigator* spent a fortnight in the vicinity of Sweers and Bentinck islands. In 1803, Flinders described the north-eastern coast of the Northern Territory as a 'poor, dried-up land, afflicted by fever and flies, fit only for a college of monks, whose religious zeal might cope with suffocating heat and with musketos which admitted no moment of repose'.⁴⁷

During the mid-1860s, traders, shippers and merchants saw potential for development of ports in Australia's north to capitalise on rich markets in Asia. Burketown is such an example. Within a year of its establishment, in 1865, the town was decimated by 'Gulf fever' and the entire township was forced to relocate to a new site on Sweers Island. This new town of Carnarvon became a substantial settlement until settlers relocated to Normanton at the mouth of the Norman River.

Throughout the 19th and early 20th centuries, large tracts of land in the Northern Territory and north Queensland were granted to settlers for cattle grazing and other pastoral development. Many of these lands included the broad coastal frontages and estuarine and wetland areas of the Planning Area.

Church missions

Many of today's Aboriginal communities were first established as church missions during the early 1900s. These communities include Napranum, Aurukun and Mapoon on the west coast of Cape York Peninsula. The history of these settlements has been strongly influenced by which religious group ran the mission. 'Some missions had an active policy of destroying Aboriginal culture – Aboriginal languages could not be spoken, ceremonies could not be performed, kin from outside could not be visited. People were dressed in European clothing and given manual labour to do; usually the children were totally isolated from their parents in dormitories. Other missions worked within traditional culture, adapting teachings and practices to suit local conditions.'⁷³



Mitchell River aerial

© Kerry Trapnell



The Planning Area was a focus of military activities during the Second World War. The Torres Strait Islands and their people were heavily involved in the defence of Australia. Green Island Fort on Thursday Island is an excellent example of coastal defences constructed during the 1890s to protect trade routes from perceived but unrealised threats from Czarist Russia. In the 1940s the fort was utilised in the active defence of Australia against Japanese incursions into the region.

Karumba had previously been used as a refuelling depot for flying boats on the Sydney to London passenger route and this role continued for RAAF flying boats during the war. A wartime airbase was established on the Gove Peninsula where three operational squadrons were based.

During the 1960s, the first major commercial fisheries were established and the role of the Planning Area in providing ports for export shipping was re-established with the development of several major mines. The waters of the Gulf of Carpentaria and the Arafura Sea are currently experiencing considerable growth in marine-based tourism focused largely on recreational fishing.

Other places of maritime historical significance within the Planning Area include lighthouses on Booby Island and Goods Island in Torres Strait, and the sites of several major shipwrecks.

Navigation and shipwrecks

Navigation in the Northern Planning Area is made hazardous by tropical cyclones and strong tidal currents throughout the reefs and islands of Torres Strait. More than 170 shipwrecks are recorded in Torres Strait, most of which are small sailing vessels of under 500 tonnes. Despite improved mapping and advanced marine navigation aids, the natural hazards of Torres Strait continue to challenge commercial shipping and highlight the need for pilotage and other maritime services in the area.

Large vessels wrecked in the Planning Area include:

- the paddle steamer, *Young Australian*, in the Roper River in 1873;
- the steamship, *Quetta*, which sank in 1890 with the loss of 133 lives after striking an uncharted rock near Thursday Island;
- the steamer, *Douglas Mawson*, which was wrecked in the Gulf of Carpentaria in 1923 with the loss of 20 lives; and
- the 58 000 tonne oil tanker, *Oceanic Grandeur*, which grounded in 1970 after striking an uncharted rock 20 km from Thursday Island. The ship was able to offload its cargo and limp into port for repairs.



Norman River in wet season

Source: B Wannan



3. NATURAL VALUES

Although we are only beginning to understand the unique environments and natural resource values of the Northern Planning Area, it is clear that the Planning Area contains species, habitats and ecosystems that are of special conservation significance for Australia and the world.

The Planning Area and its catchments are relatively undisturbed, due to isolation, vast geographic scale and relatively small human populations.⁶⁴

Ecosystem status

Overall, the Planning Area is an excellent example of a shallow-water tropical marine ecosystem.

The area contains extensive and productive marine and estuarine habitats, such as mangrove communities and seagrass beds. In the southern Gulf of Carpentaria, there are extensive tidal flats, salt pans and salt marshes. These areas are of international importance as habitats for fish nurseries and migratory birds.

Among the great variety of species for which the area is known are sea turtles, dugong, estuarine crocodiles, fish, prawns, crabs, sea snakes and trepang. The area also holds major turtle nesting rookeries for olive ridley, hawksbill, green and flatback varieties. While flatback turtles are found in the tropical waters of northern Australia, the Indonesian archipelago and Papua New Guinea, they only breed and nest in northern Australia. Crab Island on the west coast of Cape York Peninsula is the most significant nesting site in the world for flatback turtles.

While biodiversity is high, the Planning Area shares similarities with other shallow-water, tropical ecosystems in the Indo-Pacific region. What sets it apart is the relative integrity of its ecological pathways and processes. It also contains numerous areas that are listed on the *Directory of Australia's Important Wetlands*, including the Limmen Bight tidal wetlands and the Port McArthur tidal wetlands. The directory also includes the geological aggregations found in the southern Gulf of Carpentaria and the south-east Karumba Plain. Each of these aggregations represents a unique mix of geological features, which, considered as a whole, are unlike any other.

Coral reefs in the eastern Torres Strait area form part of the northern Great Barrier Reef and well-developed fringing reefs occur around islands in Torres Strait and off Arnhem Land. Combinations of biophysical values give particular significance to many of the inshore island groups, including the Wessel Islands, The English Company Islands, the Sir Edward Pellew Group and the Wellesley Islands.

A recent research expedition conducted by Geoscience Australia found a 100 km² living coral reef in the Gulf of Carpentaria along with movements of ancient sediments that looked much like underwater sandstorms, as well as other previously unmapped reefs. The living coral reef supports a thriving array of sea-life including soft sponges, corals and shellfish.⁷⁴

Geomorphology

In order to appreciate this marine environment, it is necessary to understand its evolutionary history. About 10-15 million years ago, the northward-moving Australian continent collided with the Pacific Plate. The resulting tectonic uplift and volcanic activity eventually led to the creation of New Guinea.

Over millions of years the islands of Australia and New Guinea were alternately land-linked, then separated by water, several times enabling the movement of plants and animals between them.³⁶ As recently as 15-16 000 years ago, the Gulf of Carpentaria was an extremely large, brackish-to-freshwater lake. It has been estimated that ancient Lake Carpentaria may have been 500 km long, 250 km wide and 15 metres deep.²⁹

Much of what is now the seabed of the Planning Area was shaped by erosion and sedimentation by rivers and winds over the past 150 000 years.²⁴ Today the Planning Area is a generally shallow marine environment lying wholly within Australia's continental shelf. The main marine zones are the Arafura Sea, the Gulf of Carpentaria and Torres Strait.



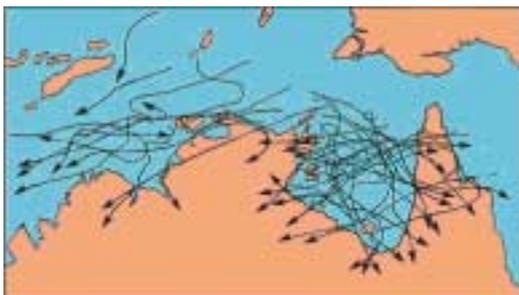
Changes to the geomorphology of the Planning Area are continuing today, influenced by siltation from wet season flooding and other climatic factors. The shoreline of the west coast of Cape York Peninsula, for example, is slowly moving seaward while some of the low-lying islands of Torres Strait are suffering serious shoreline erosion. It is possible that future climate changes may hasten these geomorphological processes.

Over most of the Planning Area, water depths do not exceed 70 metres and the seabed is relatively featureless. Extending north-east from Cape Arnhem is a remarkably flat area of seabed known as the Arafura sill. This large area, covering approximately 10 000 km², has less than two metres variation in elevation.⁵⁸ Such flatness is believed to be the result of wave action during periods of rising sea levels.^{36, 58}

In the **deeper offshore waters** of the continental shelf there are few features of distinction. But near the north-western corner of the Planning Area – at the head of a large underwater valley known as the Arafura Depression – the Area's deepest waters are found, reaching to about 200 metres.³⁰

The **seabed** is relatively flat, with bottom sediments ranging from sandy (inshore) to muddy (offshore).²⁵ Detailed knowledge of seabed sediments is available only for the Gulf of Carpentaria and Torres Strait. In the central, deeper Gulf area, seabed sediments contain over 80% mud, while coarser grained, sandy deposits are found in the shallower coastal zone. Around Torres Strait, seabed sediments are mainly calcareous sand and gravel, although there are areas of high mud content in the north-eastern Strait where sediment inflows from Papuan rivers are deposited.²⁴

Figure 3.1: Cyclone tracks over the past 20 years



Source: Australian Bureau of Meteorology

Cyclones are the main cause of sediment movement and disturbance throughout most of the Planning Area, although in Torres Strait and along the north coast of Arnhem Land tidal currents prevail.⁶³

Climate and drainage

As the Planning Area lies between latitudes 10°S and 18°S it is subject to a monsoonal climate characterised by:

- a pronounced wet season between December and March;
- generally dry conditions for the remainder of the year;
- relatively dry south-east trade winds from May to October; and
- moister north-west winds during the summer monsoon season.

A distinctive feature of the Planning Area's climate is the occurrence of tropical cyclones from December to April. Most of this cyclone activity is concentrated in the Gulf of Carpentaria. In addition to severe winds, cyclones can also lead to storm surges that have been known to increase tide levels by more than five metres.²³

The major drainage basins that flow into the Planning Area have a total catchment area of approximately 660 000 km². Compared with other parts of Australia, these catchments are largely undeveloped.

Freshwater inflow into the Planning Area amounts to approximately 105 000 gigalitres a year. This is extremely high by Australian standards. Most of this run-off occurs during the monsoonal wet season and is usually accompanied by major flooding, which can close road access to many coastal communities for up to several months each year.

There are 31 major rivers that drain into the Planning Area from the Australian mainland. The largest freshwater inflows come from the Mitchell, Archer and Staaten rivers in Queensland; and the Roper and McArthur rivers in the Northern Territory. The Planning Area is also influenced by run-off from rivers in Papua New Guinea and West Papua. The largest and most significant of these is the Fly River.



Cyclone activity

Since 1885 there have been more than 90 tropical cyclones in the Gulf of Carpentaria. The more memorable of these cyclones include:

- March 1923 – resulting in the loss of the Gulf steamer *Douglas Mawson*, with the loss of 20 lives;
- February 1948 – a storm surge inundated all but the highest parts of Bentinck Island, caused wells and springs to go salty and eventually led to the abandonment of the island;
- March 1967 – Cyclone Cynthia caused considerable damage at Groote Eylandt and brought 425 mm of rain in 24 hours to Angurugu;
- March 1984 – Cyclone Kathy sank and damaged trawlers sheltering in the Pellew Islands and caused sea turtles to be stranded up to seven km inland near the McArthur River mouth; and
- February 1987 – a cyclone destroyed most of the buildings in the NT community of Baniyala, 100 km south-west of Nhulunbuy.



Source: Australian Bureau of Meteorology

Figure 3.2: Drainage basins





Yolngu seasons calendar

The monsoonal climate in northern Australia bears little resemblance to the European concept of four seasons. The Yolngu people in Arnhem Land use a calendar that is based upon eight main seasons derived from distinct climatic and animal activities.

Dhuludur'	('the Pre-wet season', October-November) when the weather is erratic, 'female' thunder and lightning storms are frequent, turtles and Threadfin Salmon are hunted, and the 'male' thunder shrinks the waterholes.
Bärra'mirri	('the season of Heavy Rain and Growth', December-January) when there is heavy rains and prolific plant growth, the Magpie Geese arrive and shellfish are harvested.
Mayaltha	('the Flowering season', February-March) when there are bright sunny days but little bush tucker, flies arrive and mosquito larvae are abundant in the pools.
Midawarr	('the Fruiting season', March-April) when the east wind signals a time of abundant bush foods, including fruits, nuts and barramundi.
Ngathangamakulingamirri	('a two week Harvest season', April)
Dharratharramirri	('the Early Dry season', May-July) when the trade winds (south-southeast) arrive, the bush is fired, Magpie Lark flocks arrive and sharks and stingrays give birth.
Burrugumirri	('the time of the Birthing of Sharks and Stingrays', three weeks in July to August)
Rarrandharr	('the Main Dry season', August-October) when warm southeast winds blow, the soil is hot, young sharks and stingrays are hunted, and the stringybark flowers. ²⁸

Oceanography and geography

Water temperatures within the Planning Area are amongst the highest in Australian waters and high by global standards.³⁰ In the Gulf of Carpentaria water temperatures in the central part of the Gulf are separated into layers during summer with bottom temperatures just below 25°C and surface temperatures around 30°C. By contrast, salinity levels are relatively even throughout the water column.⁵⁷

The Planning Area is not subject to the influence of any major open-ocean currents like those that beat against and work along Australia's eastern, western and southern shores. Currents within the Planning Area mainly result from winds and tides. In the Gulf of Carpentaria, the prevailing conditions drive a predominantly clockwise movement of water around the margins with relatively little mixing of coastal waters with those of the central Gulf. During the 'Dhimurru winds' – or south-east trade winds – season of July to September there is some evidence of a slight reversal of current direction.³⁸



Tidal ranges of between two and four metres occur in areas west of Cape Arnhem and in Torres Strait. In the Gulf of Carpentaria, the tidal range is generally less than two metres. The structure of astronomical tides in the Gulf of Carpentaria is very complex, mainly due to the fact that tidal energy entering the Gulf from the Coral Sea is largely blocked by the islands and submerged reefs of Torres Strait. At Gove Harbour, there are two high tides and two low tides each day. At many other locations in the Gulf there is only one high tide and one low tide each day. At Weipa, there are periods when the tide varies little at all. This tidal complexity has implications for the adaptation and distribution of some species to the tidal zones, estuarine habitats and nurseries of specific areas of the Planning Area.

Like many other parts of the Australian continental shelf, waters in the Planning Area are generally low in nutrients. There are no major upwellings of nutrient-rich deepwaters, although there is some nutrient

enrichment in the eastern Arafura Sea and the northern Gulf of Carpentaria that may arise from upwelling near Aru Island off West Papua.²² In the Gulf of Carpentaria, because the shallow and turbid coastal waters receive more land run-off, they are more productive and support a more abundant and diverse range of biota than other parts of the Planning Area.²²

Torres Strait is shallow with water depths rarely exceeding 50 metres. In western areas, water depths are generally between 10 and 15 metres. The bathymetry is complex with many coral reefs, submerged sandbanks and small islands. The Prince of Wales channel provides the only deep passage through the waters between Australia and Papua New Guinea.

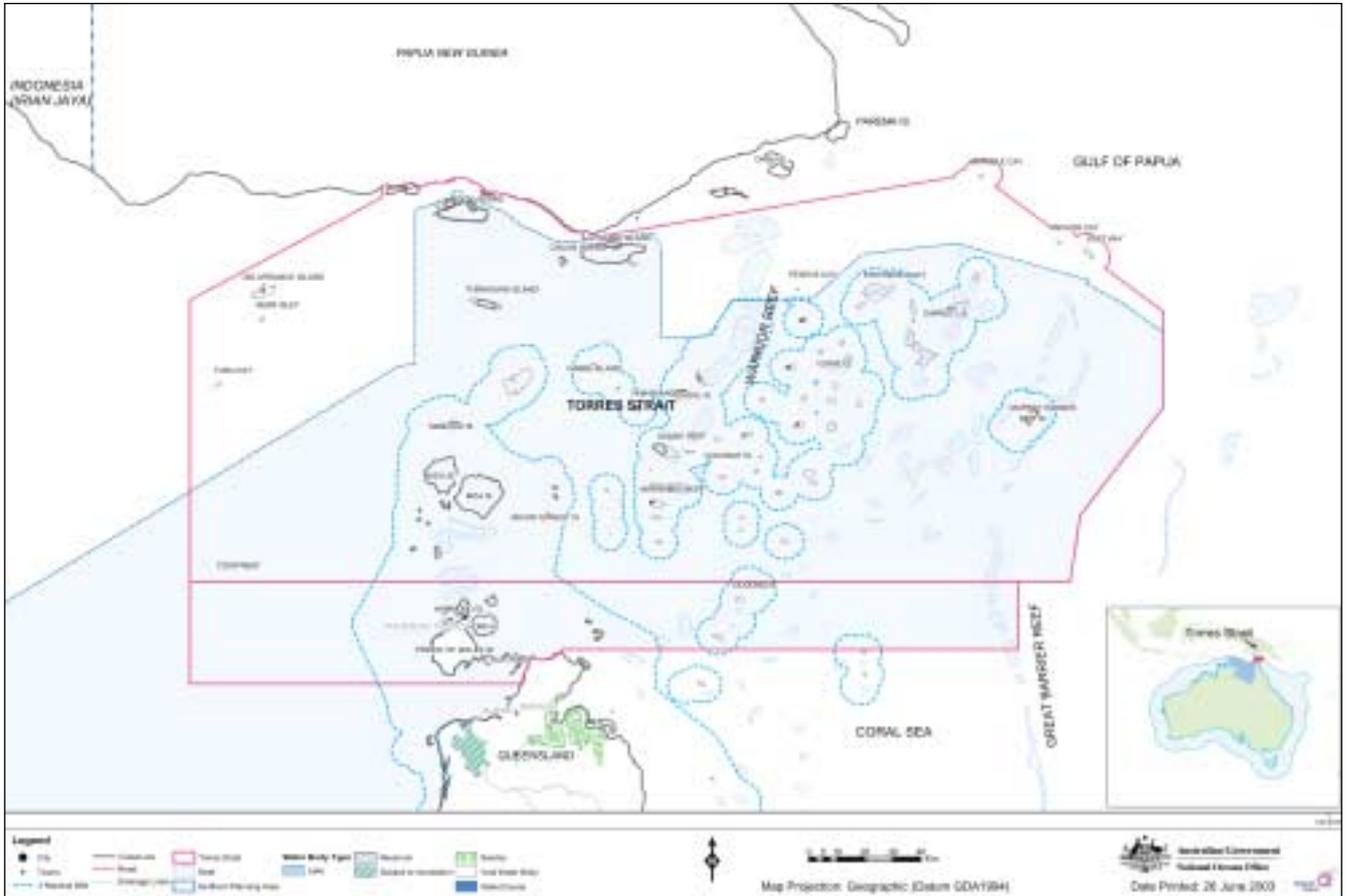


Water lillies

© Tony Karacsonyi



Figure 3.3: Map of Northern Planning Area – Torres Strait



The Strait contains over 100 islands, islets, reefs and cays. About 90% of the islands are Australian, with the balance belonging to Papua New Guinea. Geographically, the islands can be divided into four groups:

- the eastern islands of volcanic origin are steep, fertile and surrounded by well-developed fringing reefs;
- the central islands are small, low sandy cays with extensive fringing reefs;
- the top western group is formed from alluvial soil from nearby Papuan rivers – it is fringed by dense mangrove communities, mudflats and muddy reefs; and
- the western group consists of high rocky islands that are an extension of the Australian mainland – most are fringed with mangroves and reefs.

The northern end of the Great Barrier Reef extends into the eastern part of Torres Strait. It includes well-defined and exposed outer barrier or ‘ribbon’ reefs.

Torres Strait is an oceanographic ‘barrier’ between the Gulf of Carpentaria and the Coral Sea. Strong tidal currents that are found throughout the Strait result from two separate and dissimilar tidal systems on either side of the Strait. Hydraulic effects, created by narrow reef passes and constrictions between the islands, accelerate tidal currents.^{26, 61}

The coastal landforms and habitats of the Planning Area reflect a long geological history. The Gulf of Carpentaria is the site of submerged estuaries, pointing to an earlier period of much lower water levels and exposed land masses. The submergence of the Queensland plateau with the subsequent rise in water levels meant that ancient Lake Carpentaria was lost and new coastal landforms were developed. This dynamic region has seen much change in recent geological history.



The variety of different coastal landforms within the Planning Area include:

- the sandy beaches with low rocky headlands and mangrove-fringed saline mudflats along the northern coast of Arnhem Land;
- coastal dunes up to 50 metres in height at Cape Arnhem with large parabolic dune systems extending southwards along the coast;
- coastal cliffs around the Gove Peninsula;
- tidal sand and mudflats around the southern Gulf of Carpentaria; and
- extensive saltflats and claypans with dense coastal and riverine mangrove fringes along the west coast of Cape York Peninsula.⁵

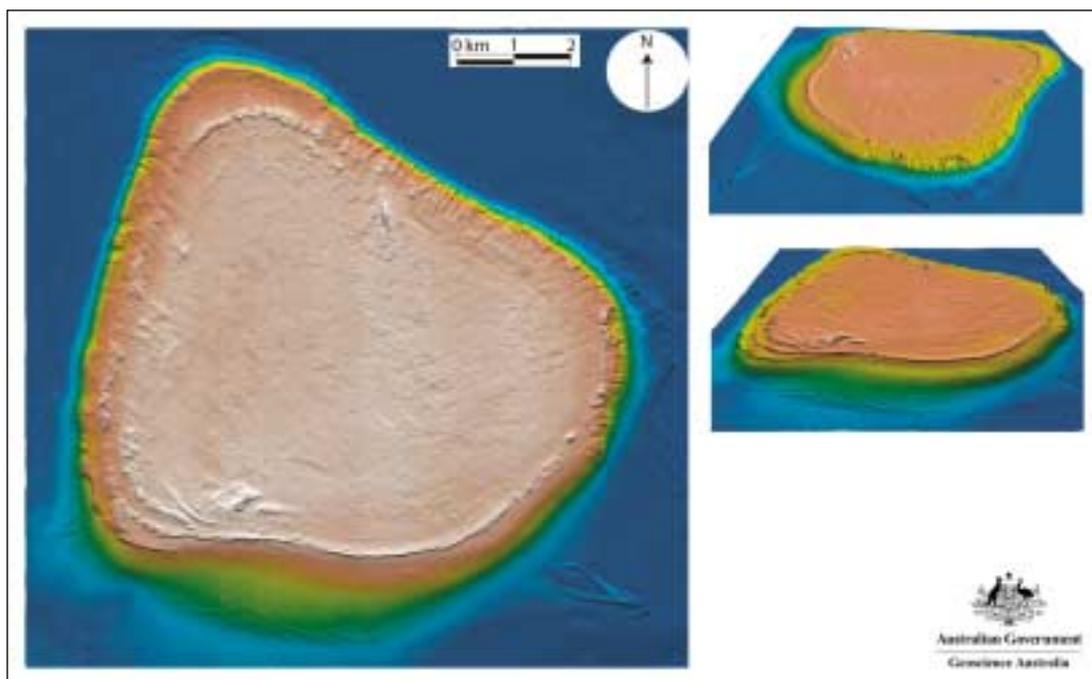
Outside of Torres Strait, the seven main groups of inshore rocky continental islands are:

- Goulburn Islands and the Crocodile Islands off the north coast of Arnhem Land;
- the Wessel Islands and The English Company Islands that both form strings of small islands off the north-eastern corner of Arnhem Land;
- the Groote Eylandt group of islands on the western side of the Gulf of Carpentaria;
- the Sir Edward Pellew Group near the mouth of the McArthur River; and
- the Wellesley Islands in the southern Gulf of Carpentaria.

Extensive **coral reefs** include the well-defined and exposed outer barrier – or ‘ribbon’ – reefs, which form the northernmost extent of the Great Barrier Reef. By contrast, the shallow, turbid waters of the inshore Gulf of Carpentaria and Arafura Sea are less conducive to coral growth.⁶³ Nonetheless, Geoscience Australia recently explored a previously undocumented 100 km² living coral reef in the Gulf of Carpentaria. The fringing coral reefs off north-eastern Arnhem Land and around Groote Eylandt are relatively unexplored.

Northern Australia has the greatest diversity of **seagrass** species and communities in the Indo-Pacific region. Seagrasses provide important habitat and nursery areas for many commercial species of fish and crustaceans and are the principal food source for the dugong and green turtle.⁴² Seagrass communities in the Planning Area are generally of mixed composition and any single community may comprise up to 13 separate species.

Figure 3.4: Map of Big Reef – Gulf of Carpentaria



Source: Geoscience Australia



Most seagrass beds are found along open coastline to a depth of 10 metres. Extensive coastal seagrass areas, totalling 906 km², are found in the Gulf of Carpentaria. The marine habitats west of Cape Arnhem, including Arnhem Land, have not been surveyed for seagrass beds, so their extent is unknown.

Torres Strait supports a diverse array of seagrass communities. The structure and distribution of these communities are controlled by physical conditions, including tides, currents, turbidity and small-scale topographic variations.³⁵ Over the past 30 years areas of seagrass in the Strait have been subject to dieback. The seagrass communities in Torres Strait support the largest known population of dugong in the world, with numbers believed to be about 25 000.³⁷ Due to the highly migratory nature of dugongs, population estimates in Torres Strait can vary considerably from year to year.

Mangroves grow in intertidal areas throughout the Planning Area. They generally occur along the banks of estuaries and tidal rivers, and in foreshore areas in the southern Gulf of Carpentaria. Species richness is greatest on the western side of Cape York Peninsula and along the northern coast of Arnhem Land. In these areas approximately 31 of Australia's 38 species of mangrove are found. Mangrove communities are important nursery grounds for a variety of commercial and non-commercial species of fish, prawns and crabs.⁴¹ They play an important role in coastal protection by reducing the effects of tropical storms, cyclones and storm surges and also trap and stabilise coastal sediments.⁴²



Saltpans and fringing mangroves

Source: GLADA

Saltpan and saltmarsh communities are commonly found along the landward edge of the Planning Area. Large areas of saltpan and saltmarsh appear to be restricted to tropical zones where they are believed to form as a result of highly seasonal rainfall. It is estimated that between Cape Arnhem and Cape York there are 3864 km² of saltmarsh – this is more than 16% of Australia's total saltmarsh area.²⁰ Saltpans and saltmarshes are considered to have important productivity links with prawn populations but these links are not well understood.³⁹ They also provide important habitats for birds, particularly migratory species, including waders.

Intertidal mudflats cover a large proportion of the Planning Area's coastal zone, yet, to date, very little research has been conducted on them. These areas lie between the limits of the high and low tides, providing a distinct habitat for a large number of species, most notably molluscs, crustaceans, polychaete worms and echinoderms. Because of their rich biological productivity, intertidal mudflats are important feeding areas for thousands of resident and migratory waterbirds.

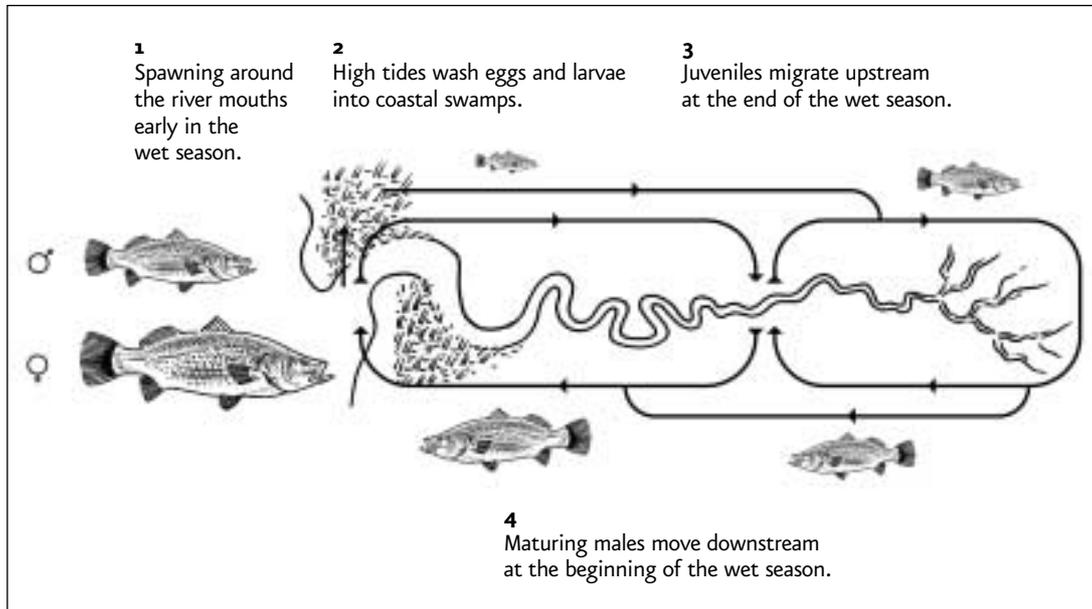
Marine fauna

The Planning Area occurs within the Northern Australian Tropical Region⁴⁵ whose waters have been described as 'a vast, rich soup of marine species'.⁵³ With few obstructions to the movement of shelf and coastal marine species, the region's marine life have a wide territorial range, some mixing with the marine species of South East Asia. Consequently the number of endemic marine species found within the Planning Area is low when compared with Australia's southern, temperate waters, where vast geological and oceanographic barriers prevent the movement and exchange of species between regions.

Apart from major commercial and recreational species – such as barramundi – much remains to be learnt about the ecology of fish in the Planning Area. Fish species are believed to be widely distributed, but with pronounced differences in the mixture of species, their abundance and the community structure.⁹ Within the Gulf of Carpentaria alone more than 300 species from 85 families have been recorded with several species supporting important fisheries. These include barramundi, Spanish mackerel and various species of snapper and shark.



Figure 3.5: Barramundi life cycle⁷⁷



The barramundi

Barramundi (*Lates calcarifer*) have sweet white flesh and are a popular table fish. They are the fishing icon of northern Australia as well as having totemic importance to some Indigenous communities and are much sought after by professional and recreational fishers.

Barramundi produce eggs between the months of September and March. Spawning occurs in marine bays and river mouths and juvenile barramundi move into mangrove and wetland habitats. As the wet season comes to an end, the juvenile barramundi migrate up rivers to freshwater billabongs. After three to five years, fish migrate back to the coast to spawn.

The majority of barramundi change sex during their lives. They mostly mature as males and then start changing sex as they grow to about 90 cm. Large barramundi can grow to 150 cm in length and weigh more than 40 kg. They are thought to live to about 20 years of age.⁶⁵

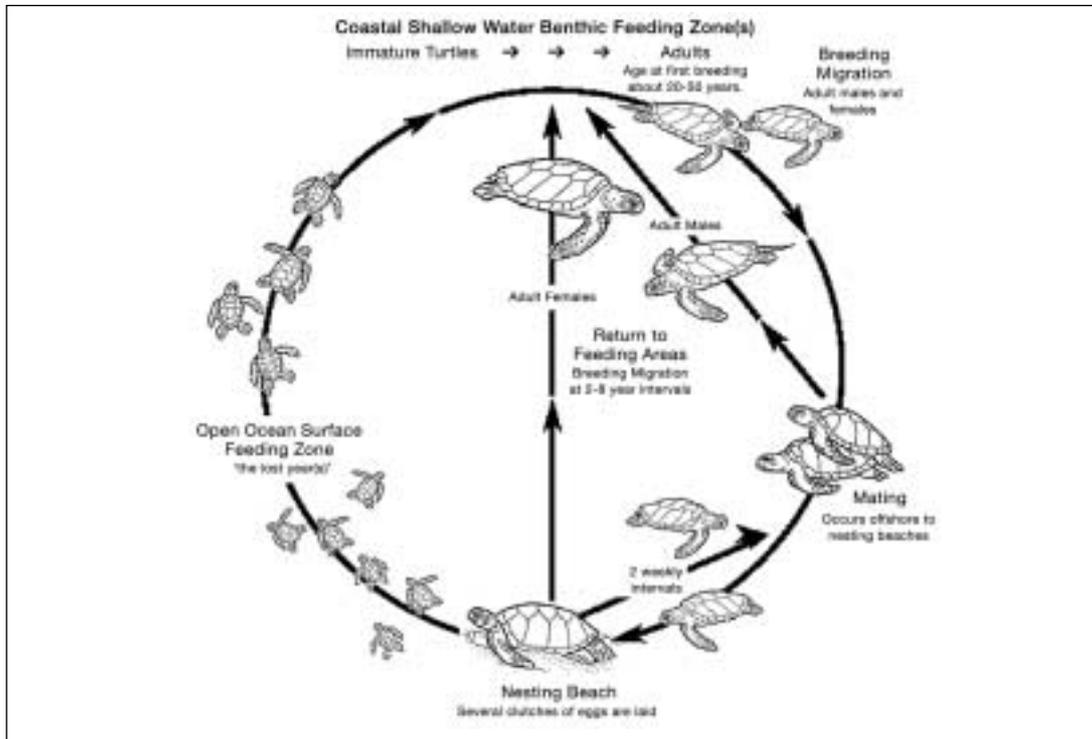
While little detailed study of the bottom-dwelling fauna has been undertaken, one survey in the Gulf of Carpentaria recorded 684 distinct species of organisms.⁶⁶ Although most species identified were present throughout the Gulf, levels of diversity and abundance were highest in the sands and muddy sands of inshore waters.

Crustacea such as prawns and crabs are abundant in the Planning Area. Nine prawn species are targeted by the Northern Prawn Fishery and two species of bug are taken as bycatch. The Planning Area is also Australia's major provider of mud crabs to the seafood market. Of the two varieties of this delicacy, *Scylla serrata* dominates the large commercial and recreational catch. Mud crabs also have cultural significance for Indigenous communities, being totemic animals for some and providing an important food source for many.

Feral animals, such as pigs and cane toads, appear to be having an increasing impact on flora and fauna in the Planning Area. However, the extent of that impact has not yet been reliably quantified.



Figure 3.6: Life cycle of marine turtles⁷⁵



Adapted from Lanyon, Limpus & Marsh 1989

Animals of conservation significance

Partly because of the relative intactness of habitats in the Planning Area, there are many marine and marine-related animals of conservation significance.



Turtle

© Tony Karacsonyi

Six of the seven species of **marine turtles** found throughout the world occur in the Planning Area. They are the green, olive ridley, hawksbill, leatherback, flatback and loggerhead. Under Australian Government threatened species legislation, olive ridley and loggerhead turtles are listed as 'endangered'. The balance is listed as 'vulnerable'. Important nesting sites in the Northern Territory include the north-east coast of Arnhem Land, the Groote Eylandt area and the outer Sir Edward Pellew Islands. In Queensland, important nesting sites occur at Crab Island (where the largest-known group of flatbacks in the world breeds), the Wellesley Islands and beaches at Pera Head near Weipa.³⁴ Marine turtles are highly mobile and often utilise feeding grounds far removed from nesting sites.³² Flatback turtles are only known to nest in northern Australia, though they travel to feeding grounds throughout the Indonesian archipelago and Papua New Guinean waters.



© Tony Karacsony
Saltwater crocodile

Estuarine crocodiles are widespread throughout the coastal environs of the Planning Area. In the west the Northern Territory coastline provides excellent breeding habitats, while in the eastern Gulf of Carpentaria the best breeding sites are found in waters adjacent to the Weipa plateau.

The **dugong** (once known as the 'sea cow' and thought to provide the basis for the 'mermaid' of maritime legend) is a large, herbivorous marine mammal, the only living member of the family *Dugongidae*. These gentle, slow swimming mammals and their calves are susceptible to incidental capture by commercial fishing operations. Restricted to the shallow waters hosting abundant seagrass beds, dugong are sensitive to loss of habitat arising from coastal development or intensive boating activities that impact upon marine vegetation. A significant proportion of the world's remaining population is found in northern Australian waters. While dugong are highly mobile, Torres Strait is understood to support the world's largest known population. The mammals are also common throughout inshore waters of the Gulf of Carpentaria, with the Wellesley Islands providing the most important habitat due to the extensive seagrass beds that provide primary feeding grounds.⁵⁷ While not listed as endangered or vulnerable in Australian waters (the minimum population estimate for Australia is about 80 000 animals), they are fully protected from commercial or recreational exploitation under state/territory and Australian Government legislation. Dugong continue to be traditionally harvested by Indigenous peoples for whom the species is of great cultural significance.



Although the Planning Area has not been systematically surveyed for **dolphins and whales**, there are records of bottlenose, Indo-Pacific humpback, Irrawaddy river and spinner dolphins, plus false killer whales and short-finned pilot whales.¹⁶ The mammals are thought to be relatively common in parts of the Gulf of Carpentaria.

Of the 38 species of **sea-snakes** found in Australian waters, at least 26 are found within the Planning Area.⁵⁷ Sea-snakes have been recorded in large groups on the surface of the Gulf in the vicinity of Blue Mud Bay, between the coast and Groote Eylandt, around the Wellesley Islands and off the coast of Weipa.¹⁶ Most live in waters of less than 15 metres deep. Sea-snakes have been a significant bycatch in the Northern Prawn Fishery, with 200 000 taken during the 1989-90 season.^{59, 60}

Sharks, rays and sawfish

Sharks, rays and sawfish are relatively widespread in the Planning Area with approximately 64 species of shark, 43 of rays and four of sawfish.

Despite sharks being common in northern waters a number of species are protected. These include:

- Colclough's shark – or the bluegrey carpet shark as it is better known – found around the top of the Gulf of Carpentaria. This member of the blind shark family has been nominated for protection under the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- the whale shark, which has also become the focus of a seasonal eco-tourism industry in Western Australia, is listed as vulnerable under the EPBC Act; and
- the grey nurse shark, which is regarded as critically endangered under the EPBC Act.

The freshwater whipray, known for its long, whip-like tail and a stinging spine, is the only Australian species restricted to fresh and estuarine waters and is found along the eastern coast of the Gulf of Carpentaria. It also has been nominated for protection under the EPBC Act.



Sawfishes can be easily confused with sawsharks. They are, in fact, highly modified rays with their gill openings on the underside, whereas sharks have gills at the side of the head. Sawfish are large and long-lived, but their saws are particularly at risk of being entangled in fishing nets. Sawfish populations appear to have been decimated throughout the world and Australia may have some of the last healthy populations of the species.²³ The freshwater sawfish, for example, is located only in northern Australia and is found in the fresh and brackish water of the Planning Area. It is recognised as vulnerable under the EPBC Act.^{24, 71}

Seabirds and waders

The Planning Area hosts at least 35 known species of **tropical seabirds**. There are important nesting colonies along much of the northern and eastern coasts of the Top End, on the Wellesley Islands in Queensland and the Sir Edward Pellew Group in the Northern Territory. Summer research cruises in the Gulf of Carpentaria have recorded 17 species of seabirds travelling or feeding at sea.⁸ Widespread species such as crested terns, lesser frigate birds and brown boobies were commonly seen over coastal waters less than 75 km from land, while streaked shearwaters, which breed on islands around Japan, were only recorded in the central north-western Gulf.

What bird was that?

The sarus crane is the world's tallest flying bird – a large male can reach up to six feet tall. Because of its similarity to the brolga, the sarus crane was only recognised by Australian ornithologists in the 1960s, though sarus cranes are distinguished from brolgas in some Aboriginal languages of the region. Once thought to be recent invaders, DNA studies suggest that sarus cranes may have made a home in Australia for thousands of years in the Cape York Peninsula, and south to the Burdekin River and the Gulf of Carpentaria. The World Conservation Union (IUCN) recognises sarus cranes as endangered and the Convention on International Trade in Endangered Species (CITES) has classified them as an Appendix II species: those not presently threatened with extinction but which may become so if trade in the species is not regulated, or their habitats are threatened.

The Planning Area is crossed by one of the major migratory pathways for **wading birds**, with some coastal areas in the Gulf providing critical staging points for waders on their annual journey from sites in the Northern Hemisphere. The south-east Gulf region hosts more than half the migratory waders that occur in Queensland with the highest population density along the coastline north of Karumba.²⁵ Other important wader habitats occur around the mouth of the McArthur River.⁴³



4. CULTURAL VALUES

It is important to acknowledge that most, if not all, of the 'natural' resources described above also have cultural significance to the Aboriginal and Torres Strait Islander peoples of the Planning Area. The separate description of natural and cultural values is therefore somewhat artificial for Indigenous cultures that integrate all aspects of the human, biological and physical environment within holistic belief and kinship systems.

Sea-country

Indigenous concepts of group ownership and management of the sea differ significantly from the introduced European view of the sea as common domain, open to all and managed by governments. Unlike contemporary European systems of management, Indigenous systems do not include jurisdictional boundaries between land and sea. And although the relationship between Indigenous people and sea country varies between cultural groups, a common feature of all coastal Aboriginal and Torres Strait Islander cultures is the close association of particular groups to particular marine and coastal areas – a form of customary ownership of maritime areas known as 'customary marine tenure'. Aboriginal and Torres Strait Islander cultures have operated a system of customary marine tenure that has been in place for thousands of years to protect and manage places and species that are of importance to their societies.⁵³ Customary marine tenure is mainly communicated orally, being transmitted over time through stories, totems, dance and ceremonies.

The 'saltwater people' of Indigenous coastal communities within the Northern Planning Area have always maintained special links with their 'sea-country' through occupation, resource utilisation or cultural practice.⁵⁵ Sea-country includes the inshore bays, open ocean, beaches, dunes, tidal reaches, reefs and mudflats⁶⁷ but may also incorporate remembered features of landscape drowned long ago by rising sea levels. For example, ancient elements of the coast, sea or seabed may be incorporated into Dreaming stories that explain the origins of the natural world and form the basis of customary law and the relationship between people and their environment.⁶⁹

This close association⁶⁸ with sea-country is part of an integrated system of cultural domains that provides clan groups with their identity and customary rights to utilise resources.⁵⁴

The concept of sea-country underpins the practice of customary marine tenure and the associated management systems that remain in place today. Typically, association with sea-country is based on belonging to a particular clan, although there are also associations based on broader kinship ties and through residence of contemporary coastal communities. Clan membership is given at birth and is retained for life, even if the clan member migrates to another clan estate, a community settlement or town. It provides access rights and responsibilities in regard to the hunting, fishing and gathering of the resources of the clan's estates, and may include some rights to resources on related estates.⁵⁴

Cultural associations may also identify sacred sites – locations where significant mythological events may have taken place or where special ceremonies are conducted. In the Northern Territory there are registered sacred sites along much of the coast, around inshore islands and within the sea.³ In Queensland no formal registration of such sites has been established.

Associations between people and the sea are also expressed through totemic relationships with particular plant or animal species.⁵⁴ Totems are often regarded as relations and must be respected and cared for. The Yolngu people of north-eastern Arnhem Land regard the green turtle, or miyapunu, as such a totem. However, totems may be much smaller animals, such as mangrove worms, or other features of the environment such as water currents or phases of the moon.

Aboriginal and Torres Strait Islander cultural values may also be linked to physical artefacts. Fishtraps around the southern Gulf of Carpentaria and the Wellesley Islands include what is probably the largest Aboriginal fishtrap complex in Australia and provide excellent examples of Aboriginal fishing techniques.



5. SOCIAL & ECONOMIC VALUES

As we enter the 21st century, the Northern Planning Area and its hinterland remain remote, relatively isolated and sparsely populated. However, the Planning Area hosts important communities, established and developing industries and a wide range of human activities that are intrinsically linked to the marine environment.

Settlements

The 2001 census estimates that the total population bordering the Planning Area or on islands within the Planning Area is less than 32 000 and the majority of the population is Aboriginal and Torres Strait Islander. The major population centres are the Torres Strait Islands and the mining townships of Nhulunbuy, Groote Eylandt and Weipa. No single settlement has a population of more than a few thousand people.

Torres Strait currently includes 15 island communities. The population of the islands is more than 7000, with 70% being of Indigenous origin. As with mainland Aboriginal communities, Torres Strait Islander cultural associations with sea-country remain strong and there is a high degree of dependence on the sea for food resources. A comprehensive native title claim over the waters of Torres Strait has been lodged with the National Native Title Tribunal.

Outside of the Torres Strait Islands, more than 60% of the mainland coast is owned by Aboriginal people, with most of the balance held as grazing or mining leases. Most of the islands in the Gulf of Carpentaria and north of Arnhem Land are also Aboriginal lands. To community residents, the coast and sea is not just a physical resource and food supply, it is also a cultural domain, shaped by spiritual forces and imbued with spiritual power. This cultural domain transcends arbitrary boundaries between land and sea.

Table 5.1: Coastal community populations (2001 Census)

Area	Indigenous population	Non-Indigenous population or status unknown	Total population	% Indigenous
Goulburn Islands to Buckingham Bay (NT)	5655	550	6205	91%
Nhulunbuy Township (NT)	221	3294	3515	7%
Nhulunbuy Surrounds (NT)	1449	287	1736	84%
Groote Eylandt Area (NT)	2186	943	3129	70%
Roper River/ Borroloola Area (NT)	1383	313	1696	82%
Mornington Island Area (Qld)	848	95	943	90%
Burketown to Karumba (Qld)	951	1478	2429	39%
Western Cape York Peninsula (Qld)	4406	516	4922	90%
Torres Strait Islands (Qld)	5411	1741	7152	76%
Total	22 510	9217	31 727	71%

Source: Australian Bureau of Statistics 2002



There are several native title claims before the National Native Title Tribunal that include waters within the Planning Area. These include waters of:

- Torres Strait;
- the west coast of Cape York Peninsula;
- the Wellesley Islands;
- the Sir Edward Pellew Group;
- Blue Mud Bay; and
- the west Arnhem seas.

Lifestyle

Despite the isolation and lack of services, there are advantages in living along the coast of the Planning Area. Opportunities for recreational fishing and boating abound. For Aboriginal and Torres Strait Islander communities there is sea access to maintain connection to traditional coastal lands and sea 'tucker' such as sea turtles and dugong.

Residents of the region are proudly independent and self-reliant, as demanded by the isolation and climate. They appreciate and enjoy a more relaxed lifestyle that is not overburdened by the formalities, demands and restrictions of social and commercial life in large urban centres. This image of wild, rugged living in the 'Top End' of Australia is highly attractive to visitors, who have been successfully targeted by marketing campaigns highlighting the area's unique wildlife, land and seascapes, Indigenous culture and larger-than-life bush characters – all appealing to the romantic and adventurous spirit of the city dweller.

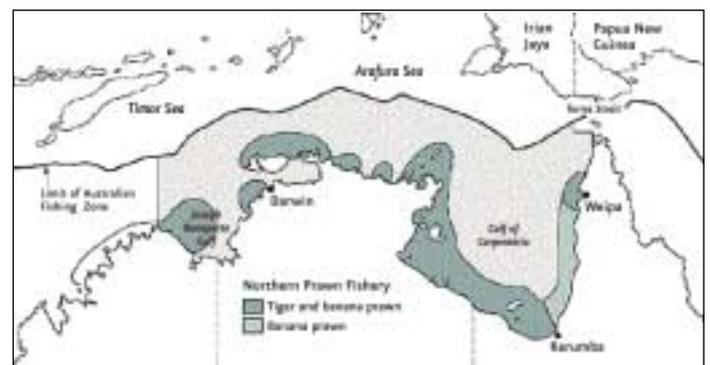
Sea and air transport links have become essential. With the exception of Karumba and Normanton, which are linked to major population centres by the Matilda Highway, road access is extremely difficult and subject to closure for extended periods during the wet season.

Commercial fishing

Commercial fishing is the major economic activity within the Planning Area, with the fisheries broadly grouped into four categories – Australian Government-managed, Queensland-managed, Northern Territory-managed and jointly-managed.

Outside Torres Strait the only active Australian Government-managed fishery in the Planning Area is the Northern Prawn Fishery. It occupies all of the Planning Area, extending westwards to the Joseph Bonaparte Gulf in Western Australia. The three main prawn species taken are white banana, brown tiger and grooved tiger, while other species taken include the Endeavour, red-legged banana, giant tiger, western king and red spot king varieties. This is the Planning Area's largest and most productive fishery and one of the most valuable in Australia with a gross value of \$105 million to \$160 million annually. Most of the catch is exported to Japan, China and South East Asian countries.³

Figure 5.1: Map showing Northern Prawn Fishery area



Source: AFMA²

The Northern Prawn Fishery has two open seasons each year. In 2002, banana prawns were taken from 1 April to 13 May and tiger prawns from 1 September to 1 December. The majority of the catch is taken from within the Planning Area and logbook data indicate that 75% of fishing effort occurs within the Gulf of Carpentaria.



Prawn trawler

© Steve Lovegrove



**Table 5.2: Northern Prawn Fishery:
2001 Catch and effort data**

Catch of banana prawns (tonnes)	7245
Catch of tiger prawns (tonnes)	1983
Catch of Endeavour prawns (tonnes)	1157
Catch of king prawns (tonnes)	4
Total prawn catch (tonnes)	10 389
Banana fishery effort (days)	6247
Tiger fishery effort (days)	10 440

Source: Australian Fisheries Management Authority (2002a)

Prawns are caught using conical-shaped nets trawled (towed) over the seabed. Trawling usually occurs in sea depths of 15 to 40 metres and tow durations can range from a few minutes to several hours. Typically, tiger prawns are caught at night and banana prawns are caught during daylight hours.

Ninety-six trawlers and four mother ships operate in the fishery. All have freezers and have the capacity to remain at sea for several months before returning to home ports in Brisbane, Cairns, Weipa, Karumba, Darwin and Fremantle.

The fishery is subject to a wide range of management controls including:

- total closures between seasons;
- permanent closure of areas such as shallow water seagrass beds;
- limits on the number of vessels and the amount of gear;
- an automatic vessel monitoring system; and
- compulsory use of turtle excluder devices (TEDs) and bycatch reduction devices (BRDs).

Figure 5.2: Double rig prawn trawl configuration used in the NPF

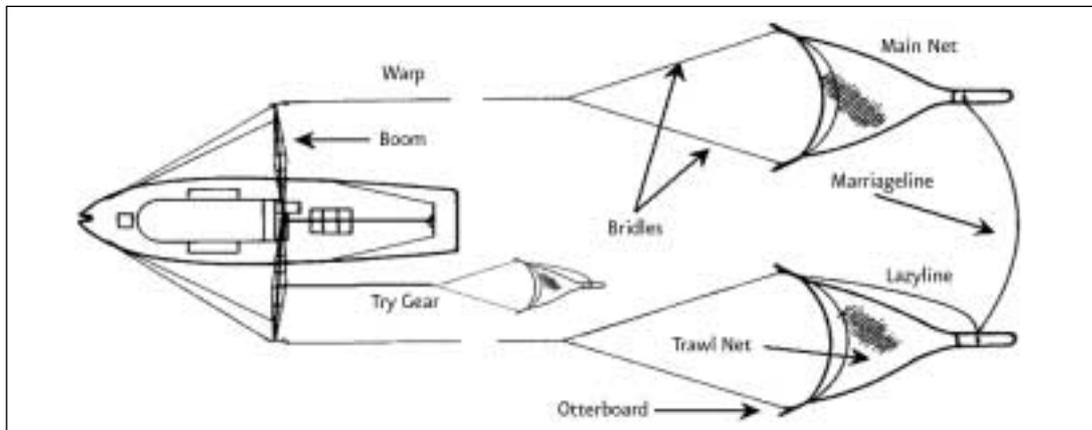


Illustration: G Day, AMC

Figure 5.3: Typical installation of a TED and a BRD in an NPF trawl codend (Illustrated is a top opening TED called the NAFTED and a square mesh window BRD)

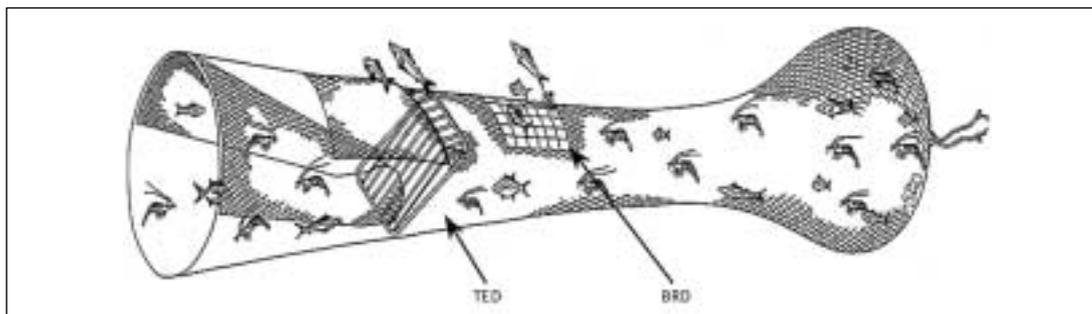


Illustration: G Day, AMC



Table 5.3: Queensland commercial fisheries

Fishery	Main target species	Gear type	Commercial harvest and value in Planning Area	Commercial effort in Planning Area	Fishery status
Narrow-barred Spanish mackerel	narrow-barred Spanish mackerel	line and net	123 tonnes \$1.1 million	24 boats 652 days	Resource status is unclear
Inshore: Barramundi	barramundi threadfin salmon grey mackerel shark	net	1151 tonnes \$7.3 million	83 boats 11 637 days fished	Fully exploited but sustainable
Inshore: Non-barramundi	tropical shark grey mackerel blue threadfin king threadfin	net	649 tonnes \$3.9 million	13 boats 896 days fished	–
Mud crab	mud crab	crab pots	156 tonnes \$1.7 million	49 boats	–

Source: Queensland Department of Primary Industries 2002⁶⁸

The Australian Fisheries Management Authority (AFMA) recently released a draft Assessment Report on the Northern Prawn Fishery, which will be submitted to the Department of Environment and Heritage for assessment under the *Environment Protection and Biodiversity Conservation Act 1999*. In the report, AFMA states that there is ‘a high degree of confidence that the fishery and the broader marine environment are being managed in a sustainable and precautionary manner’.³

The Queensland Fisheries Service manages several commercial fisheries within the Gulf of Carpentaria, including the:

- Spanish mackerel fishery;
- barramundi inshore fishery;
- non-barramundi inshore fishery; and
- mud crab fishery.

There are also several developmental fisheries in the region that may increase in scale in the future. The annual gross value of the Queensland-managed catch in the Planning Area is approximately \$14 million.

Torres Strait fishing

The principal economic activity in Torres Strait is commercial fishing. In the Australian area of jurisdiction, traditional fishing and commercial fisheries are managed by the Torres Strait Protected Zone Joint Authority (PZJA), who has delegated the responsibility of operational management to AFMA. The fisheries currently under management are prawn, tropical rock lobster, pearl shell, Spanish mackerel, trepang, trochus, finfish, barramundi and traditional fishing (including turtle and dugong). Five of these fisheries are jointly managed with Papua New Guinea. The estimated value of production of the commercial fisheries is more than \$30 million.⁷⁰



Table 5.4: Northern Territory commercial fisheries

Fishery	Main target species	Gear type	Commercial harvest and value/yr*	Commercial effort*	Fishery status	Importance of Planning Area
Barramundi	barramundi threadfin salmon	nets	1397 tonnes (total) \$6.7 million	29 500 100 metre net-days	Heavily utilised	Major
Coastal Line Fishery	black jewfish golden snapper	line	141 tonnes \$0.4 million	5200 hook-days	Uncertain, some localised heavy utilisation	Minor
Coastal Net Fishery	blue salmon mullet queenfish shark	nets	57 tonnes \$0.2 million	1067 100 metre net-days	Developing – low utilisation	Minor
Mud Crab	mud crabs	crab pots	1139 tonnes \$11 million	1 034 412 pot lifts	Fully or heavily exploited in major fishing areas	Major
Offshore Snapper (excl. Timor Sea)	gold band snapper red emperor ruby emperor	line trawl	169 tonnes (demersal) 1000 tonnes (trawl) \$4.9 million	60 demersal licences 1 trawl licence	demersal is underutilised trawl is developing but underutilised	Moderate
Shark	blacktip shark grey mackerel	nets	710 tonnes \$3.49 million	3.6 million 100 metre net-days	Fully utilised	Moderate
Spanish Mackerel	Spanish mackerel	line	502 tonnes \$2.1 million	839 fishing days	Nearing full utilisation	Moderate
Trepang	sandfish	collected by hand	115 tonnes \$1.2 million	177 days	Nearing full utilisation	Moderate

* For entire NT

Source: NT DBIRD 2002⁴⁰



The Fisheries Group within the Department of Business, Industry and Resource Development in the Northern Territory manages several commercial fisheries in the Gulf of Carpentaria and in the Arafura Sea. These include the coastal line and coastal net fisheries and other fisheries targeting:

- barramundi;
- mud crabs;
- offshore snapper;
- shark;
- Spanish mackerel; and
- trepang.

There are also several developmental fisheries in the region that may increase in scale in the future. The annual gross value of the Northern Territory-managed catch in the Planning Area is estimated to be about \$18 million.

Recreational fishing

Fishing, the major recreational pursuit in the Planning Area, is a major 'industry' in its own right. Fishing tournaments have played a significant role in raising awareness and promoting recreational fishing in the Planning Area. Each year, major tournaments are conducted from locations such as Nhulunbuy, Groote Eylandt, Borroloola, Burketown, Normanton, Karumba and Weipa.

Outside of larger townships, access to recreational fishing areas is often through Aboriginal land. Recreational anglers usually require access permits and Indigenous communities play an important role in the management of access and facilities.



Recreational fishing

Source: Rob Fox

Barramundi is the most popular target species although reef fishing for species such as coral trout and red emperor is also popular. Some of Australia's best light and medium tackle gamefishing is also found along the coastline of the Northern Territory. The mud crab is another prized recreational target. Like many other activities in the Planning Area, recreational fishing is mainly undertaken during the dry season.

Recreational fishers are regulated by Queensland and the Northern Territory in their relevant jurisdictions. Management measures include some size limits, catch limits and seasonal closures for some species.

Australia's first commercial fishery

The Planning Area includes the location of Australia's first commercial fishery. The harvesting of trepang (also known as beche-de-mer or sea cucumber) commenced in the early 1700s, well before European settlement. Macassans from the island of Celebes, in what is now the Indonesian province of Sulawesi, operated the fishery. These fishermen sailed to the Northern Territory coast to find the trepang that lie visible and apparently inert on the sea floor, or are exposed at low tide. Harvesting was done by hand, spearing, diving or dredging.

The catch was immediately washed and gutted and the thick muscle wall of the animal was placed in boiling water before being dried and smoked. This preservation process enabled the product to survive the long journey home where it was sold as a prized ingredient in Chinese cooking. Trepang is valued for its jelly-like texture, said to enhance the flavour of other foods, and has a popular reputation as a general stimulant and aphrodisiac.³⁷

A significant aspect of this fishery is that it was conducted with the permission and involvement of coastal and island Aboriginal societies, who engaged in trade with the visiting Macassans and, on occasions, accompanied them to their homeland across the Arafura Sea.



Indigenous fishing

Many of the marine and freshwater species of northern Australia are staple food sources and have special cultural significance to Indigenous peoples. Most Indigenous fishing is at subsistence level and contributes significantly to the domestic economy of families in isolated communities, where purchasing store foods can be extremely expensive and where fresh produce is often unavailable. Indigenous fishing traditions are based on notions of 'country' and of clan estates where membership provides access to hunting, fishing and gathering rights. Traditional laws and customs may relate to the use and management of resources.

Within the Planning Area, Indigenous people harvest many species of fish, crustaceans and molluscs, plus species such as dugong and green turtle. Under the laws and policies of Queensland, the Northern Territory and Australian governments, Aboriginal and Torres Strait Islander peoples are exempt from bag limits, size limits or restrictions against the taking of protected species if the activities are undertaken according to traditional custom.



Transfer barge at Bing Bong

Source: MIM

In the early days of the pearl and trochus industries in Torres Strait last century, Indigenous people provided most of the deckhands and divers, sometimes under abusive and dangerous work conditions with little or no pay. The first mission station on western Cape York Peninsula (Mapoon) in the late 1800s was established to protect coastal Aboriginal people from trepang and trochus fishermen, whose labour recruitment practices had already decimated Aboriginal societies on the east coast.

Indigenous people throughout the Planning Area are keen to have more direct involvement in and benefit from contemporary commercial fishing and there is a growing interest in aquaculture among many Indigenous communities. For several decades, Torres Strait Islanders have lobbied for greater control of their marine resources as part of their ongoing move towards greater regional autonomy.

Ports and shipping

Sea transport, fundamental to the economic and social wellbeing of the Planning Area, has been an integral part of life since the region was first settled by Indigenous people.

At first glance, sea transport seems to be focused on the export of mineral commodities from Gove, Groote Eylandt, McArthur River, Karumba and Weipa.

These ports also serve a variety of other roles. They help to service the commercial and recreational fishing fleets and provide essential barge services to smaller, remote, coastal and island communities. They also serve increasing numbers of charter and tourist vessels, with Nhulunbuy being a first port of call for many yachts visiting from overseas.

Warships, including naval vessels from foreign countries, transit the Planning Area because of its strategic location and visits sometimes occur at regional ports such as Gove, Groote Eylandt, Weipa and Thursday Island.



Table 5.5: Ports in the Planning Area (excluding Thursday Island)

Port	Location	Operated by	2001-02 Port activity		Comments
			Ships handled	Throughput	
Melville Bay (NT)	Gove Peninsula, Eastern Arnhem Land	Alcan Gove Pty Ltd	131	3.9 million tonnes	Major export port for bauxite and alumina.
Milner Bay Groote Eylandt (NT)	An island in the western Gulf of Carpentaria	GEMCO	48	1.7 million tonnes	Major export port for manganese from the Gemco Mine on Groote Eylandt.
Bing Bong (NT)	Near mouth of McArthur River in south-western Gulf of Carpentaria	McArthur River Mine	17	365 000 tonnes	Major export port for lead-zinc concentrates. Metal concentrates are transhipped by barge to ships anchored 30 km offshore.
Karumba (Qld)	At mouth of Norman River in south-eastern Gulf of Carpentaria	Ports Corporation of Queensland	134	975 000 tonnes plus 34 000 head of livestock	Major export port for zinc and lead concentrates from Pasmaenco Mine. Export port for live cattle. Metal concentrates are transhipped by barge to ships anchored 40 km offshore.
Weipa (Qld)	North-west coast of Cape York Peninsula	Ports Corporation of Queensland	328	12.8 million tonnes plus 6000 head of livestock	Major coastal and export port for bauxite. Receiving port for fuel and general cargo. Export port for live cattle.
Skardon River (Qld)	100 km north of Weipa on north-west coast of Cape York Peninsula	Ports Corporation of Queensland	–	–	Newly declared port for the export of kaolin from the Skardon River mine. Trade will commence in near future.

Source: Qld Transport, Qld Ports Corporation, NT Dept. of Infrastructure, Planning and Environment, Bureau of Transport & Regional Economics^{46 50}



The sea route through Torres Strait and across Australia's northern waters is one of the nation's busiest. In 1998, approximately 3000 ships passed through the Planning Area via this route. Of those 3000, 45% were bulk carriers, 30% were tankers and 20% were general cargo vessels.⁴⁹ Pilotage is recommended, but currently is not compulsory in Torres Strait unless navigating the route to the Great Barrier Reef.

All ships passing through Torres Strait are subject to the Torres Strait and Great Barrier Reef (Inner Route) Ship Reporting System (REEFREP). Under this system, it is mandatory for all ships longer than 50 metres, all oil tankers and all ships towing or pushing to report their location and status at designated points within these areas. The REEFREP system aims to significantly enhance navigational safety in Torres Strait and the Great Barrier Reef.²¹

Hundreds (possibly thousands) of cruising yachts pass through Torres Strait and the rest of the Planning Area every year. These privately owned vessels, ranging from budget backyard constructions to multi-million dollar luxury craft, bring small groups of individuals from many nationalities into contact with the communities and environments of the Planning Area. Weather conditions often require crews to layover in Thursday Island, Nhulunbuy or smaller ports for weeks or months, resulting in a transient population that inevitably makes a significant contribution to local economies.

Petroleum and mineral exploration

There are three main offshore basins that potentially hold reserves of **oil and gas**:

- the Carpentaria Basin;
- the underlying Bamaga Basin in the Gulf of Carpentaria; and
- the Arafura Basin off the north coast of Arnhem Land.⁷

Although there is no exploration currently underway, over the past 30 years there has been one exploration well drilled offshore in the Carpentaria Basin and 11 in the Arafura Basin. All wells were abandoned although traces of hydrocarbons have been recovered from the Arafura Basin.

The Planning Area is considered to be a high risk area for oil and gas exploration and is not considered to be highly prospective.³⁰ Although levels of exploration to date have not been high, demand for energy from nearby onshore mineral processing ventures may entice further exploration.

Alluvial deposits in the Gulf of Carpentaria are considered to hold potential for the discovery of **diamonds**.⁴⁴ The gems originate from the erosion of inland kimberlite pipes – the principal volcanic environment for the creation of diamonds – with sediments transported downriver and deposited offshore. Areas with the greatest potential for alluvial diamonds are off the mouth of the McArthur River and the Limmen Bight near the mouths of the Roper and Limmen Bight rivers. There is also some exploration interest in the Northern Territory waters of the southern Gulf region.

Extensions of onshore mineralisation exist offshore at Weipa (for **bauxite**) and Groote Eylandt (for **manganese**), but currently there is no exploration activity underway. Recent assessments of potential inland mineral resources south of the Gulf of Carpentaria coastline suggest a high potential for the discovery of new, world-class **zinc/lead/silver** and **copper/gold** deposits.³⁸ If such deposits are discovered, their development may require access to the coast for export purposes.



Port of Weipa

Source: Ports Corporation of Queensland



There are major mining operations on land within the region: for bauxite at Weipa (Comalco), zinc, lead and silver at McArthur River (Xstrata), bauxite, aluminium oxide and aluminium hydrate at Nhulunbuy (Alcan) and manganese at Groote Eylandt (GEMCO).

The total production value of these mining operations for 1999-2000 was estimated to be over \$600 million.⁷⁶

Tourism

Although not significant by national standards, tourism in the Planning Area is growing rapidly and increasing in its contribution to the economic base of the region. The current industry is built largely around 'fishing tourism'.

An estimated 100 000 tourists visit the southern Gulf of Carpentaria each year.³¹ Of those, 90% list recreational fishing as the main or one of the main reasons for their visit. Some small resorts specifically targeting the fishing tourism market operate on Mornington and Sweers islands.

Commercial fishing charters operate from Gove, Weipa and Darwin, providing access to many less-visited destinations such as the Wessel Islands and The English Company Islands. At least one company operates small cruise vessels through the Planning Area, with trips running between Cairns and Darwin, including stops at Cape York, Thursday Island, Gove and the Wessel Islands.

In association with charter fishing, there is also a small dive tourism industry mainly centred around Gove. Most diving and snorkelling is centred on fringing reefs around the Gove area and off the north-eastern corner of Arnhem Land. Bird watching cruises operate out of Normanton and Karumba.

Tourism in the Planning Area is highly seasonal and will probably remain that way. However, there is interest in developing 'wet season' tourism based around activities such as bird watching. While not widespread at present, there are opportunities for greater involvement of Aboriginal people and Torres Strait Islanders in tourism. The manufacture and sale of Indigenous artefacts to tourists is a significant source of income for some Indigenous people.

With increased investment in tourism, services are becoming more professional and marketing better organised. Local marketing and promotion is organised through bodies such as the East Arnhem Land Tourist Association, the Gulf Region Tourist Promotion Association and the Gulf Savannah Development Association. Around the southern Gulf of Carpentaria, the Savannah Guides is an award-winning network of professional tour guides.

Surveillance and defence

The Northern Planning Area has international borders with Papua New Guinea and Indonesia. The main objectives of surveillance and defence operations in the Planning Area are the protection of Australia's sovereignty, the maintenance of quarantine barriers and, increasingly, the control of illegal entry and fisheries enforcement.

Australia's maritime surveillance is currently coordinated by **Coastwatch**, an operational division of Customs.

The resources at its disposal include:

- fixed-wing aircraft;
- helicopters in Torres Strait;
- Customs patrol vessels;
- sea time provided by RAN patrol boats and larger fleet vessels; and
- aerial surveillance time provided by RAAF maritime patrols.

When a Coastwatch aircraft detects an incident that the crew considers to be a potential or actual breach of Australia's laws, it reports it to the National Surveillance Centre in Canberra. The centre immediately consults the relevant client agency to determine the requirement for any follow-up action. If a surface response is requested, the National Surveillance Centre arranges for the most appropriate vessel, usually a naval patrol boat or a Customs vessel, to undertake the response. Often Coastwatch aircraft will continue to provide forward air support to the response vessel until it reaches the scene of the incident.



There are no military practice areas within the Planning Area. However, the Department of Defence's **Northern Australia Exercise Area (NAXA)** lies just outside the Planning Area's western boundary. The Army has established Reserve units and the **North West Mobile Force (NORFORCE)** within remote Arnhem Land and Gulf communities to help bolster surveillance and reconnaissance in northern Australia.

The **Northern Australia Quarantine Strategy (NAQS)** provides the framework for defence against the introduction of exotic plants and animals, and diseases. Two main programs help to protect Australia's plant and animal industries, human health and the environment. Firstly, scientific officers from the Australian Quarantine Inspection Service (AQIS) undertake plant and animal surveys, both in Australia and the neighbouring countries of Indonesia and Papua New Guinea. Secondly, border protection programs are carried out by AQIS in conjunction with state and territory agencies. Within the Planning Area, quarantine staff are based at Nhulunbuy, Weipa and Thursday Island. Torres Strait and the area extending across the tip of Cape York are designated as a **Special Quarantine Zone** in recognition of the quarantine risks in this area.

Research and monitoring

Ongoing research and monitoring is gradually improving knowledge and understanding of the Planning Area, its dynamics, its ecosystems and its values. The **CSIRO Division of Marine Research** has been actively involved over the past decade in undertaking research in the Gulf of Carpentaria to assist in the management of the Northern Prawn Fishery. More recently, CSIRO has been involved in the mapping of biophysical attributes and habitats in Torres Strait, including the development of a Geographic Information System (GIS).

The **Northern Territory University** (to be known as the Charles Darwin University from 2004) is an active researcher in the area, particularly with regard to biology, ecology and cultural heritage management. **James Cook University** is currently involved in the development of an information system in the southern Gulf of Carpentaria and is at the forefront of research into dugong.

State and territory agencies, often with funding assistance from the Australian Government, are actively involved in research in coastal parts of the Planning Area. Much of this research is targeting species and areas of conservation significance, fisheries management, habitat protection and integrated coastal management. **Geoscience Australia** is undertaking research into sediment transport and marine geoscience.

The **Australian Institute of Marine Science (AIMS)** has recently taken a strategic decision to focus greater research attention on the waters of northern Australia. A new research facility, the Arafura and Timor Research Facility, jointly funded by AIMS and the **Australian National University**, is being constructed in Darwin. One of the initial research projects is likely to involve an investigation of the physical environment and biology of waters and the seabed near Cape Wessell and the Arafura Sea.



Community, industry and conservation groups are also actively involved in research and monitoring.

Examples include:

- logbooks kept by commercial fishing operators;
- studies of marine turtle movements and interactions with marine debris is being undertaken by Dhimurru Land Management Aboriginal Corporation in collaboration with the World Wide Fund for Nature and others;
- monitoring of wading birds in the southern Gulf of Carpentaria by the Queensland Wader Study Group;
- the involvement of the Marine and Coastal Community Network in the international Reefcheck program;
- studies of marine debris being undertaken by the World Wide Fund for Nature in conjunction with Conservation Volunteers Australia, government agencies and Indigenous communities;
- habitat mapping and environmental monitoring being undertaken by the Ports Corporation of Queensland and mining companies; and
- the establishment of Aboriginal Ranger programs in communities in both the Northern Territory and Queensland [see 6. Management].

The National Oceans Office, the departments of Environment and Heritage and Agriculture, Fisheries and Forestry (which jointly manage the Natural Heritage Trust), the Torres Strait Regional Authority and the Queensland Government are seeking to integrate current and proposed planning processes in Torres Strait, including the regional marine planning process. The purpose is to establish an integrated planning process that provides the greatest benefits for the region.

The majority of marine-related research in Torres Strait is being channelled through the newly created Torres Strait Cooperative Research Centre (CRC). The research program of the CRC, which commenced on 1 July 2003 and will initially run for three years, consists of three broad project groups:

- sustaining the harvest of marine resources;
- understanding ecosystem processes; and
- evaluating management strategies and risks.

Many coastal Aboriginal communities have developed increasing capacity for undertaking environmental research projects via community-based land and sea management agencies, often in partnership with universities or other research institutions. In Torres Strait, the Island Coordinating Council and the Torres Strait Regional Authority have had a long involvement in research and planning for sustainable marine management and resource use.

Building on these research programs, more activity is needed across the Planning Area in order to better understand the human, ecological, and physical dynamics of the region and enable us to manage sustainably into the future.



Monitoring seagrass

Source: Ports Corporation of Queensland



Cross-cultural research and management

The Yolngu people of north-east Arnhem Land in the Northern Territory are custodians of internationally significant rookeries of four species of sea turtle: green, flatback, olive ridley and hawksbill. Responding to their concerns about declining turtle numbers the Yolngu activated their long-held cultural responsibility for looking after turtles by developing a sea turtle research project that combines traditional law and knowledge with contemporary scientific methods.

The project has been undertaken through the Dhimurru Land Management Aboriginal Corporation in conjunction with the Northern Territory University, the Northern Territory Parks and Wildlife Service and World Wide Fund for Nature Australia.

A diverse range of research activities includes:

- the recording of traditional knowledge;
- a turtle stranding and rescue program;
- heavy metal analysis;
- habitat mapping;
- tagging and nesting studies;
- quantifying Indigenous harvesting;
- population genetic sampling; and, most recently
- satellite tracking of green turtle migrations.

Studies conducted elsewhere have shown that turtles can migrate between nesting and feeding areas as far afield as Western Australia, Queensland, Papua New Guinea or Indonesia. Therefore it was expected that the green turtles nesting in north-east Arnhem Land would travel

far from the Gulf of Carpentaria. However, contrary to expectations, satellite tracking research by Dhimurru and project partners has shown that green turtles departing from nesting beaches in north-east Arnhem Land generally stayed within the southern waters of the Gulf.

Based on these findings, the Yolngu people of north-east Arnhem Land have begun discussion about cooperative management of turtles with other Indigenous people within the turtles' migratory range. These discussions and links have since expanded to include Indigenous communities as widespread as Western Australia, Cape York and Torres Strait. An essential component of these discussions is the need to ensure that the traditional harvest of turtles and eggs is sustainable. The hunt monitoring methods tested by the Yolngu in north-east Arnhem Land have been adopted and are contributing to the capacity of hunting communities to manage their catch.

Maintaining a traditional lifestyle is of enormous cultural significance to Indigenous Australians and hunting sea turtles is regarded as an important cultural activity. The ongoing collection and exchange of information arising from this project will assist Indigenous people to make decisions about the sustainable use of marine resources and to plan for the future cultural, social and economic wellbeing of their communities. ^{33, 39, 51, 62}



6. MANAGEMENT

Contemporary systems of marine and coastal management are required to take into account considerations at the local, regional, state/territory, national and international levels. They are, by necessity, relatively complex.

At the international level, the use and management of marine domains and resources is subject to a range of international treaties, conventions and agreements to which Australia is a signatory. Some of the more significant of these in the context of the Planning Area are:

- the United Nations Convention on the Law of the Sea (UNCLOS);
- the Convention on Biological Diversity;
- the International Convention for Prevention of Pollution from Ships (MARPOL);
- the International Convention on Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Dumping Convention);
- the Convention on Conservation of Migratory Species of Wild Animals (Bonn Convention);
- the Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA); and
- the Torres Strait Treaty.

International conventions and instruments that support the recognition of Indigenous peoples' rights and interests in marine environmental management and resource use include:

- the Convention 107 on the Elimination of All Forms of Racial Discrimination;
- the International Covenant on Civil and Political Rights;
- the International Covenant on Economic, Social and Cultural Rights; and
- the Convention on Biological Diversity.

Australia has jurisdiction over the waters and seabed up to 200 nautical miles offshore. Waters beyond three nautical miles from the coastline are generally under the jurisdiction of the Australian Government.

For some activities, such as commercial fishing and petroleum exploration and development, cooperative management agreements between the Australian, Queensland and the Northern Territory governments are in place. Arrangements are also in place to coordinate the implementation of the Australian Ballast Water Management Strategy and the National Plan to Combat Pollution of the Sea by Oil across these levels of government.

The Northern Territory and Queensland governments manage waters and the seabed within three nautical miles from the coastline. The Queensland Government has recently put into effect a State Coastal Management Plan that provides a vision and direction for coastal management in Queensland. The Northern Territory has commenced work on the preparation of a new coastal policy.

Operating parallel to the various national, state and territory legislative and policy models are the traditional, Indigenous management systems. While the objectives of these models and systems do not necessarily differ, the means of achieving the objectives certainly do.



Turtle caught in discarded net

Source: Dhimurru website



One of the most striking features of management in the Planning Area is the importance of community-based management arising from the region's isolation and high population of Indigenous peoples. Examples of this include:

- development of Aboriginal Sea and Land Ranger Programs by Indigenous organisations in the Northern Territory and Queensland;

- involvement of community representatives and fishers in providing advice to fisheries management agencies at both the Australian Government and state/territory levels through Management Advisory Committee (MAC) arrangements;
- involvement of Indigenous and conservation organisations in research and monitoring of marine debris, turtles and dugong; and
- development of codes of conduct for some commercial fisheries.

Research into marine debris

The World Wide Fund for Nature (WWF), Dhimurru Land Management Aboriginal Corporation, Conservation Volunteers Australia and Northern Territory Fisheries have been working together to determine the extent and origins of marine debris washed ashore in north-east Arnhem Land. Local communities were aware of the impact that marine debris was having on turtles, but were unsure of the sources and real extent of the problem.

In order to address the problem in a systematic and scientific manner, comprehensive surveys have been undertaken on selected stretches of beach.

A summary of debris collected during the 2000 and 2001 surveys is provided below.

2000 Survey	2001 Survey
2 rubber thongs	4000 rope pieces
700 rope pieces	450 plastic lids
650 fishing buoys & floats	4500 rubber thongs
500 fishing nets	1400 plastic toiletry containers
1 message in a bottle	1000 fishing buoys & floats
	590 fishing nets
	200 toothbrushes
	100 plastic toys

Of particular concern is the quantity of derelict fishing nets that are found washed ashore. These derelict nets are a hazard to navigation and a significant threat to wildlife, including threatened species such as turtles and dugong. A significant proportion of debris in north-east Arnhem Land is likely to originate from south-east Asian fishing operations. WWF, in collaboration with a number of other groups, has developed a Fishing Net Identification Kit to assist in the identification and monitoring of derelict fishing nets.

The issue of marine debris provides an example of how activities in international and national waters can lead to local impacts, and it highlights the need for integrated management across national and international political boundaries.



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