

7. Pressures on the Marine Park

7 Pressures on the Marine Park

The governance framework, regulatory environment and future role and responsibilities of the Authority needed to deliver long-term protection of the Great Barrier Reef will be shaped by the nature and extent of the threats and pressures facing the ecosystem.

These pressures arise from the multiple uses of the Marine Park, from activities in catchment areas adjacent to the Great Barrier Reef and other external pressures such as climate change. Understanding the nature of these individual pressures and the extent to which their impacts need to be addressed is central to consideration of the changes necessary to the current arrangements. The extent to which these pressures arise from actions that occur within Marine Park boundaries and fall within the purview of the Authority are also an important consideration. The relative risks to the ecosystem posed by these pressures will also influence the future approach required.

The *Great Barrier Reef Marine Park Act 1975* provides for management of the Great Barrier Reef through the establishment, control, care and development of the Marine Park. At the time the Act was passed, the main perceived pressures were mining, oil spills, the crown-of-thorns starfish and management of tourism. The remoteness of large parts of the Great Barrier Reef afforded some protection from user impacts over the first two decades and the multiple use approach to park management could thus initially be delivered by separate regulatory approaches for each issue and sector.

Over the last 10 years tensions have emerged with increasing access to and use of the Marine Park for commercial and recreational activities. Since 1996, for example, a number of investment warnings on commercial fisheries have been issued by the Queensland Department of Primary Industries and Fisheries due to concerns that the fisheries are fully exploited and over-capitalised. Management plans to reduce effort in a number of fisheries have been introduced in parallel with increasing levels of protection and zoning for different uses in both the Marine Park and the Queensland marine park. Financial assistance has been provided jointly on two occasions by the Australian and Queensland governments to address the social and economic impacts of such measures. This assistance was in relation to the implementation of Dugong Protection Areas in 1999 and the update to the *Fisheries (East Coast Trawl) Management Plan 1999* in 2001. Over the period 2004 to 2006 the Australian Government is providing an assistance package for commercial fishers and associated land-based businesses affected by the implementation of the 2003 Zoning Plan (Chapter 11).

Also over the last decade climate change, water quality, increasing population pressure and coastal development have been identified as major pressures on the long-term maintenance of the Great Barrier Reef. These pressures and the measures to address them are largely external to the Marine Park or transcend Park boundaries. They also have national, international and cross-jurisdictional policy implications that require a consistent approach and an integrated framework for decision making.

Robust quantitative and qualitative assessments of pressures and risks will be required to inform actions, strategies and priorities. The need to assess the required level and form of protection of the Marine Park, and to assess any economic and social impacts that may result in the Marine Park or in the catchment area, will be a major challenge for the future. At present, such information is not generally or regularly available in relation to individual pressures or across pressures, with the important exception of the assessments underpinning the *Reef Water Quality Protection Plan*.

This chapter provides a synopsis of the quantitative and qualitative information on the extent of the pressures facing the Great Barrier Reef and the agencies and jurisdictions involved.

7.1 Water quality

Water quality was first identified in 1989 as an emerging pressure on the long-term health and resilience of the Great Barrier Reef. Poor water quality can inhibit development and growth of corals and marine plants, and can support organisms that compete with corals or feed off corals (such as the crown-of-thorns starfish). Other water quality threats include pollution by toxic compounds such as pesticides, oil and acid sulphate soils, altered salinity regimes from discharges of fresh water and introduction of exotic parasites, pathogens and disease.

Water quality in the Great Barrier Reef is influenced by marine and land activities such as agriculture in catchment areas, coastal development, wetland and mangrove clearing, sewage and stormwater discharges from marine outfalls and waste and ballast water discharges from ships.

The diffuse-source pollution that impacts on water quality results from land use practices that occur in water catchments feeding into the Great Barrier Reef. These practices sometimes result in sediment, acidified soil, fertiliser and pesticide being discharged into the Great Barrier Reef via river systems.

The catchment area is very large. It comprises 22 per cent of Queensland's land area, 20 per cent of its population and contains 30 major rivers. Around 80 per cent of land in the catchments adjacent to the Great Barrier Reef supports agricultural production. Fertiliser use has resulted in a doubling of nitrogen exports and a tripling of phosphorus since 1850 and soil erosion ranges at 0.8 to 30 tonnes per hectare per annum. Figure 8 shows the increase in land area used for sugar cultivation in Queensland between 1930 and 1996. Figure 9 shows the increase in phosphorus and nitrogen use in catchment areas over a similar period.

Flood plumes from the major rivers are of concern as they can carry a large volume of pollutants. Their impacts are concentrated on inshore reefs, which put the areas from Port Douglas to Hinchinbrook and from the Whitsunday Islands to Mackay most at risk. These areas contain 28 per cent of inshore reefs and are the most heavily utilised area of the Marine Park by both tourists and fishers.

Figure 8: Increase in Queensland land area used for sugar cultivation, 1930–1996

Source (Gilbert 2001)

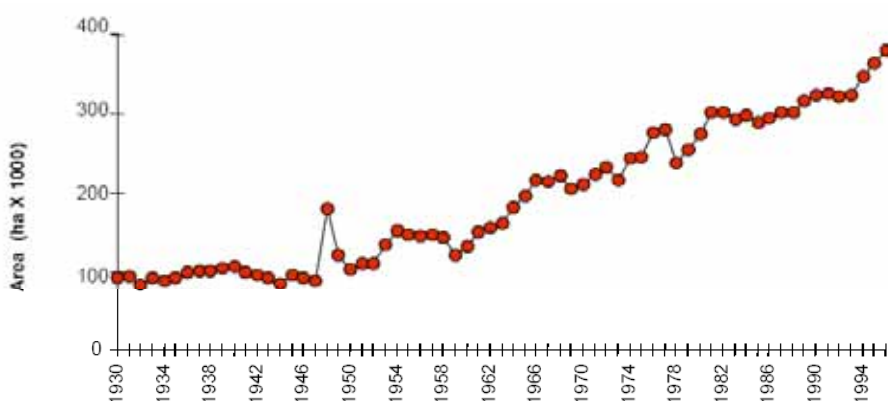
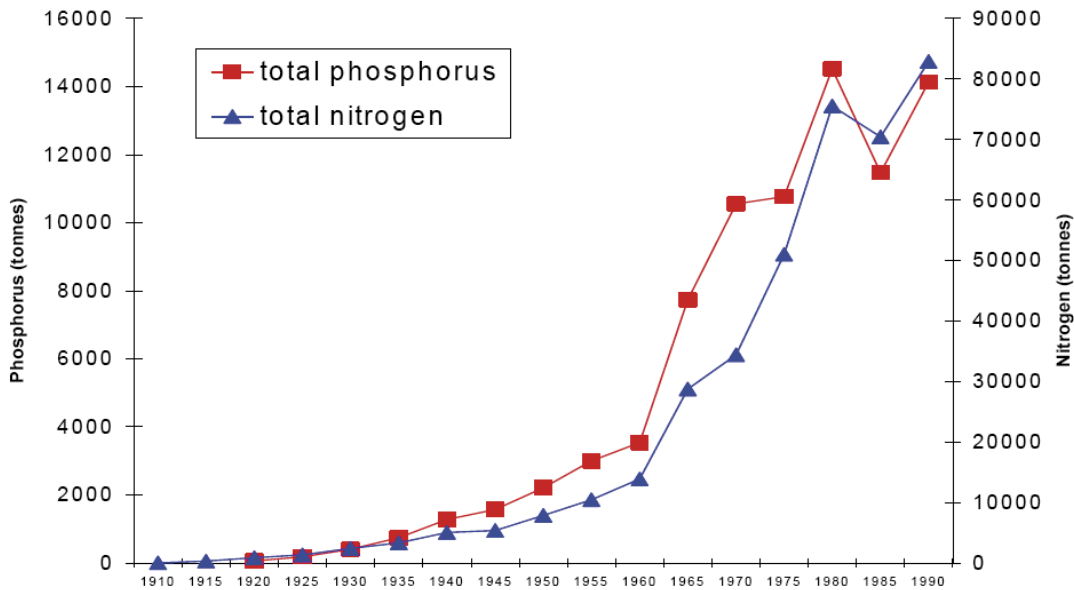


Figure 9: Increase in phosphorus and nitrogen use in the Great Barrier Reef catchment, 1910–1990

Source (Pulsford 1996)



The development of the *Reef Water Quality Protection Plan*

Early responses to water quality concerns focused on controlling point sources of pollution through regulation. Significant investigation of diffuse source pollution from the catchment area was undertaken in 2001 which resulted in a report, released by the Minister for the Environment and Heritage, (GBRMPA 2002) proposing end-of-river load targets for 26 rivers entering the Marine Park. Reports on the issue were also released by the Great Barrier Reef Protection Inter-Departmental Science Panel (2002) and the Productivity Commission (2003).

In 2002, Australian and Queensland government steps related to activities in the catchments adjacent to the Great Barrier Reef affecting water quality were brought together to form a collaborative approach to the issue. In this year, the Prime Minister and the Premier of Queensland signed a Memorandum of Understanding¹⁹ to protect the Great Barrier Reef from land-sourced pollutants. From this, the *Reef Water Quality Protection Plan* was developed and put in place in 2003. The Plan has as its goal halting and reversing the decline in water quality entering the Great Barrier Reef lagoon within 10 years. It has two objectives. The first is to reduce the load of pollutants from diffuse sources in the water entering the Great Barrier Reef. The second is to rehabilitate and conserve areas of the catchment that have a role in removing water borne pollutants. There are nine major strategies and 65 key actions under the Plan. The development of the Plan was underpinned by scientific and socio-economic assessments.

Funding for many activities under the *Reef Water Quality Protection Plan* is provided through the *National Action Plan for Salinity and Water Quality* and the Natural Heritage Trust. Further funding beyond the agreed timetables for the *National Action Plan* and the Trust will be settled by governments through future budget processes.

¹⁹ Memorandum of Understanding between the Commonwealth Government and the Government of the State of Queensland on Cooperation to Protect the Great Barrier Reef from Land-sourced Pollutants.

The Memorandum of Understanding makes explicit the objectives of the arrangement, the basis of the approach, the process and timelines for developing the *Reef Water Quality Protection Plan*. It also ensures transparency and accountability. There is a requirement for independent audit on progress against the Plan and two formal progress reports through the Ministerial Council back to the Prime Minister and Queensland Premier. The first such report occurred in 2005 and the second is due in 2010. The Memorandum of Understanding establishes an Intergovernmental Steering Committee to oversee the process comprising seven agencies including the Authority.

In addition to the *Reef Water Quality Protection Plan*, there are a number of government initiatives directed at improving water quality. These include the development of coastal management plans, water recycling strategies, the *National Action Plan for Salinity and Water Quality* and Natural Heritage Trust programmes and measures (for example, the Coastal Catchments Initiative). Queensland legislation such as the *Land Act 1994*, *Water Act 2000*, *Vegetation Management Act 1999* and *Environment Protection Act 1994* also plays a role in controlling activities affecting water quality.

7.2 Climate change

Research by the Global Coral Reef Monitoring Network (GCRMN 2000, 2004) indicates that 11 per cent of the world's reefs have been lost due to human impacts and a further 16 per cent to the massive climate-related coral bleaching event in 1998. It has been estimated that 58 per cent of the world's reefs are threatened (World Resources Institute 1998).

The single largest cause of this loss and threat of future losses is coral bleaching. In 1988, for example, a significant climate-related bleaching event destroyed 16 per cent of coral reefs in the world in nine months. Only around half of these damaged reefs are likely to recover over the next 20 years.

Australian coral reefs are currently in good condition relative to the rest of the world. Healthy coral reefs will be more resilient to human and climate change pressures. For example, only 3 per cent of the Great Barrier Reef was lost in the 1998 bleaching event, whereas the loss in the West Indian Ocean was 48 per cent.

Over the coming century, global climate change is expected to lead to:

- increased air and sea-surface temperatures
- rises in sea level
- ocean acidification
- changes in weather patterns
- more frequent storms, droughts, floods and other extremes of weather in some places
- possible alterations in the pattern of ocean circulation.

The Intergovernmental Panel on Climate Change (IPCC 2001) foreshadows major impacts on the world's coral reefs, including the Great Barrier Reef, as a result of climate change. It suggests there will be more extensive coral bleaching and reduced species biodiversity and fish yield from reefs. The resilience of coral to bleaching events will depend on the extent of other concurrent pressures, in particular declining water quality.

Coral bleaching is a natural event. However, the intensity and frequency of bleaching events is likely to increase with global warming. Mass bleaching occurs when the sea surface temperature rises above the tolerance range for the particular coral type, which, in the case of the Great Barrier Reef, is usually in the range of 28 to 32 degrees Celsius. Bleaching also occurs during extreme low tides or heavy fresh water run-off onto reefs.

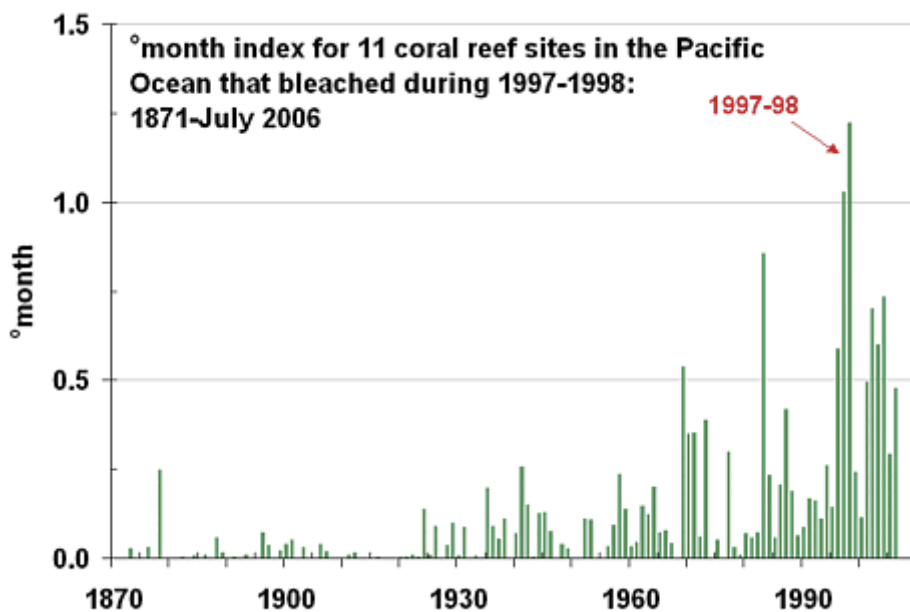
Other impacts of climate change are also of potential concern. Increased sea levels may inundate wetlands, estuaries, mangroves, intertidal and coastal areas and reduce biodiversity and water quality.

Increased intensity of storm events such as cyclones is likely to increase the severity and breadth of storm damage to ecological communities. Absorption of carbon dioxide by the oceans causes higher acidity. This changes the concentrations of carbonate and bicarbonate ions available to marine organisms that may lead to slower growth and weaker skeletons. This may increase the rate of erosion of reefs and impact more broadly upon marine life, as many of the species potentially affected sit at or close to the bottom of food chains.

In 1998, the worst coral bleaching event in 700 years occurred on the Great Barrier Reef (Lough 2000). This was followed in 2002 by the warmest year for sea water temperatures in north-east Australia since 1870. There was major bleaching in this year affecting 60 per cent of the Great Barrier Reef. By 2004, many of the catastrophic declines in some species as a result of these events had been fully reversed, which demonstrates the current resilience of the reef (Australian Greenhouse Office 2003). Figure 10 plots annual thermal stress indices, showing the increasing frequency of bleaching events since 1871.

Figure 10: Annual thermal stress indices averaged from 11 sites in the Pacific Ocean, 1871–2006

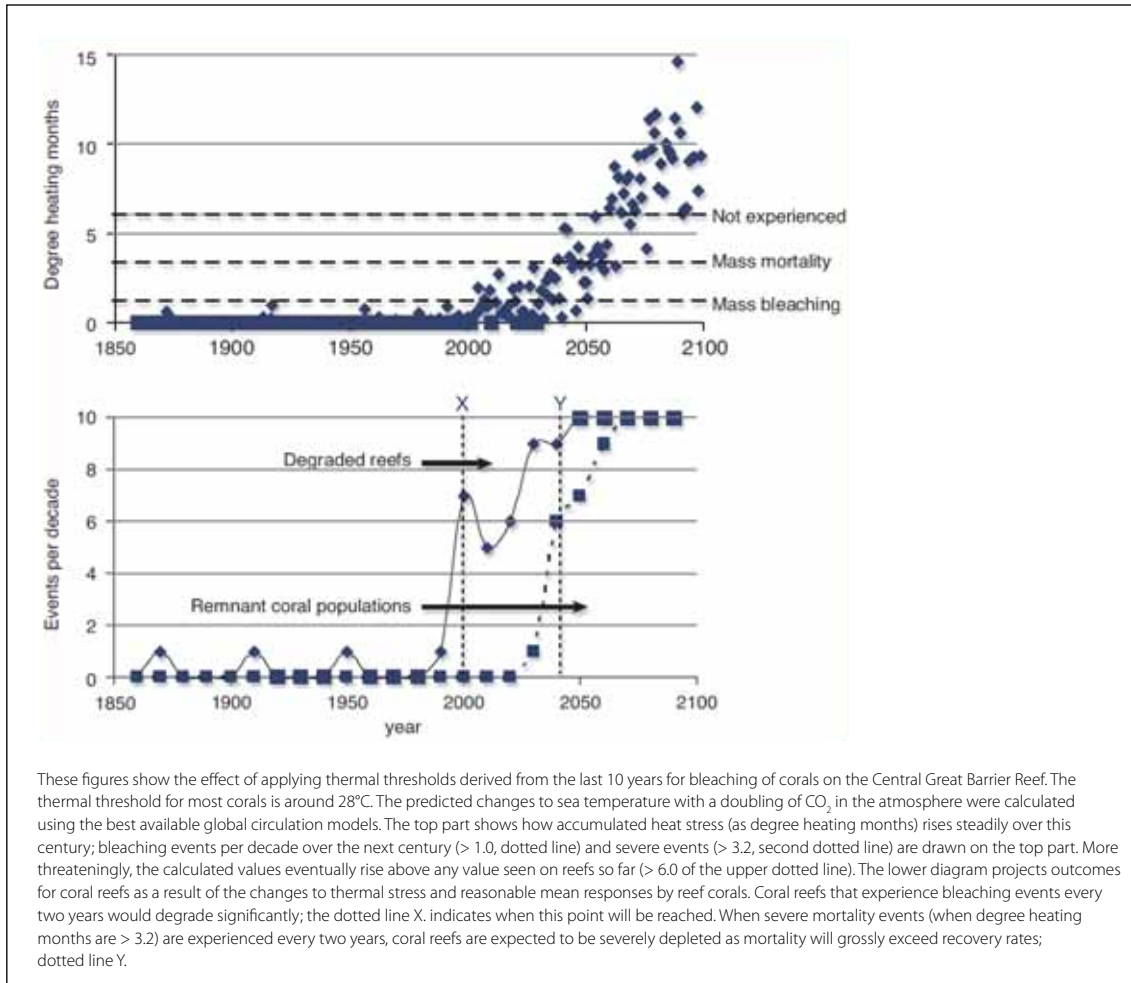
Source (Lough 2006)



The average warming in Australia's coral reef regions is expected to be in the range of 2 to 5 degrees Celsius by the year 2100. This suggests that the Great Barrier Reef will experience temperatures above present bleaching thresholds almost every year well before the end of the century (see Figure 11). This increased frequency and intensity of bleaching events will place the coral reefs under considerable pressure as there will be minimal recovery time between bleaching events. Coral may be able to adapt initially through selection of more heat tolerant coral and algae species. However, scientists expect that the rate and extent of adaptation will be slower than necessary for the corals to resist the projected frequency and severity of high sea surface temperatures.

Figure 11: Projected bleaching events Great Barrier Reef

Source (GCRMN 2004)



7.3 Coastal development

The *Australian State of the Environment Report 2001* (Australian State of the Environment Committee 2001) concluded that Australia's coastal and marine environments are likely to be under increasing pressure over the next decade. The 'sea change' phenomenon is a growing pressure on the coastal environment around Australia, including the Great Barrier Reef. Population growth in coastal areas outside capital cities is 50 per cent higher than the national average. The population along the coast of the Great Barrier Reef is currently around 850 000 and expected to grow to one million by 2026.

There are 21 local government areas adjacent to the Great Barrier Reef. Most have populations of around 25 000, but some have up to 140 000. An assessment of these local government areas shows population increases from 5 to 65 per cent from 1986 to 1991 and expected changes of from 1 per cent in the Cape York Peninsula Coast to 73 per cent in the northern Wide Bay Coast between 1996 and 2011 (GBRMPA 1998). There is also increasing resource and heavy industry development that is providing strong economic growth and exports in the region. The economics of coastal development are a clear business driver and will provide challenges into the future for environmental protection.

Table 10: Population change in coastal regions adjacent to the Great Barrier Reef

Source (GBRMPA 1998)

| | % change 1986–1996 | % change 1996–2011 |
|-----------------------------------|--------------------|--------------------|
| Cape York Peninsula Coast | 15 | 1 |
| Wet Tropic Coast | 38 | 34 |
| Cardwell/Hinchinbrook Coast | 5 | 4 |
| Dry Tropic Coast | 14 | 27 |
| Whitsunday Coast | 24 | 23 |
| Capricorn Coast | 33 | 41 |
| Curtis Coast | 21 | 24 |
| Wide Bay Coast (northern section) | 65 | 73 |

Continuing coastal development will result in a number of pressures on the Great Barrier Reef. First, increasing population will increase local demand for commercial and for recreational use of the Marine Park. Secondly, development can impact on water quality through pollution, increasing water turbidity from run-off and through the release of acid from acid sulphate coastal soils. A further pressure arises from the reduction in coastal habitats such as mangroves, salt marshes, salt flats, wetlands, sea grass beds, dunes, estuaries, and intertidal mudflats.

Another source of pressure is heavy industry. Heavy industry within catchments adjacent to the Great Barrier Reef includes alumina, shale oil, zinc, copper and nickel refineries and power stations. There are 13 existing heavy industry operations and five proposals for further developments in the Gladstone area.

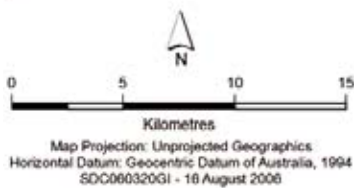
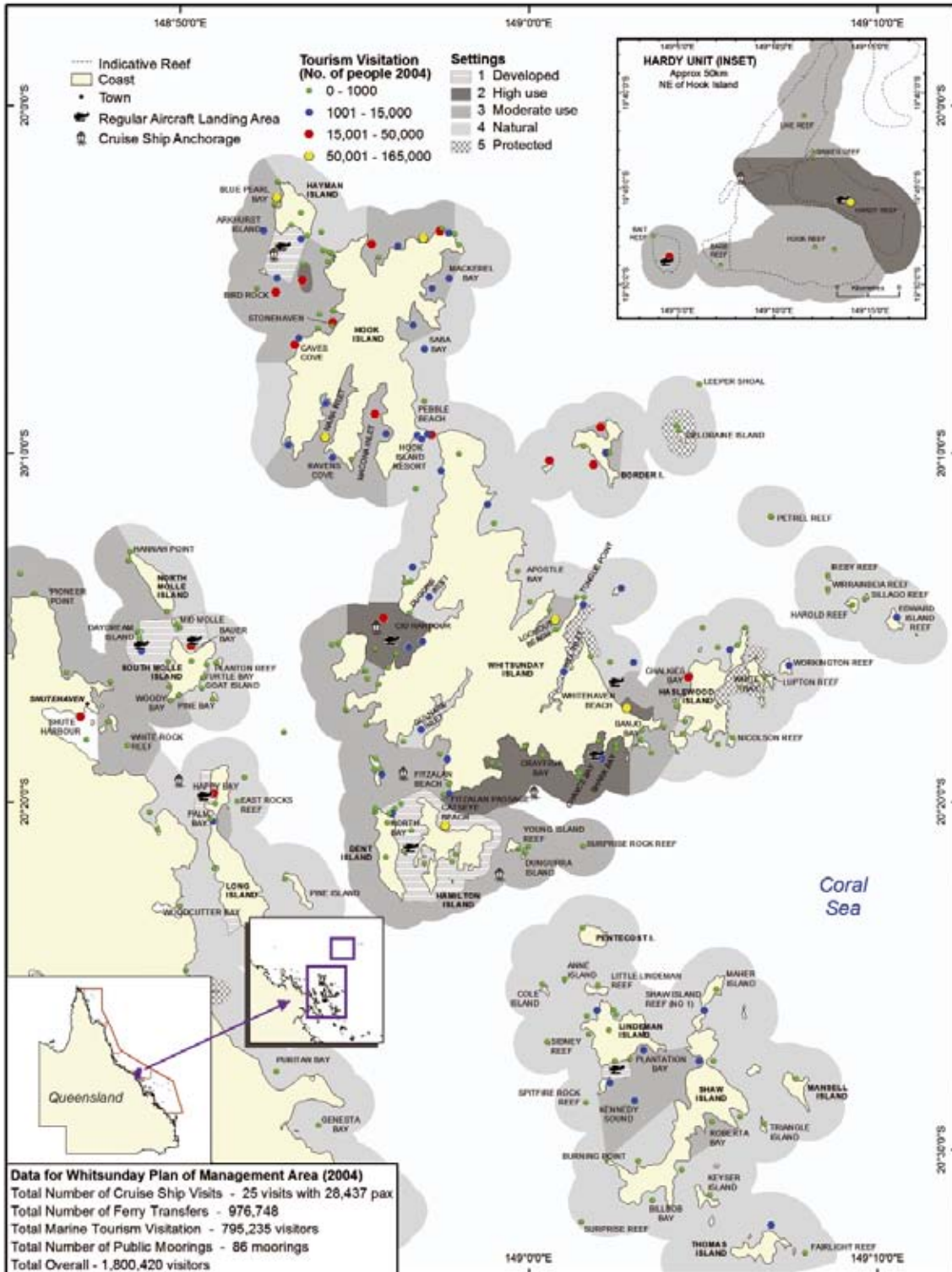
Effluent discharged into waterways and the marine environment is subject to Queensland and local government regulation. In particular, point source pollution is generally managed through environmental assessments and approvals under the Queensland *Environment Protection Act 1994*. In addition, the Queensland *Integrated Planning Act 1997* has implications for coastal development regulation. Its purpose is to balance community well-being, economic development and the protection of the natural environment.

7.4 Tourism

Tourism is a major contributor to the economy of the areas of Queensland adjacent to the Great Barrier Reef. One of the main attractions of the Great Barrier Reef to tourists is its good condition relative to the rest of the world's reefs. Pressures on the health of the Great Barrier Reef are therefore a key concern to the tourism industry.

Tourism is one of the major commercial uses of the Marine Park. Tourism activities include day tours on high speed catamarans, dive tours, boat hire, cruise ships, and island resorts. Other activities include recreational fishing, particularly charter boat fishing. In 2005, there were 840 operators and 1 500 vessels permitted to operate in the Marine Park. Environmental Management Charge data show that visitor days have increased from 1.85 million in 2001 to 1.97 million in 2004, a 5 per cent increase. The majority of overnight visitors to the Great Barrier Reef, some 75 per cent, are domestic, with about half coming from interstate (Access Economics 2005). Cairns, Port Douglas and the Whitsunday Islands have to date been areas of intense use by tourists. Map 28 shows tourism infrastructure and usage in the Whitsunday area. Up to 85 per cent of visitors come to this area which comprises only around 10 per cent of the Park.

Map 28: Tourism development and usage in the Whitsunday area



This map presents the tourism visitation of the Whitsunday's area as a case study for tourism. The tour vessels used by operators range in size from small sailing vessels, which typically take fewer than 20 people, to the large luxury wave-piercing catamarans, which carry up to 400 people. There is also an increasing number of cruise ships and super yachts using the Great Barrier Reef, visiting specific reefs, continental islands and coral cays.

The impacts of tourism include damage to coral and marine ecosystems through inappropriate anchoring, diving and snorkelling activities, development and operation of moorings, and pollutant discharge from ships and resorts during normal operations and from shipping incidents. Looking to the future, these impacts may increase as demand for tourism increases and advances in transport technology and the increasing use of cruise ships make the more remote areas of the Great Barrier Reef more accessible. Resource allocation between the fishing, tourism and conservation sectors can also be expected to be a key issue in the future in the multiple use of the Marine Park.

The marine tourism industry is a major contributor to the local and Australian economy. Gross tourism expenditure in the Great Barrier Reef catchment in 1999–2000 was \$4.2 billion (Productivity Commission 2003), with gross value for 2020 estimated at around \$6.5 billion. The tourism industry in the catchment area provides 48 000 jobs (10 per cent of all jobs) in the region.

Tourist activities in the Marine Park are regulated through zoning plans, plans of management and site plans developed under the *Great Barrier Reef Marine Park Act 1975*. Permits are the primary means of managing commercial tourism use. They prescribe where an operator may go and the activities that can be conducted there. Permits are also required for moorings, pontoons and other infrastructure, as well as research, educational and collecting activities. Accreditation and incentives for best practice are key tools in managing tourism. The Authority works with the industry, notably through the Tourism and Recreation Reef Advisory Committee, which has developed the *Cooperative Framework for the Sustainable Use and Management of Tourism and Recreation Opportunities in the Great Barrier Reef Marine Park* (2002). This Framework provides a key basis for the management of tourism by the Authority.

7.5 Fishing

Commercial and recreational (including charter) fishing constitute a major use of the Marine Park. Fishing is a long standing use of the Great Barrier Reef. Hand netting for prawns began in the 1880s, with commercial fishing by the coral reef fin fishery starting around 1940 and commercial otter trawling in the 1950s.

There are 17 commercial fisheries that operate within the Great Barrier Reef Marine Park. Only two of these have operations that extend much beyond the Marine Park—30 per cent of the East Coast Otter Trawl Fishery and 60 per cent of the Spanner Crab Fishery occur outside Marine Park boundaries. The Coral Reef Fin Fish Fishery operates on the perimeter of reef areas, whereas trawling occurs in deeper waters in between reefs. The Spanner Crab Fishery occurs on a specific habitat in the southern region of the Marine Park.

The value of the commercial fishing operations within the Marine Park has been estimated at \$130 million per annum in Gross Value of Production terms (PDP Australia 2003). The East Coast Otter Trawl and Coral Reef Fin Fish Fishery constitute 82 per cent of this value.

It is reported that there are around 198 000 recreational fishers (National Recreational and Indigenous Fishing Survey 2003) in the catchments adjacent to the Great Barrier Reef. The annual catch of recreational fishers throughout Queensland is around 8 500 tonnes²⁰ of seafood. In some cases the recreational catch is larger than the commercial catch (e.g. coral trout). Around 55 per cent of recreational fishing occurs from the shore (Hunt 2005a). Recreational fishing in Queensland has been trending downwards at 1 per cent per annum since 1996 (Hunt 2005a).

Some 45 000 interstate and international tourists participate in recreational fishing, many through charter fishing. There are around 120 charter fishing vessels operating in the Marine Park.

20 Queensland Government Department of Primary Industries and Fisheries figures taken from http://www.dpi.qld.gov.au/cps/rde/xchg/dpi/hs.xml/28_139_ENA_HTML.htm

Annual expenditure by recreational fishers in the catchment is estimated at between \$80 and \$201 million (Hunt 2005a). The Queensland Department of Primary Industries and Fisheries has estimated expenditure on recreational boat fishing in the Marine Park at around \$100 million for 2004 (Access Economics 2005).

Hunting of marine turtles, dugongs and other marine resources is undertaken by some Traditional Owners. It represents an important part of their culture. There is a recognised need to ensure that such hunting is sustainable.

Over the period 1996 to 2004 the major commercial fisheries in the Marine Park have been subject to a number of management controls introduced by the Queensland Government. These controls have included effort reduction through caps, quotas, licence restrictions, gear restrictions and spatial and temporal closures. As at the end of 2005, Queensland had introduced three Fisheries Management Plans—the *Fisheries (East Coast Trawl) Management Plan 1999*, the *Fisheries (Coral Reef Fin Fish) Management Plan 2003* and the *Fisheries (Spanner Crab) Management Plan 1999*.

An amended State fisheries management plan for the East Coast Trawl Fishery was introduced in 2001. This provided for a 15 per cent reduction in effort. It also closed 96 000 square kilometres (28 per cent) of previously un-trawled areas of the Marine Park. A joint Commonwealth–State adjustment package of \$20 million was used to purchase licences equating to 10.86 per cent of the effort in the fishery. There was also an in-kind contribution from the fishery through a 5 per cent across-the-board effort reduction. The area remaining open to trawling in 2004–05, including with the implementation of the *Great Barrier Reef Marine Park Zoning Plan 2003*, is 58 per cent of the total fishery and 34 per cent of the Marine Park (GBRMPA 2003b).

Over the period 1996 to 2004 there has been a 20 per cent reduction in annual catch of principal fish species in the East Coast Otter Trawl Fishery (Table 11) and a reduction in actual effort of 38 per cent (Figure 12) (Queensland Government 2005). This is due to the interaction of a broad range of regulatory and market factors.

Figure 12: East Coast Trawl Fishery – annual number of otter trawl days fished and number of reporting licences (includes Moreton Bay), 1988–2004

Source (Queensland Government 2005)

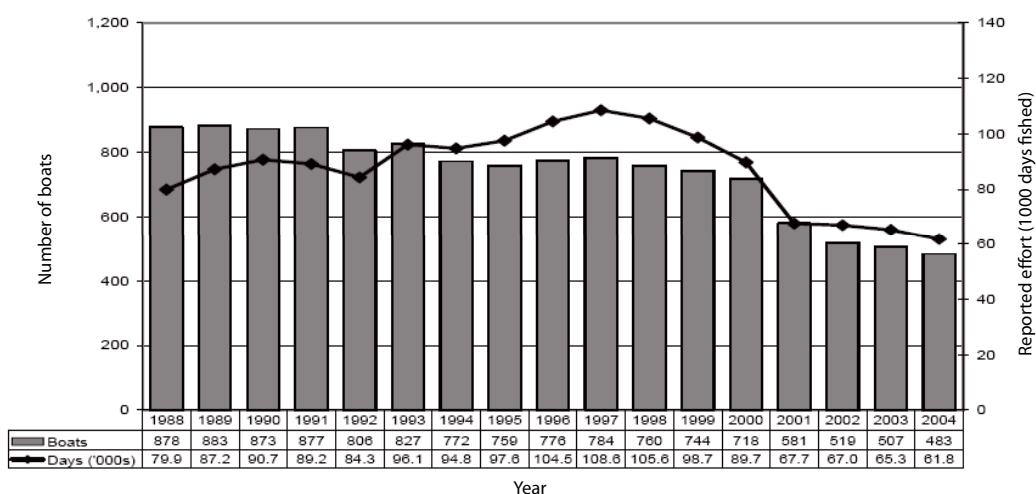


Table 11: Annual catch in tonnes of principal species harvested by otter trawl in the Queensland East Coast Trawl Fishery (includes areas outside the Marine Park), 1996–2004

Source (Queensland Government 2005)

| Species | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Prawns | 8 936 | 7 338 | 8 555 | 7 891 | 6 087 | 6 133 | 6 979 | 7 313 | 7 167 |
| Scallops | 760 | 1 054 | 1 052 | 932 | 958 | 1 059 | 571 | 442 | 664 |
| Bugs | 662 | 748 | 744 | 551 | 393 | 322 | 478 | 469 | 470 |
| Squid | 167 | 236 | 189 | 108 | 174 | 117 | 126 | 133 | 152 |

The Fisheries Management Plan for the Coral Reef Fin Fish Fishery that came into force in 2004 introduced a 37 per cent reduction in total allowable catch and 77 per cent reduction in licences. The implementation of this plan coincided with the introduction of the 2003 Zoning Plan.

In 1997, the East Coast Inshore Fin Fish Fishery was impacted by the introduction of 15 Dugong Protection Areas in which netting is restricted or prohibited. Financial assistance of \$2.5 million for licence buy-out was made jointly available by governments.

Management Plans have not as yet been completed for the other two major commercial fisheries, the East Coast Inshore Finfish Fishery and East Coast Dive-Based Fisheries.

In July 2004 the *Great Barrier Reef Marine Park Zoning Plan 2003* came into force. The Plan placed restrictions on the areas available for commercial and recreational fishing. The overall impact of the 2003 Zoning Plan on fishing was estimated to be 10.5 per cent of commercial catch and between 1 and 5 per cent impact on recreational fishers (PDP Australia 2003). In the financial years 2004–05 and 2005–06, the Australian Government has made available funding of \$87 million to help affected business and communities adjust to the impacts of the 2003 Zoning Plan. The assessment and analysis of the socio-economic impacts of zoning is considered further in Chapter 11.

Complementary mirror zoning conserving approximately 20 per cent of the coastline adjoining the State coast marine park was introduced by Queensland in November 2004 (Hunt 2005a and 2005b). It is estimated that around 50 per cent of net, crab and beam trawl fisheries occurs in estuaries and intertidal areas that form part of the State marine park.

Since November 2004, a total of 16 Queensland-managed fisheries that operate in the Marine Park have been subject to the assessment and approval requirements under the *Environment Protection and Biodiversity Conservation Act 1999*. This includes the five main commercial fisheries. Approvals are usually for a period of three years. Assessment occurs if the fishery is in Commonwealth waters, in which case the fishery is assessed for impacts on cetaceans, listed threatened species and communities, listed migratory species and listed marine species and/or where the fishery has an export component, in which case the extent to which the fishery is managed in an ecologically sustainable manner is determined.

Fishing can impact on fish numbers, both target species and 'by-catch'. It can also damage the seabed and reefs through the use of nets and anchors. By-catch quantity estimates range from two to 10 times that of the retained species. CSIRO trawl depletion experiments, undertaken over a five-year period in the Far Northern Section of the Marine Park, have shown that one pass of a trawl net removed between 5 per cent and 25 per cent of benthos (seabed life) (Poiner I. et al. 1998). The recent trawl fisheries management plan has sought to address these issues and introduced requirements for by-catch reduction devices that can reduce by-catch in prawn trawling by up to 30 per cent. The plan also targeted a 25 per cent reduction in the impacts on the seabed between 1999 and 2005.

The management requirements for fisheries and the ecosystem in the Marine Park have changed considerably since 1975. Today, management actions need to be approached in a manner that is consistent with the World Heritage Convention, the Authority's legislative objectives, Queensland fisheries management and environment protection legislation and the Australian Government's legal and policy framework on oceans, Marine Protected Areas and fishing.

There are now many dimensions to the policy and regulatory environment, tensions between objectives, and responsibilities vested in a number of different bodies across jurisdictions. This has become a complex regulatory environment for business planning by commercial interests. Since 1996, access to resources in the major fisheries has been subject to increasingly tighter fisheries management controls including allocation of resources for commercial and recreational fishers in individual fisheries. Marine Park zones allow recreational, commercial and conservation uses of the Marine Park through conditions placed on access and types of use. The area subject to such zoning has significantly increased with the implementation of the 2003 Zoning Plan. The allocation of resources between extractive and non-extractive use of the Park is now a major pressure.

7.6 Shipping

Every year approximately 6 000 ship movements of large vessels in excess of 50 metres in length occur within the Great Barrier Reef and Torres Strait region. Some 75 per cent of these vessels use the Inner Route with the rest entering or departing through Hydrographers, Palm or Grafton Passages (Great Barrier Reef and Torres Strait Shipping Management Group 2003).

A wide variety of goods including hazardous materials are transported to, from and through the Great Barrier Reef and Torres Strait. The vessels using the Great Barrier Reef are 42 per cent bulk carriers, carrying significant tonnages of export cargo, including coal, bauxite, nickel ores, raw sugar, alumina and silica sand. Between 5 per cent and 10 per cent of ships are oil tankers, 24 per cent container vessels, and 22 per cent general cargo (Great Barrier Reef Shipping Review Steering Committee 2001).

Demand for shipping services along Queensland coastal waters is expected to increase with expanding mining and minerals processing. For example, around Townsville, Rockhampton and Gladstone such developments are projected to increase by about 36 per cent between 2001 and 2020.

There are two major shipping routes in the Great Barrier Reef and the Torres Strait. The Inner Route extends north-south between the Great Barrier Reef and the Queensland coast from the Torres Strait to Gladstone in the south. The Outer Route commences at the eastern limit of the Torres Strait (the Great North East Channel) continuing southwards through the Coral Sea and rejoining the Queensland coast near Sandy Cape south of Gladstone. Ships may traverse the Great Barrier Reef via four main transit passages: Grafton Passage near Cairns, Palm Passage near Townsville, Hydrographers Passage near Mackay and in the south, the Capricorn Channel.

The navigational task along the Inner Route, the Torres Strait and its transit passages is demanding. The region is covered by an extensive network of reefs, cays and islands and is subject to strong trade winds, occasional cyclones and complex tidal streams. Ships encounter shallow waters, reduced visibility in the wet season and narrow shipping lanes in some areas.

The Australian Maritime Safety Authority is responsible for maritime safety, marine environment protection, and maritime and aviation search and rescue services in Australia. These roles are performed in accordance with Australia's obligations under a range of international conventions including the United Nations Convention on the Law of the Sea, the Chicago Convention on International Civil Aviation, the International Convention for the Safety of Life at Sea and the International Convention on Maritime Search and Rescue.

In performing its functions, the Australian Maritime Safety Authority works collaboratively with the Authority in addressing pollution and safety issues within the Marine Park. It was instrumental in the declaration of the area as a Particularly Sensitive Sea Area by the International Maritime Organization in 1990. The Australian Maritime Safety Authority oversees the safety of the shipping routes through the Marine Park and administers the requirements under the *Great Barrier Reef Marine Park Act 1975* for compulsory pilotage of boats over 70 metres and oil and chemical tankers.

The Australian Maritime Safety Authority provides a national network of integrated aids for the safe and efficient coastal navigation by commercial ships and runs the mandatory ship reporting system REEFCENTRE at Hay Point. In addition the 2003 Zoning Plan includes designated shipping areas throughout the Inner Route to provide recognised passages and guaranteed access to ports.

Shipping has the potential to adversely impact on the Great Barrier Reef and Torres Strait region. The introduction of invasive marine species into new environments via ship hulls and ballast water has been identified by the International Maritime Organization as one of the four greatest threats to the world's oceans. In 2001 a potential pest species, the Asian green mussel, was identified in the port of Cairns. However, the national marine pest response has so far been successful in preventing the establishment of the pest.

Other shipping impacts include oil and chemical spills, waste disposal, the use of anti-fouling paints on ships, physical damage from groundings and anchorage, and air pollution. Protection is provided to the Great Barrier Reef under the International Convention for the Prevention of Pollution from Ships (MARPOL), which is implemented through Commonwealth and Queensland legislation. This legislation bans tanker cargo washings, chemicals, and sewage discharge.

The Australian Maritime Safety Authority has recorded 230 reports of oil spill sightings in the Great Barrier Reef and Torres Strait region since 1989. None of these incidents has resulted in a major oil spill pollution event requiring response through the REEFPLAN programme that is administered jointly by the Australian Maritime Safety Authority, the Great Barrier Reef Marine Park Authority and the Queensland Government under the *National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances*. However, a total of 18 pollution events required some form of response. In addition, between 1985 and 2005 there were 31 major shipping incidents in the Great Barrier Reef (excluding the Torres Strait) comprising 15 groundings and 16 collisions.²¹

The environmental and economic impact of an oil spill and subsequent clean up operations can be significant, as demonstrated by incidents in other Australian waters. The oil spill which followed the grounding in the Torres Strait of the *Oceanic Grandeur* in 1970 led to high mortality of oysters in pearl farms and a serious depletion of juvenile pearl collecting beds. More recently, the *Iron Baron* grounding near Launceston in 1996 involved a bunker fuel spill with clean up costs of around \$10 million. The *Laura D'Amato* operational spill incident in Sydney Harbour in 1999 resulted in clean up costs, legal proceedings and fines totalling more than \$3 million.

7.7 Summary

There are clearly many pressures on the health of the Great Barrier Reef Marine Park. The major threat of warming seas from global climate change is the overarching pressure on the Great Barrier Reef. Yet the extent of climate change and its impacts cannot be directly controlled by the Authority or the actions of the Australian and Queensland governments alone. Maintaining the Great Barrier Reef ecosystem in a healthy and resilient condition will be essential for it to withstand the major impacts of climate change, in particular coral bleaching. Thus effectively managing each of the pressures on the Great Barrier Reef—including water quality, coastal development, direct source pollution, tourism, shipping and fishing—in order to ensure the resilience of the ecosystem, will be of paramount importance over the next 30 years.

²¹ Information provided to the Review Panel by the Australian Maritime Safety Authority.