

Marine Tourism on the Great Barrier Reef

CURRENT STATE OF KNOWLEDGE

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Marine tourism has the highest commercial value of any activity in the Great Barrier Reef Marine Park with an estimated contribution of more than \$1.5 billion per year to the Australian economy. Approximately 1.6 million visitors travel to the Great Barrier Reef Marine Park on commercial tourism operations each year. In addition, more than one million visitor nights per year are spent on island resorts.

The 'footprint' of marine tourism on the Reef is considered to be small and generally localised. However, because of the size and significance of the tourism industry, careful science-based management and responsible self-regulation by the industry is needed to ensure that tourists do not damage the environment that attracts them.

Trends, types and location of tourism

Tourism visitation to the Great Barrier Reef was low in the 1950s. Visitor numbers rose rapidly through the 1970s and 1980s. This increase in tourists and the infrastructure to support them caused concern about the possible impacts of tourism. Since 1994, numbers of reef tourists have stabilised, with some minor fluctuations due to changes in international visitation and in patterns of travel.

Most tourism activity on the Great Barrier Reef (about 85%) is in the Cairns and Whitsunday areas of the Marine Park (about 7% of the total area of the Park). There are far fewer visitors to the remaining 93% of the Park. However, advances in transport may improve access to regions of the Reef that are currently remote or inaccessible to tourism operators. This could change the distribution and management of tourism impacts in the future.

Marine tourism activities on the Great Barrier Reef are mostly based on:

- **Structure-based tourism operations.** Tourism pontoons that are used as a base for day passengers represent the largest single component of the industry. There are also some underwater observatories, and a floating hotel operated briefly in the 1980s.
- **Vessel-based tourism operations.** These carry from less than 10 to more than 400 passengers, and may be site-specific or roving, and may operate to islands or moorings.
- **Extended vessel-based tourism operations.** Vessels carry 6 – 160 passengers on trips of several days to weeks, generally stopping at more than one destination.
- **Bareboat charter.** Primarily based in the Whitsunday Islands, yachts are available for charter with or without crew for operation within a restricted area.
- **Cruise ships.** Large (>10,000 tonne) cruise ships pass through and anchor overnight in the Marine Park.
- **Aircraft-based operations.** Conventional aircraft, seaplanes and helicopters are used for sightseeing and reef visits.
- **Resort and shore-based operations.** There are several island-based resorts within the Marine Park, and a number of mainland resorts adjacent to the Marine Park.



Photo: Tourism Queensland

Seaplanes give access to remote areas of the Reef.

Perceptions of tourism impacts

In 1997, more than 1,000 Australian residents were surveyed about their perceptions of threats to the Reef. Many respondents believed that urban and industrial run-off (67%), agricultural run-off (66%), crown-of-thorns starfish (65%) and commercial fishing (65%) had a large or very large negative impact on the Great Barrier Reef. Half of the respondents (50%) believed that tourism activities and infrastructure had a large or very large negative impact on the Reef. This indicates that the public is concerned about marine tourism impacts on the Great Barrier Reef.

Managing marine tourism

Because the tourism industry is one of the major users of the Marine Park, management systems have been created to regulate tourism activities and minimise impacts.

Tourism activities in the Great Barrier Reef Marine Park are managed jointly by the Great Barrier Reef Marine Park Authority (GBRMPA) and the Queensland Parks and Wildlife Service (QPWS) within a framework of legislation, zoning plans, plans of management, permits and codes of practice. Permits are the principal tools for managing tourism; tourism operators must have a permit from the managing agencies to operate in the Marine Park.



Photo: Rob Parsons

CRC Reef are surveying reef tourists to find out how they use the reef and their satisfaction with their experience

Plans of management are prepared for intensively used, or particularly vulnerable groups of islands and reefs, and for protection of vulnerable species or ecological communities.

Impacts of marine tourism

In addition to management strategies and industry stewardship, there are several factors that protect the Great Barrier Reef from tourism impacts that have been reported on some overseas reefs. Most importantly the Great Barrier Reef is vast – it is 2,500 km long, covers an area of 344,000 km², and consists of more than 2,900 individual reefs and 940 islands. Overall, there are less visitors per area compared with other coral reefs, for example those near Florida. In addition, the coastal region adjacent to the Great Barrier Reef is less densely populated than regions adjacent to overseas reefs.

Marine tourism can have ecological, social and cultural impacts. The major ecological impacts on the Great Barrier Reef from marine tourism are related to:

- **Coastal or island-based tourism development** (loss or alteration of natural coastal areas, population pressure, pollution from construction activities, ongoing pollution from discharge of treated sewage and stormwater);
- **Marine-based tourism infrastructure** (alteration of marine habitat by structures such as pontoons and moorings);
- **Shipping and boating** (anchoring, ship groundings, littering, waste discharge);
- **Recreational activities** (diving, snorkelling, reef walking, fishing); and
- **Wildlife interactions** (bird watching, turtle watching, whale watching, fish feeding).

Many of these impacts are also associated with recreational boating, commercial fishing and shipping activities.

While social and cultural impacts have long been recognised as important, they are not as well studied as ecological impacts. Social impacts include the negative effects of tourism on the experiences of other users of the Great Barrier Reef. This can lead to displacement of traditional and recreational users. Visitors seeking a wilderness experience may find the density of tourists at some high-use sites unacceptable. Repeat visitors are reported to be more sensitive to the presence of high-density tourism and reef infrastructure than first-time visitors. However, because of the large size of the Great Barrier Reef, most visitors can choose from a variety of experiences ranging, for example, from visits to pristine reefs to organised water sports activities.

Snorkelling and diving are some of the few areas of tourism behaviour where social impacts have been examined. Most people surveyed on day trips to the reef were not affected by crowding while snorkelling. In a related study, experienced divers were more sensitive to large numbers of other divers than novice divers.

Other threats to the Great Barrier Reef include:

- coral bleaching and global climate change;
- alteration and loss of natural habitat;
- declining inshore water quality;
- outbreaks of crown-of-thorns starfish;
- unsustainable fishing; and
- the threat of oil spills from shipping.

Most of these factors could potentially impact large areas of the Reef, unlike the more localised impacts of tourism activities.

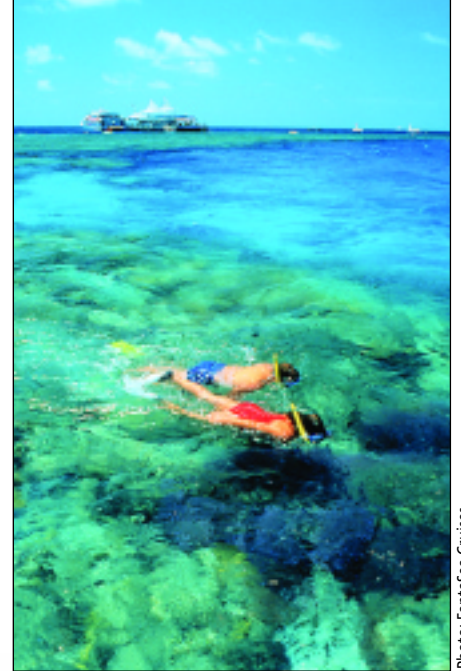


Photo: FantaSea Cruises

Snorkellers on the Reef.

Coastal and island-based tourism development

Large numbers of visitors to the Reef need infrastructure such as accommodation, transport, entertainment and services. Of the 940 islands on the Great Barrier Reef, 27 have resorts. The value of tourism business to Great Barrier Reef island resorts is estimated at \$300 million per year.

Development in coastal areas adjacent to the Great Barrier Reef and on islands significantly modifies the environment and can disturb native vegetation and wildlife. New development proposals are assessed by relevant agencies for their environmental and social impacts, based on integrated coastal and regional planning, and managed through tools such as conditional permits and environmental monitoring programs. Construction activities within the Marine Park also require a security bond against possible future site restoration.

Earth and drainage work during the construction of buildings, marinas and other structures can lead to disturbance and pollution of the marine environment. Once constructed, the generation and discharge of sewage effluent and of stormwater are the main issues that require ongoing management. Elevated levels of nutrients and other pollutants and turbidity can have negative impacts on coral reefs. All sewage discharges into the Marine Park must be tertiary-treated with nutrient reduction, or the effluent



must be re-used on the land with minimal marine discharge. Research has found that the use of treated effluent for irrigation, for example of golf courses and gardens, as an alternative to ocean discharges, can substantially reduce the amount of nutrients discharged into the surrounding marine waters.

Marine-based tourism infrastructure

Pontoons are moored at offshore reefs up to 60 km from the coast, in areas of the Great Barrier Reef where there are few coral cays or islands. Some pontoons provide a base for up to 500 visitors each day. About half of the tourists visiting the Great Barrier Reef travel on day trips to a moored pontoon.

The number and location of pontoons in the Marine Park is restricted, and the installation of new pontoons requires environmental impact assessments and environmental monitoring programs.

Several incidents of storm and cyclone damage to pontoons have intensified pressure to improve the mooring design of pontoons. Through collaboration between researchers, Marine Park managers and the engineering industry, guidelines for reef infrastructure have been developed. These guidelines include recommendations on design of moorings, anchors and pontoon body, procedures for siting pontoons, and their installation and maintenance. The guidelines will be used to guide future developments.

There is strong motivation for tourism operators to implement practices that protect the environment near pontoons, because there are a limited number of suitable sites and the cost of moving pontoons, should the reef be damaged, is high.



Photo: Tourism Queensland

Underwater ecotrail for divers.

While early pontoons had an impact on corals under the pontoons as a result of shading and movement of the mooring chains, recent advances in siting and mooring design have greatly reduced their impacts. A recent study found few detectable impacts of operating pontoons on coral or fish communities.

Predatory fish aggregate around moorings and pontoons and this has prompted concerns that local fish populations may be depleted. However, studies showed no evidence of any impacts of predatory fish species on prey or competitor species around pontoons. The fish responded to human signals and dispersed away from the pontoons when tourism boats were not present. Fish are attracted to the pontoons by fish feeding, which tourism operators can only carry out under a tourism program permit.

Shipping and boating

Anchoring can damage corals and other benthic organisms both from the weight of the anchor and from movement of the anchor chain across the sea floor. Most regular tourism operators therefore use moorings, many installed by the operators themselves, to reduce anchor damage and to ensure a safer operating environment. Anchoring is strictly controlled by permit conditions and codes of practice.

In high-use areas of the Marine Park, on reefs offshore from Cairns and around the Whitsunday Islands, new management initiatives are aimed at reducing anchor damage by recreational and charter vessels and cruise ships. They include:

- designating 'no anchoring' or 'limited anchoring' areas, mostly in the Whitsundays;
- establishing a series of 'designated cruise ship anchorages' and numerous 'reef anchorages' in the Cairns Section;
- implementing a public mooring program in inshore high-use areas to reduce boat anchoring; and
- implementing an intensive education, training and extension program.

The release of sewage, wastewater and litter into the water are issues that relate to tourism operators, as well as to all recreational and commercial boating and shipping. Discharge of waste from ships is regulated by the Queensland

Department of Transport and the GBRMPA. New regulations will improve the protection of reefs from vessel sewage when they come into effect in early 2004, for example by increasing the no-discharge distance to any land, reef, or other sensitive area in open water, such as aquaculture facilities. Littering in the Marine Park is unsightly and illegal, and can harm marine animals if the litter is swallowed. It is best addressed by public education and, where necessary, enforcement.

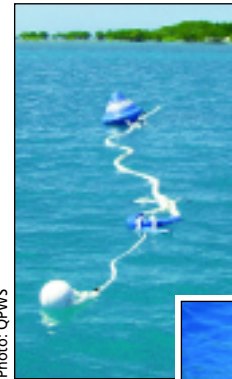


Photo: QPWS

Anchor damage is reduced by installing public moorings and restricting anchoring in high-use areas.



Photo: GBRMPA

Recreational activities on reefs

Some studies overseas found that high levels of diving activity at a site can cause detectable changes to coral communities, and eventually change the appearance of the reef. The damage occurs primarily to fragile, branching corals. Therefore, tourism operations involving large numbers of divers are directed away from more sensitive sites.

In the Red Sea and the Caribbean, damage to reefs was apparent when there were around 5,000 divers per site per year. An estimated 350,000 dives per year take place on the Great Barrier Reef, spread over hundreds of dive sites. Few sites on the Great Barrier Reef approach use by 5,000 divers per site. At the Cod Hole, north of Cairns, where diving density reached high levels, special management arrangements were put in place in cooperation with the local dive tourism industry to reduce impacts at the site. These included restrictions on anchoring (access only by mooring) and limits on group size.

Most divers on the Great Barrier Reef do not damage corals. However, a study has shown that a small number of divers, who were not proficient or were focused on other activities such as underwater photography, were responsible for most damage. Studies of coral damage by snorkellers at seven sites near reef pontoons found that significant damage occurred on only one site. Through pre-dive briefings, divers and snorkellers can be made aware of the fragility of corals and of ways to minimise damage. Best Environmental Practices for the dive industry have been developed to support environmentally responsible behaviour.

Reef walking, once popular with tourists, now occurs at only a few locations. The potential for destruction of fragile corals is obvious, and management of reef walking includes informing tourists of the potential impacts of walking on fragile branching corals, and keeping walkers to tracks where possible.

The level of fishing by tourists is small compared with that of other recreational and commercial fishers and accounts for approximately 3% of the estimated total catch. A small but financially significant game-fishing industry operates predominantly in waters offshore from Port Douglas. The industry probably has low environmental impact because it focuses on large oceanic species such as marlin, most of which are tagged and returned to the water. About 120 charter vessels also offer day and extended fishing charters, mostly in the southern and central Great Barrier Reef. Fishing is managed by both Commonwealth and State Governments. Where fishing is permitted, the Queensland Fisheries Service also regulates the size and number of fish taken.

Wildlife interactions

Birds

Breeding populations of seabirds are common in the northern and southern regions of the Great Barrier Reef, which have more islands suitable for nesting than the central section. Human impacts on bird populations relate to direct impacts on breeding success as a result of disturbance, and loss of bird-roosting habitat. Tourism and recreation activities can impact on seabird populations, particularly since faster boats allow visitors to reach previously inaccessible islands. Bird species vary in their susceptibility to disturbance, so islands may become dominated by species that are more tolerant of human activity.

The Queensland Parks and Wildlife Service manages access to seabird breeding islands, and guidelines for visiting seabird islands have been developed jointly by the GBRMPA and Environment Australia. Breeding populations are protected by annual and seasonal site closures. Disturbance of nesting seabirds by visitors to Michaelmas Cay off Cairns is a major concern. The tourism industry has assisted in developing a management plan for Michaelmas Cay, which limits the number of visitors and restricts access to some areas.

Whales

Whale watching in the Great Barrier Reef region is a seasonal activity. In the Whitsundays, it is based on humpback whales during their winter migration. Since 1991, there has also been a small but growing industry based on encounters with dwarf minke whales for a two-month



Photo: Alastair Birrles, CRC Reef

Dwarf minke whales are a seasonal tourism attraction in the northern Great Barrier Reef.

season on the reefs between Port Douglas and Lizard Island. Visitors on charter vessels interact with the whales in the water, with the whales approaching snorkellers who are holding a rope tethered to the boat. CRC Reef researchers in collaboration with the tourism industry and the GBRMPA have developed a code of practice for swimming with dwarf minke whales, to ensure that encounters do not disturb the whales or endanger tourists.

Turtles

In Australia, marine turtles are considered a threatened species, with declining numbers of nesting loggerhead turtles recorded in the Great Barrier Reef World Heritage Area. Turtles aggregate to lay their eggs at a limited number of sites, for example Raine Island in the north (green turtles), and Wreck Island in the south (loggerhead turtles). People can temporarily disturb nesting turtles, but there is no evidence that production of eggs is affected. However, lights associated with coastal infrastructure can disorientate turtle hatchlings as they hurry towards the water.

In the Bundaberg region, an organised tourism industry has developed around turtle watching over a three-month period in summer. This industry is estimated to be worth more than \$2 million annually. A large number of loggerhead turtle hatchlings have survived at the Mon Repos Conservation Park near Bundaberg. Because of the value of the turtles as a nature-based tourism resource, a habitat which would otherwise have been destroyed by natural flooding and erosion has been preserved.

Access to turtle breeding islands is managed by the Queensland Parks and Wildlife Service, and a code of practice. Breeding populations are protected by closing some islands to the public and closing other islands seasonally.

Visitors to Heron Island enjoy turtle watching.



Photo: GBRMPA

The future

The impact of tourism on most of the Great Barrier Reef is low because of the large size of the Reef, the low population levels adjacent to it, well-developed management systems, and industry stewardship. Future advances in technology will make more of the Great Barrier Reef accessible to more people, which could increase the potential for deleterious impacts of marine tourism if left unmanaged. CRC Reef Research Centre, with its partner organisations, is supporting a range of research activities aimed at identifying and explaining patterns of change in Reef tourism and the development of predictive models that support longer term, more proactive tourism planning. As the tourism industry depends on a healthy Great Barrier Reef ecosystem, the CRC Reef Research Centre provides a variety of scientific research programs focusing on the conservation and sustainable use as well as on the identification and abatement of threats from human activities to the values of the Great Barrier Reef World Heritage Area. The GBRMPA is working with the marine tourism industry to develop a new cooperative framework for managing tourism and recreation in the Marine Park. A balanced, cooperative approach will ensure sustainable future use and management of tourism and recreation on the Great Barrier Reef.

Benefits of marine tourism

The marine tourism industry plays a key role in presenting the World Heritage values of the Great Barrier Reef to the community. Tourism operators provide interpretive material and briefings for visitors, which enhances community understanding of the Reef and its ecology.

The marine tourism industry is a major contributor to the Australian economy, with an estimated annual contribution in excess of \$1.5 billion. The Productivity Commission, an independent Commonwealth agency advising the Australian Government on economic policy, has estimated the gross value of the tourism industry in the Great Barrier Reef catchment as \$4.3 billion. This figure includes marine tourism expenditure as well as transport and accommodation expenses and activities on the land, for example visits to National Parks and other terrestrial attractions. According to this estimate, tourism is the most important industry in the Great Barrier Reef region, after mining. Total direct employment in the tourism industry is estimated at 120,000 people, of which about 48,000 people are employed in the marine sector.



Photo: Tourism Queensland

Boat trip to a remote area.

The benefits of sustainable reef-based tourism include foreign and investment income, increased employment and career opportunities for young Australians, particularly in regional areas, and improved infrastructure for residents. Marine tourism operators also provide most of the infrastructure that is supplied by governments in terrestrial parks such as toilet facilities, rubbish removal, water and power.

Because tourism operators visit the Reef regularly, they act as 'Reef watchdogs'. They are often the first to notice changes on the Reef as well as unusual or damaging practices, which they report to management authorities. A group of tourism operators based in Cairns and Port Douglas helps to monitor the Reef through the 'Eye-on-the-Reef' program. Tourism industry staff also contribute significantly to local controls of crown-of-thorns starfish outbreaks to help conserve the Reef and maintain the quality of the visitor experience. Through the Environmental Management Charge (\$4.50 per visitor per day from April 2003), the tourism industry is a source of funding for research, education and management of the Great Barrier Reef Marine Park.

The tourism industry relies on a healthy, attractive environment for its business. The most important factor that influences the enjoyment of day visitors to the Great Barrier Reef is the quality of the corals and fish. For a sustainable future of the industry, this is a strong motivation for improved conservation of the Great Barrier Reef as a whole.



Ensuring the future of
the world's coral reefs

CRC Reef Research Centre Ltd

is a knowledge-based partnership of coral reef researchers, managers and industry. Its mission is to plan, fund and manage world-leading science for the sustainable use of the Great Barrier Reef World Heritage Area. It is a joint venture between:

- Association of Marine Park Tourism Operators
- Australian Institute of Marine Science
- Great Barrier Reef Marine Park Authority
- Great Barrier Reef Research Foundation
- James Cook University
- Queensland Department of Primary Industries
- Queensland Seafood Industry Association
- Sunfish Queensland Inc

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