IUCN Conservation Outlook Assessment 2017 **(archived)**
Finalised on 08 November 2017

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Great Barrier Reef

SITE INFORMATION

Country:
Australia
Inscribed in: 1981
Criteria:
(vii) (viii) (ix) (x)

Site description:
The Great Barrier Reef is a site of remarkable variety and beauty on the north-east coast of Australia. It contains the world's largest collection of coral reefs, with 400 types of coral, 1,500 species of fish and 4,000 types of mollusc. It also holds great scientific interest as the habitat of species such as the dugong ('sea cow') and the large green turtle, which are threatened with extinction. © UNESCO

SUMMARY

2017 Conservation Outlook

Significant concern

The Great Barrier Reef, one of the earliest properties to be inscribed as World Heritage, is a global icon. Unfortunately, a number of values for which the property was inscribed are declining, with a further dramatic decline occurring during the 2016 and 2017 coral bleaching events. Some of the activities causing a threat to the values of the property can be influenced by the management authorities, such as fishing and coastal development. Other pressures on the property cannot be addressed at the site level, such as climate change, which arguably poses the greatest threat to the values of the property. While individual decisions and management approaches appear in themselves adequate, the cumulative impacts of many decisions, on top of the legacy impacts and impending impacts of climate change, are unclear. Although the property's protection and management capacity are often cited as being among the best in the world, there is a real concern that many of the values may continue to decline. The Reef 2050 Long-Term Sustainability Plan (LTSP) for the property should help direct many conservation and land management actions with the aim of ensuring that the best possible scenarios are in place for the long-term conservation of the property's iconic values. However, its implementation still needs to be evaluated. A comprehensive review of the performance in meeting the targets established under the LTSP will be undertaken by the World Heritage Committee at its 44th session in 2020.

Current state and trend of VALUES

High Concern
Trend: Deteriorating

The Great Barrier Reef is a very large property containing a large number of World Heritage values. Since inscription in 1981, and despite good management and protection, many iconic species and habitats have declined. While there have been positive trends, such as improved water quality and the increase in

humpback whale numbers, coral bleaching continues to be a significant threat to the values of the property. The 2016-2017 back-to-back coral bleaching events have been unprecedented in severity and impacts.

Overall THREATS

Very High Threat

Climate change poses the most important threat to the long-term conservation of the property. Significantly the 2016 and 2017 bleaching events have seriously affected the OUV of the property and climate change continues to impact the resilience of the property. Poor water quality from catchment runoff, impacts from coastal development, illegal and unsustainable fishing and crown-of-thorns starfish also continue to be major threats to the long-term conservation of the property. Poor water quality is an extremely important threat to the property, influencing in-shore regions of the reef in particular. Despite good management and significant resources in place to deal with these challenges, the level of threats to the site’s values remains very high. These major threats are only some of the 41 threats impacting the GBR that are listed in the 2014 Outlook Report (GBRMPA 2014). Two further issues of real concern are the cumulative, long-term impacts of all these threats.

Overall PROTECTION and MANAGEMENT

Mostly Effective

The enormous size of the property and surrounding developmental pressures means that there will always be protection and management challenges. The management authority (the Great Barrier Reef Marine Park Authority, or GBRMPA) has often been cited as a leader in protected area management and protection, and the EPBC Act used as exemplary legislation for World Heritage. However, there remain strategic issues concerning climate change and sustainable development that continue to be of significant challenge and threat to the property. Although the management authority has taken extensive and innovative measures in order to protect the property, until the status of values is shown to be maintained, concerns remain and overall the threats to the values of the property remain significant and the status of the values for which the property was inscribed continue to deteriorate. The adoption of the Reef 2050 LTSP has been recognised as a significant step in providing an overarching framework for the management of the property and addressing the multiple

threats it is facing; however, progress towards achieving some of the targets has been slow so far.

FULL ASSESSMENT

Description of values

Values

World Heritage values

▶ **Exceptional geological formations and processes linking reefs, coral cays and continental islands.**
Criterion:(viii)

The world’s largest coral reef ecosystem demonstrating all stages of reef development. The processes of geological and geomorphological evolution are well represented, linking 600 continental islands with more than 300 coral cays and some 3,000 reefs. The varied sea and landscapes within the property have been moulded over the past 15,000 years by changing climates, sea levels and the erosive power of wind and water (World Heritage Committee, 2012; State Party of Australia, 1981; 2013a; IUCN, 1981; Lucas et al., 1997).

▶ **Spectacular species assemblages**
Criterion:(vii)

The Great Barrier Reef World Heritage Area (GBR WHA) is home to spectacular and globally important breeding colonies of seabirds and nesting marine turtles, including the world’s largest green turtle breeding area. Other assemblages found within the property include annual coral spawning, migrating whales and significant spawning aggregations of many fish species (World Heritage Committee, 2012; State Party of Australia, 1981; 2013a; IUCN, 1981; Lucas et al., 1997).

► Superlative natural beauty above and below the water

Criterion:(vii)

The Great Barrier Reef (GBR) is of superlative natural beauty both above and below the water, providing some of the most spectacular scenery on Earth. From the air, the vast mosaic patterns of reefs, islands and coral cays produce an unparalleled aerial panorama of seascapes comprised of diverse shapes and sizes (World Heritage Committee, 2012). The spectacular scenery includes magnificent vistas of green vegetated islands and spectacular sandy beaches alongside azure waters, vast mangrove forests and framed by rugged vegetated mountains with lush rainforest gullies. Below water is the worlds' largest network of living coral reefs with spectacular assemblages of hard and soft corals, and thousands of species of reef fish (World Heritage Committee, 2012; State Party of Australia, 1981; 2013a; IUCN, 1981; Lucas et al., 1997).

► Outstanding on-going ecological and biological processes in the evolution and development of coastal and marine ecosystems and communities of plants and animals.

Criterion:(ix)

The globally significant diversity of reef and island morphologies contained within the property reflects ongoing geomorphic, oceanographic and environmental processes. Complex cross-shelf, longshore and vertical connectivity is influenced by dynamic oceanic currents and ongoing ecological processes such as upwellings, larval dispersal and migration. Biologically, the unique diversity of the Great Barrier Reef (GBR) reflects the maturity of an ecosystem that has evolved over millennia; evidence exists for the evolution of hard corals and other fauna. Globally significant marine faunal groups include over 4,000 species of molluscs, over 1,500 species of fish, plus a great diversity of sponges, anemones, marine worms, crustaceans and many other groups. Extensive beds of Halimeda algae represent active calcification and accretion over thousands of years (World Heritage Committee, 2012; State Party of Australia, 1981; 2013a; IUCN, 1981; Lucas et al., 1997).

► Outstanding diversity of plants including mangroves and seagrass

Criterion:(x)

The continental islands within the property support thousands of plant species, while the coral cays have their own distinct flora including threatened species. The shallower marine areas support 37 species of mangroves (54% of the world diversity) and 15 seagrass species covering over 6,000 km2 (23% of the world diversity). A further 40,000 km2 of deep-water seagrasses is also estimated. There is also a high diversity of macroalgae and benthic microalgae (World Heritage Committee, 2012; State Party of Australia, 1981; 2013a; IUCN, 1981; Lucas et al., 1997; GBRMPA, 2009; Coles et al., 2009).

► Outstanding diversity of invertebrate species, including hard and soft corals

Criterion:(x)

As the world's most complex expanse of coral reefs, there are more than 500 species of corals in 60 genera including hard corals, soft corals, sea pens and sea fans. This equates to 56% of the world's hard coral species and one-third of the world's soft coral and sea pen species. Ecologically important inter-reefal areas include at least 330 species of ascidians, between 300 and 500 species of bryozoans, 800 species of echinoderms, at least 4,000 species of molluscs, 1,500 species of sponges and a high diversity of flatworms, crustaceans and polychaetes (World Heritage Committee, 2012; State Party of Australia, 1981; 2013a; IUCN, 1981; Lucas et al., 1997; GBRMPA, 2009).

► Outstanding diversity of fish including threatened species

Criterion:(x)

The property is home to over 1,600 species of fish in more than 130 families with the number of reef-associated fish alone being 1,468. Over 130 species of sharks, rays and skates, many of which are threatened, have also been recorded within the property (World Heritage Committee, 2012; State Party of Australia, 1981; 2013a; IUCN, 1981; Lucas et al., 1997; GBRMPA, 2009).

► Threatened reptiles

Criterion:(x)

With six of the world's seven species of marine turtle, the property provides globally important nesting and feeding grounds for the loggerhead (Caretta caretta, EN); green (Chelonia mydas, EN); hawksbill (Eretmochelys imbricata, CR) and flatback (Natator depressus, DD) turtles, including one of the last significant breeding populations of the hawksbill turtle in the world, the largest green turtle breeding population in the world and 70% of the South Pacific population of the loggerhead turtle. 14 species of sea snakes breed in the property (World Heritage Committee, 2012; State Party of Australia, 1981; 2013a; IUCN, 1981; Lucas et al., 1997; GBRMP, 2012).

► Bird diversity

Criterion:(x)

Some 242 species of birds have been recorded with 22 breeding species of seabird on cays and some continental islands; some of these breeding sites are globally significant. Species previously regarded as threatened include the roseate tern (Sterna dougallii gracilis), little tern (Sternula albifrons) and Torresian imperial-pigeon (Ducula spilorrhoa), although they are now classified as Least Concern. Beach thick-knee (Esacus giganteus) is considered to be Near Threatened (World Heritage Committee, 2012; State Party of Australia, 1981; 2013a; IUCN, 1981; Lucas et al., 1997; IUCN, 2013).

► Threatened mammals

Criterion:(x)

The property is home to one of the world's largest populations of dugong (Dugong dugon, VU, including 15% recorded within Australian waters). Significant refuge for cetaceans with at least 30 species of whales and dolphins, including the Australian snubfin dolphin (Orcaella heinsohni, CR) and the Indo-Pacific humpbacked dolphin (Sousa chinensis, NT). Regionally important habitat for the dwarf minke whale (Balaenoptera acutorostrata, LC) and an important breeding ground for humpback whale (Megaptera novaeangliae, LC). Longman's beaked whale (Indopacetus pacificus, DD), possibly the rarest whale in the world, has been recorded here. It also includes the most important remaining habitat for the Endangered Proserpine rock wallaby (Petrogale persephone) (World Heritage Committee, 2012; State Party of Australia, 1981; 2013a; IUCN, 1981; Lucas et al., 1997).

Assessment information

Threats

Current Threats

Very High Threat

Climate change, poor water quality from catchment runoff, impacts from coastal development, impacts of fishing and crown-of-thorns starfish pose the biggest threats to the long-term conservation of the property and its Outstanding Universal Value (OUV). Collectively the various impacts of climate change pose the greatest current threat to the GBR, and both local and global efforts are urgently required to reduce those impacts. Poor water quality is an extremely important threat to the property, particularly affecting in-shore regions of the reef. Good management instruments are in place but at the same time increases in extreme weather events have caused major damage to the property since inscription. The extent of impacts from coral bleaching in 2016 and 2017, in terms of both frequency and severity, has never been seen historically. The only section of the GBRWHA that has escaped bleaching to date is the offshore southern region.

▶ Water Pollution, Household Sewage/ Urban Waste Water, Agricultural effluents

Very High Threat
Inside site, widespread(15-50%)
Outside site

Sediment, nutrient and pesticide runoff from coastal rivers and storm damage (GBRMPA, 2009; UNESCO and IUCN, 2012) has led to significant declines in coral cover, particularly of in-shore reefs south of Cooktown. Over recent years there has been some improvement in water quality through an ambitious Reef Water Quality Protection Plan (Reef Plan) (UNESCO and IUCN, 2012; Reef Plan, 2011, 2013). The Reef Water Quality Protection Plan is being revised in 2017. For the first time, 35 basin water quality targets are included

in the Plan. The revised draft Plan, which was released for public comment from 28 August to 10 October 2017, is underpinned by an updated Scientific Consensus Statement, released on 28 August 2017 (IUCN Consultation, 2017). However, the rate of improvement has been slower than targeted and water quality remains a significant threat to the Outstanding Universal Value (OUV) of the property. Progress towards achieving the water quality targets of the Reef 2050 Long-term Sustainability Plan has also been slow and the most immediate water quality targets are unlikely to be achieved within the planned timeframe (UNESCO, 2017). The 2017 Scientific Consensus Statement for the Great Barrier Reef also notes that “current initiatives will not meet the water quality targets” (Australian Government and Queensland Government, 2017). The Australian and Queensland Governments are jointly investing AU$573 million in water quality initiatives over the next five years (Commonwealth of Australia, 2016).

► Invasive Non-Native/ Alien Species, Hyper-Abundant Species

Very High Threat
Inside site, scattered(5-15%)
Outside site

Crown-of-thorns starfish outbreaks linked to water quality (GBRMPA, 2009) pose a threat to the property. Measures to address the threat of starfish in high value areas are being undertaken. Outbreaks of crown-of-thorns starfish continue to occur on the Great Barrier Reef. There is strong evidence to support a connection between human-related impacts (in particular, nutrients from land-based runoff) and outbreaks of crown-of-thorns starfish. Over the period 2012-2015, the Australian Government invested AU$10.5 million into a targeted crown-of-thorns starfish control programme (Commonwealth of Australia, 2015) and as of 2017 a further AU$21 million has been invested to expand the programme through to 2020. This investment includes AU$568,000 towards innovative research trials such as the Australian Institute of Marine Science trials into breeding of the starfish’s feared predator – the giant triton sea snail (Charonia tritonis). The snail is native to coral reefs in the Pacific but is now rare (IUCN Consultation, 2017; Frydenberg and Entsch, 2017).

► Fishing / Harvesting Aquatic Resources

Very High Threat

Inside site, widespread(15-50%)
Outside site

Progress towards environmentally sustainable use of fisheries resources in the Great Barrier Reef has been made over the preceding years but there is still much scope for improvement. Rezoning of the Great Barrier Reef Marine Park in 2004 (GBRMPA, 2004) increased no-take zones up to 33% of the property, along with the reduction of effort in some commercial sectors and the introduction of 16 dugong protection areas, in 1997, has been positive. The overall compliance and surveillance programme for the no-take zone and spatial protection provided by dugong protection areas to gillnet fishing is highly sophisticated (GBRMPA, 2009; UNESCO and IUCN, 2012), however non-compliance is still a significant issue for both the recreational and commercial sectors (GBRMPA, 2014). Illegal fishing/poaching, unsustainable fishing and the incidental catch of species of conservation concern both remain very high risk to the property, and the extraction of predators, discarded catch and extraction of spawning aggregations are all high risks identified in the Great Barrier Reef Outlook Report 2014 (GBRMPA, 2014). More effective management for both recreational and commercial fishing is required to ensure that the objectives of the Reef 2050 Plan are met and the OUV status of the property is not compromised.
Populations of Indo-Pacific humpbacked dolphin (Sousa chinensis) and Australian snubfin dolphin (Orcaella heinsohni) are likely to be in decline and incidental capture in gillnet fisheries has been identified as high risk to these animals (GBRMPA, 2012a). Fishing activities are also a high risk to other non-target species, including sawfish, dugong, marine turtles, sea snakes, and even some target species, including some species of sharks and rays and bony fish.
In 2017, the Queensland Government released the Queensland Sustainable Fisheries Strategy 2017-2027 that aims to ensure fisheries resources are managed in a sustainable and responsible manner (Queensland Government, 2017). In June 2017, the Queensland Government approved AU$20.883 million over 3 years to support implementation.

► **Tourism/ visitors/ recreation, Tourism/ Recreation Areas**
Low Threat

Inside site, widespread(15-50%)
Outside site

Visitation to the entire Great Barrier Reef Marine Park for the financial year ending 30 June 2017 was approx. 2.34 million visitor days (IUCN Consultation, 2017).
In addition, an estimated 14 million recreational visits are made to the GBR annually (to boat, fish, sail, dive, snorkel and swim). Compared to other threats, direct impacts from tourism remain low.
The marine tourism industry is a key partner in the protection and management of the Great Barrier Reef. Many tourism operators ensure their activities are best practice by following the Responsible Reef Practices for tourism operators.
High Standard Tourism Operators voluntarily operate to a higher standard than required by legislation as part of their commitment to ecologically sustainable use. These operators are independently certified as meeting best practice standards for the key areas of protection, presentation and partnership.

► Ocean acidification, Temperature extremes, Storms/Flooding

Very High Threat
Inside site, throughout(>50%)
Outside site

Climate change poses the biggest threat to the long-term conservation of the property and its OUV. Of most concern are ocean warming and acidification and the increased frequency and intensity of extreme weather events. The unprecedented back-to-back coral bleaching that occurred in 2016 and again in 2017 was the worst ever recorded on the GBR, impacting the upper two-thirds of the length of the Reef. The category 4 Cyclone Debbie in March 2017 was the tenth severe cyclone to impact the Reef since 2005 and had a major impact on the Whitsundays and the southern GBR (IUCN Consultation, 2017). A study by Hughes et al., based on data collected during the 2016 bleaching, as well as previous events, showed that of the 171 individual reefs that were aerially surveyed, 43% bleached in 1998, 56% in 2002, and 85% in 2016. The northern region of the GBR was affected most in 2016 (Hughes et al., 2017). The interim report on 2016 coral bleaching provided by the State Party together with its Update Report notes widespread bleaching of various levels of severity throughout the property, with the most severe bleaching

documented between the tip of Cape York and just north of Port Douglas (GBRMPA, 2016b). This unprecedented severe bleaching and mortality of corals in 2016 in the Great Barrier Reef was widely seen as a game changer. Some argue that given the severity of the damage and the slow trajectory of recovery, the overarching vision of the Reef 2050 Long-term Sustainability Plan is no longer attainable for at least the next two decades (Tarte et al., 2017). Climate change also impacts on other habitats through changes in rainfall patterns and increased likelihood of flooding affecting seagrass, mangroves and the other biodiversity found within the property. Increased storms and intensity of storms, possibly due to climate change, may also cause increased sediment, nutrient and pesticide runoff from land (Johnson & Marshall, 2007; ANU, 2009; De'ath et al., 2009; GBRMPA, 2007, 2009; UNESCO and IUCN, 2012). The Great Barrier Reef's scale and world class management mean that globally it is best placed to face the challenges posed by a changing climate – however the severity and frequency of climate related system level disturbances is affecting its capacity to recover from these impacts.

► Shipping Lanes

High Threat
Inside site, widespread(15-50%)
Outside site

Risks of ship strikes on already depleted populations of long-lived, slow-breeding species including dolphins, whales, dugongs and sea turtles are of concern. Additionally, there is significant noise pollution from shipping traffic and localised coral and seagrass smothering from the resuspension of sediments in the wake of deep-draft ships traversing the inner shipping route. Risk of oil and chemical spills are also of concern (e.g. the Chinese ship Shen Neng 1 grounded on the Reef in 2010 – the largest ever known direct impact by a ship in the GBR, damaging an area of 0.4 km2). As a result of this, the Vessel Traffic Service was extended to cover the entire Reef Region. The 2014 GBR Outlook report assessed the risk of large oil and chemical spills as unlikely but with major consequences. Shipping may also introduce invasive species from ballast water and there are problems of waste disposal, anchor damage and biocides from anti-fouling. Management and regulation of shipping and marine safety is implemented through the Australian Marine Safety Authority (GBRMPA, 2009; UNESCO and IUCN, 2012;

Senate Hearing, 2013). The 2014 Great Barrier Reef Outlook report noted that “despite an increase in shipping activity, impacts were relatively stable” (GBRMPA, 2014). There have been no large vessel (SOLAS class) groundings since 2010. In 2015, the Particularly Sensitive Seas Area Region was expanded beyond the Great Barrier Reef into the neighbouring Coral Sea.

► Commercial/ Industrial Areas

Very High Threat
Inside site, scattered(5-15%)
Outside site

The 2014 Great Barrier Reef Outlook Report noted that the influence of coastal development arose “from both the legacy of past development actions, such as broad scale clearing of catchment habitats for agriculture, and current and future actions, such as smaller scale clearing and reclamation for urban and industrial development” (GBRMPA, 2014). Extension of existing ports, dredging and shipping continue to pose significant threats to the OUV of the property. Impacts from such development include loss and degradation of critical habitat for marine megafauna; fragmentation of dugong, turtle and dolphin populations through habitat loss and degradation. In its Decision 39COM 7B.7, the World Heritage Committee welcomed “the State Party’s decision to reconsider the approval to dispose capital dredge material inside the property from the proposed Abbot Point development and the commitment to establish a permanent ban on dumping of dredged material from all capital dredging projects within the property” (World Heritage Committee, 2017). Legislation has since been passed to ban sea-based disposal of capital dredge material in the property and to restrict new port development within current port limits (UNESCO, 2017). Mandated under the Queensland Sustainable Ports Development Act 2015 (Ports Act, Part 1, Clause 2), master plans are being developed for the priority ports Gladstone, Abbot Point, Townsville and Hay Point/Mackay. The purpose of the Ports Act is to provide for the protection of the Great Barrier Reef World Heritage Area through managing port-related development in and adjacent to the area.

Potential Threats

Very High Threat

Recent severe bleaching events have already demonstrated the scale of impacts from climate change. Rising sea temperatures will further stress coral reefs, increasing bleaching severity, and ocean acidification will increasingly become a concern, ultimately reducing the resilience of many species critical to the reef. Severe weather events, such as cyclones are also predicted to increase in both frequency and intensity. Furthermore, the Queensland population is projected to double by 2050 putting even greater pressure on the GBR.

► Ocean acidification, Temperature extremes, Storms/Flooding

Very High Threat
Inside site, widespread(15-50%)
Outside site

Recent severe bleaching events have already demonstrated the scale of impacts from climate change. Rising sea temperatures will further stress coral reefs, increasing bleaching severity and impacting on ocean acidification ultimately reducing the resilience of many species critical to the reef. Severe weather events, such as cyclones, are also predicted to increase in both frequency and intensity. If worst-case climate change scenarios occur, the OUV of the property will be severely affected despite research indicating that well-protected areas offer greater resilience and capacity to rebuild compared to reefs without their full complement of fish (Hughes et al., 2007; Diaz-Pulido et al., 2009).

Protection and management

Assessing Protection and Management

► Relationships with local people

Mostly Effective

Over one million people live in or around the Great Barrier Reef (State Party of Australia, 2013a). There is a strong commitment to the protection of the property among all stakeholders involved, including Commonwealth, State and local authorities, Traditional Owners, representatives from NGOs, the private sector and the wider community (UNESCO and IUCN, 2012). The

GBRMPA reported working with more than 30 Traditional Owner groups, administering an AU$500,000 grants programme on Traditional Use of Marine Resources Agreements to gain greater compliance with laws concerning illegal use of nets to take turtle and dugong, and empowering the community (GBRMPA, 2011). There has been very positive progress in partnerships with Traditional Owners. The Great Barrier Reef Marine Park Authority is engaged with over 80 per cent of Traditional Owners that have connections to sea country in the Region and continues to work closely with them in relation to its management (GBRMPA, 2014). However, the level of engagement with some groups varies considerably, with some engagement being more limited (IUCN Consultation, 2017). The Great Barrier Reef Marine Park Authority is also supported by two Reef Advisory Committees (Indigenous Reef Advisory Committee and Tourism Reef Advisory Committee) and 12 voluntary community-based Local Marine Advisory Committees. The Great Barrier Reef Marine Park Authority also engages with stakeholders through the Reef Guardians programme which includes Reef Guardian Schools, Councils, Farmers and Fishers. The Reef 2050 Advisory Committee and Reef 2050 Plan Independent Expert Panel support the implementation of the Reef 2050 Plan. Through the Australian Government's Reef Trust, Partnership for the Reef has also been released. A key component of the Reef Trust is its ability to facilitate greater opportunities for partnerships and private investment to work effectively alongside public investment. To date, the Reef Trust has facilitated up to AU$19.8 million of private investment through co-investment partnerships. Approximately 1,800 farmers/landholders were engaged through Reef Program water quality grants, partnerships and systems repair projects, and 30 through the first two phases of Reef Trust Reverse Tenders in the Wet Tropics and Burdekin regions.

► Legal framework

Mostly Effective

The primary objective of the Great Barrier Reef Marine Park Act 1975 (Australian Government, 1975) is "…to provide for the long term protection and conservation of the environment, biodiversity and heritage values of the Great Barrier Reef Region". The legislation, however, also has secondary objectives, including "allowing ecologically sustainable use". In addition, the Environment Protection and Biodiversity Conservation (EPBC) Act 1999 is a

model for World Heritage legal framework, and other laws. There are many other relevant pieces of Federal and State legislation that provide additional legal protection (Commonwealth of Australia, 2013b) and apply over differing jurisdictional areas within the GBR, addressing such matters as Native Title, sea dumping, historic shipwrecks, fisheries, etc. (see p. 196, GBRMPA, 2014). A number of specific new regulations have recently been adopted to address some specific issues. These include a ban on sea-based disposal of capital dredge material in the property (but not maintenance dredge spoil) and restriction of new port development to current port limits (UNESCO, 2017). The statutory Zoning Plan is only one of many statutory spatial management layers used within the GBR. Others include statutory plans of management for high use and important conservation areas, site plans, special management areas, and other spatial and temporal management provisions (e.g. defence training areas, designated shipping areas, seasonal closures and agreements with Traditional Owners). Today there are complementary (State/Federal) management provisions for virtually all marine waters in the GBR Region irrespective of the jurisdiction.

► Enforcement

Mostly Effective

Complementary management arrangements are in place between GBRMPA and other agencies including the Queensland Department of Agriculture, Fisheries and Forestry. The GBRMPA also provides public options for reporting such as the Independent Eyes and Ears Incident Reporting programme and the Field Management Program jointly undertaken with the Queensland Government. The GBRMPA’s resources include funding and capacity directed at ensuring tourism is environmentally sustainable. This is done by developing tourism management arrangements as well as managing tourism permits, environmental impact assessments, planning, compliance and enforcement. The Department of Defence contributes to providing for security and border protection, assists with quarantine and fisheries enforcement. The remoteness of some locations within the GBR WHA makes enforcement particularly challenging. In 2015-16, there were a total of 971 offences in the GBR Marine Park, 55% of which related to fishing offences (GBRMPA 2016a). Of these, 19 related to commercial fishing offences, 2 were foreign fishing offences, 516 were recreational fishing offences. “Despite concerted effort and focus on this issue since 2012, recreational fishing

offence numbers have continued to rise" (GBRMPA, 2016a).

▶ Integration into regional and national planning systems

Some Concern

The Great Barrier Reef Marine Park Authority (GBRMPA) is the statutory Australian management authority for the park, and works with the Queensland Government and a range of State and Federal government agencies in cooperative partnerships (GBRMPA, 2011). In general terms, the actual Marine Park falls under Australian Government jurisdiction, and the adjacent catchments are within the jurisdiction of the Queensland State Government. These differences lead to issues when adopting an ecosystem-based approach to management (Brodie & Waterhouse, 2012). They also add layers of complexity to integrating the property into national and regional planning. The Reef 2050 Plan includes several actions for regional and national planning.

▶ Management system

Mostly Effective

The Australian and Queensland governments have been working together for the long-term protection and conservation of the Great Barrier Reef Marine Park since its inception in 1975.
This cooperative approach was formalised by the Emerald Agreement in 1979. It was updated in July 2009 with the Great Barrier Reef Intergovernmental Agreement to provide a contemporary framework for cooperation between the governments, recognising challenges such as climate change and catchment water quality not foreseen at the time of the 1979 agreement.
The 2015 Agreement reflects the shared vision for the future outlined in the Reef 2050 Plan, and renews the Australian and Queensland governments' commitment to protecting the Great Barrier Reef World Heritage Area including its Outstanding Universal Value.
The Great Barrier Reef Ministerial Forum oversees the implementation of the Intergovernmental Agreement. The Ministerial Forum is comprised of two ministers each from the Australian and Queensland governments with responsibility for matters relating to the environment and marine parks, science, tourism and/or natural resource management.

The Great Barrier Reef Marine Park Authority (GBRMPA) is the management authority for the park, which covers some 99% of the World Heritage area. It works in partnership with the Queensland Parks and Wildlife Service to deliver an effective Field Management programme; ensuring that users of the Reef comply with the Zoning Plan (GBRMPA, 2011). The management system includes a multi-use zoning plan, local plans of management and numerous strategies for biodiversity conservation, tourism, invasive species management, water quality, etc. The Reef 2050 Long-term Sustainability Plan adopted by the Australian and Queensland Governments in 2015 has been welcomed by the World Heritage Committee as providing an overarching framework for the management of the property in the face of multiple and complex challenges. The Plan defines a comprehensive vision for the conservation of the property's OUV over the next 35 years and proposes 7 major outcomes for the property to be delivered by 2050 (UNESCO, 2015).

► Management effectiveness

Some Concern

As part of the Great Barrier Reef Outlook Report 2014, an independent assessment of management effectiveness was undertaken. The evaluation of the management of the property found considerable improvement in a number of areas since the Great Barrier Reef Outlook Report 2009. The development of the Great Barrier Reef Biodiversity Conservation Strategy 2013, a range of species vulnerability assessments, the revised joint Australian and Queensland Reef Water Quality Protection Plan 2013 (Reef Plan, 2013), Coastal Ecosystem Assessment Framework 2012, the Climate Adaptation Strategy and Action Plan 2012-2017 and Informing the Outlook for the Great Barrier Reef Coastal Ecosystems, in addition to the review of the Zoning Plan through the Representative Areas Program, and the joint Field Management Program are examples of the world class management of the Region (Hockings et al., 2014). Management effectiveness challenges are evident for broad scale issues, which are complex socially, biophysically and jurisdictionally. These include ports, shipping, climate change, coastal development, fishing and heritage (Hockings et al., 2014). The adoption of the Reef 2050 Long-term Sustainability Plan (Reef 2050 Plan) has been recognised as a very significant step in providing an overarching framework for the management of the property and addressing the multiple threats it is facing; however, progress towards achieving some of the targets has been

slow so far (UNESCO, 2017). A comprehensive review of the performance in meeting the targets established under the Reef 2050 Plan will be undertaken by the World Heritage Committee at its 44th session in 2020 (World Heritage Committee, 2017).

► Implementation of Committee decisions and recommendations

Some Concern

The 39th session of the World Heritage Committee in 2015 was a crucial moment where the Committee examined progress made by Australia in the implementation of its requests. Decision 39 COM 7B.7 (World Heritage Committee, 2015) noted efforts by the State Party but noted with concern the conclusions of the Great Barrier Reef Outlook Report 2014 and while it acknowledged efforts in regards to a number of previous requests, it maintained concern over a number of ongoing and serious threats to the OUV of the property. This Decision also requested the State Party to submit an update on progress with implementation of Reef 2050, which was received by the World Heritage Centre in 2016. A comprehensive review of the performance in meeting the targets established under the Reef 2050 Plan will be undertaken by the World Heritage Committee at its 44th session in 2020 (World Heritage Committee, 2017). It is now widely acknowledged that the Reef 2050 Plan needs to be revised “to consider the potential impacts of plausible climate and weather scenarios, and that reducing global emissions is the priority for the Reef’s future” (Independent Expert Panel Communiqué, 2017). The mid-term review of the Reef 2050 Plan is currently underway – the Great Barrier Reef Ministerial Forum brought forward the immediate commencement of the mid-term review in July 2017.

► Boundaries

Mostly Effective

Boundaries of the property mostly match the Great Barrier Reef Marine Park. The Marine Park comprises 99% of the property. Parts of the property not included in the Marine Park comprise: islands under State (Queensland) jurisdiction (about half of these are national parks); State waters and internal waters of Queensland (e.g. deep bays or narrow inlets, many of which are State Marine Parks); and a number of small exclusion areas around major ports/ urban centres (e.g. Cairns). These boundary differences result in

jurisdictional complexities, and in many cases, have resulted in challenges in regards to management of GBR coastal freshwater ecosystems, estuaries and port exclusion areas. The property is managed through a comprehensive multi-level 'management system' of a range of spatial and temporal plans of which the comprehensive multiple-use zoning system (GBRMPA, 2004) is a key component, and which is matched by complementary Queensland legislation in the adjoining State land and waters. The Coral Sea Commonwealth Marine Reserve, which covers 989,842 km2 and abuts the entire eastern edge of the GBR WHA, adds substantial additional protection for the integrity of the property (State Party of Australia, 2013b). While the Australian Government's EPBC Act 1999 provides the framework to protect and manage Australia's WHAs, and State legislation exists to manage locations that fall within the WHA but not the Marine Park, there has been a lack of integration of research, management and monitoring activities in these areas.

► Sustainable finance

Mostly Effective

The Queensland and Australian governments provide significant investment in the property and its management. In addition to maintaining its AU$35 million expenditure contributing to improved water quality, the new Queensland Government has committed an additional AU$100 million over five years towards water quality initiatives, scientific research and helping business transition to better environmental practices in primary production and fishing industries (Commonwealth of Australia, 2015). Projected investment in the coming decade for research and management activities on the Reef and in the adjoining catchments along the coast is more than AU$2 billion (Commonwealth of Australia, 2015). This level of investment continues previous budget support to the management of the property. Previous investment included the GBRMPA receiving more than AU$200 million over the five years up to 2011 (GBRMPA, 2011). This included AU$2.13 million for an initiative to control crown-of-thorns starfish. In addition, funding has been earmarked for AU$12.5 million over four years from 2013 to the Great Barrier Reef Foundation to coordinate research in areas such as reef resilience and climate change; AU$2.8 million for projects to inform the comprehensive strategic assessment and long-term sustainable development planning for the World Heritage Area and adjacent coastal zone; AU$12.4 million over four

years to 2015 for reef ecosystem research through the National Environmental Research Program (NERP) followed by a further AU$31.8 million over 5 years through the National Environmental Science Program (NESP); more than AU$11.25 million for 14 projects in catchments that flow into the GBR lagoon for activities which restore, manage and better protect biodiversity; and AU$3.68 million over four years through the NERP's Tropical Ecosystems Hub for water quality research aimed at better understanding the drivers and impacts of water quality on the biodiversity of the GBR. While the level of funding is significant compared with many other World Heritage areas, to date, most funding has been spent addressing water quality, and while it has achieved some positive results, it has not managed to stop the deteriorating trends of many World Heritage values (IUCN Consultation, 2017). The Reef 2050 Plan Investment Strategy provided by the State Party as part of their Update Report to the World Heritage Committee in 2016 maps out AU$ 1.28 billion against the 2050 LTSP actions over the next 5 years, excluding general investment such as the Reef Fund (UNESCO, 2017).

► Staff training and development

Mostly Effective

While base training of staff is good there is limited on-the-job training for field staff in biodiversity management issues. Some staff participate in workshops, conferences and steering committee meetings at GBRMPA. Processes involved in developing programmes such as cumulative impact assessment and integrated monitoring would help build staff capacity.

Despite ongoing levels of financial support to the property, funding has not kept pace with an increase in use of the protected area. While activities including compliance, maintenance of faculties and work on threatened species are prioritised, the lack of funding increases is resulting in an ongoing decline in management capacity (Hockings et al., 2014). The recently released Independent Review of Governance also recommended increasing the classification levels of middle management staff of GBRMPA commensurate with their responsibilities (Craik, 2017).

Some areas of management inputs (staffing and funding) have declined since the Outlook Report 2009. This appears to be largely a result of competing requirements for management of other high priority issues. In the face of

essentially static resources for overall management outside specially funded programmes, redirection of effort is the main recourse for addressing these emerging priorities, which indirectly impacts on staff training and development.

► Sustainable use

Mostly Effective

The Land and Sea Country Indigenous Partnerships Program is consistent with the implementation of Article 10 of the World Heritage Convention, namely sustainable use of biodiversity.
Traditional use of marine resources within the property may include activities that are identified as part of Aboriginal and Torres Strait Islander peoples' customs or traditions, for the purposes of satisfying personal, domestic or communal needs. In addition to specific management strategies for the sustainable use of species, other Traditional Use of Marine Resources Agreement (TUMRA) activities may include cultural heritage mapping/surveys; protection, research and monitoring sea country; compliance, leadership, knowledge management; education, information exchange; language mapping on sea country.
Permits are provided to facilitate opportunities for sustainable use of the Marine Park. Permits are issued mainly for tourism, research, harvest fisheries, dredging and infrastructure (for example jetties and marinas) and include detailed risk based environmental impact assessment.
Under the Offshore Constitutional Settlement arrangement, all fisheries within the GBR Region, are managed by the Queensland Government through Fisheries Queensland, (except for tuna and tuna-like species which are managed by the Commonwealth of Australia). In 2017, the Queensland Government released the Queensland Sustainable Fisheries Strategy 2017-2027 that aims to ensure fisheries resources are managed in a sustainable and responsible manner. This strategy sets out clear targets to be achieved by 2020 and 2027 and a range of actions to deliver on targets. There are 33 actions across ten reform areas.

► Education and interpretation programs

Highly Effective

The Great Barrier Reef Marine Park Authority undertakes a number of

programmes to inform and motivate members of the community about the Great Barrier Reef and its protection and management, including ways they can contribute to its health.

Communication and engagement strategies are developed, implemented and evaluated on a range of programmes and topics. Each identifies key audiences, tools and channels and messages to communicate and promote engagement in a strategic and coordinated way.

The Marine Park Authority's external website is the central hub of information about Reef health and management, with more than 500,000 visits recorded on the site each year.

Social media channels — such as Facebook, Instagram, Twitter and LinkedIn — are also used to communicate and engage with an online community in excess of 60,000 users about the Reef and its management. E-newsletters provide targeted information to subscribers.

A decrease in funding in real terms for the Field Management Program (a joint programme between the Australian and Queensland Governments) has led to fewer staff and resources available for the programme, including a reduction in interpretation facilities and products and in the maintenance of infrastructure on islands and moorings in some cases. A targeted education and compliance strategy has been implemented to help give effect to the zoning plans of the property, with focus on high-risk threats. A network of Community Access Points distribute zoning maps and educational material to raise awareness and encourage visitors to follow the zoning rules.

Engagement occurs through regional networks, Local Marine Advisory Committees, the Reef Guardian stewardship programme, the Reef HQ Aquarium, and through information services provided to stakeholders and the community.

ReefHQ Great Barrier Reef Aquarium is the Australian Government's National Education Centre for the Great Barrier Reef and receives approximately 140,000 visitors annually. Through the provision of educational and informational services relating to the Marine Park, ReefHQ ensures the community and stakeholders have a clear understanding of the value of the Great Barrier Reef, the threats to its sustainable future and their role in protecting it. ReefHQ achieves this through providing world class living exhibits complemented by thematic and interactive educational experiences, which raise awareness and encourage behavioural change within the community that will help protect the Great Barrier Reef.

More than 276 schools and over 120,000 students and 7,400 teachers are helping build the resilience of the Great Barrier Reef through the Reef Guardians Schools programme. Other Reef Guardian programmes include the highly successful Reef Guardian Council programme, the Reef Guardian Farmers programme and the Reef Guardian Fishers pilot programme. A number of Marine Aquarium Fish and Coral Collection Fishers operating under their Pro-vision Reef Stewardship Action Plan 2013 (Mitigating Ecological Risk in a Changing Climate) have also joined the Reef Guardian pilot programme. The GBRMPA's Reef Guardian programme demonstrates that a hands-on community-based approach to caring for the Great Barrier Reef is essential to help preserve its immense social, economic and environmental value (GBRMP, 2011).

► Tourism and visitation management

Mostly Effective

Managers apply a range of management tools in an effort to minimise impacts from tourism. Whilst the tourism planning system adequately addresses the localised impacts of tourism, the management arrangements do not effectively address the larger threats posed by climate change and water quality. Under the 'High Standard Tourism Program' operators work to protect and present the Reef. Operators must be independently assessed under Ecotourism Australia's ECO Certification Program as operating at the two highest levels of the programme: Ecotourism and Advanced Ecotourism to be recognised as high standard by the GBRMPA. In 2012, there were 58 high standard reef tourism operators, carrying over 60 per cent of all tourists who visit the GBR. The GBRMPA has developed factsheets to assist tourism operators to reduce their emissions and adapt to climate change (State Party of Australia, 2013b). To some extent, successes in managing tourism have meant that management emphasis has shifted from tourism to other high impact threats.

► Monitoring

Mostly Effective

Long-term Monitoring Programmes (LTMP) in place include actions to assess GBR coral status and have been in place since 1985, implemented by the Australian Institute of Marine Science (AIMS). These include the GBR wide

long-term chlorophyll monitoring programme run from 1991 by GBRMPA and AIMS; the Reef 2050 Water Quality Improvement Plan /Reef Rescue Marine Monitoring Program assessing water quality and ecosystem health since 2005; aerial survey monitoring of dugong populations led by James Cook University; seagrass monitoring led by Queensland Department of Environment and Heritage Protection (from the 1970s onwards) and citizen science programme, Seagrass Watch; and for fish, the Fisheries Long Term Monitoring Program (commencing in 1999) and the Fisheries Observer Program. Specific programmes to collect fisheries information are in place including biological monitoring, stock status process, recreational surveys, log books for Species of Conservation Interest (including turtles and dugong), quotas, vessel monitoring systems, licensing and Performance Management Systems. There could be improved intra- and inter-port coordination of environmental monitoring, reporting and research and evaluation to better develop and present a cogent assessment of the effects and influences of ‘ports’ (Hockings et al., 2014). The Reef 2050 Integrated Monitoring and Reporting Program is currently being designed to draw together and build upon multiple existing monitoring and reporting systems to measure and assess performance against targets in the Reef 2050 LTSP. The Reef 2050 Integrated Monitoring and Reporting Program also aims to provide a reef knowledge system delivering up-to-date, management relevant information to better inform and support adaptive management of the GBR.

► Research

Highly Effective

Strong research and science base, the result of a large and long-term investment of efforts, and the involvement of many scientists and institutions (UNESCO and IUCN, 2012). The Outlook Report process and the Great Barrier Reef Region and coastal zone strategic assessments have accumulated and consolidated knowledge relevant to the management of the GBR and made this available to managers, stakeholders and the general public. In addition, these processes have identified key knowledge gaps and have stimulated programmes and projects to fill these knowledge gaps (Hockings et al., 2014). Management agencies have developed strong and extensive partnerships with research providers such as CSIRO, the Australian Institute of Marine Science and universities. The Reef Water Quality Protection Plan Research, Development and Innovation Strategy 2013-2018 provides

direction for reef water quality research. The NESP Tropical Water Quality Hub invests in priority research to support management of the GBR.

Overall assessment of protection and management

Mostly Effective

The enormous size of the property and surrounding developmental pressures means that there will always be protection and management challenges. The management authority (the Great Barrier Reef Marine Park Authority, or GBRMPA) has often been cited as a leader in protected area management and protection, and the EPBC Act used as exemplary legislation for World Heritage. However, there remain strategic issues concerning climate change and sustainable development that continue to be of significant challenge and threat to the property. Although the management authority has taken extensive and innovative measures in order to protect the property, until the status of values is shown to be maintained, concerns remain and overall the threats to the values of the property remain significant and the status of the values for which the property was inscribed continue to deteriorate. The adoption of the Reef 2050 LTSP has been recognised as a significant step in providing an overarching framework for the management of the property and addressing the multiple threats it is facing; however, progress towards achieving some of the targets has been slow so far.

▶ Assessment of the effectiveness of protection and management in addressing threats outside the site

Some Concern

Legally through the EPBC Act any threats to the property from outside the site require assessment and authorisation. However, some differences of opinion over the impact of some economic activities, and how they will affect the Outstanding Universal Value of the property, have led to community concerns. Statutory instruments used to assist the management of the GBR WHA are generally contemporary and appropriate. However, the relevant Queensland legislation is not always consistent with the Commonwealth legislation, often due to differences in objectives. The Great Barrier Reef Zoning Plan has been very effective for issues such as protecting key sites and reducing the impacts of fishing, resulting in positive outcomes for biodiversity values. However, zoning (spatial planning) is not designed to

address management of other topics (for example tourism and fisheries). That is why a range of other spatial and temporal management tools are also used. Management effectiveness is strongest on issues limited in scale or intensity and presenting only minor or moderate complexity, such as defence and research activities (Hockings et al., 2014).

► **Best practice examples**

Examples of best practice are numerous. The Zoning Plan (GBRMPA, 2004) has been widely cited as an important management and protection tool. The sound governance/legislative framework, with complementary legislation and integrated management for all State and Federal waters is a model approach. The EPBC Act for World Heritage is also a model piece of legislation. Communication, community training, ecotourism certification and outreach programmes (Reef Guardians, etc.) are also best practice. There is also widespread public support and consensus that the GBR is important, with many industries recognising that their future depends upon its health.

State and trend of values

Assessing the current state and trend of values

World Heritage values

► **Exceptional geological formations and processes linking reefs, coral cays and continental islands.**

High Concern
Trend:Deteriorating

Increasing coastal development is resulting in the loss of both coastal habitats that support the Great Barrier Reef and connectivity between habitats (GBRMPA, 2009). The Northern GBR region contains the widest range of reef types within the WHA, including extensive inshore turbid reefs, fringing reefs on high islands, wooded cays, mid-shelf reefs, ribbon reefs, deltaic reefs in the far north, submerged shoals, Halimeda bioherms and mesophotic reefs.
The 2016 coral bleaching substantially affected shallow reef-building

processes, such as internal and external bioerosion, calcification and reef accretion and while the greatest of these impacts will be felt in the Northern GBR, the impacts will be far reaching given the processes linking these features across the expanse of the GBR.

▶ Spectacular species assemblages

High Concern
Trend:Deteriorating

In addition to coral cover (see other sections) there is a reported decline of species associated with the reef, and some evidence of seabird decline (GBRMPA, 2009). However, there has been no record of loss of some species assemblages.

▶ Superlative natural beauty above and below the water

High Concern
Trend:Deteriorating

Coral cover, a primary indicator of reef status, is declining. This is due to a number of interrelated stressors, specifically coral bleaching but also including terrestrial runoff of sediments and nutrients and associated crown-of-thorns starfish outbreaks, water acidification associated with climate change, and coral diseases (Brodie & Waterhouse, 2012). While the level and extent of impacts from recent 2016-2017 bleaching events is still being assessed, it is considered that coral mortality has been significant (Hughes et al., 2017). Analysis of the long-term dataset shows hard coral cover has significantly declined over the past 30 years (GBRMPA, 2014).
However, the picture is not simple or clear cut, with reefs in different regions showing enormous differences in trends, including both increases and declines (GBRMPA, 2009; 2014).

▶ Outstanding on-going ecological and biological processes in the evolution and development of coastal and marine ecosystems and communities of plants and animals.

High Concern
Trend:Deteriorating

The loss of coral cover already observed in some areas will profoundly change virtually all reef processes, in many cases for at least 1-2 decades if

no other major perturbations occur. For example, particle feeding by corals has declined, predation on them has increased (on a per-capita basis), disease of corals is increasing, and recruitment of corals has been impaired. Other key processes that have been affected are symbiosis between corals, zooxanthellae and microbes, competition for space, herbivory, calcification and the provision of coral habitat.

► Outstanding diversity of plants including mangroves and seagrass

Low Concern
Trend:Stable

Only seagrass, mangroves and algae were considered in the 2009 and 2014 Outlook reports with no information provided on the terrestrial plants found within the property, despite the importance of the terrestrial vegetation to a number of the values for which the property was inscribed. While no robust trends in seagrass health and abundance are available, it is suggested that seagrass is declining in parts of the GBR, particularly in the Townsville region (Brodie & Waterhouse, 2012). Although other reports say seagrass beds have been stable over the last 20 years (GBRMPA, 2009). The Outlook Report 2009 noted the overall area of seagrass meadows was considered to have been relatively stable over the preceding 20-year period. Since then, monitoring of about 30 intertidal seagrass meadows along the central and southern coast indicates that their overall abundance has declined (GBRMPA, 2014). Mangroves are considered to be in excellent condition but subject to localised (and potentially increasing) losses from port and urban development (GBRMPA, 2009; Brodie & Waterhouse, 2012). In contrast to international trends, the overall condition of mangrove forests in and adjacent to the Region is relatively stable and abundance is being maintained (GBRMPA, 2014).

► Outstanding diversity of invertebrate species, including hard and soft corals

Critical
Trend:Deteriorating

The unprecedented back-to-back coral bleaching that occurred in 2016 and again in 2017 was the worst ever recorded on the GBR, impacting the upper two-thirds of the length of the Reef. The category 4 Cyclone Debbie in March 2017 was the tenth severe cyclone to impact the Reef since 2005 and had a

major impact on the Whitsundays and the southern GBR (IUCN Consultation, 2017). A study by Hughes et al., based on data collected during the 2016, as well as previous bleaching events, showed that of the 171 individual reefs that were aerially surveyed, 43% bleached in 1998, 56% in 2002, and 85% in 2016 (Hughes et al., 2017).The interim report on 2016 coral bleaching provided by the State Party together with its Update Report notes widespread bleaching of various levels of severity throughout the property, with the most severe bleaching documented between the tip of Cape York and just north of Port Douglas (GBRMPA, 2016b).

► Outstanding diversity of fish including threatened species

Critical
Trend:Deteriorating

There is long-term monitoring of 214 species of coral reef fish populations while fisheries-dependent monitoring provides some information on the trend of a number of species targeted by fishers; however, there is limited fisheries independent monitoring. Of the species targeted in fishing activities, decades of fishing pressure have reduced the size of individual fish, reduced abundances, and contributed to population declines — at least for the more heavily fished species (GBRMPA, 2014). The 2009 and 2014 Outlook Reports (GBRMPA, 2009; 2014) note some significant declines in ecologically important species such as some of the 134 shark and ray species. It is possible that the speartooth shark has become extinct from waterways on the east coast of Australia (UNESCO and IUCN, 2012). There are significant range contractions and population declines for freshwater sawfish and green sawfish from the southern and central section of the Great Barrier Reef north to at least Cooktown (UNESCO and IUCN, 2012; GBRMPA, 2012b). Significant challenges in fisheries management for both recreational and commercial fishing continue to pose a threat to the OUV of the property.

► Threatened reptiles

High Concern
Trend:Deteriorating

Some significant declines in ecologically important species such as marine turtles have been reported (GBRMPA, 2009; 2014). Research indicates that green turtle populations may be at the beginning of a decline, including declining annual average size of breeding females, increasing re-migration

interval and declining proportion of older adult turtles to the population (Limpus et al., 2003; Brodie & Waterhouse, 2012). There are concerns for the northern green turtle breeding stock including poor nesting success at Raine Island, while southern green turtle stock appeared to be in good condition prior to 2011 then had record mortality, presumably associated with seagrass loss (UNESCO and IUCN, 2012; Brodie & Waterhouse, 2012). Serious declines in loggerhead turtle were noted by Brodie and Waterhouse (2012) although the 2009 Outlook Report recorded improvement thanks to turtle excluder devices on fishing trawlers (GBRMPA, 2009; UNESCO and IUCN, 2012). No leatherback turtle nests have been recorded in Queensland since 1996 and flatback turtles show no sign of decline (Brodie & Waterhouse, 2012). It is unknown if sea snakes are declining in the property although it has been noted that they are taken as bycatch (GBRMPA, 2009, 2012c). The 2009 and 2014 Outlook Reports add that estuarine crocodile numbers are recovering (GBRMPA, 2009; 2014).

► Bird diversity

Critical
Trend:Deteriorating

While there is regular monitoring of seabird populations at a number of sites, long-term trend information is only available for a small number of islands. The 2014 Outlook report does not provide sufficient information on any of the seabird populations to assess trends. The 2014 report notes the significant declines cited in the 2009 Outlook Report particularly for ecologically important species such as seabirds. The overall status assessment of the 20 seabird species known to breed in GBR (at inscription the figure was 22) remains poor due to the cumulative impacts of climate variability in combination with increased pressure on resilience from commercial and recreational fishing; direct disturbance by visitors to islands; activities on the mainland coastline; breeding habitat destruction and the introduction of exotic plants and animals to breeding habitats; and pollution and water quality degradation with associated trophic disturbance (UNESCO and IUCN, 2012).

There are no population estimates for the Region’s shorebirds. Australia-wide declines of between 70 and 80 per cent have been recorded in the past 24 years, including populations that migrate through the Region.

► Threatened mammals

High Concern
Trend:Stable

The dugong population in northern areas of the Region is considered in good condition and stable with no evidence of a major decline. However, evidence for serious dugong decline in some areas from 1962 to 1999 (Marsh et al., 2005) triggered significant conservation initiatives. Possible causes of mortality include incidental netting in fish nets and shark nets, loss of seagrass habitat due to water quality impacts and coastal development and hunting (Marsh et al., 2007). The combination of severe weather events in 2011 has also increased dugong mortality with evidence suggesting that large numbers of animals moved to the northern GBR as a result of the seagrass loss (UNESCO and IUCN, 2012). In 2011, there was an estimated population of only 600 animals between the Daintree River and the Region's southern boundary compared with an estimate of around 2,000 from the previous survey in 2005 (GBRMPA, 2014). It is estimated that 15 species of whale inhabit the Region, either seasonally or throughout the year, and there is limited information on the condition of most of these, with the exception of the humpback whale and the dwarf minke whale.
The population of 'east Australian' humpback whales has increased to an estimated population of more than 14,500 animals in 2010 (Noad et al., 2010), about half of the estimated pre-whaling population size (Brodie & Waterhouse, 2012). Populations of two inshore marine mammals, the endemic Australian snubfin dolphin and the Indo-Pacific humpbacked dolphin are at risk, especially from interactions with large mesh fishing nets and increasing human use of their inshore habitat. Snubfin dolphins appear to be in serious threat due to the recent coastal industrial boom (UNESCO and IUCN, 2012; Cagnazzi et al., 2013). The status of the Proserpine rock wallaby is not discussed in the GBR Outlook Report (GBRMPA, 2009; 2014).

Summary of the Values

► Assessment of the current state and trend of World Heritage values

High Concern

Trend: Deteriorating

The Great Barrier Reef is a very large property containing a large number of World Heritage values. Since inscription in 1981, and despite good management and protection, many iconic species and habitats have declined. While there have been positive trends, such as improved water quality and the increase in humpback whale numbers, coral bleaching continues to be a significant threat to the values of the property. The 2016-2017 back-to-back coral bleaching events have been unprecedented in severity and impacts.

Additional information

Benefits

Understanding Benefits

► Outdoor recreation and tourism, Natural beauty and scenery

The direct and indirect value-added contribution to the Australian economy is estimated at AU$6.4 billion in 2015-16. This includes AU$5.7 billion from the tourism industry, $346 million from recreational activity and AU$199 million from commercial fishing and aquaculture. This economic activity generates about 64,000 jobs, mostly in the tourism industry, which takes over 2 million tourists to the GBR each year. These industries, and their flow-on activities, underpin a significant and growing proportion of Queensland’s regional economy (Deloitte, 2017). A wide variety of recreational activities occur in the Region, and popular destinations include islands and reefs. Visits to the Region by catchment residents are increasing, likely tied to local population growth and people visiting more frequently.

► Importance for research, Contribution to education

There is a great deal of research and education activities conducted within the property, which also creates jobs. A range of academic institutions, government agencies and foundations undertake research in and about the

Great Barrier Reef, providing income and employment in regional communities. These include:
• Australian Institute of Marine Science (AIMS)
• Great Barrier Reef Marine Park Authority (GBRMPA)
• JCU ARC Centre of Excellence
• GBR Foundation
• A network of six island research stations (Lizard Island, Low Isles, Green Island, Orpheus Island, Heron Island and One Tree Island). In 2015–16, AU$130 million of revenue was generated by these organisations through the conduct of scientific research, reef management and related activities. They spent AU$57 million and AU$65 million on employment and intermediate inputs respectively. The total value of scientific research and reef management associated with the GBR in 2015–16 is around AU$182 million contributed to the Australian economy (Deloitte Access Economics, 2017).

► **Cultural identity and sense of belonging, History and tradition, Sacred or symbolic plants or animals, Sacred natural sites or landscapes**

Traditional Owners' connection to sea country within the Region continues to be practised and maintained according to traditional customs and spiritual lore, reflecting ongoing stewardship and custodianship. Many Traditional Owners use marine resources to practise their sustainable 'living maritime culture', provide traditional food for families, and educate younger generations about traditional and cultural rules, protocols and activities in sea country (GBRMPA, 2014).

► **Fishing areas and conservation of fish stocks**

Recreational and commercial fishing is permitted but regulated. Commercial fishing and aquaculture in and adjacent to the Region generate about AU$199 million per year (Deloitte Access Economics, 2017). Recreational fishing continues to be one of the most popular pastimes in the Region. Some areas within the GBR WHA provide important nursery grounds for a number of commercially valuable species. Traditional use of marine resources continues to provide environmental, social, economic and cultural benefits to Traditional Owners and their sea country.

► Tourism-related income, Provision of jobs

The economic contribution of the Great Barrier Reef to the Australian economy increased from approximately AU$5.4 billion in 2006–07 to AU$6.7 billion in 2015-16 (Deloitte Access Economics 2017). The number of full-time positions that are dependent on the Reef has fluctuated, from 53,800 in 2006–07 to 69,000 in 2011–12, and then to 64,000 in 2015–16.

Summary of benefits

The large size of the property and the fact that it was inscribed on the World Heritage List under all four natural criteria supports the evidence for the wide array of benefits provided by the property to the people living both within and outside the property. In addition to nature conservation and conserving cultural and wilderness values, the property provides a wide range of ecosystem services, furnishes a wealth of scientific knowledge and provides jobs through tourism, fishing, park management, research and education. Local populations can benefit from traditional, recreational and commercial fishing and hunting (some Traditional Owners continue to hunt dugong) provided that it is sustainable. In 2011–12, recreational activities (including fishing) were the second largest direct use of the World Heritage Area, generating AU$244 million (value-added), a substantial increase on the estimate of its value in 2006–07 (AU$153 million). The activities generated employment equivalent to 2,724 full-time jobs, up from approximately 1,700 in 2006–07. Of the four recreational activities, recreational fishing is the most popular with an estimated 3.8 million fishing trips taking place in 2015–16, the expenditure generated from recreational fishing activities amounts to AU$70 million. The total value of all recreational activity associated with the GBR in 2015–16 is estimated to contribute around AU$346 million to the Australian economy (including AU$284 million to the GBR Region).

Projects

Compilation of active conservation projects

№	Organization/ individuals	Project duration	Brief description of Active Projects
1	GBRMPA; Reef and Rainforest Research Centre (RRRC); Association of Marine Park Tourism Operators (AMPTO); various universities including James Cook University		Removal of crown-of-thorns starfish and research into management of outbreaks of this pest species.
2	NESP		National Environmental Science Program (NESP)
3	Queensland Government, GBRMPA, Wuthathi and Kemer Meriam Nation (Ugar, Mer, Erub) Traditional Owners, BHP and the GBR Foundation.		The Raine Island Recovery Project aims to protect and restore the island’s critical habitat to ensure the future of key marine species, including green turtles and seabirds.
4	Various organizations		Numerous projects are undertaken by different organizations

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