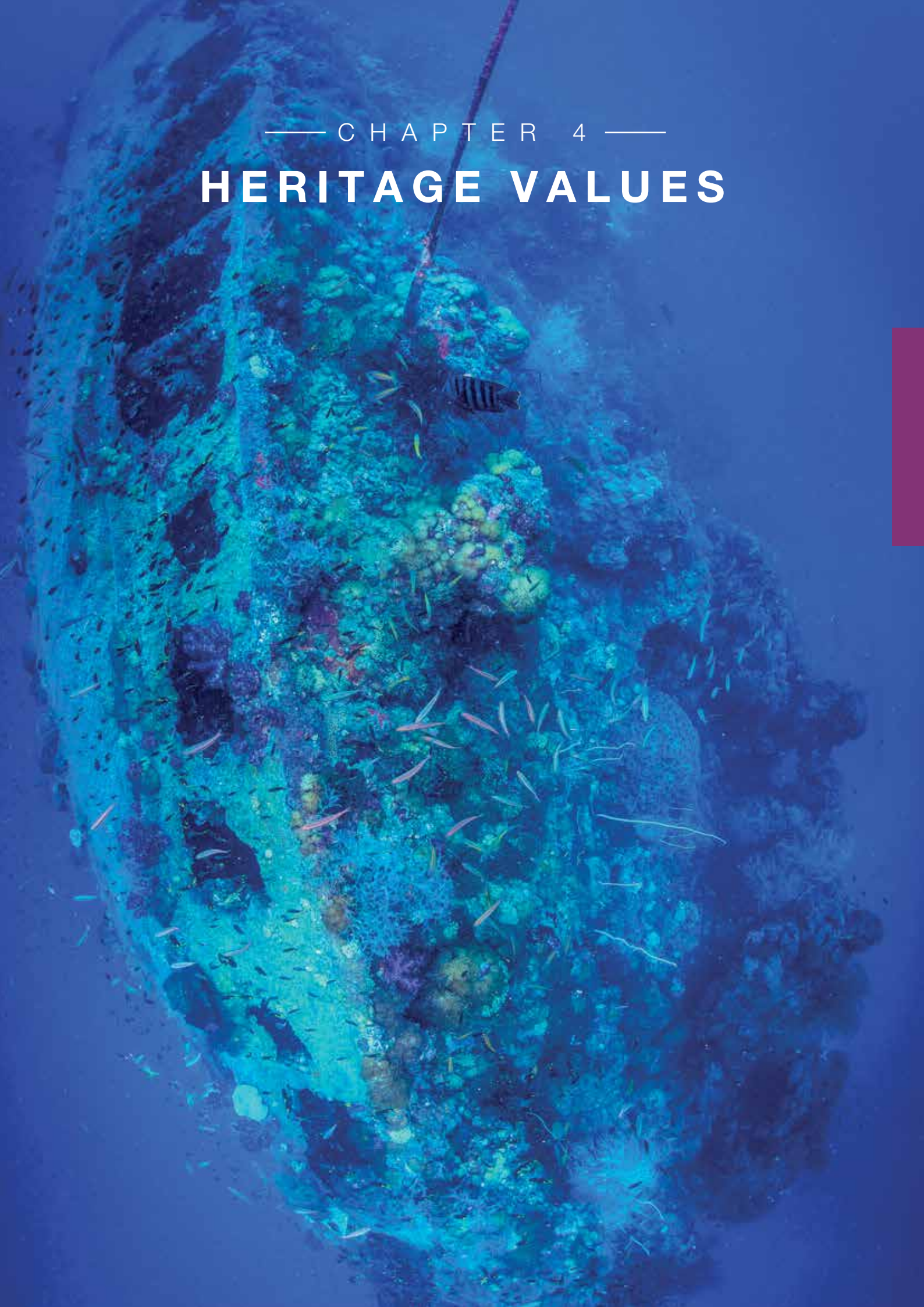


— CHAPTER 4 —

HERITAGE VALUES



◀ *The SS Yongala is one of the Region's historic shipwrecks and a popular dive site.* © Matt Curnock 2015

HERITAGE VALUES

*‘an assessment of the current heritage values ...’
of the Great Barrier Reef Region, paragraph 116A(2)(a)
of the Great Barrier Reef Marine Park Regulations 1983*

4.1 Background

Heritage values of the Region were considered in the Outlook Report for the first time in 2014, following amendments to the *Great Barrier Reef Marine Park Act 1975* (Cth) in 2008. The scope of the assessment includes the Region’s natural, Indigenous and historic heritage value (Table 4.1),⁷⁶⁰ some of which extend beyond the Region’s boundary. For example, Indigenous heritage values of the Region include Traditional Owners’ connection to both land and sea. Therefore, the assessment of Indigenous heritage values may include areas outside the Region (such as islands and the coastline, irrespective of jurisdiction) that affect the Region (Section 4.3).

Table 4.1 Scope of assessment of the heritage values of the Region

Domains of heritage values	Scope of assessment
Natural	The Region and ecosystems outside the Region to the extent they affect the Region (Chapters 2 and 3). The regulatory requirements for assessing natural heritage values (biodiversity and ecosystem health) extend beyond the Region.
Indigenous	The Region and areas outside the Region to the extent they affect the Indigenous heritage value of the Region.
Historic	The Region, including Commonwealth islands. Queensland islands, internal waters and the Catchment above mean low water mark are excluded from the assessment.



Traditional Owner and researcher working in partnership on Raine Island. © Department of Environment and Science (Qld)

4.1.1 Structure of assessment

In Australia, three heritage domains (or types of heritage value) are recognised: natural, Indigenous and historic (Table 4.1)⁷⁸⁰. In this Outlook Report, some sections have been reordered to better align with these three domains (Table 4.2) and the requirements set out in the regulations applying to the Marine Park (Marine Park regulations).

The Outlook Report describes aspects of heritage values in terms of components (values that are graded) and attributes (attributes of a component used to assess significance) (Figure 4.1). The Marine Park regulations set the parameters for the heritage assessment in the Outlook Report; in some instances, the prescribed values are equivalent to things considered attributes in other settings. For example, for consistency with previous Outlook Reports, aesthetic heritage values are given a grade, whereas in other settings, a value's aesthetic attributes demonstrate the value's historic significance.

Table 4.2 Structure of heritage values assessment – comparison between Outlook Reports
The Marine Park regulations establish the scope of the Outlook Report heritage assessment.

2014 Structure of heritage values assessment	2019 Restructure of heritage values assessment
<ul style="list-style-type: none"> • Indigenous heritage values • Historic heritage values • Other heritage values • World heritage values and national heritage values • Commonwealth heritage values • Natural heritage values 	<ul style="list-style-type: none"> • Natural heritage values <ul style="list-style-type: none"> ◦ world heritage value ◦ national heritage value • Indigenous heritage values • Historic heritage values <ul style="list-style-type: none"> ◦ Commonwealth heritage values • Other heritage values – attributes of heritage significance (social, aesthetic and scientific)

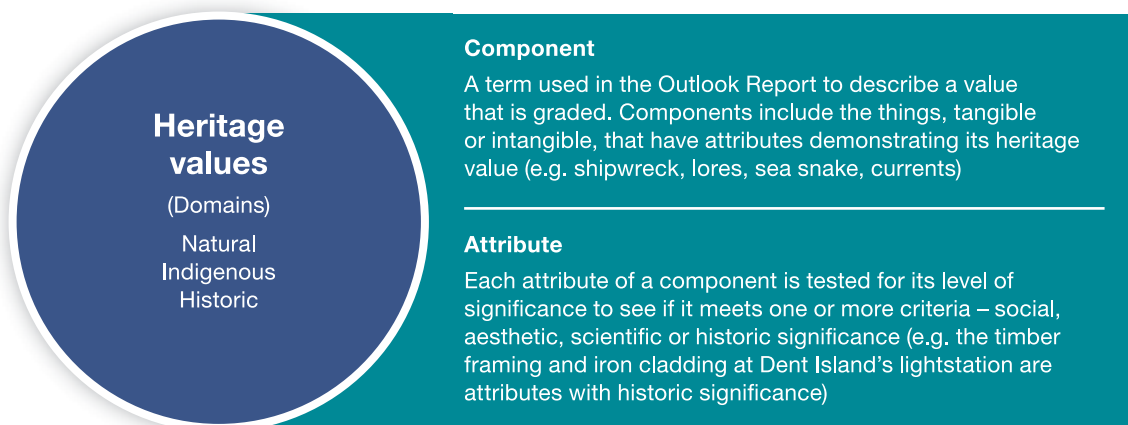


Figure 4.1 Heritage values matrix
Source: Commonwealth of Australia 2015⁷⁸⁰

4.2 Current condition and trends – natural heritage values

Five components of natural heritage values are graded. Three components are considered in good condition, but borderline with poor. Habitats for conservation of biodiversity has deteriorated to a poor grade. Major stages of the Earth's evolutionary history has deteriorated to good condition.



Full assessment summary: see Section 4.6.1

The Great Barrier Reef was inscribed on the World Heritage List in 1981 and included on the National Heritage List in 2007. These two listings recognise the Region for the same natural heritage value. Therefore, for the purpose of this assessment, the Region's world and national heritage value is assessed together as a natural heritage value, with reference to Chapter 2 (biodiversity values) and Chapter 3 (ecosystem health values) for evidence of the condition of the Region's natural heritage value.

4.2.1 World heritage value and national heritage value

All properties inscribed on the World Heritage List have a common thread; they all have outstanding universal value. Outstanding universal value can be described as 'cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity'⁷⁸¹. The United Nations Educational, Scientific and Cultural Organization (UNESCO) explains outstanding universal value as having three pillars, of which some aspects are assessed within the Outlook Report. Under the *Operational Guidelines for Implementation of the World Heritage Convention*⁷⁸¹, to have outstanding universal value a property must:

- meet one or more of the 10 world heritage criteria (Pillar 1)
- meet the condition of integrity (wholeness and intactness) (Pillar 2). Cultural heritage properties must also meet the condition of authenticity, however, this is not applicable to the Great Barrier Reef
- have an adequate system of protection and management to safeguard its future (Pillar 3).

The Reef is inscribed under four natural world heritage criteria (Table 4.3). Any component contributing to these criteria not assessed in Chapters 2 and 3 (for example, natural beauty, aesthetics and major stages of the Earth's evolutionary history) are assessed in this chapter. The assessment also includes a brief assessment of the integrity of the property (Section 4.2.6).⁷⁸¹ Safeguards for the property (protection and management effectiveness) are briefly assessed here in relation to heritage values. However, the broader and more comprehensive assessment of management effectiveness is included in Chapter 7.

Table 4.3 World heritage criteria relevant to the Reef and how they are assessed

This table summarises how the Outlook Report chapters relate to the world heritage criteria; more detail is shown in Appendix 3.

Short title (component of Outlook Report)	Current world heritage criteria	Outlook Report assessment of natural heritage values
Natural beauty and natural phenomena	(vii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance	The natural beauty of the property is assessed in Chapter 4. Chapters 2 and 3 inform an assessment of natural phenomena
Major stages of the Earth's evolutionary history	(viii) be outstanding examples representing major stages of Earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features	The major stages of Earth's evolutionary history are assessed in Chapter 4 and informed by Chapters 2 and 3.
Ecological and biological processes	(ix) be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, freshwater, coastal and marine ecosystems and communities of plants and animals	Ecological and biological processes are assessed in Chapters 3 and 8.
Habitats for conservation of biodiversity	(x) contain the most important and significant natural habitats for <i>in situ</i> conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation	Habitats and biodiversity are assessed in Chapters 2, 4 and 8.
Integrity	The integrity of the property relates to its wholeness and intactness. Integrity is an additional component (not a criterion) of the assessment of the Region's world heritage and national heritage values	The integrity of the property is assessed in Chapter 4 and Appendix 4.

4.2.2 Natural beauty and natural phenomena (criterion vii)

The Reef was inscribed as a world heritage property as an example of superlative natural beauty above and below the water.²⁸ The property is noted to have spectacular scenery creating an unparalleled aerial panorama of seascapes, and it is visible from space.²⁸ At a whole-of-Region level, overall habitats are assessed to be in poor condition, affecting aspects of its natural beauty and phenomena. Widespread coral mortality (as a result of sea temperature extremes in combination with predation by crown-of-thorns starfish) and impacts from severe cyclones, have affected the aesthetics and natural beauty of some parts of the Region above and below the water (Section 4.5.2).

The natural beauty of the property endures, however, it is under increasing pressure from cumulative impacts above and below the water

The Whitsunday islands rank as a cornerstone feature of the world heritage property. The vistas created by the vegetated islands, sandy beaches and turquoise seas, remain largely intact above the water. Nearly 90 per cent of the Whitsunday islands are retained as national park and restricted access to these areas reduces the impact of pressures from human use. However, cyclone Debbie passed through the Whitsundays in 2017, significantly affecting its aesthetic values above and, to a large extent, below the water. Management intervention actions carried out following the cyclone have gone part way to assisting recovery of the land-based vistas. For example, approximately 10,000 cubic metres of sand was re-profiled on Whitehaven Beach in April 2017 to accelerate beach recovery. Further clean-up activities were undertaken in 2018 (Figure 4.2).³⁵



Figure 4.2 Cyclone damage on Whitehaven Beach, 2017
Whitehaven Beach in the Whitsundays is renowned for its long white sandy beach.
Left: Post-cyclone clean-up.
Right: Re-profiled beach. © Queensland Parks and Wildlife Service 2017

The significant elements that make up the Reef's superlative natural phenomena include annual coral spawning, migrating whales, nesting turtles and significant spawning aggregations of many fish species.²⁸ These species and processes endure, but they are under increasing pressure from cumulative impacts. Closely aligned to the Reef's naturalness are the aesthetic attributes of the Reef (Section 4.5.2), above and below the water. The aesthetic values of the world heritage property rely heavily on the condition of the Region's ecosystem. The condition, trend and recovery of the Region's biodiversity and ecosystem health (the Region's natural heritage values) are assessed in Chapters 2 and 3. The most prominent threats to the Region's ecosystem include the ongoing chronic effects of increased sea temperature, poor water quality⁷⁸² and acute die-offs of corals caused by spikes in summer temperatures. For example, visual elements of inshore underwater scapes are particularly affected by water clarity^{782,783}, with Reef users stating water clarity contributes to their aesthetic appreciation of the Reef^{783,784}. These threats are compounded by coral predation from crown-of-thorns starfish and the acute effects of recurrent cyclones.

Contemporary studies⁷⁸⁵ have identified that isolated pockets of the Reef are more likely to be affected by visual pollution through increased coastal and island development (Section 6.4) and increased marine debris (Section 6.5). On the land, damage to coastal and island vegetation from severe weather events has occurred. While the Region has shown signs of recovery following these events, aesthetic values can be significantly affected in the short to medium term. Examples include where island infrastructure remains unrepaired and habitats are not restored. Significant progress towards understanding the human dimensions of the Reef has been made, focusing on societal attitudes and how people value the Reef (Section 4.5.1).

Taken as a whole, the Region's natural beauty and natural phenomena endure but have deteriorated in several areas. Since 2014, some elements necessary to maintain outstanding universal value have been altered. Some aspects of natural phenomena (for example, coral spawning) have been significantly reduced following back-to-back bleaching events⁹⁶ (Chapters 2 and 3).

4.2.3 Major stages of the Earth's evolutionary history (criterion viii)

The Reef has evolved over millennia, but it is relatively young in geological terms. The continental shelf upon which the Reef has formed was largely in place by approximately 2.6 million years ago.⁷⁸⁶ Although it was capable of supporting reef growth, it appears widespread coral reef development (similar to contemporary inshore shoals) did not occur until after 700,000 years ago.⁷⁸⁷ True reef growth, comparable to that of the modern reef, took place prior to approximately 450,000 years ago.⁷⁸⁸

Since that time, there have been at least six phases of reef growth during periods when interglacial sea-levels have inundated the continental shelf, punctuated by six periods of emergence when sea-levels fell during glacial periods.^{787,788} In the context of Earth's evolutionary history, long-term active calcification and accretion, which

While the current impacts and changes from disturbances are minor on an evolutionary scale, they are unprecedented and will be long-lasting

are important ecological and biological processes, add to its outstanding universal value.⁷⁸⁹ Since 2014, scientific understanding of reef and low-lying island formation, the distribution of submerged coral reefs and other key habitats (such as *Halimeda* bioherms), and the effects of a range of processes over the millennia has been extended.^{21,790,791,792,793} While the Reef continues to provide outstanding examples of the Earth's evolutionary history and geomorphological diversity, such as Raine Island and the Ribbon Reefs³², unprecedented recent disturbances, as outlined in Chapters 2 and 3, will have long-lasting effects.

Many reefs have experienced significant episodic pauses in reef growth that lasted for several centuries during the mid to late Holocene.^{122,791,794} Numerous studies have considered the cause of these turn-off periods, including falling sea level, resuspension of terrigenous material (from the erosion of rocks on land) and severe cyclones, all of which may explain a gap in the core data implying a hiatus in reef growth.^{21,794,795} An analysis of sediment cores has established a new estimate for the duration of the last significant interglacial period of reef growth in the southern Reef: from at least 129,000 to a younger 121,000 years ago.⁷⁹⁵ Reef and coral cores provide a reliable history of reef growth⁷⁹⁶ and environmental information (such as water chemistry), which can extend back decades to centuries depending on the length of the core.⁵⁰⁹ Coral cores from the Great Barrier Reef (and reefs globally) indicate that coral calcification rates have decreased in the last 25 years⁷⁹⁷ as a result of extreme temperatures and coral bleaching.

The Reef's ability to regenerate and laterally extend seaward over millennia following periods of climatic and sea-level change is well documented.^{21,795} However, processes that influence reef formation and maintain sediment accumulation on reef islands (for example, ocean acidification, sea temperature and sea-level rise) are intensifying in a negative way due to climate change^{32,485,798}, and pose the greatest threat to the Reef's contemporary geomorphology.^{799,800} This intensification will change how reefs and low-lying islands grow and maintain their shape.³¹ The ecological process of reef building has deteriorated since 2014 and is considered poor (Section 3.4.8). Due to these widespread threats to geomorphology, the Reef's resilience is decreasing and its size is becoming a less effective buffer for this world heritage criterion.

Overall, there has been alteration of some elements important to major stages of the Earth's evolutionary history, such as accretion, sea-level rise and sea temperature. This component has deteriorated since 2014.

4.2.4 Ecological and biological processes (criterion ix)

Ecological and biological processes form part of the Reef's outstanding universal value. The assessment of this criterion is considered against these processes being intact across the whole of the property. Processes are assessed on the system's ability to maintain its structure and function in the face of external pressures.

At a Region-wide scale, ecosystem processes have not ceased to operate. However, ecological and biological processes that are fundamental to a functioning ecosystem (for example, reef building, recruitment and symbiosis) are considered to be in poor condition (Chapter 3). This poor condition is partially dependent on the condition of other physical and chemical processes, like sediment exposure and nutrient cycling. Some ecological and biological processes remain in very good to good condition, such as primary production, microbial processes, and herbivory.

Reefs, islands, cays and the mainland remain connected by functioning ocean current systems and weather patterns. However, since 2014, the condition of one of the most critical physical processes, sea temperature, has deteriorated to very poor condition across a wide area as a result of climate change. This has led to substantial changes in some processes. The global significance of the Reef continues to be underpinned by the form and structure of its organisms, as well as the interconnectedness of the Reef's complex physical, chemical and ecological processes.²⁸ Overall, the condition of processes across the Region is variable, with deterioration in some areas. The potential implications on the Region's intactness is assessed in Section 4.2.6.

4.2.5 Habitats for conservation of biodiversity (criterion x)

The Reef's biodiversity, its vast network of habitats and range of species, is an important part of the Region's outstanding universal value. The assessment of the Reef's biodiversity under criterion (x) is considered as a value distributed throughout the whole of the property. While the Reef continues to be one of the most remarkable places on Earth, for the first time since Outlook Report assessments began in 2009, habitat loss and degradation has occurred in a number of areas, its condition overall is poor and biodiversity is being affected (Chapter 2). Key habitats, such as coral reefs and seagrass meadows, are considered to be in very poor and poor condition, respectively. More spatially extensive habitats, such as lagoon floor and the water column, are considered to be in good condition (with the latter borderline poor), although there is less confidence in these grades due to limited data.

Overall, habitats for conservation of biodiversity are deteriorating

The habitat and species condition grades reflect the increasing cumulative pressures the Region faces from a changing climate and other anthropogenic impacts. Multiple disturbances have transformed coral reef structures on a broad scale across the entire Region^{95,97} and cumulatively hindered the recovery of some coral-dependent species (Sections 2.3.5 and 8.3.1). Historically, the Region's size has provided a buffer to periodic and dispersed damage, due to its broad latitudinal extent. Given the global scale of human-induced climate change, the size of the Region is becoming a less effective buffer to some broadscale impacts.

At the time of inscription in 1981, some 400 species of corals in 60 genera were known to occur in the Region.²⁸ It is now known the Region is home to more than 1200 species, including hard and soft corals.^{203,204} World-leading management decisions are based on scientific exploration that continues to uncover and expand recorded knowledge of the Reef. For example, in 2014 a new species of mangrove (*Bruguiera hainesii*), never before recorded in Australia, was found in the Trinity Inlet, Cairns.¹⁷⁰ This species is listed as critically endangered on the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). The scalloped hammerhead shark (*Sphyrna lewini*) has recently been listed as a 'conservation dependent' species under Commonwealth legislation (Section 2.4.8).^{294,801} In 2016, the northern Great Barrier Reef hawksbill turtle population (*Eretmochelys imbricata*) was reclassified under Queensland legislation from vulnerable to endangered (Section 2.4.10).³²²

Habitats for conservation of biodiversity are deteriorating, with observed loss and alteration of many elements necessary to maintain outstanding universal value. The potential implications on the Region's intactness is assessed in Section 4.2.6.

4.2.6 Integrity

Integrity is a measure of the wholeness and intactness of a place's natural heritage value⁷⁸¹, and is an important prerequisite for a property to be inscribed on the World Heritage List. UNESCO recognises that the Great Barrier Reef is not a pristine ecosystem⁷⁸¹ and exists in a dynamic state. Because the dynamic state involves interaction with people, management and domestic policies are an element of the integrity test. The current condition and trend of the biodiversity and ecosystem health of the Reef informs the integrity test.

Human-induced climate change is challenging the integrity of the World Heritage Area; its size is becoming a less effective buffer against broadscale impacts

The spatial extent of the World Heritage Area has remained generally unchanged since the time of inscription. The property's size, at least for some of its habitats, is becoming a less effective buffer against ongoing multiple Reef-wide disturbances (Appendix 4). The widespread loss of coral habitat, warming seas and intensifying external pressures from outside the Region are affecting the property's intactness.

The multi-tiered governance and management regime for the Reef aims to protect its biodiversity, ecosystem and heritage values through management tools, such as the *Great Barrier Reef Marine Park Zoning Plan 2003*, and enforcement. However, this multi-tiered management regime is not designed to directly address the effects of a changing climate. Climate change remains the greatest risk to the outstanding universal value of the World Heritage Area and its integrity. As such, managers are increasingly intervening where critical habitats or species require assistance. Some measureable benefits are being seen at a local scale, where timely actions were taken (Chapter 8). The effectiveness of the tools currently used to manage these pressures are independently assessed in Chapter 7. While the property remains whole and intact, the condition of many elements that make up the four world heritage criteria are deteriorating.

4.3 Current condition and trends – Indigenous heritage values

Four components of Indigenous heritage values are graded. The component ‘cultural practices, observances, customs and lore’ remains in good condition. The remaining three components continue to be poor.



Full assessment summary: see Section 4.6.2

Indigenous heritage is living heritage because Traditional Owners continue to maintain a connection with their heritage. Indigenous heritage is all-encompassing and includes natural components, such as species and ecological processes. Many traditional cultural practices include plants, animals and places. In this way, the condition of natural components of the Region are inseparable from Indigenous cultural identity (Figure 4.3). Therefore, the natural heritage values assessed in Chapters 2 and 3 are fundamental to the condition of Indigenous heritage values and Traditional Owners’ connection to land and sea country.

Indigenous heritage values are recognised nationally as a standalone heritage domain (Table 4.1). Information on Indigenous heritage values are presented under the following four discrete components:

- cultural practices, observances, customs and lore
- sacred sites, sites of particular significance and places important for cultural tradition
- stories, songlines, totems and languages
- Indigenous structures, technology, tools and archaeology.

In reality, these components are interconnected and the description of each value should be viewed in this context.

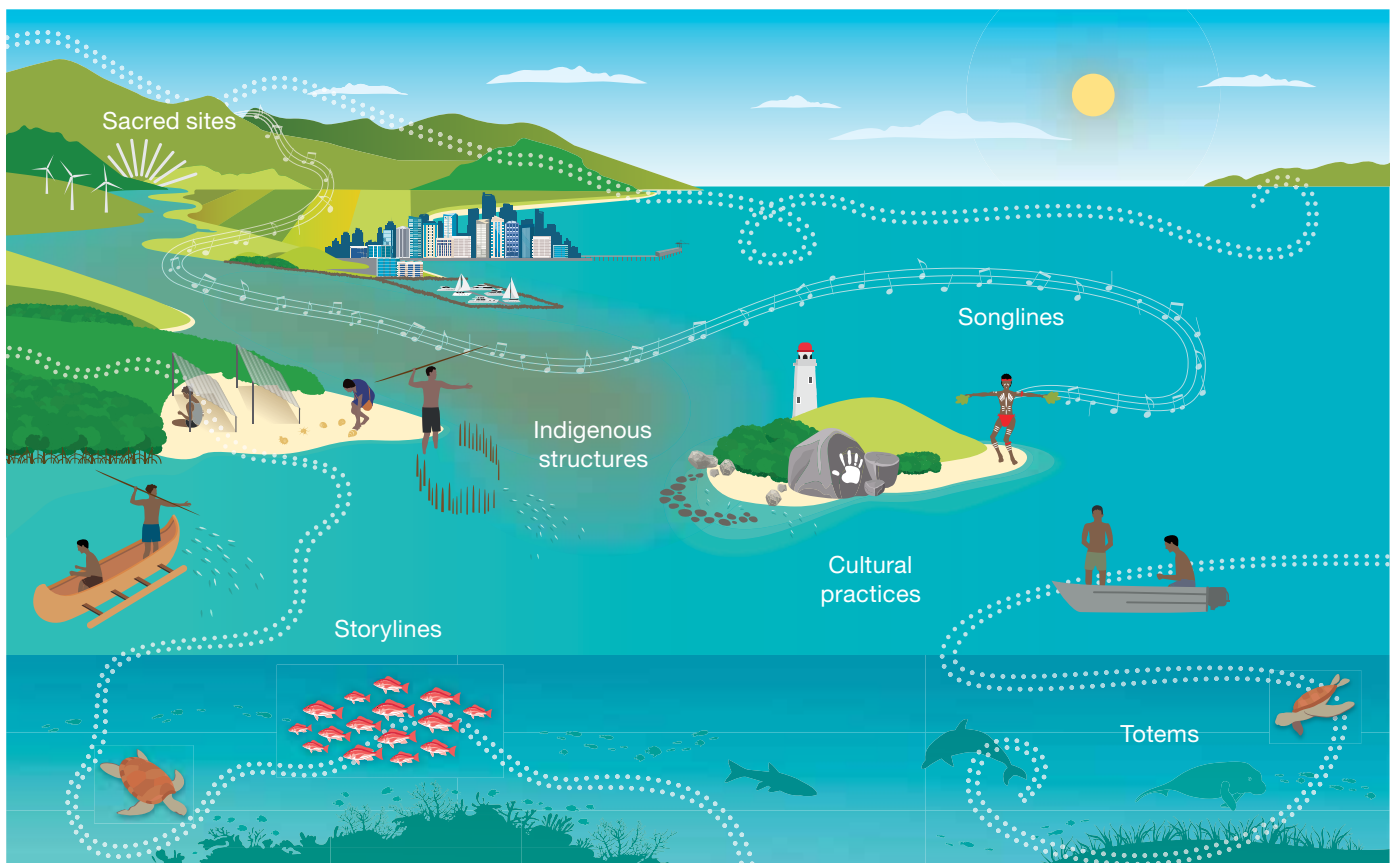


Figure 4.3 Nature is inseparable from Indigenous cultural identity

Songlines, stories, cultural practices, significant places, totems, structures and other elements of tangible and intangible Indigenous heritage weave people and the natural world together.

The Region is rich in Indigenous heritage. A survey of approximately 1900 people (tourism operators, tourists and commercial fishers) identified that people valued the Reef because of its rich traditional heritage⁷⁸⁵. People also value the Reef because it provides a place where people can continue to pass down wisdom, traditions and a way of life. Traditional Owners perceive heritage as everything in sea country, recognising that Indigenous heritage is biocultural (meaning heritage is dependent on biological resources, tradition and knowledge)⁸⁰² and includes the environment and intangible components.

In 2017, the Marine Park Authority undertook extensive consultation with Traditional Owners of the Reef to identify how Indigenous heritage can be better recognised, protected and managed.⁸⁰³ The consultation led to several indicators that have been identified in the Marine Park Authority's 2019 *Aboriginal and Torres Strait Islander Heritage Strategy for the Great Barrier Reef Marine Park*.⁸⁰³ The strategy aligns with the four Indigenous heritage components assessed in the Outlook Report. Traditional Owners also validated indicators for the Reef 2050 Integrated Monitoring and Reporting Program (RIMReP) targets and objectives under the Strong Peoples – Strong Country framework (Figure 4.4). Coastal development, climate change, and loss of Indigenous knowledge are considered the greatest threats to Indigenous heritage values (Chapter 9).



Figure 4.4 Strong Peoples – Strong Country
*The Aboriginal and Torres Strait Islander Heritage Strategy*⁸⁰³ supports the development of Indigenous heritage indicators and monitoring to assess the condition of Indigenous heritage values over time through the Reef 2050 Integrated Monitoring and Reporting Program (RIMReP). As part of this program, an Indigenous Heritage Expert Group identified six key hubs relevant to Strong Peoples – Strong Country: country health; people's health; heritage and knowledge; culture and community; education; and empowerment and economics. Source: Artwork for Strong Peoples – Strong Country. © Luke Mallie, Mallie Designs (licensed for use by RIMReP partners).

4.3.1 Cultural practices, observances, customs and lore

Cultural practices, observances, customs and lore are aspects of Indigenous heritage values that are passed down from generation to generation. They can form an important aspect of day-to-day life, such as satisfying personal, domestic or communal needs, such as fishing and collecting. This component includes skills, folklore, rituals, religious beliefs and intellectual traditions. Approximately 20,000 years ago, the sea level around the Australian coast was around 120 metres lower than present.⁸⁰⁴ Traditional lands would have extended out to the continental shelf; these areas are now underwater. The earliest direct date for traditional use of coastal resources in the Reef is approximately 6440 years ago, when sea level stabilised at close to its current position, with evidence of foraging for oysters and gastropods around the Whitsundays area.⁸⁰⁵ The long established cultural practice of turtle and dugong hunting, dating back at least 5000 years ago^{806,807}, is linked to spiritual renewal⁸⁰⁸, and while technology has evolved over time, the practice itself remains a critical part of cultural practice, observances, customs, and lore.⁸⁰⁹

While there have been advances in technology over time (for example, global positioning systems and cultural heritage databases), cultural practices, observances, customs and lore is largely intangible and can be difficult to record. Some Great Barrier Reef Traditional Owner groups manage databases and records of these values. One of the greatest threats to this type of Indigenous heritage is loss of Indigenous knowledge if Elders and knowledge keepers pass away and/or knowledge transfer does not occur. Other contributing threats include difficulties Traditional Owners face in exercising their cultural rights and responsibilities. For example, if access to an area important for cultural observance is blocked (by infrastructure) or reduced (through increased visitation by other users) it affects the ability for the transfer that knowledge to younger generations. There have been ongoing attempts to erode these rights through lobbying to ban turtle and dugong hunting⁸¹⁰, on animal cruelty grounds, and where the cultural practice occurs in the vicinity of tourism activities (for example, around Green Island).⁸¹¹

Indigenous heritage is all-encompassing and includes natural (biodiversity) and other (aesthetics of a landscape) components



Traditional Owners at the entrance to Leekes Creek, Great Keppel Island — launched as a protected fish habitat area in 2017. © GBRMPA

Access to country is an important aspect of maintaining cultural practices, observances, customs and lore. In 2017, over 30 Woppaburra Traditional Owners from the Keppel Island group attended the launch of a culturally and ecologically important fish habitat area at Leekes Creek (*Balban Dara Guya*) on Great Keppel Island. The fish habitat area, declared under Queensland legislation, is the first to be declared on an off-shore continental island to have an Indigenous language name as its primary title.

4.3.2 Sacred sites, sites of particular significance and places important for cultural tradition

Sacred sites, sites of particular significance and places of cultural tradition are tangible aspects of the Region's Indigenous heritage values. The locations of sacred sites are not widely known outside Traditional Owner groups to respect cultural traditions and protect the sites. A public record of mapped Indigenous heritage archaeological studies (Figure 4.5) includes large areas of the Reef coastline for which there are few or no archaeological studies.

This lack of knowledge is most pronounced between Princess Charlotte Bay and the tip of Cape York and south to Goold Island (excluding Lizard Island where several studies have been undertaken). In addition, only 16 of the approximately 900 islands in the Region have dated archaeological sites, contributing to a lack of understanding and recognition of these important areas in management frameworks, such as spatial planning and permitting. In addition to terrestrial and intertidal sacred sites, many sites lie submerged within the inner and mid-shelf reefs. These nearshore locations have been influenced by glacial and interglacial cycles on sea level. Sacred sites and sites of

Several sites of Indigenous significance within the Keppel Island region are well documented

particular significance also contribute to intangible aspects of heritage and are closely linked to customary practices and songlines. It is unclear how the condition of tangible aspects (sacred sites and sites of particular significance) and intangible aspects (for example, songlines) have changed since 2014. However, it can be inferred that in areas where the habitat has been modified (such as port expansions and island marina development), or areas significantly degraded by severe weather and climate change, impacts to this type of Indigenous heritage value would have occurred.

The Keppel Island region is one area that has been studied and well documented. This area has numerous published records of sacred sites, burial grounds, middens and sites of significance.⁸¹³ The site at Mazie Bay is the most archaeologically significant in the Keppel Island group, with numerous occupation sites dating from approximately 4200 years ago.⁸¹³ In 2017, the Woppaburra Traditional Owners worked with the Marine Park Authority to detail some sites of importance on their country and developed guidelines for consideration in the permitting and assessment processes.⁸¹⁴

Scarred trees made by Aboriginal and Torres Strait Islander peoples through the removal of bark and some of the wood to make canoes, are important features of the Indigenous cultural landscape. Middens are also sites of importance to Aboriginal and Torres Strait Islander peoples and have archaeological significance. They are often material remains of historically important communal food preparation areas, burials and toolmaking areas. Middens are often located in intertidal areas, which makes them vulnerable to severe weather and human interaction.⁸¹⁵ Some records of damage to these material Indigenous heritage values are documented (for example, middens around Hinchinbrook Island and Cape Upstart south of Townsville, have been affected by cyclonic activity^{816,817}), but managers generally lack knowledge of

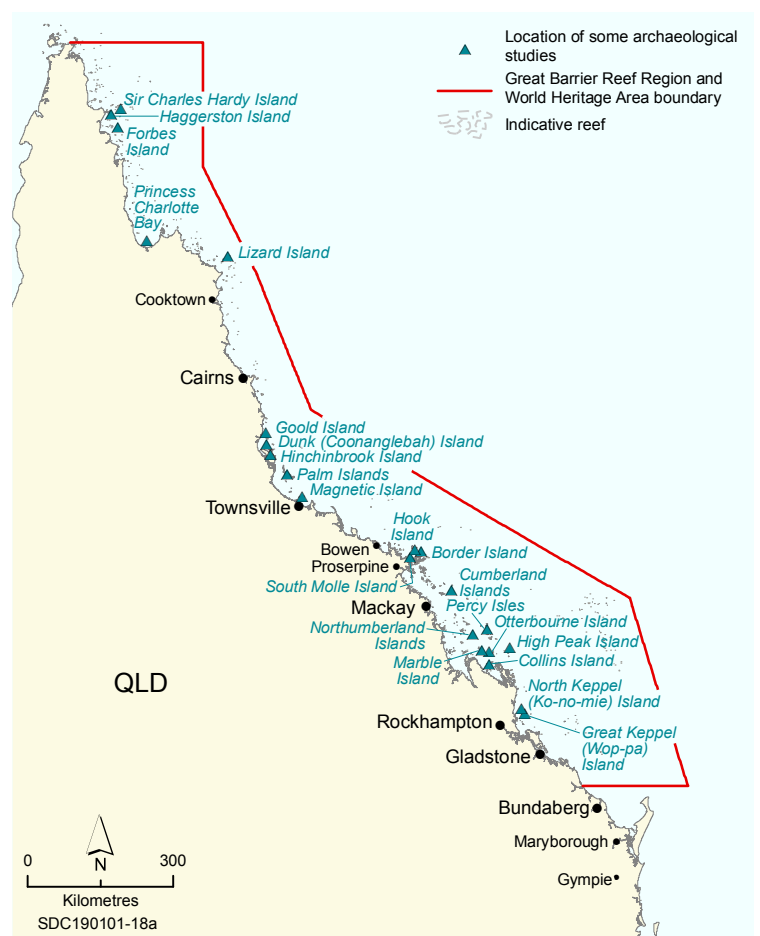


Figure 4.5 Indigenous heritage archaeological studies
Location of some archaeological studies and places of known Aboriginal and Torres Strait Islander activities within the Great Barrier Reef Marine Park. Source: Adapted from Rowland et al. 2015⁸¹²

their location and condition across the Region. Submersion of these artefacts can in some instances protect them from anchor damage and human interference (for example, removal of shells from a midden). Whereas, exposed or damaged sacred sites along the coast are likely to be more at risk from climate change and severe cyclones. Sacred sites and other important material and non-material Indigenous cultural places in the vicinity of areas of development or intensive use are more vulnerable to direct human pressure. Damage to sites, whether intentional, unintentional or by illegal activities, can result in the loss of irreplaceable material heritage and have other non-material implications (such as inability to undertake cultural practices). For example, fishing and collecting cultural practices are affected if fish trap rocks are moved and the trap is no longer functional. Other examples include cutting down or defacing scar trees.

4.3.3 Stories, songlines, totems and languages

Knowledge of the environment and the responsibility to maintain all living species, places or objects is passed down through generations in stories, songlines, totems and languages.⁸¹⁸ Stories also interact closely with customs and lore. Stories, songs, dance, dress, art and language are expressions of Traditional Owners' relationships with country, people, belief, knowledge, lore, language, symbols, ways of living, sea, land and objects — all arising from Indigenous spirituality.⁸¹⁹ Stories, songlines, totems and languages, and an understanding of their condition and trend, form part of the Indigenous knowledge held by Traditional Owners. Managing agencies, such as the Marine Park Authority, are working with Traditional Owners to ascertain whether they would like to share knowledge for reporting and management purposes.

Storytelling is embedded within Indigenous customs and cultural practices to encourage passing down of knowledge

Historical sea-level rise and changes to the entire northern fringe of the Australian continent around Cape York to Princess Charlotte Bay, is reflected within some stories and songlines, which have been recently recorded.⁸²⁰ For example, many of the large offshore islands, such as Lizard Island and the Whitsunday islands further south, were part of the mainland until about 13,000 years ago, and this is reflected in the stories and histories told.⁸²⁰

For tens of thousands of years, Aboriginal and Torres Strait Islander peoples lived on land that is now the Reef.⁸⁰⁵ Aboriginal stories recall the ability to walk across to Hinchinbrook Island and the Palm islands.¹⁰⁷ For example, Traditional Owners recall that, during the last glaciation, the coastline was the current outer barrier reef and a large river entered the Reef near Fitzroy Island (south of Cairns).⁸¹⁸ Oral histories from the Yidindji people recall a place “halfway between Fitzroy Island and King Beach that was called *mugada* (‘pencil cedar’) after the trees that grew there”.⁸²¹ This area is now completely submerged, forming an inner coral reef habitat within the Region.



Figure 4.6 Woppaburra seasonal calendar showing important totems
© Dr Harry Van Issum, artwork by Glenn Barry 2016

A totem is a natural object, plant or animal that is inherited by individual members of a clan or family as their spiritual emblem. Totems are an important part of Indigenous cultural identity and can be incorporated in song, dance, music and tools.⁸²² For the Woppaburra Traditional Owners of the Keppel Island group, the humpback whale (*mugga mugga*) is an important saltwater spiritual totem and forms a core part of their stories and traditional seasonal calendar (Figure 4.6); it cannot be hunted or harmed. The seasonal calendar demonstrates the Woppaburra people's connection to the land and sea — it depicts the tide and ocean movements and the coastal flora and marine species. In the colder months, when there are high tides and low winds (Figure 4.6, bottom left of the calendar), Woppaburra Traditional Owners

know it is the time to forage for mud crabs on short days, and for mullet as they migrate from estuaries in early winter.⁸¹⁴ The condition of species (Chapter 2) informs an assessment of the condition of totems. Humpback whales are assessed to be in very good condition (Section 8.3.7), so that totem is also considered in very good condition. However, across the Region, managers (or western scientists) do not have a comprehensive understanding of which species are important totems to Traditional Owners. The inherent location-based importance of stories, songlines, totems and languages, which can span land and sea, means other uses and pressures on an area can break, damage or displace these values.

4.3.4 Indigenous structures, technology, tools and archaeology

Indigenous structures, technology, tools and archaeology are tangible aspects of Indigenous heritage values. While some structures and sites are located within the Region, many are located on the adjacent coast and islands and are important to the Region's heritage significance. Indigenous structures include dwellings, middens, technology and tools used by Aboriginal and Torres Strait Islander peoples. Reef managers do not have a good understanding of the condition of Indigenous structures, technology, tools and archaeology.

Some heritage components have been documented (for example, on the Keppel Island group, Lizard Island and the Whitsunday islands), but little formal monitoring of their condition occurs. Gaining more knowledge of the location, condition and trend of these components will require working with Traditional Owner groups, such as through data-sharing arrangements, to access Indigenous knowledge. For this to occur, Traditional Owners may require support to access country, monitor sites and transmit knowledge. These values may be vulnerable to threats generated by coastal development in the Catchment and direct use activities within the Region.

The Region is a focus for coastal resource use by Aboriginal and Torres Strait Islander peoples. Over time, tools and technologies have been developed to support activities like shell fishing, crabbing, fin fishing and customary harvesting of turtles and dugongs. For example, handmade single-piece bark canoes were used along much of the Reef coastline.^{823,824} The canoes enabled significant journeys (up to 50 kilometres from the mainland) in some locations, however it is unclear whether these voyages were uninterrupted journeys or whether people 'hopped' from island to island.⁸¹² Lizard Island, a large granitic island north of Cairns, is the only location on the Reef known to contain a record of historic pottery development by Aboriginal people.⁸²⁵ Analysis of pottery shards from the area indicate the pottery was made locally on the island using sand and granite.⁸²⁵

4.4 Current condition and trends – historic heritage values

Seven components for Commonwealth heritage values are graded. Processes continues to be very good. Rarity, research, characteristic value, aesthetic characteristics, technical achievement and Indigenous tradition remain in good condition.



Full assessment summary: see Section 4.6.3

Five components are graded for historic heritage values – other. All components, except Commonwealth lightstations, continue to be poor.



Full assessment summary: see Section 4.6.4

Historic heritage values relate to the occupation and use of the Region (including Commonwealth islands) since the arrival of European settlers and other migrants. By its nature, historic heritage will continue to evolve, representing the flow of history, changing community perceptions and contemporary attributes.⁸²⁶ The assessment of the Region's historic heritage values does not include the heritage values on Queensland islands or parts of the Catchment (above low water mark). An exception is applied, however, where values are critical to transmitting (sharing) knowledge about the condition and trend of the Region's historic heritage value (for example, new shipwrecks in the intertidal zone).

4.4.1 Commonwealth heritage value

The Commonwealth Heritage List, created under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act), is a list of natural, Indigenous and historic heritage properties or places owned or managed by the Australian Government. Five properties in the Region are on the Commonwealth Heritage List: Low Island and Low Islets lightstation; the lightstations on Dent Island, Lady Elliot Island and North Reef (Figure 4.7); and the Shoalwater Bay Military Training Area (Figure 4.10). No new places in the Region have been added to the Commonwealth Heritage List since 2014.

The condition and trend of Commonwealth heritage values are assessed in Section 4.6.3 against the EPBC Act criteria (processes, rarity, research, characteristic value, aesthetic characteristics, technical achievement, and Indigenous tradition). Not all places are included for all criteria; only the relevant places are assessed (and noted) against each criterion.

Management of the Commonwealth heritage places remains constant. Their management effectiveness is discussed in Chapter 7. A noteworthy management initiative since 2014 is the Marine Park Authority's adoption of the *Great Barrier Reef Marine Park Commonwealth Heritage Listed Places and Properties Heritage Strategy 2018–21*⁸²⁷ in December 2017. The strategy fulfils a requirement under the EPBC Act and will be reviewed every three years.

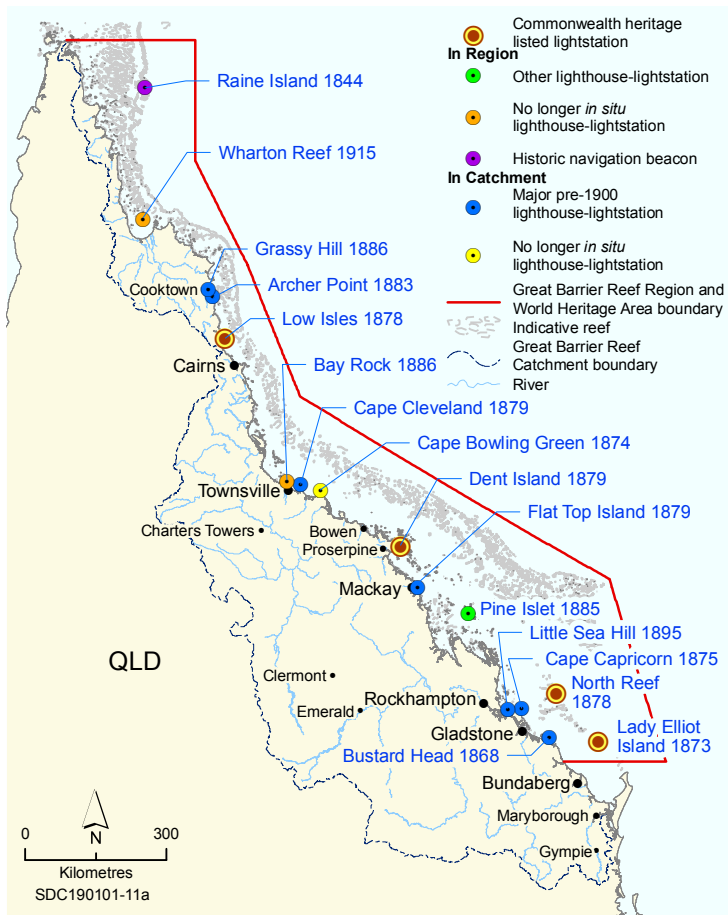


Figure 4.7 Historic lightstations and lighthouses in the World Heritage Area

The historic lightstations and lighthouses in the World Heritage Area demonstrate a phase in the evolution of maritime travel through the treacherous waters of the Great Barrier Reef. Few lighthouses remain in situ in the Region; many have been relocated to the mainland for preservation and display. Source: Adapted from Department of the Environment (Cth)⁸²⁸ and Department of Environment and Science (Qld)⁸²⁹



Figure 4.8 Low Islets lighthouse, Low Island, 2015
© GBRMPA 2015



Figure 4.9 North Reef lighthouse
© Australian Maritime Safety Authority 2014

Low Island and Low Islets lightstation The lighthouse was first lit in 1878 and was the first lighthouse in the northern part of the Reef (Figure 4.7).⁸²⁸ The lightstation is situated on Low Island, about 15 kilometres north-east of Port Douglas. Low Island is included on the Commonwealth Heritage List because of its significance to the Kuku Yalanji and Yirrganydji Traditional Owner groups as part of their Dreamings. No new evidence is available regarding the condition of the island's Indigenous heritage values. The current condition and trend of the lightstation has been monitored by managers through an annual monitoring and maintenance program. In late 2014, an asbestos audit of the lightstation structures was completed and a maintenance overcoating of the lighthouse structure was undertaken in 2018.⁸³⁰ The display at the Low Islets lightstation museum was upgraded in 2017.

The lightstation is situated just above sea level on a small unprotected cay (Figure 4.8), and is susceptible to sea-level rise. Given its location, more frequent intense storms predicted under climate change scenarios, could affect the historic and Indigenous heritage value of the place. The place was included on the Commonwealth Heritage List in 2008 against the process (importance in the course, or pattern, of Australia's cultural history) and Indigenous tradition criteria.⁸²⁸ Despite ongoing management and maintenance of this site, published long-term condition data on these criteria are limited.

Dent Island lightstation The lightstation is located four kilometres south-west of Hamilton Island in the Whitsundays. The lightstation was included as a Commonwealth heritage place in 2004.⁸³¹ The property's listed values include processes and characteristic attributes.

Extreme weather events are the main threat to the Dent Island lightstation, which is situated on the leeward side of the island on an elevated rocky outcrop. Exposure to the marine elements also makes the structures more vulnerable to corrosion, a problem that requires ongoing management. The physical condition of the property has been improved since it was outlined in the 2013 Dent Island Lightstation Heritage Management Plan.⁸³¹ In 2013–14, a maintenance overcoating of the lighthouse structure was undertaken⁸³⁰ and the winch house and derrick crane were significantly refurbished as part of the maintenance program. An asbestos audit undertaken for the structures on the island in late 2014 concluded the buildings and structures were generally in good condition. Managers are confident the condition and trend of this place's historic heritage value remain good and improving, however published data are limited.

Lady Elliot Island lightstation was included as a Commonwealth heritage place in 2004.^{832,833} Of the five Commonwealth heritage places in the Region, the Lady Elliot Island lightstation is recognised for the greatest number of attributes: processes, rarity, characteristic, aesthetic characteristic and technical achievement. The place's architectural and structural elements (such as the cast iron external cladding) are significant, and the use of timber

framing for the staircase is a rare example of this construction method. The property was outlined in 2012 as being generally in a good and stable condition, having been well built and generally well maintained.⁸³³ The lightstation is located 75 kilometres north-east of Bundaberg. Its location on a remote low-lying vegetated cay makes it susceptible to impacts from sea-level rise and extreme weather events. Structural corrosion is the main threat given the place's exposed location. Managers are confident this historic property has maintained good condition since 2014 given the maintenance and management actions that have preserved it.⁸³² An asbestos audit was undertaken on the lightstation structures in June 2015. However, updated published condition data are limited.

North Reef lightstation The lighthouse was built in 1878 and is located on North Reef, about 77 kilometres north-east of Curtis Island off Gladstone (Figure 4.7). It is recognised for its rarity as one of the few lighthouses built on a coral reef (Figure 4.9).⁸³⁴ The lightstation is located on a small unprotected cay and is susceptible to sea-level rise and any increase in frequency and intensity of cyclones. Exposure to the marine environment makes the structures vulnerable to corrosion. The property was included on the Commonwealth Heritage List in 2004. The lighthouse was fully refurbished in 2011. Failed protective coating systems were removed from the internal and external surfaces and the structure was completely

Commonwealth heritage places are well maintained

repainted.⁸³⁰ Its listed attributes (processes, rarity and technical achievement) have been well maintained and continue to be protected, although up-to-date published evidence is limited.

Shoalwater Bay Military Training Area was included as a Commonwealth heritage place in 2004 under several criteria (rarity and technical achievement).⁸²⁸ The Commonwealth heritage place reflects the boundaries and values of the Shoalwater and Corio Bays Area Ramsar wetland and the military training area owned by the Department of Defence (Figure 4.10). The place spans marine and terrestrial ecosystems, and is partly within the Region. Shoalwater Bay is an important habitat for several listed vulnerable species forming part of the place's rare attributes: dugongs, humpback whales, and green, hawksbill and loggerhead marine turtles. The condition of these species are varied. Population of dugongs are improved (Section 2.4.16) and concerns are mounting for the future of the marine turtles (Section 2.4.10). Humpback whales are considered in very good condition (Section 8.3.7). The place also satisfies the processes criterion, being a nationally significant place for geomorphological, ecological and biological processes in the marine hinterland interface. The Shoalwater Bay Military Training Area Commonwealth heritage place will, therefore, be affected by drivers and pressures, such as climate change and anthropogenic threats. The current condition is generally monitored as part of the ongoing management of the Defence estate. Also, condition reports are prepared for the Talisman Sabre military exercises that occur in the area every two years (Section 5.3).

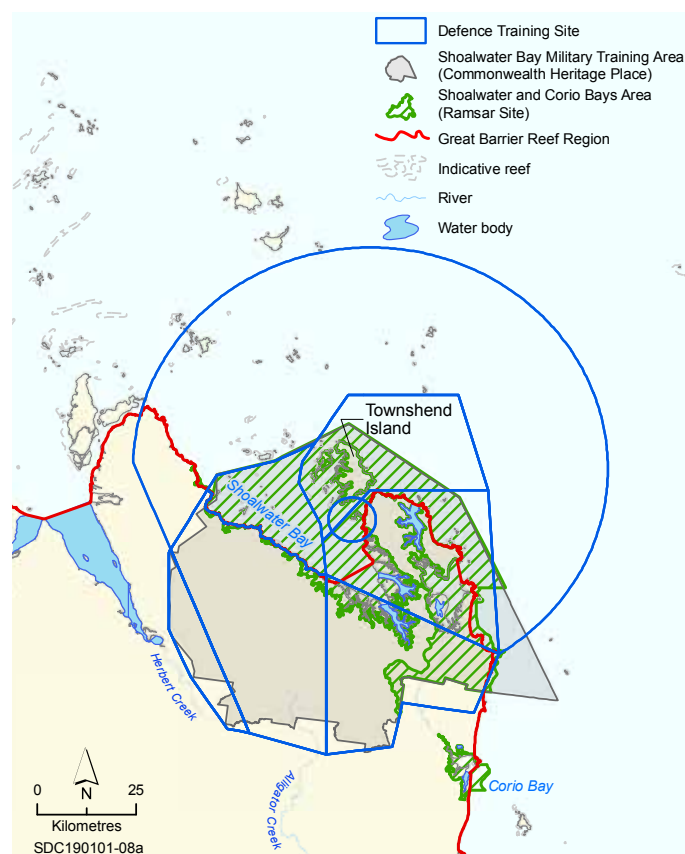


Figure 4.10 Shoalwater Bay Military Training Area Commonwealth heritage place

The Commonwealth heritage place reflects the boundaries and values of the Shoalwater and Corio Bays Area Ramsar wetland and the military training area owned by the Department of Defence.

4.4.2 Other historic lightstations and lighthouses

In 2014, this component was assessed together with the Commonwealth and Queensland historic heritage values. Commonwealth heritage lightstations are now assessed separately (Section 4.4.1) to remove duplication. Pine Islet lightstation is the only other known historic lightstation in the Region (that is, located on a Commonwealth island, reef or cay). Pine Islet lightstation, south-east of Mackay (Figure 4.7), is dilapidated and contains asbestos material. The lighthouse was automated in 1985 and relocated to the Port of Mackay in 1995. Pine Islet lightstation is an example of historic heritage being lost through modernisation and automation. Its current condition is a data gap.

Regardless of whether historic lightstations remain *in situ*, are working or have been automated, the place where they once stood holds historic heritage value to the Region. In most cases, even if the location of the historic feature is known, baseline data on the condition of their historic heritage value have not been systematically identified.

Lighthouses and aids to navigation (both historic and modern replacements) are scattered throughout the World Heritage Area (that is, including Queensland islands). Lightstations and lighthouses outside the Region are well recorded, and many are on the Queensland Heritage List (Figure 4.7). Condition reporting on the historic significance of aids to navigation in the Region is a data gap.

4.4.3 Historic voyages and shipwrecks

Shipwrecks are protected for their historic heritage value and maintained for their recreational, scientific and educational attributes. Protected zones can be declared up to two square kilometres around a relic. Protected zones have been declared for six historic shipwrecks in the Region: SS *Yongala*, HMS *Pandora*, SS *Gothenburg*, SS *Llewellyn*, HMCS *Mermaid*, and the *Foam*. These wrecks are assumed to be in good condition but, because they are in a dynamic marine environment, are assumed to be declining at different rates depending on their location.

Managers have inspected around 10 shipwrecks in high-priority sections of the Region

Since 2014, managers have undertaken several maritime cultural heritage surveys in high-priority sections of the Reef, inspecting around 10 shipwrecks (for example, Box 5). Data from this work, often unpublished, have been added to the Australian National Shipwreck Database to inform management activities and decisions. Noteworthy activities in this period include expeditions in 2015 to the *Foam* on Myrmidon Reef (Section 8.5.3)⁸³⁵ and the *Valetta* in the Whitsundays in 2016. Archival research on the shipwrecks around Magnetic Island in 2016 resulted in a display in the Magnetic Island museum and extensive additional information for the national database. Information on physical location, monitoring of current condition and gathering of new evidence for the majority of shipwrecks remain poor, but are improving.

Historic shipwrecks and their associated relics older than 75 years, or those declared to be historic, are protected regardless of whether their exact location is known. In mid-2019, the *Underwater Cultural Heritage Act 2018* (Cth) will replace the *Historic Shipwrecks Act 1976* (Cth) to protect underwater cultural heritage more broadly. The enactment of this legislation will extend protections currently afforded to historic shipwrecks to aircraft wrecks and other forms of underwater cultural heritage in Commonwealth waters. The effectiveness of these and other management tools is assessed in Chapter 7.

New laws will protect a broader range of underwater heritage values, including shipwrecks and other forms of cultural heritage

BOX 5

Locating our lost maritime heritage – *Martha Ridgway*

In late 2018, management agencies discovered the *Martha Ridgway* shipwreck⁸³⁶, which was lost over 170 years ago on a voyage from New Zealand to Bombay (now Mumbai). Martha Ridgway Reef was named after the wreck many years ago, yet the precise location of the wreck had never been established. This reef forms part of Wreck Bay near Raine Island in the far northern part of the Region. The *Martha Ridgway* shipwreck was found on the reef of the same name using a variety of survey methods and remote sensing equipment, including aerial survey (drone), magnetometer survey and visual census. The wreck is significant for many reasons, including its size and its association with the historic Raine Island beacon. In 1844, parts of the wreck were used to build the tower, which is now the oldest European structure north of Brisbane.



Aerial view of the location of the Martha Ridgway shipwreck (the group of underwater shapes below the boat in the middle of the image).
© GBRMPA 2018

4.4.4 World War II features and sites

World War II features and sites in the Region include aircraft wrecks (underwater, on Commonwealth islands or in intertidal areas), as well as forts and structures on Commonwealth islands. Aircraft wrecks are the dominant World War II features in the Region and are listed in the Australian National Shipwreck Database.⁸³⁶ Limited records exist

In 2015, two Catalina aircraft wrecks were protected through special management areas

on condition or trend for these historic features, partly because none of them have the status of being a Commonwealth heritage place, so lack a structured monitoring plan. Wrecks and other underwater features are susceptible to damage from severe weather events through physical movement and abrasion from wave action containing suspended sediments. The abrasive action often removes the protective marine growth, exposing the fabric of the site to corrosion and frequently uncovering fragile artefacts.⁸³⁷ Most World War II features and sites are on the mainland or on Queensland islands outside the Region. However, limited progress has been made in systematically

recording the majority of other relics. On a Reef-wide scale up-to-date information on condition is generally unpublished, even though five inspections of World War II features and sites have been undertaken since 2014.

The Marine Park regulations were amended in 2015 to protect underwater maritime cultural heritage through special management areas. In 2013, the wreck of a Catalina PBY 5 flying boat (A24-24) was found off Bowen. In the same year, a second Catalina A24-25 wreck was located off the Frankland islands about 50 kilometres south-east of Cairns. Special management areas, each one kilometre square, are now in place around these wrecks. In 2013, underwater historic aircraft and associated relics located in Commonwealth waters outside a special management area, had no specific legislative protection. In mid-2019, the new *Underwater Cultural Heritage Act 2018* (Cth) will include mechanisms to provide protection to any aircraft or aircraft relic discovered in the Region that is over 75 years old or declared to be historic. The management effectiveness of historic heritage, which includes underwater historic aircraft wrecks and relics, is addressed in Chapter 7.



Catalina A24-25 wreck located off the Frankland islands, 2013.
© Kevin Coombs

4.4.5 Other places of historic significance

Other places of historic significance in the Region include tangible components, such as structures, ruins or wrecks. There are also intangible components, such as sites where the mistreatment of Indigenous peoples occurred, (for example, drowning caves in the Keppel islands⁸¹⁴), sites of early explorations, and places with strong science exploration history, such as Low Isles and Lizard Island.

New evidence is improving understanding about human occupation in the Region before European settlement by people not of Aboriginal or Torres Strait Islander heritage. For example, early Polynesian and south-east Asian artefacts found in the Region provide an added dimension to the historic significance of the Great Barrier Reef.⁸³⁸ Reef names and the associated stories honouring prominent people connected to the Reef also provide an important record of the people's historic significance. For example, in 2014 a reef was named in honour of the late Dr Bob Endean (1925–1997), a leading marine biologist and ecotoxicologist during the 1960s environmental movement.⁸³⁹ Bob Endean Reef is located approximately 65 kilometres east of Mission Beach, an area where Dr Endean undertook significant field research. Five other reefs have been named after prominent scientists since 2014. Most intangible components of historic significance in the Region are either not recorded, or their records have not been recovered or have been lost. Published evidence about intangible historic heritage values remains a significant information gap.



Carter Reef research platform (offshore Lizard Island), where researchers would stay overnight, was demolished in the early 1990s.
© Australian Museum

4.5 Current condition and trends – other heritage values

Three components are graded for other heritage values. Social, aesthetic and scientific heritage values continue to be in good condition

Full assessment summary: see Section 4.6.5



Heritage values include 'a place's natural and cultural environment having aesthetic, historic, scientific or social significance, or other significance, for current and future generations of Australians'.^{294,840} Therefore, as well as a component being a natural, Indigenous or historic heritage value, a place may also have 'other' heritage value – social, aesthetic or scientific attributes (Figure 4.11).

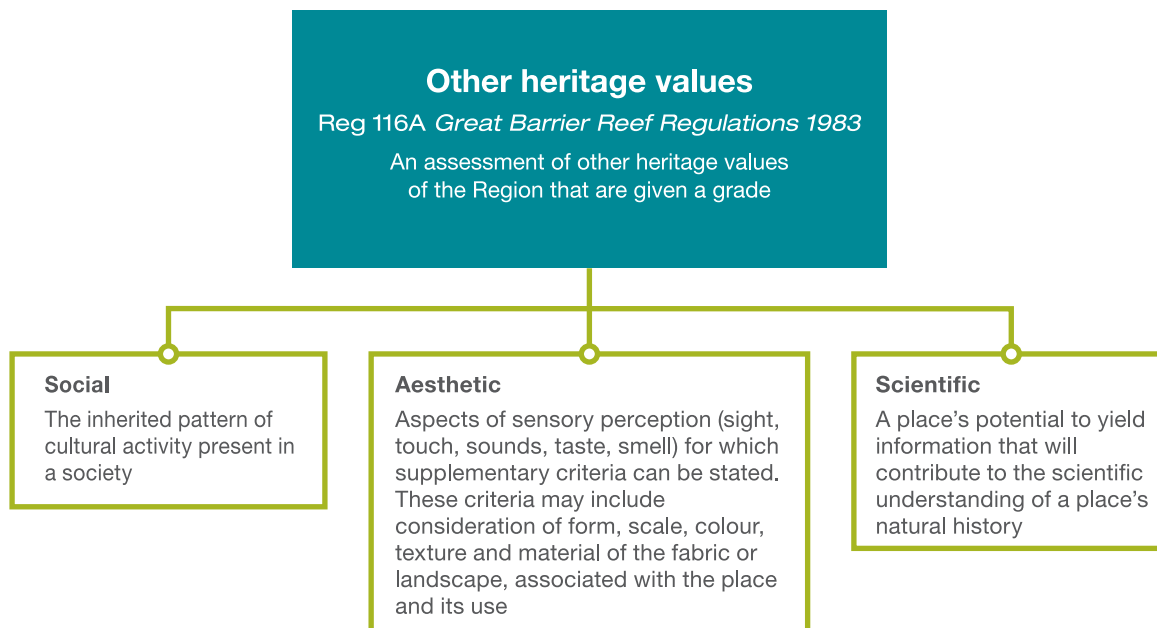


Figure 4.11 Other heritage values

The Outlook Report assesses 'other heritage values' in addition to the components outlined in the Marine Park regulations. Some overlap occurs between this assessment and the heritage matrix in Figure 4.1. Source: Commonwealth of Australia^{840,841} and Pocock et al. 2002⁸⁴²

4.5.1 Social heritage values

Social heritage values involve inherited patterns of activities embedded in society by the way communities access, use or think about the Reef. The Reef is considered Australia's most inspiring landmark by the general Australian population.^{785,843} The Reef remains, nationally, the most socially significant natural environment.⁸⁴⁴ This section describes and assesses the range of social heritage values of the Region. The inherent social significance of the Region for Traditional Owners is discussed in Section 4.3.

Human dimensions of the Reef have been monitored on a large scale since 2013. Up to the end of 2017, more than 12,000 people had contributed to this monitoring, representing communities of the Catchment, domestic and international tourists, Reef-dependent industries, and the broader Australian population.⁷⁸⁵ How society thinks and feels about the state of the Reef is at the heart of the Region's social heritage value.

Of the Australian residents surveyed in 2017 (about 1000), 85 per cent were proud of the Reef and felt a sense of responsibility to protect it.^{785,845} They were less optimistic about the Reef's future (54 per cent, down from 56 per cent in 2013). The relationship that Australian residents have with the Reef remains positive overall, with around 85 per cent believing that the beauty of the Reef is outstanding and is an asset for the Australian economy. Many Australian residents (73 per cent) felt the Reef is part of their Australian identity. Climate change, pollution and agricultural run-off were considered by Australian residents to be the biggest threats to the Reef.

About 1900 local residents of coastal towns in the Reef Catchment participated in the 2017 survey.⁷⁸⁵ Of those surveyed, over 80 per cent felt that the Reef contributes to their quality of life and wellbeing, and nearly 90 per cent felt it supported a desirable and active way of life. The vast majority thought the Reef is an economic asset (96 per

For Australians, the Great Barrier Reef remains the most socially significant natural environment

cent); supports a variety of fish and corals (about 96 per cent respectively) and enables environmental appreciation through scientific discoveries (nearly 90 per cent).⁷⁸⁵ The strong cultural and economic connection to the Reef among local residents is evidenced by the Reef supporting thousands of jobs in the tourism, fishing and research industries, both directly and indirectly (Section 5.1).⁸⁴⁶

The Reef attracts tourists from all over the world. Tourism on the Reef occurs because of, and contributes to, the Reef's ongoing social significance, which is part of its outstanding universal value. In 2017, about 1800 domestic and international tourists participated in a survey; most felt strong stewardship for the Reef and the environment. The majority of tourists (83 per cent) indicated they "would like to do more to help protect the Great Barrier Reef", and 81 per cent felt a sense of personal responsibility to protect the Reef.⁷⁸⁵ Ratings for different values associated with the Reef (including its biodiversity, scientific heritage, lifestyle and international icon values) were higher in 2017 than those reported in 2013. However, tourists' ratings of optimism for the Reef's future fell significantly.⁸⁴⁷ Climate change, pollution and tourism were perceived as the three most serious threats to the Reef by tourists. Among international tourists surveyed in 2017, 78 per cent indicated belief that "climate change is an immediate threat requiring action". Among domestic tourists, this proportion was 67 per cent.

Other heritage values of the Region have social significance to the community. For example, the shipwreck SS *Gothenburg* located near Cape Upstart, near Townsville, has connection with three Australian communities, including Darwin, Adelaide and Queensland. Of the 125 people on board, 106 drowned, including all women and children.⁸⁴⁸ However, contemporary evidence about the condition of the social significance of most heritage values, is lacking. Enquiries into the human dimensions of the Reef have notably extended knowledge of some social elements since 2014.

4.5.2 Aesthetic heritage values

The Reef is still strongly associated with beauty, but it is also perceived as being in danger and under threat.⁸⁴⁴ Enquiries into the human dimensions of the Reef continue to uncover the extent and nature of peoples' relationships with the Reef, the Reef attributes they value⁷⁸³ and trigger points at which people feel change and/or damage to the Region is too great.^{785,849}

Spectacular scenery and seascapes contribute to the aesthetic appeal of the Region

In 2017, about 1900 local residents were surveyed. The relationship between how proud people are of the Reef as a World Heritage Area (Section 4.5.1) and the importance they place on the spectacular aesthetic beauty of the Reef was evident in the majority of those surveyed (95 per cent).^{783,785} As an indicator, the value people place on the aesthetic beauty of a location may be a reason people are motivated to take care of natural places.⁷⁸³ A linked analysis in 2019 explored the community's level of ecological grief and emotional response to disturbances like coral bleaching.^{850,851,852} The results suggested around half of all residents, tourists and tourism operators, and around a quarter of fishers felt a strong sense of grief related to Reef disturbances caused by mass coral bleaching in 2016 and 2017.

The aesthetic heritage values of the Region cover land and sea — seascapes (fish, coral structure), island vistas and coastal landscapes. While new information is available on community perceptions such as "a coral reef without fish is like a playground without the laughter"⁷⁸³, evidence on the current condition of the tangible elements of aesthetic heritage values is lacking.

Island vistas have legacy impacts from, and continue to be modified by, coastal and island development. Additionally, numerous severe weather events since 2014 have damaged these land-based backdrops. Few contemporary studies have considered island vistas and other elements of the Reef's aesthetic heritage value, making it difficult to determine their current condition.

The emerging social-ecological field continues to expand methodologies to improve techniques in monitoring aesthetic heritage values, using potential indicators⁷⁸³ and computations⁸⁵³ of aesthetic value. However, ongoing examination of which locations or biophysical elements are the most important to the Reef's spectacular seascapes and scenery, remains an information gap. Evidence about the condition of the aesthetic heritage values of the Region is inferred from the condition of the Reef's natural heritage values assessed in Chapters 2 and 3.

4.5.3 Scientific heritage values

Scientific heritage value is not well-defined. However, in general terms it is a place's potential to yield information that will contribute to the scientific understanding of the place's natural history.⁸⁴¹ When coupled with the meaning of 'heritage' — being 'our legacy from the past, what we live with today, and what we pass on to future generations'⁸⁵⁴ — the scientific heritage value of the Reef encompasses human knowledge of the land and sea.

Scientific discoveries are critical to understanding and preservation of a place's natural and cultural history

The history of the current Great Barrier Reef dates back at least 450,000 years. Human knowledge of the land and sea pre-dates European occupation. Through the Reef's Traditional Owner history, knowledge is preserved in stories and songlines that have been passed down through generations. The Reef's modern scientific legacy (post-European arrival) began with early European voyages to a great south land, such as the expedition of Endeavour in 1770 with British botanist Joseph Banks. Many centuries later, the first contemporary detailed scientific study of the Reef occurred at Low Isles in 1928–1929.⁸⁵⁵ In the 21st century, the marine science research and management community provides a measure of Australia's focus on transmitting the scientific heritage value of the Region to future generations. The Reef's prominence through long-term studies and scientific literature is strong. Between 2014 and early 2019, around 2000 scientific journal articles about coral and social values in the Great Barrier Reef were published, and citations of these number in the tens of thousands.⁸⁵⁶

A 2017 survey quantified society's perception of the importance of the Reef's scientific heritage value.⁷⁸⁵ Tourists and local residents said they valued the Reef because they can learn about the environment through scientific discoveries (90 and 89 per cent, respectively). Those surveyed placed a strong emphasis on the aesthetic beauty of the Reef (Section 4.5.2), which is intertwined with the need for ongoing scientific evidence about the Reef. People's desire to preserve and understand the Reef and its spectacular scenery continues to inspire scientific exploration. As a result, the condition of the Reef's scientific heritage value continues to improve.

4.6 Assessment summary – Heritage values

Paragraph 116A(2)(a) of the *Great Barrier Reef Marine Park Regulations 1983* requires '... an assessment of the current heritage values ...' of the Great Barrier Reef Region.






The assessment of the Reef's heritage values has been considered against their inherent components and attributes, namely:

- natural heritage values – world heritage value and national heritage value
- Indigenous heritage values
- historic heritage values – Commonwealth heritage values and other historic heritage values
- other heritage values.

Since 2014, the assessment of historic lightstations has been refined. The Commonwealth heritage places were, and continue to be, assessed under the Commonwealth heritage values (Section 4.6.3). Other historic lightstations are assessed separately in Section 4.6.4.

4.6.1 Natural heritage values – world heritage value and national heritage value

The assessment statements for Section 4.6.1 regarding natural heritage values are standalone and relevant to the assessment of the world heritage and national heritage values only.



















Grading statements – natural heritage values					Trend since last report
					↑ Improved ↔ Stable ↓ Deteriorated — No consistent trend
Very good All elements necessary to maintain the outstanding universal value are essentially intact and their overall condition is stable or improving. Available evidence indicates only minor, if any, disturbance to this element of outstanding universal value.	Good Some loss or alteration of the elements necessary to maintain the outstanding universal value has occurred, but their overall condition is not causing persistent or substantial effects on this element of outstanding universal value.	Poor Loss or alteration of many elements necessary to maintain outstanding universal value has occurred, which is leading to a significant reduction in this element of outstanding universal value.	Very poor Loss or alteration of most elements necessary to maintain the outstanding universal value has occurred, causing a major loss of outstanding universal value.	Borderline Indicates where a component or criterion is considered close to satisfying the adjacent grading statement.	Confidence ● Adequate high-quality evidence and high level of consensus ◐ Limited evidence or limited consensus ○ Inferred, very limited evidence

Grade and trend			Confidence		Criterion and component summaries
2009	2014	2019	Grade	Trend	
					Natural heritage values – world heritage value and national heritage value The Reef’s world heritage and national heritage value represents the outstanding universal value of the Region. Outstanding universal value remains, however, the grade is borderline with poor because the condition of the property has deteriorated to varying extents with respect to criteria vii, viii, ix and x. While the property remains whole and intact, ecosystem resilience is deteriorating and the property’s size is becoming less effective as a buffer against these disturbances.
					Natural beauty and natural phenomena: At a broad scale, the Region retains much of its spectacular scenery. However, its natural beauty is being affected in some areas (for example, by poor inshore water quality). Components of natural phenomena, such as turtle breeding, whale migration and coral spawning, continue but these elements (criterion vii) are being increasingly challenged by climate change, resulting in the condition being good borderline poor. Much of the evidence is inferred from the assessments in Chapters 2 and 3.
					Major stages of the Earth’s evolutionary history: The Reef’s ability to regenerate and grow over millennia following periods of climatic and sea-level change is well documented. However, new evidence has identified that some alteration to processes that influence reef formation, and maintain sediment accumulation on reefs and islands has occurred. This alteration is intensifying in a negative way due to climate change (criterion viii).
					Ecological and biological processes: Overall, some ecological and biological processes (criterion ix) remain in good condition. However, many ecological processes have deteriorated since 2014 due to the combined effects of climate change and inshore land-based run-off. As a result, the condition is considered good borderline poor.
					Habitats for conservation of biodiversity: The property contains a diverse range of habitats (criterion x), many of which are under pressure. Overall, significant habitat reduction and alteration in a number of areas has led to persistent and substantial effects on populations of some dependent species.
					Integrity: While the property remains whole and intact, its integrity is deteriorating. An altered disturbance regime due to climate change has impaired the resilience of the ecosystem resulting in the condition being good borderline poor. The property’s size is becoming less effective as a buffer against Reef-wide disturbances.
					Natural heritage values: This component has been absorbed into the assessment of the processes and habitats criteria.































4.6.2 Indigenous heritage values

A series of statements apply to Indigenous, historic and other heritage values, standardising the allocation of grades for all components and attributes examined in the assessment, as well as the grade for the criterion.

Grading statements – Indigenous, historic and other heritage values					Trend since last report
					<ul style="list-style-type: none"> ↑ Improved ↔ Stable ↓ Deteriorated — No consistent trend
<p>Very good Heritage values have been systematically and comprehensively identified and included in relevant inventories or reserves. Known heritage values are well maintained and retain a high degree of integrity.</p>	<p>Good Heritage values have been mostly identified and included in relevant inventories or reserves. Known heritage values are generally maintained and retain much of their integrity.</p>	<p>Poor Heritage values have not been systematically identified. Known heritage values are degrading and generally lack integrity.</p>	<p>Very poor Heritage values have not been identified. Known heritage values are degraded and lack integrity.</p>	<p>Borderline Indicates where a component or criterion is considered close to satisfying the adjacent grading statement.</p>	<p>Confidence</p> <ul style="list-style-type: none"> ● Adequate high-quality evidence and high level of consensus ◐ Limited evidence or limited consensus ○ Inferred, very limited evidence

Grade and trend			Confidence		Criterion and component summaries
2009	2014	2019	Grade	Trend	
					Indigenous heritage values: Aboriginal and Torres Strait Islander peoples are increasingly reasserting their role in sea country management and protection of Indigenous heritage. The condition and trend of Indigenous heritage values are tied closely to the condition of natural heritage values. The condition of many values remains limited.
					Cultural practices, observances, customs and lore: Loss of Indigenous knowledge is a threat to this component. It is assumed that knowledge transfer is being maintained across the Region, supported by the expansion in land and sea management and cultural activities.
					Sacred sites, sites of particular significance and places important for cultural tradition: The locations of sacred sites are not widely known outside Traditional Owner groups, but the Keppel island region is well documented. Only a very small portion of the Region has dated archaeological sites, contributing to a lack of understanding and recognition of these important areas in management frameworks.
					Stories, songlines, totems and languages: The location-based importance of this component, which can span land and sea, means other uses and pressures can break, damage or displace these values. This value is reliant on healthy populations of totemic species, some of which are in poor condition. The condition of this component is not well understood by managers and is inferred to be poor.
					Indigenous structures, technology, tools and archaeology: The location-based importance of this component, which can span land and sea, means other uses and pressures can break, damage or displace these values. Some heritage components have been documented on and around islands, but limited monitoring of their condition occurs.

4.6.3 Historic heritage values – Commonwealth heritage values

Grade and trend			Confidence		Criterion and component summaries
2009	2014	2019	Grade	Trend	
					Commonwealth heritage values: The five places in the Region included on the Commonwealth Heritage List retain the values for which they were listed. The condition and trend of most places are based on limited published evidence. However, the inference from managers is the properties retain their integrity and are in good condition.
					Processes: The five Commonwealth heritage places in the Region remain <i>in situ</i> . While published condition data are limited, managers are more confident than in 2014 that the heritage values are well maintained and retain a high degree of integrity. For this reason, the grade has improved.
					Rarity: The rare architectural features and location of the Lady Elliot Island and North Reef lightstations are maintained. The Shoalwater Bay Military Training Area continues to support threatened species listed as rare attributes, even though some species are deteriorating.
					Research: Research and monitoring of the natural environment continues to expand scientific knowledge about the Shoalwater Bay Military Training Area. Condition data are well documented.
					Characteristic value: The Dent Island and Lady Elliot Island lightstations are in good condition as a result of ongoing management. Condition data are not systematically published, however, maintenance programs are recorded.
					Aesthetic characteristics: The aesthetic characteristics of the Lady Elliot Island lightstation remains in good condition following ongoing maintenance and management. Condition and trend data are not published.
					Technical achievement: The technical attributes of the Shoalwater Bay Military Training Area, and the Lady Elliot Island and North Reef lightstations have not been modified. Condition data are not systematically published.
					Indigenous tradition: Low Island retains its importance as part of the sea country of the Kuku Yalanji and Yirrganydji Traditional Owner groups. No new published data are available on Indigenous traditions, and so the trend since 2014 is inferred to be stable.

4.6.4 Historic heritage values – other

Grade and trend			Confidence		Criterion and component summaries
2009	2014	2019	Grade	Trend	
					Historic heritage values: Many historic heritage components have not been systematically identified, resulting in an inferred stable trend for several components. Further investigation since 2014 has uncovered a lack of evidence on condition and trend across most components, and the grade has been updated to reflect this.
					Commonwealth lightstations: The values of the four lightstations in the Region included on the Commonwealth Heritage List have been retained and are in good condition.
					Other historic lightstations and lighthouses: The former Pine Islet lightstation is the only lightstation attribute located in the Region that is not identified on the Commonwealth Heritage List. The site is derelict; the lighthouse was relocated in 1995. Condition reporting on aids to navigation is data deficient.
					Historic voyages and shipwrecks: The six historic shipwrecks in the Region are well recorded and in good but naturally declining condition. However, limited progress has been made on systematically recording the majority of other relics.
					World War II features and sites: Many of these relics have not been systematically identified. Since 2014, two Catalina aircraft wrecks have been protected by special management areas. Site expeditions in this period provide some baseline, condition and trend data.
					Other places of historic significance: Little change has occurred for this component. Broad historic heritage values have not been systematically identified. Condition is not well understood.

4.6.5 Other heritage values

Grade and trend			Confidence		Criterion and component summaries
2009	2014	2019	Grade	Trend	
					Other heritage values: The Region's scientific heritage value is escalating. The Australian people's concern about the declining condition of the Reef is an emerging observation, as their connection to its environment and natural beauty continues to be strong.
					Social heritage values: The inherited pattern of cultural activity present in the communities that value the Reef is embedded in the way they access, use or think about the Reef. New studies show the socio-economic worth of the Region supports strong social heritage values.
					Aesthetic heritage values: Aesthetic beauty is closely aligned to the condition of the ecosystem. Strong evidence has established that several disturbances have damaged parts of the Reef's naturalness. Widespread and localised impacts are also inferred to have diminished some of the Region's aesthetic heritage values.
					Scientific heritage values: The long history of Traditional Owners living on, and researchers studying, the Reef is significant. The Reef's prominence in long-term scientific studies continues to increase.

4.7 Overall summary of heritage values

The Great Barrier Reef's heritage values are assessed against natural (world heritage and national heritage), Indigenous, historic (Commonwealth and other) and other heritage (social, aesthetic and scientific) values.

The Great Barrier Reef remains whole and intact and maintains many of the elements that make up its outstanding universal value, as recognised in its world heritage listing. However, significant components that underpin all four natural world heritage criteria for which the World Heritage Area was inscribed in 1981 have deteriorated since its inscription. One criterion — habitats for the conservation of biodiversity — is assessed as poor, which aligns with the assessment findings in Chapter 2. Given that the impacts from climate change are accelerating, the overall assessment of the Reef's world heritage and national heritage values is good, borderline poor.

Indigenous heritage includes tangible and intangible heritage and is interlinked with the condition of the Reef's natural components. The effects of acute and chronic disturbances in the past five years have affected the condition of the Region's Indigenous heritage value, some of which is irreplaceable (for example, songlines). For this reason, material and non-material Indigenous heritage is graded as being in poor condition overall with a stable trend. However, the limited evidence available in both 2014 and 2019 means the confidence in both grade and trend is rated as inferred. A noteworthy achievement in this space was the release of the Marine Park Authority's 2019 *Aboriginal and Torres Strait Islander Heritage Strategy*.

The historic heritage values of the five properties in the Region listed on the Commonwealth Heritage List are graded as good, having been identified and included in a relevant inventory. Yet, the condition and trend of most places are based on limited published evidence. The inference by managers is, however, that the properties retain their integrity and are in good condition.

Other historic heritage components (other lightstations, shipwrecks, aircraft wrecks and other places of historic significance) are graded overall as poor. Published condition and trend data are lacking for most sites, so confidence in the grade and trend is limited or inferred. Positive progress has been made towards gathering evidence on shipwrecks and aircraft wrecks. The significant discovery in late 2018 of the precise location of the wreck of the *Martha Ridgway* increased the baseline data for this component.

Other heritage values, including social, aesthetic and scientific, are graded overall as good. The significance of the World Heritage Area still transcends national boundaries and remains a source of pride for the Australian public broadly. Significant progress has been made since 2014 in understanding the human dimensions of the Reef, focusing on societal attitudes and how people value the Reef. The social heritage value of the Region is considered to be in good condition.

A 2017 survey of approximately 3900 people living close to, or deriving benefit from, the Reef (local and national residents, tourists, tourism operators and commercial fishers) highlighted the wider community's concern about the declining condition of the Reef, as their connection to its environment and natural beauty continues to strengthen.^{847,857}

As people's concerns about the declining health of the Reef increase, the Region's scientific heritage value continues to grow. The connection between emerging science and the natural heritage value of the Region provides adequate evidence to assess scientific heritage value.

Overall, human-induced climate change is challenging the integrity of the World Heritage Area; its size is becoming a less effective buffer against broadscale impacts

Indigenous heritage includes tangible and intangible heritage and is interlinked with the condition of the Reef's natural components

The significance of the World Heritage Area still transcends national boundaries and remains a source of pride for the Australian public broadly



The Reef is still strongly associated with beauty, but is also perceived as being significantly under threat. © Matt Curnock 2017