**Great Barrier Reef**

**Great Barrier Reef**, complex of [coral reefs](https://www.britannica.com/science/coral-reef), shoals, and islets in the [Pacific Ocean](https://www.britannica.com/place/Pacific-Ocean) off the northeastern coast of [Australia](https://www.britannica.com/place/Australia) that is the longest and largest reef complex in the world. The Great Barrier Reef extends in roughly a northwest-southeast direction for more than 1,250 miles (2,000 km), at an offshore distance ranging from 10 to 100 miles (16 to 160 km), and its width ranges from 37 to 155 miles (60 to 250 km). The Great Barrier Reef has an area of some 135,000 square miles (350,000 square km), and it has been [characterized](https://www.britannica.com/dictionary/characterized), somewhat inaccurately, as the largest structure ever built by living creatures.

**Geography**

The reef actually consists of some 2,100 individual reefs and some 800 fringing reefs (formed around islands or bordering coastlines). Many are dry or barely awash at low [tide](https://www.britannica.com/science/tide); some have islands of [coral](https://www.britannica.com/animal/coral) [sand](https://www.britannica.com/science/sand), or cays; and others fringe high islands or the mainland coast. In spite of this variety, the reefs share a common origin: each has been formed, over millions of years, from the skeletons and skeletal waste of a mass of living marine organisms. The “bricks” in the reef framework are formed by the calcareous remains of the tiny creatures known as coral [polyps](https://www.britannica.com/science/polyp-zoology) and hydrocorals, while the “cement” that binds these remains together is formed in large part by [coralline](https://www.britannica.com/science/Corallina) [algae](https://www.britannica.com/science/algae) and [bryozoans](https://www.britannica.com/animal/moss-animal). The interstices of this framework have been filled in by [vast](https://www.britannica.com/dictionary/vast) quantities of skeletal waste produced by the pounding of the [waves](https://www.britannica.com/science/wave-physics) and the depredations of boring organisms.

[European exploration](https://www.britannica.com/topic/European-exploration) of the reef began in 1770, when the British explorer Capt. [James Cook](https://www.britannica.com/biography/James-Cook) ran his [ship](https://www.britannica.com/technology/ship) aground on it. The work of charting channels and passages through the maze of reefs, begun by Cook, continued during the 19th century. The Great Barrier Reef Expedition of 1928–29 contributed important knowledge about coral physiology and the ecology of coral reefs. A modern laboratory on [Heron Island](https://www.britannica.com/place/Heron-Island) continues scientific investigations, and several studies have been undertaken in other areas.

The reef has risen on the shallow shelf fringing the Australian [continent](https://www.britannica.com/science/continent), in warm waters that have enabled the corals to [flourish](https://www.britannica.com/dictionary/flourish) (they cannot exist where average [temperatures](https://www.britannica.com/science/temperature) fall below 70 °F [21 °C]). Borings have established that reefs were growing on the [continental shelf](https://www.britannica.com/science/continental-shelf) as early as the [Miocene Epoch](https://www.britannica.com/science/Miocene-Epoch) (23.0 million to 5.3 million years ago). Subsidence of the continental shelf has proceeded, with some reversals, since the early Miocene.

The [water environment](https://www.britannica.com/science/pelagic-zone) of the Great Barrier Reef is formed by the surface water layer of the southwestern Pacific Ocean. The reef waters show little seasonal variation: surface-water temperature is high, ranging from 70 to 100 °F (21 to 38 °C). The waters are generally crystal-clear, with submarine features clearly visible at depths of 100 feet (30 metres).

# **Resources**

Forms of life include at least 450 [species](https://www.britannica.com/science/species-taxon) of hard [coral](https://www.britannica.com/animal/coral) as well as [anemones](https://www.britannica.com/animal/sea-anemone),[sponges](https://www.britannica.com/animal/sponge-animal), [worms](https://www.britannica.com/animal/worm), [gastropods](https://www.britannica.com/animal/gastropod), [lobsters](https://www.britannica.com/animal/lobster), [crayfish](https://www.britannica.com/animal/crayfish), [prawns](https://www.britannica.com/animal/prawn), and [crabs](https://www.britannica.com/animal/crab). More than 1,500 species of [fishes](https://www.britannica.com/animal/fish) and other [vertebrates](https://www.britannica.com/animal/vertebrate) [inhabit](https://www.britannica.com/dictionary/inhabit) the reef. Some of the most common fishes include [wrasses](https://www.britannica.com/animal/wrasse), [damselfish](https://www.britannica.com/animal/damselfish), [triggerfish](https://www.britannica.com/animal/triggerfish), and [angelfish](https://www.britannica.com/animal/angelfish), and larger species include [rays](https://www.britannica.com/animal/ray-fish) and [sharks](https://www.britannica.com/animal/shark) (e.g., [tiger sharks](https://www.britannica.com/animal/tiger-shark-species) and [whale sharks](https://www.britannica.com/animal/whale-shark), the largest living fish). The reef is also home to six of the seven known species of [sea turtles](https://www.britannica.com/animal/sea-turtle), more than a dozen [sea snakes](https://www.britannica.com/animal/sea-snake), and nearly two dozen species of [birds](https://www.britannica.com/animal/bird-animal).

The most destructive reef [animal](https://www.britannica.com/animal/animal) is the [crown-of-thorns starfish](https://www.britannica.com/animal/crown-of-thorns-starfish) (Acanthaster planci), which has reduced the colour and attraction of many of the central reefs by eating much of the living coral. Encrusting [red algae](https://www.britannica.com/science/red-algae) Lithothamnion and Porolithon form the fortifying purplish red algal rim that is one of the Great [Barrier Reef’s](https://www.britannica.com/science/barrier-reef) most [characteristic](https://www.britannica.com/dictionary/characteristic) features, while the [green alga](https://www.britannica.com/science/green-algae) Halimeda flourishes almost everywhere. Above the surface, the [plant](https://www.britannica.com/plant/plant) life of the cays is very restricted, consisting of only some 30 to 40 species. Some varieties of [mangroves](https://www.britannica.com/plant/mangrove) occur in the northern cays.

In addition to its scientific interest, the reef has become increasingly important as a [tourist attraction](https://www.britannica.com/topic/tourism). Growing concern over the preservation of its natural heritage has led to increased controls on such potentially threatening activities as drilling for [petroleum](https://www.britannica.com/science/petroleum) resources. The extensive use of tourist craft and the sustainability of [commercial fishing](https://www.britannica.com/technology/commercial-fishing) were controversial matters in the late 20th and early 21st centuries.

The reef’s health, however, is also threatened by other factors. It is [susceptible](https://www.britannica.com/dictionary/susceptible) to periodic [coral bleaching](https://www.britannica.com/science/coral-bleaching) events—that is, the “whitening” of the coral skeleton, caused by breakdown of the coral’s [symbiosis](https://www.britannica.com/science/symbiosis) with [algae](https://www.britannica.com/science/algae) called [zooxanthellae](https://www.britannica.com/science/zooxanthella). At least six mass bleaching events caused by [climate change](https://www.britannica.com/science/climate-change) have taken place since 1998, resulting in the loss of substantial coral coverage. Some marine scientists noted that coral coverage on the reef fell by nearly 50 percent between 1985 and 2012 as a result of damage caused by coral bleaching, [invasive species](https://www.britannica.com/science/invasive-species) such as the [crown-of-thorns starfish](https://www.britannica.com/animal/crown-of-thorns-starfish) (Acanthaster planci), and [tropical cyclones](https://www.britannica.com/science/tropical-cyclone). In 2016 and 2017, bleaching resulted in coral coverage declines by up to one-third in the northern part of the reef. Another severe bleaching event in 2020 extended to the southern areas of the reef.

Supervision of the reef is largely the responsibility of the Great Barrier Reef Marine Park (declared in 1975), which [encompasses](https://www.merriam-webster.com/dictionary/encompasses) the vast majority of the area. There are also smaller state and national parks. In 1981 the Great Barrier Reef was added to [UNESCO’s](https://www.britannica.com/topic/UNESCO) [World Heritage List](https://www.britannica.com/topic/World-Heritage-site).