

Coral Reefs of Australia

Regional summary

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SUMMARY

Australian coral reefs support exceptionally high biodiversity, and include the world's largest barrier reef system, the Great Barrier Reef. These ecosystems face severe pressure from climate change-driven heat stress, severe storms and cyclones. They also face localised human pressures from fishing, coastal development and pollution. The IUCN Red List of Ecosystems assessment classified all 17 Australian coral reef ecoregions as Critically Endangered (CR). Based on observed change, risk reflects largely historical heat stress (Criterion C1), and biotic disruptions (Criterion D1), along with some ecoregions experiencing declining (Criterion A1) or restricted (Criterion B) distributions. This places 24.5% of the total assessed Australian coral reef area (4 ecoregions) as Critically Endangered, a further 12.5% of the reef area (6 ecoregions) as Endangered, and 57.7% of the reef area (5 ecoregions) as Vulnerable, with the remaining 5.3% (2 ecoregions) scoring Near Threatened. When projected marine heatwaves and mass bleaching under future climate scenarios (Criterion C2) are included, all 17 ecoregions are Critically Endangered (CR). Four ecoregions of the Great Barrier Reef and Torres Strait are also CR due to projected loss of area (Criterion A2) and quantitative ecosystem collapse modelling (Criterion E).

REGIONAL DESCRIPTION

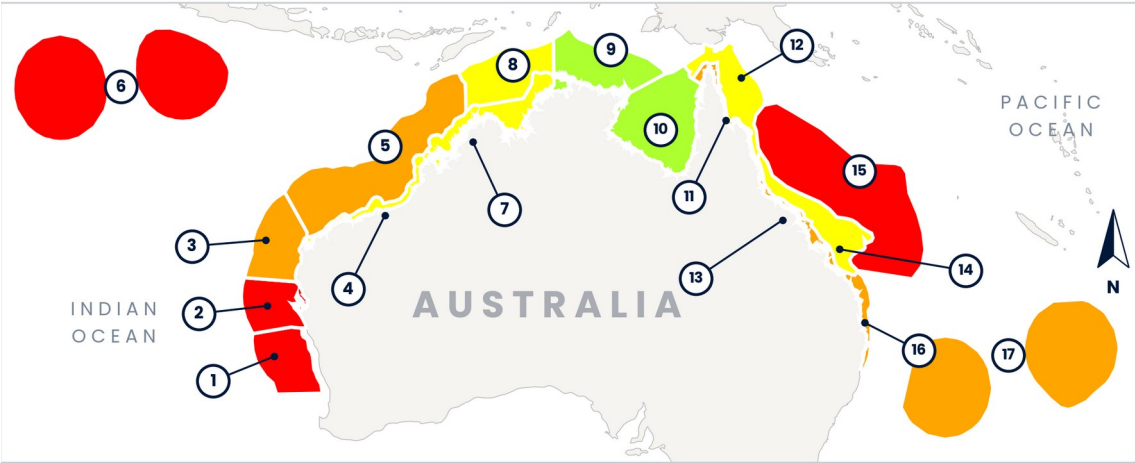
Australian coral reefs extend across approximately 65,000 km², from tropical waters at around 10°S to Lord Howe Island (31°S) off the east coast and the Houtman Abrolhos Islands (29°S) off the west coast. They represent approximately 36% of the photic coral reef area assessed globally in the Red List of Ecosystems (16% of global coral reef extent according to GCRMN 2025) and include the world's largest barrier reef system, the Great Barrier Reef. Australian coral reefs span 13 Marine Ecoregions of the World (MEOW). For this assessment, four of these were further subdivided into inshore and offshore units, resulting in a total of 17 ecoregions assessed, corresponding to Level 4 of the IUCN Global Ecosystem Typology.

BIOTIC COMPONENTS

Australian coral reefs support exceptionally high biodiversity, with the Great Barrier Reef alone hosting more than 450 species of hard coral and reef communities vary substantially across environmental and latitudinal gradients. They are built primarily by hard corals and crustose coralline algae. In tropical offshore reefs, coral assemblages are dominated by fast-growing *Acropora* spp. and massive *Porites* spp., while inshore, turbid and high-latitude reefs support more stress-tolerant assemblages including *Porites*, *Turbinaria*, *Goniopora* and encrusting *Montipora* spp. Other important benthic components include soft corals, sponges and macroalgae, with temperate kelp communities occurring alongside coral reefs at the southern limits of their distribution. Australian coral reefs support more than 1,600 fish species across diverse trophic groups, including herbivorous parrotfishes and surgeonfishes that help limit algal establishment and maintain substrate available for coral recruitment.

Observed change

Based on the past 50 years of observed change
Criteria A1, B, C1 and D1



Overall risk

Observed change plus future climate projections
Adds projected heat stress (C2, IPCC SSP2-4.5); A2 and E for the Great Barrier Reef and Torres Strait



CO Collapsed	CR Critically Endangered	EN Endangered	VU Vulnerable
NT Near Threatened	LC Least Concern	DD Data Deficient	NE Not Evaluated
① Houtman – offshore	⑦ Bonaparte Coast – inshore	⑬ Central & Southern GBR – inshore	
② Shark Bay	⑧ Bonaparte Coast – offshore	⑭ Central & Southern GBR – offshore	
③ Ningaloo	⑨ Arnhem Coast	⑮ Coral Sea	
④ Exmouth to Broome – inshore	⑩ Gulf of Carpentaria	⑯ Tweed-Moreton	
⑤ Exmouth to Broome – offshore	⑪ Torres Strait N GBR – inshore	⑰ Lord Howe and Norfolk Islands	
⑥ Cocos-Keeling & Christmas Island	⑫ Torres Strait N GBR – offshore		

Figure 1. Risk categories of Australia's 17 coral reef ecoregions. Top: observed change, based on the past 50 years of observed change (criteria A1, B, C1 and D). Bottom: overall risk (official RLE category), based on observed change plus projected heat stress from ocean warming over the next 50 years (IPCC SSP2-4.5; criterion C2) and criteria A2 and E for the four Great Barrier Reef and Torres Strait ecoregions. Numbers identify the ecoregions listed below the maps and in Table 1.

ABIOTIC ENVIRONMENT

Australian coral reefs span a broad range of environmental conditions, from warm tropical waters to cooler subtropical environments. Sea temperature is a dominant control, with tropical reefs typically experiencing seasonal temperatures of 23–29°C. Ocean currents, particularly the East Australian and Leeuwin Currents, influence temperature, nutrient supply and larval connectivity. Light and water clarity also strongly shape reef communities. Offshore reefs generally occur in clear, nutrient-poor waters, while inshore reefs experience greater sediment and nutrient inputs from coastal runoff, with those of the arid west coast less affected than those on the east coast. Water movement, substrate availability, storms and ocean chemistry further influence coral growth, calcification and long-term reef development.

MAIN THREATS

Climate change-driven heat stress is the most pervasive threat to Australian coral reefs, with temperature extremes affecting all 17 ecoregions and causing recurrent mass bleaching and coral mortality. Severe storms, cyclones and flooding also cause widespread physical damage and can increase sedimentation and poor water quality. Outbreaks of crown-of-thorns starfish (*Acanthaster cf. solaris*) are an important cause of coral loss on northern and central reefs. Direct human pressures are generally more localised and include coastal development, dredging, agricultural runoff, pollution, shipping, fishing, harvesting and tourism. Many of these impacts are concentrated on accessible inshore reefs. Rather than widespread direct physical loss of reef area, these interacting cumulative pressures primarily contribute to the loss of coral cover, ecological function and reef-building capacity, reducing recruitment and increasing the risk of shifts towards degraded, low-coral or algal-dominated reef states.

ASSESSMENT RESULTS

The IUCN Red List of Ecosystems assessment classified all 17 Australian coral reef ecoregions as Critically Endangered (CR), triggered by Criterion C2 with increasing marine heat stress and mass bleaching predicted under future climate scenarios. Observed changes over the past 50 years are reflected by the combination of historical reductions in distribution (Criterion A1), restricted geographic distribution (Criterion B), historical heat stress (Criterion C1) and functional biotic disruption (Criterion D1). In the absence of future heat stress projections (Criterion C2), these observed changes place 24.5% of the total assessed Australian coral reef area (4 ecoregions) as Critically Endangered, a further 12.5% of the reef area (6 ecoregions) as Endangered, and 57.7% of the reef area (5 ecoregions) as Vulnerable, with the remaining 5.3% (2 ecoregions) scoring Near Threatened. For the four Great Barrier Reef and Torres Strait ecoregions, projected declines in distribution (Criterion A2) and quantitative ecosystem-collapse modelling (Criterion E) provide additional evidence of high risk of collapse.

Reduction in distribution (Criterion A): Based on the proportion of reef sites where hard coral cover has fallen below critical thresholds, over the past 50 years four ecoregions are threatened (A1): Shark Bay (EN), Exmouth to Broome – inshore (VU), Cocos-Keeling and Christmas Island (VU), and Tweed-Moreton (VU). Under future projections using IPCC SSP2-4.5, all four Great Barrier Reef ecoregions assessed (A2) are classified as Critically Endangered (CR).

Restricted distribution (Criterion B): Four of the 17 ecoregions are assessed as Endangered (EN), a further two as Vulnerable (VU), while the remaining 11 are Least Concern (LC). Smaller ecoregions, such as Cocos-Keeling and Christmas Island, and Tweed-Moreton, meet the thresholds for restricted area of occupancy when combined with ongoing threats such as coral bleaching.

Abiotic degradation (Criterion C): Based on historical heat stress (C1), 14 of the 17 ecoregions are threatened, with four classified as Critically Endangered (CR), five as Endangered (EN), and five as Vulnerable (VU). Based on future climate projections (C2, IPCC SSP2-4.5), all 17 ecoregions are Critically Endangered (CR), reflecting the increasing frequency and severity of marine heatwaves.

Biotic disruption (Criterion D): Ten of the 17 ecoregions are threatened, with three (Ningaloo, Exmouth to Broome – offshore and Tweed-Moreton) classified as Endangered (EN), driven by changes in hard coral cover, the macroalgae-to-turf ratio, and fish abundance, with fish indicators contributing to higher risk classifications in several ecoregions. Four ecoregions are Data Deficient (DD).

Quantitative risk analysis (Criterion E): Only four ecoregions were assessed under this criterion and all four Great Barrier Reef and Torres Strait ecoregions assessed are Critically Endangered (CR), based on quantitative modelling of the probability of ecosystem collapse by 2075 under IPCC SSP2-4.5. The analysis used mechanistic projections of coral dynamics across 3,797 individual reefs, with 5% hard coral cover used as the collapse threshold. Criterion E was not evaluated for the other 13 Australian ecoregions.

Table 1. Risk category of each Australian coral reef ecoregion under each criterion, observed change and overall risk. Numbers match Figure 1.

Ecoregion	A1	A2	B1	B2	C1	C2	D1	E	Observed change	Overall risk
1 Houtman – offshore	DD	NE	EN	NT	CR	CR	DD	NE	CR	CR
2 Shark Bay	EN	NE	VU	LC	CR	CR	DD	NE	CR	CR
3 Ningaloo	LC	NE	EN	VU	EN	CR	EN	NE	EN	CR
4 Exmouth to Broome – inshore	VU	NE	LC	LC	VU	CR	VU	NE	VU	CR
5 Exmouth to Broome – offshore	LC	NE	LC	LC	EN	CR	EN	NE	EN	CR
6 Cocos-Keeling & Christmas Island	VU	NE	VU	EN	CR	CR	VU	NE	CR	CR
7 Bonaparte Coast – inshore	DD	NE	LC	LC	VU	CR	VU	NE	VU	CR
8 Bonaparte Coast – offshore	LC	NE	LC	LC	NT	CR	VU	NE	VU	CR
9 Arnhem Coast	LC	NE	LC	LC	NT	CR	NT	NE	NT	CR
10 Gulf of Carpentaria	DD	NE	LC	LC	NT	CR	DD	NE	NT	CR
11 Torres Strait N GBR – inshore	DD	CR	LC	LC	EN	CR	DD	CR	EN	CR
12 Torres Strait N GBR – offshore	LC	CR	LC	LC	VU	CR	VU	CR	VU	CR
13 Central & Southern GBR – inshore	LC	CR	LC	LC	EN	CR	VU	CR	EN	CR
14 Central & Southern GBR – offshore	LC	CR	LC	LC	VU	CR	NT	CR	VU	CR
15 Coral Sea	LC	NE	LC	LC	CR	CR	VU	NE	CR	CR
16 Tweed-Moreton	VU	NE	EN	EN	VU	CR	EN	NE	EN	CR
17 Lord Howe and Norfolk Islands	LC	NE	LC	VU	EN	CR	NT	NE	EN	CR

Overall risk: the official RLE category; risk of collapse based on observed change plus projected heat stress from ocean warming over the next 50 years (IPCC SSP2-4.5; criterion C2) and criteria A2 and E where assessed. Observed change: risk of collapse based on the past 50 years of observed change (criteria A1, B, C1 and D). Categories: CO: Collapsed; CR: Critically Endangered; EN: Endangered; VU: Vulnerable; NT: Near Threatened; LC: Least Concern; DD: Data Deficient; NE: Not Evaluated.