

Summary

- The Great Barrier Reef (GBR) off the coast of eastern Australia in the Coral Sea is the largest coral reef ecosystem in the world and a global biodiversity hotspot.
- As well as corals, birds, fishes and invertebrates, the GBR is home to six of the world's seven turtle species. It is also important for about 30 species of whales and dolphins. It is a major feeding ground for dugongs and contains mating and calving grounds for humpback whales.
- Within Australian waters, shipping activity has grown by about 4% a year since the early 2000s. Much of this growth has been in the Coral Sea and is linked to increasing exports of natural resources.
- The Australian government plans to quantify underwater noise from ships on a national scale and develop guidelines on underwater noise for GBR species.

The Great Barrier Reef



- The Great Barrier Reef (GBR) covers 350,000 square kilometres.
- It is a UNESCO World Heritage Site, recognized as one of the richest and most complex natural ecosystems on Earth.¹
- The GBR is made up of some 3,000 individual coral reefs that contain an extraordinary abundance of biodiversity, with more than 1,500 fish species, 400 coral species, 4,000 mollusc species, 240 bird species and 30 marine mammal species.¹

Marine life in the Great Barrier Reef

- Humpback whales are the most commonly sighted whale in the GBR Marine Park. The reef is a biologically important area for these whales, where they mate and give birth.²
- During the breeding season, male humpbacks produce songs to attract females.
- A broad range of coral reef fish species use reef sounds during the larval settlement stage of their life cycles.³
- Turtles sense and react to low-frequency underwater sound, although it's unclear how they use it.⁴



Humpback whale (*Megaptera novaeangliae*)

Shipping and underwater noise in the region

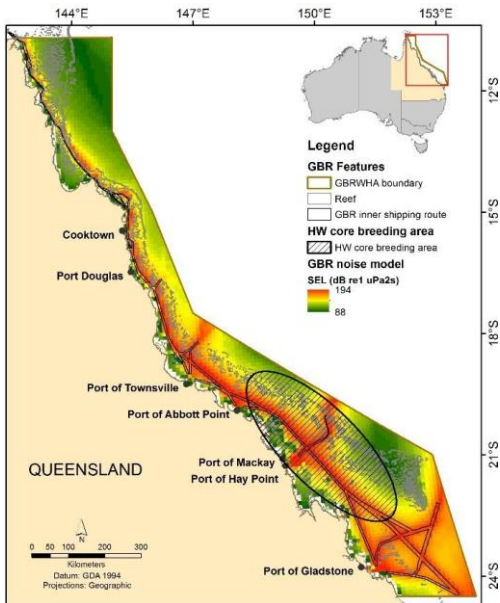


Figure 1: Modelled sound exposure levels (one year; 2016, 1/3 octave bands between 10 Hz to 2 KHz) from shipping in the inner shipping route of the Great Barrier Reef in a humpback whale (HW) breeding ground. ¹

- As an island nation, Australia relies heavily on shipping for trade.
- Australia is one of the world's largest exporters of natural resources. International exports, mainly of coal and liquefied natural gas, make up about 87% of its total cargo.⁵
- In Australian waters, commercial shipping has grown by approximately 4% each year since the early 2000s. Much of this growth has been in areas that are significant for marine mammals, including the GBR World Heritage Area (Fig. 1).
- Shipping traffic related to natural resource export and general trade continues to increase near the GBR. Port expansions (e.g., the Adani Carmichael mine project, Abbott Point) are expected to cause further increases.

Impacts of underwater noise

- It's not yet known exactly how much underwater noise breeding whales in the GBR are exposed to. However, models indicate that it could be enough to mask the sounds they make to attract mates and limit their ability to communicate across distances.
- In other parts of the world, underwater noise from ships has forced humpback whales to change their foraging activities and singing behaviours significantly. In the GBR, their breeding grounds overlap with a shipping route that services all ports on the Queensland coast – a situation that has the potential to cause masking of their song.⁶
- Given the great diversity and volume of fishes, turtles and marine mammals in the GBR that rely on sound for aspects of their life cycles, it is likely that ship noise is causing harm. Although evidence of impacts is sparse for the GBR, it exists in other parts of the world.^{7,8}

Monitoring and management

- The Australian government recently funded a National Environmental Science Program (NESP) project to quantify shipping noise in the country's marine environment. This is the first comprehensive, nation-wide assessment of shipping noise in Australia (and within World Heritage Areas and Marine Parks).¹¹
- The government is also planning to develop federal guidelines on underwater noise through its Reef 2050 Long-Term Sustainability Plan. The plan mentions developing a new guideline on assessing and managing underwater noise impacts on GBR species. The NESP project aims to contribute to this objective.^{11, 12}
- Because of coastal development and port expansions related to the mining industry, UNESCO is monitoring Australia's commitment to the sustainability of the GBR as a World Heritage Area.