# Coastal habitats and biodiversity

## Summary

Knowledge of Queensland's habitats and biodiversity continues to grow, although gaps remain, particularly in knowledge of the coastal zone of Cape York and the Gulf of Carpentaria. There is increased knowledge of the extent of seagrasses, mangroves and saltmarsh in Queensland, more detailed mapping of the biodiversity of the Great Barrier Reef, along with monitoring of coral cover, and growing knowledge of the species diversity of the marine environment. However, trends in habitat and biodiversity are often difficult to establish, because either only baseline studies have been conducted or the design of studies has made comparisons difficult.

*Mangroves at low tide (Photo: EPA)*

Data show that over the past four years the threats posed by introduced plants, the crown-of thorns starfish and the toxic cyanobacteria Lyngbya have grown. New evidence shows that the dugong has suffered a serious long-term decline, although the population appears to have stabilised. Additionally, if the coral bleaching episode of 2002 is any indication, the threat associated with climate change presents a significant challenge. On the other hand, the recovery of the humpback whale population shows that management practices can sometimes reverse previous damage. Developments in the protection of habitat, control of introduced species and changes to practices by industries that have impacts on coastal and marine environments have contributed to the regulation of pressures, but more is required. The development of suitable responses is, in some cases, hampered by lack of suitable data, and the design, coordination and resourcing of data collection and analysis require attention. Only with suitable programs of monitoring and research will it be possible to assess the effectiveness of current responses and develop new responses to the continuing threats to Queensland's biodiversity.

Coordination of the development of protection measures by various agencies also requires consideration, as a range of departments and agencies across different levels of government take a role in environmental management. State–Commonwealth cooperation in dealing with water quality issues on the Great Barrier Reef is a welcome development.

*New evidence suggests that the dugong population has stabilised. (Photo: GBRMPA)*

While steady improvements in protective measures for habitats and biodiversity have been made since 1999, data suggest that they are not yet sufficient. The adequacy of existing protective legislation may depend on increased allocation of resources dedicated to its implementation. The growing pressures present challenges that will require innovation to adequately protect Queensland's marine and coastal biodiversity.

## Description

Queensland's coastal zone supports an enormous range of life of world significance. It is a series of highly intricate ecosystems noted for their rich species diversity, particularly within the two World Heritage Areas, the Wet Tropics and the Great Barrier Reef. The coastal zone supports a number of iconic species, including six of the world's seven species of marine turtles, the humpback whale, dolphins and dugongs, while habitat adjoining the coast supports a number of other vulnerable and endangered species, including the mahogany glider and the southern cassowary. The coastal zone also contains the bulk of Queensland's population, which places significant pressure on coastal habitats. Growing pressures on the environment present challenges that will require innovation to adequately protect Queensland's marine and coastal biodiversity.

*Queensland's coastal zone supports six of the world's seven species of marine turtles. (Photo: EPA)*

## Pressures

Coastal habitat and biodiversity are subject to pressures arising from direct human activity, such as plant disturbance and removal associated with building and engineering works, and the accidental or deliberate killing of species, resulting from actions such as the release of toxic materials, fishing, roadkill, hunting and collecting. Maritime transport also has impacts on coastal ecology through pollution incidents, poor mooring practices, and the release of contaminants and marine pests. In addition, coastal ecosystems continue to be altered as a result of the impacts of exotic and displaced species such as lantana, rubber vine and feral pigs.

*Coastal ecosystems are altered through the impacts of exotic and displaced species such as rubber vine (*Cryptostegia grandiflora*). (Photo: EPA)*

Pressures also arise from human activity far from the coast. Sediment runoff resulting from unsustainable agricultural and mining practices and contamination from point source discharges in coastal catchments present threats. Perhaps the most profound of these more general pressures results from global warming, which has the potential to significantly disrupt ecological processes occurring on the Great Barrier Reef, in the Wet Tropics and in significant wetlands.

A number of pressures on coastal habitats and biodiversity are discussed in Chapter 7, 'Biodiversity', and in other sections of this chapter, particularly 'Coastal resource use and development' and 'Coastal water quality'.

### Disturbance of coastal and marine habitat

Increasing activity associated with growth in population and exploitation of coastal resources is the main direct pressure on coastal habitats and biodiversity. Disturbance of habitat increases pressure on a number of threatened and vulnerable species, such as the mahogany glider and the cassowary.

In key areas of the state, coastal strip development is placing increasing pressure on specific coastal habitats (figure 6.6). Protected areas in the coastal zone are notably small and fragmented lands. Clearing for urban development is discussed in 'Coastal resource use and development'.

*Pressures on the coastal zone can disturb the habitats of threatened and vulnerable species, including the mahogany glider. (Photo: Queensland Museum)*

#### *Marine plant removal*

Removal and disturbance of marine plants are regulated by the *Fisheries Act 1994*; the number of permits issued has remained relatively steady since 1998 (figure 6.25). The area of habitat affected since 1996 has not been published. Similarly, while construction works in, on or above land under tidal water (such as the building of jetties, pontoons, boat ramps, decks, boardwalks, wharves, pipelines, mooring piles and similar works) are also regulated (table 6.21), the cumulative impact of these works on habitat has not been assessed.

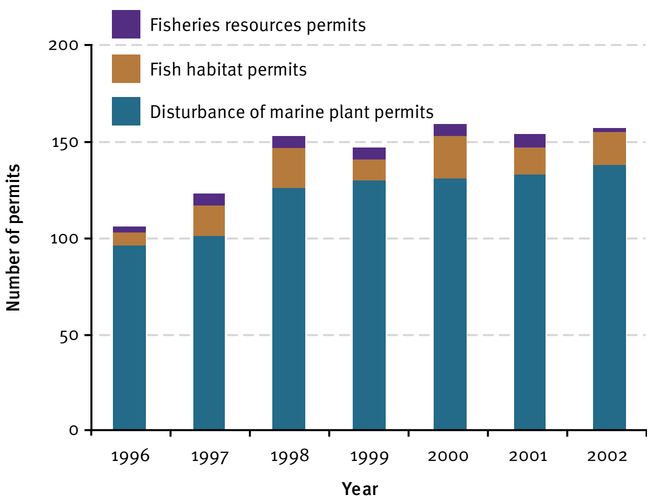


Figure 6.25 *Number of permits to disturb marine plants issued under provisions of the* Fisheries Act 1994, *1996–2002*
*Source: DPI*

## Seagrass

*Contributed by Stuart Campbell, Len McKenzie and Rob Coles*

Considerable progress has been made in increasing knowledge of seagrasses in Queensland. Numerous studies, including community-based monitoring and studies commissioned by various port authorities have augmented broadscale studies by DPI.

Queensland has 15 species of seagrass, representing 25% of the world's seagrasses. Seagrass meadows are important for stabilising coastal sediments and providing food and shelter for diverse organisms, as a nursery ground for shrimp and fish of commercial importance, and for nutrient trapping and recycling. The marine mammal *Dugong dugong* and the green sea turtle (*Chelonia mydas*) feed directly on seagrasses.

Seagrass communities in Queensland have remained relatively stable over the past three years. Low rainfall associated with the recent El Niño climatic pattern (2001–02) has resulted in a relatively low discharge of sediment-laden fresh water from river systems. Seagrass meadows that were damaged by floodwaters in some areas of northern and southern Queensland in 1999–2000 have recovered.

Queensland's seagrasses are mostly found growing in waters less than ten metres below mean sea level, although some species of *Halophila* can be found to depths of 60 m. Species diversity of seagrass meadows tends to decline from north to south. While knowledge of intertidal and shallow subtidal (down to 10 m) distributions is good, there is only a basic understanding of deepwater (>10 m) seagrasses.

### The Gulf of Carpentaria

Twelve species of seagrass are found in the Gulf of Carpentaria, mostly in inlets and bays. Their distribution was last mapped extensively in 1986, showing 4.1 km² of seagrass present. Recent repetitive mapping associated with port activities in Weipa, Karumba, Skardon River and Kirke River suggests that the existing distribution of seagrass is similar to that in 1986, but it is highly seasonal, temporary declines being associated with flooding during the wet season (Sheppard et al. 2000; Roelofs et al. 2001, 2002a, 2002b; Rasheed and Thomas 2002).

### Torres Strait

Surveys of the open waters of Torres Strait have led to estimates of 13 425 km² of seagrass habitat (Long and Poiner 1997), much of which is valuable habitat for juvenile commercial shrimp. It is likely that thousands of hectares have been lost in north-west Torres Strait, but these are remote locations and difficult to monitor effectively.

### The Great Barrier Reef

The best estimates of the area of seagrass meadows along the east coast are 5668 km² of intertidal and shallow subtidal habitat (down to 15 m water depth) (Coles et al. 2001 a–e; DPI unpublished data). The area of seagrass meadows in reef lagoon waters of the Great Barrier Reef World Heritage Area deeper than 15 m (figure 6.27) is likely to be as high as 40 000 km² (Coles et al. 2000).

Detailed regional assessments of seagrasses in the Great Barrier Reef region have been made at Lizard Island, Low Isles, Cairns Harbour, Green Island, Mourilyan Harbour, Hinchinbrook Channel and Mackay (Campbell et al. 2002a, 2002b; Thomas and Rasheed 2001; Rasheed et al. 2001). The Mackay (Coles et al. 2002) and Shoalwater Bay areas (Lee Long et al. 1997) were included for dugong management. These studies show that meadows have remained relatively stable over the past eight years, some declines in seagrass area in late 2001 being linked to high rainfall and catchment inputs.

On the central Queensland coast surveys of the islands and bays of the Whitsundays in 1999–2000 showed that in most areas seagrass distribution had remained stable between 1987 and 2000, although losses of about 300 ha of seagrass in Pioneer Bay have been linked to nutrient inputs and algal blooms (Campbell et al. 2002a). In southern Queensland estuaries and bays, declines of seagrasses resulting from coastal development, flooding and cyclones have been followed by partial recovery in a number of regions including Hervey Bay (Preen et al. 1995; McKenzie and Campbell 2003) and Townsville.

In waters deeper than 15 m there is a noticeable change in seagrass distribution and abundance from north to south. Seagrass meadows are sparse north of Princess Charlotte Bay and south of Mackay in the area where tidal velocities are high. The highest seagrass densities occur between Princess Charlotte Bay and Cairns and south of 23°S.

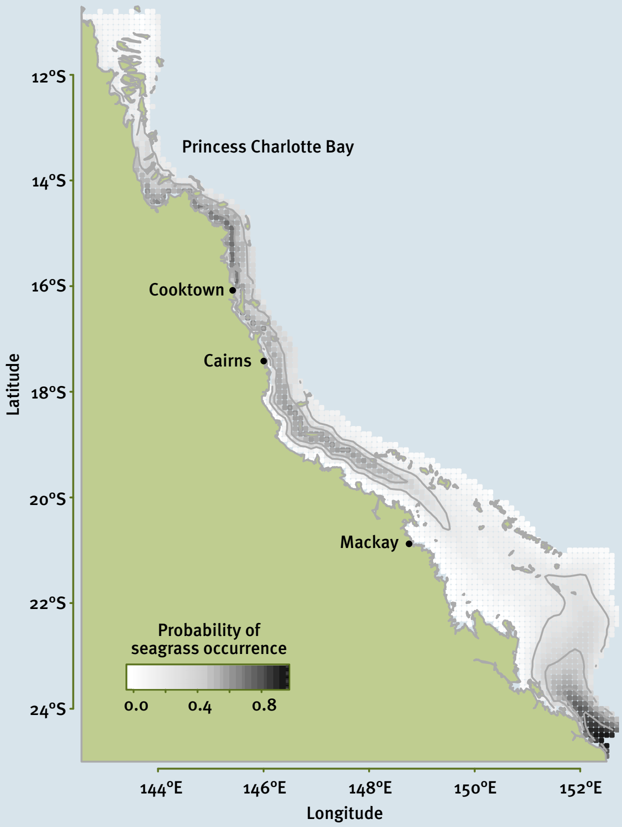


*Figure 6.27 Occurrence of deepwater seagrass in the Great Barrier Reef lagoon (contours obtained from spatial smoothing)*
*Source: DPI*

## Case study: Seagrass Watch

Seagrass Watch is a community-based monitoring program developed by the Marine Plant Ecology Group at Queensland's Department of Primary Industries in conjunction with the Natural Heritage Trust, CRC Reef, Queensland Parks and Wildlife Service, Coastcare and community organisations. The program assesses the health of nearshore seagrass habitats throughout Queensland, provides an early warning of major changes in seagrass habitats and assists in the development of management actions.

Seagrass Watch programs have been established at about 60 sites in five regions in Queensland (Hervey Bay/Great Sandy Strait, Whitsundays, Townsville, Cairns and Moreton Bay) and involve more than 500 volunteers and government workers. The program incorporates local community groups, schools, TAFE colleges, universities and government agencies. Community members involved in Seagrass Watch have become powerful advocates for the sustainable protection of fisheries habitats, are represented on local management committees and provide numerous educational sessions to industry groups, communities, schools, and Indigenous students. The program is also being developed in the Western Pacific, with an emphasis on exporting excellence in training and scientific services.

Volunteers have been trained in scientific protocols to assess the health of seagrass meadows. All data collected are entered into a database and results are presented in newsletters and reports. Seagrass Watch has assisted with assessment of dredging activities, coastal developments, sewage outfalls, boating damage and algal blooms. Information collected contributes directly to marine park planning and provides information for assessing management actions and catchment practices.

*Dugongs and the green turtle feed on seagrass meadows. (Photo: EPA)*

Challenges of the program include retraining of community participants, recruitment and training of new participants, and communication of findings to management agencies. The aim of achieving better environmental management through the integration of Seagrass Watch data with information from other monitoring programs (water quality data, oceanographic data, climate data, turtle and dugong research programs) provides a challenge for government agencies and communities to work together constructively.