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Great Barrier Reef  
Marine Park Authority

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# Environmental Status: *Seagrass*

our great barrier reef  
let's keep it great



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## Seagrasses

### Condition

#### *Diversity of Great Barrier Reef seagrasses*

Seagrasses are flowering plants and occur in the coastal, estuarine, reef and deepwater habitats of the Great Barrier Reef.<sup>5</sup> Fifteen of the sixty known species of *seagrass* worldwide occur in Queensland, most of which are widespread.<sup>28</sup> *Seagrasses* are commonly found in shallow waters less than 10m deep. However, recent surveys have mapped seagrasses down to a depth of 60m. At these depths, the *Halophila* species are predominant. Recent estimates suggest that seagrass beds cover approximately 13% of the Great Barrier Reef World Heritage Area (GBRWHA), indicating the presence of some 6,000 square kilometres of shallow seagrass habitat and a further 40,000 square kilometres of deepwater seagrass habitat in the Great Barrier Reef.<sup>7</sup>

#### *Patterns of seagrass density and distribution*

##### **Shallow water seagrasses**

The most common genera of seagrass in the GBRWHA are *Halophila* and *Halodule*, although the average cover varies with region. Since 1984, key sites within the Great Barrier Reef have periodically been surveyed by the Queensland Department of Primary Industries and Fisheries (QDPI&F) to determine the nature and extent of seagrass communities. While the cover and condition of seagrass is highly variable, some regional trends are apparent. These surveys have shown that the Northern Great Barrier Reef and Torres Strait regions have the highest diversity of seagrass species. From Cape York to Cairns, seagrasses of the genus *Halophila* dominate with equal areas of *sparse*\* and *dense*\* cover.<sup>7</sup> Approximately 1,000 hectares of seagrass can be found close to Cairns, comprised mainly of *Zostera*, *Halodule* and *Halophila* species.<sup>8</sup> Between Cairns and Bowen, seagrasses are mostly a mixture of *Halodule* and *Halophila* species, and the meadows are less dense with about 70% of seagrass area having less than 10% cover. Between Bowen and Yeppoon, seagrasses are mainly *Halodule* and *Zostera* species, with about half of the seagrass area being between 10 and 50% cover. South of Yeppoon, seagrass communities are mainly comprised of *Zostera*, *Halodule* and *Halophila* species. These communities tend to be denser with 60% of the seagrass area having a cover of 50% or greater.<sup>7,8</sup> (Refer to <http://www.reef.crc.org.au/discover/plantsanimals/seagrass/seagrassidentify.html> for further information and illustrations of some seagrass species.)

##### **Deepwater seagrasses**

Surveys by the QDPI&F in the early 1990s found extensive deepwater seagrass meadows at depths of up to 60m, in the relatively clear waters of the Great Barrier Reef lagoon. These deepwater meadows were dominated by five *Halophila* species.<sup>16</sup> The distribution of deepwater seagrasses appears to be influenced by a combination of factors including water clarity, propagule dispersal, nutrient supply and water currents.<sup>6</sup> Deepwater seagrass meadows were most likely to be found between Princess Charlotte Bay and Cairns, however, the overall density of deepwater seagrass communities is thought to be low (<5% cover) with a correspondingly low biomass.<sup>7</sup> However, relatively little is known about deepwater seagrasses.



Seagrass meadows cover approximately 13% of the GBRWHA, and play a vital role in the Reef ecosystem.



*Halophila* seagrasses (pictured) are amongst the most common in the Great Barrier Reef, and are the dominant species between Cape York to Cairns. Photo courtesy of QDPI&F.

## Ecological roles

Seagrasses perform a number of important ecological functions in the Great Barrier Reef ecosystem.<sup>5</sup> Seagrass meadows support a wide diversity of plants and animals and have high rates of *primary production*<sup>†</sup>. Seagrasses are consumed by many animals, including threatened species such as green turtles and dugongs, and are also a source of *detritus*<sup>8</sup> for coastal food webs.<sup>13</sup> The quantity and quality of seagrass may directly affect other species such as dugongs. For instance, data from the Queensland Parks and Wildlife Service (QPWS) [Strandings Database](#) suggest that increases in dugong mortality may be related to declines in seagrass pasture quality caused by abnormal wet seasons.<sup>10,20</sup>



Seagrasses provide food for threatened species such as green turtles and dugongs.

As a habitat, seagrasses provide nursery areas for juvenile prawns such as tiger and endeavour prawns, and fishes such as Spanish mackerel and king salmon (see [Environmental status – fishes](#) [Note- currently being updated]), all of which are important to commercial and recreational fisheries.<sup>29</sup> Larger predators such as birds, sharks and barramundi may also use seagrass beds as foraging grounds.

Seagrasses are thought to play an important role in the sediment and nutrient dynamics of coastal systems by stabilising sediments and recycling nutrients. However, recent research suggests that this may not always be the case for tropical seagrass meadows comprised of structurally small seagrasses.<sup>18</sup> Further investigation into the dynamics of structurally small seagrasses is required.

## Variability and current condition of Great Barrier Reef seagrass communities

### Factors influencing seagrass condition

Seagrass cover and species composition change over time, and both natural and human related factors affect these changes. In general, seagrasses are influenced by environmental factors such as the geography and hydrology of the area, the amount of available light, weather patterns, waves, temperature, salinity, erosion and sediment deposition.<sup>5,7</sup> For example, recent reports suggest that declines in shallow water seagrasses near Cairns, the Gulf of Carpentaria and the Whitsundays (in 2001-02) may be related to elevated seawater temperatures that caused seagrass ‘burning’.<sup>8</sup> Biological processes such as grazing by dugongs and turtles can also affect seagrass condition. The reduction in grazing pressure caused by declines in herbivores such as dugongs and green turtles (see [Environmental status – marine mammals](#) and [Environmental status – Marine reptiles](#)) has been suggested as a factor in the expansion of some seagrass beds on the Queensland East Coast.<sup>8</sup> Other seagrass beds further away from the coast, such as those off Green Island, have also expanded and shown changes in species composition in recent times. Research suggests that these expansions are linked to increased levels of nutrient runoff from coastal areas, which has increased the growth of seagrasses normally limited by low nutrient levels.<sup>25</sup>

### Disturbance and recovery

Seagrasses are also affected by natural disturbances, including events such as storms and cyclones that generate pulses of sediment laden and nutrient rich water flowing from coastal rivers into the Great Barrier Reef. The impact of storms and cyclones may be worsened where erosion from the land causes excessive amounts of sediment to flow into coastal areas (see [Pressure: declining water quality and coastal development](#)). For example, there are anecdotal reports of the loss of thousands of hectares of



Seagrass communities are very dynamic. Species such as *Halophila ovalis* (above) are often the first species to recolonise areas after a disturbance. Photo courtesy of QDPI&F.



seagrass from the Torres Strait region, possibly due to flooding and sediment runoff from Papua New Guinea.<sup>7,8</sup>

Given favourable conditions, these disturbance events are usually followed by a period of recovery where seagrasses re-colonise the area. The rate of recovery may depend on the magnitude of the disturbance, the species of seagrass affected, the physical and environmental conditions of the affected area and the existence of *seed banks*<sup>ll</sup> that may aid recovery.<sup>5</sup>

### **Current condition of GBR seagrasses**

Overall, many seagrass communities are constantly changing, and the condition of a particular seagrass meadow will depend on the local environment, the seagrass species present and the environmental history of the area.<sup>23</sup> This variability makes it difficult to identify long-term trends in seagrass condition. Further, little is known about long-term cycles in seagrass meadow size and biomass as monitoring programs such as [Seagrass Watch](#) have only recently been established. Nevertheless, the available data suggest that while some seagrass beds have declined, others are increasing with more seagrass beds remaining stable.<sup>22</sup> Across the Great Barrier Reef region, the changes observed in seagrass communities appear to be attributable to natural cycles of decline and recovery. At this time, there is little evidence of a widespread decline in the condition of the seagrasses of the Great Barrier Reef. However, seagrasses are subject to localised pressures and given their importance to the healthy functioning of the Great Barrier Reef ecosystem, these pressures are a cause of concern for Reef managers.

### **Pressure**

*Episodic*<sup>#</sup> pressures such as floods and cyclones have the most dramatic effects on seagrass communities, and at times cause significant declines in seagrass cover at specific locations in the Great Barrier Reef. However, seagrasses may also be affected directly by localised pressures such as dredging or trawling, or by more widespread and *chronic*<sup>#</sup> pressures such as degraded water quality, coastal development, and climate change.

While this chapter considers each of these pressures separately, seagrass communities may be affected by several of these pressures at any one time. As a result, the overall pressure on seagrass communities should be considered as the combined effect of these individual pressures, and their effect on the seagrasses community's ability to recover from disturbance events.

### ***Pressure: declining water quality and coastal development***

Probably the greatest immediate threat to seagrass habitats in the Great Barrier Reef is the run-off of sediments, nutrients and other pollutants from coastal areas. Cyclones or heavy wet season rainfall events may result in 'pulses' of sediment and nutrient laden water flowing into the Great Barrier Reef lagoon (see [Environmental status – Water Quality](#)). Increased levels of nutrients, fine sediments and chemical pollutants may reduce the health of seagrasses and consequently, their ability to recover from disturbance events such as cyclones. Seagrass habitats have also been subjected to direct disturbance and loss due to coastal development.

### ***Sediment and nutrients***

Australian seagrass communities are generally considered to thrive in low nutrient environments. Increased levels of *turbidity*<sup>\*\*</sup> and nutrients can stress seagrasses by reducing the amount of light reaching them.<sup>26</sup> Three major factors cause a reduction in light availability:<sup>1,24,27</sup>

- long term increases in suspended sediments leading to increased water column turbidity;



The runoff of excessive levels of sediments, nutrients and herbicides such as diuron are a significant pressure on seagrasses in the Great Barrier Reef.

- pulsed increases in suspended sediments and/or phytoplankton blooms that cause a dramatic reduction of water column light penetration for a limited time; and
- long term increases in dissolved nutrients that result in greater numbers of planktonic algae , benthic macroalgae or algal *epiphytes*<sup>††</sup> growing on seagrass stems and leaves.

Many inshore areas of the Great Barrier Reef have accumulated large amounts of sediment through natural processes over thousands of years. While changing land use patters in coastal catchments have resulted in a several fold increase in the amount of terrestrial sediment runoff into the Great Barrier Reef, it is unlikely that the amount of sediment runoff generated by human activities has significantly increased turbidity levels in inshore regions of the Great Barrier Reef.<sup>9</sup>

What is of concern however is that sediment particles may be increasingly fine, and contain high levels of nutrients that can lead to eutrophication. Further, the combination of increasingly fine sediment particles, high levels of dissolved nutrients and associated phytoplankton blooms can affect physiological processes and community dynamics in seagrass habitats. These factors may act to reduce the photosynthetic productivity of seagrass meadows, reduce their general health, growth and reproduction, and reduce their capacity to recover from disturbance events.

### ***Herbicides***

Seagrasses may also be directly affected by the runoff of a variety of *herbicides*<sup>§§</sup> such as diuron. Surveys in the Great Barrier Reef have shown that the coastal sediments adjacent to regions of intensive agriculture contain concentrations of diuron capable of reducing the photosynthetic capacity of seagrass.<sup>11,19</sup> This research suggests that herbicide concentrations present in nearshore sediments in areas of the Queensland coast may pose a significant, chronic threat to seagrasses in the Great Barrier Reef. The effects of herbicides on seagrasses may be exacerbated during flood events when seagrasses are already stressed by low light conditions.<sup>3,17</sup>

### ***Coastal development***

It is difficult to identify how much seagrass has been lost due to coastal development in the past as long-term monitoring of Queensland seagrasses only began in the 1980s. Additionally, there are few reliable maps that show the seagrass extent before such monitoring programs began.<sup>7</sup> However, coastal development and activities such as land reclamation and the dredging of ports and marinas have resulted in the loss of a variety of nearshore habitats, including seagrass meadows.<sup>29</sup> For example, the development of canal estates around Moreton Bay to the south of the Great Barrier Reef, resulted in the loss of thousands of hectares of nearshore seagrass habitat that was present prior to 1980.<sup>7</sup>

Dredging typically generates large amounts of suspended sediment that may smother seagrasses or reduce the amount of available light. However, development projects and dredging activities occurring within the Great Barrier Reef are closely managed through a variety of environmental controls (see [Response](#)), and there are no recorded instances of large scale die backs of seagrass caused by coastal development in the Great Barrier Reef.



Dredging associated with coastal development may result in increased turbidity that could cause declines in seagrass. Consequently, dredging activities in the Great Barrier Reef Marine Park are tightly controlled.

In the Great Barrier Reef, the pressure from these activities may be intensified in coastal regions, as many of the locations that have adequate shelter and ideal conditions for productive seagrass meadows are also good sites for coastal developments, such as ports and marinas. Further information about water quality and coastal development on the Great Barrier Reef is described in the chapter [Environmental Status - Water Quality](#).

### ***Pressure: trawling***

Another human pressure on seagrass habitat is trawling. In 2002, there were some 485 trawlers licensed and capable of trawling in the Great Barrier Reef. As trawl nets are dragged across the seabed to catch prawns, they may cause physical damage to seagrass beds. Most shallow-water seagrass habitat is protected from this potential impact (see [Response](#)) and trawlers usually avoid dense, deepwater seagrass habitat because the seagrass fills and clogs the nets. Nevertheless, deepwater seagrass habitats with sparse seagrass densities are potentially at risk from damage by trawlers. The level of impact on deepwater seagrasses and their recovery are unknown and requires further research. For more information on trawling in the Great Barrier Reef, see [Environmental status – inter-reefal and lagoonal benthos](#) and [Management status – fisheries](#).

### ***Pressure: cyclones and floods***

Natural events such as cyclones and floods can cause widespread loss of seagrasses.

For example:

- In 1972, a cyclone decimated the seagrass beds of Cockle Bay at Magnetic Island off Townsville. Surveys showed that different species recovered at different rates, with some species re-colonising the area only to be out-competed by other species in subsequent years. Ten years after the cyclone, *Halophila* species had reached a ‘steady state’ while *Halodule* seagrasses were still increasing.<sup>2</sup>
- In 1992, major flooding and a cyclone caused a massive loss of seagrass in Hervey Bay, south of the Great Barrier Reef. After two years, seagrasses began to recover in the *subtidal* (below 5m depth) regions of the bay, but *intertidal*<sup>1</sup> seagrasses only started to recover after four to five years.<sup>4,7,21</sup>



Recovery of seagrasses from these events will depend on the nature and extent of the disturbance, the seagrass species involved, the subsequent environmental conditions and the presence of seed banks that may help seagrasses to re-colonise the area.

### ***Pressure: climate change***

In 2001, the Intergovernmental Panel on Climate Change (IPCC) released the report “Climate Change 2001, the [Third Assessment Report of the IPCC](#) which reaffirms the scientific consensus that the Earth’s climate is changing. The report also states there is new and stronger evidence that most of the global warming observed over the last 50 years is attributable to human activities. In the Great Barrier Reef, the effects of climate change are likely to include changes in sea level and coastal hydrology, an increase in the frequency and the intensity of severe storms and cyclones, increased flooding, and rising sea temperatures and carbon dioxide concentrations.

Predicted increases in water temperature driven by climate change could lead to seagrass burning. During the summer of 2001-02, unusually warm water temperatures resulted in seagrass burning (pictured above) in the Whitsundays region. However, little is known about the direct effects of climate change on seagrasses. Photo courtesy of QDPI&F.

The specific effects of climate change on seagrasses in the Great Barrier Reef are unknown. Nevertheless, the IPCC [Third Assessment Report](#) predicts that increasing temperatures may affect seagrass growth rates, reproduction and increase susceptibility to disease. Rising sea levels may reduce the amount of light available to seagrasses and increasing levels of ultraviolet B radiation may stress some species. Climate change may alter the ecological balance of seagrass communities and cause algae to out-compete some seagrass species. Conversely, rising sea levels and increased carbon dioxide concentrations could result in an increase in the amount of habitat available to seagrasses and increase photosynthetic rates.

Where seagrasses are close to their thermal tolerance, rising sea temperatures may cause seagrass burning and death. In 2002, sea temperatures in some parts of the Great Barrier Reef were several

degrees higher than the long-term seasonal averages resulting in major [coral bleaching](#). Shallow water seagrass communities in the Whitsundays, Shoalwater Bay, Green Island and Weipa were also affected and experienced seagrass burning and mortality.<sup>8</sup> Given the ecological roles of seagrass habitats in marine ecosystems, sustained losses of seagrass habitat may have significant effects on the species that rely upon them including commercially important fish and prawn species, and threatened species such as dugongs and turtles.<sup>12</sup>

## ***Response***

The Great Barrier Reef Marine Park Authority (GBRMPA) uses a variety of management tools to minimise human pressures on seagrass habitats, including zoning provisions that regulate the types of activities that may be undertaken in the Great Barrier Reef Marine Park (Marine Park), and programs to address specific issues. The GBRMPA works closely with State and local governments, and the Australian [Department of the Environment and Heritage](#) to address issues that affect seagrass habitats.

### ***Response: legislation and protected areas***

Within the Marine Park, zoning allows for a variety of uses, but also sets aside sensitive areas, such as important seagrass habitats, for protection in ‘green’ or ‘pink’ zones that either prohibit extractive activities or restrict public access to these areas. To provide for the better protection of the various habitats of the Great Barrier Reef, including seagrass habitats, the entire Marine Park has been rezoned through the Representative Areas Program, culminating with the release of a new [Great Barrier Reef Marine Park Zoning Plan 2003](#) that came into effect on 1 July 2004 (see [Response: preserving biodiversity and ecosystem function](#)).

In waters outside the GBRMP, seagrasses are ‘listed marine plants’ under the [Queensland Fisheries Act](#) (1994) and destruction or disturbance of seagrass is only allowed when a permit has been assessed and issued by the [QDPI&F](#). Additionally, inshore and estuarine seagrass meadows may be declared as [Fish Habitat Areas](#) under the [Queensland Fisheries Act](#) (1994). Fish Habitat Areas allow for multiple use and entry but prohibit activities that may disturb or degrade the habitat or its values. There are currently 68 Fish Habitat Areas in Queensland covering 721,000 hectares of important fish habitats including seagrasses. For more information on the role of Fish Habitat Areas in the Great Barrier Reef, see [Environmental status – fishes](#) [Note-currently being updated].

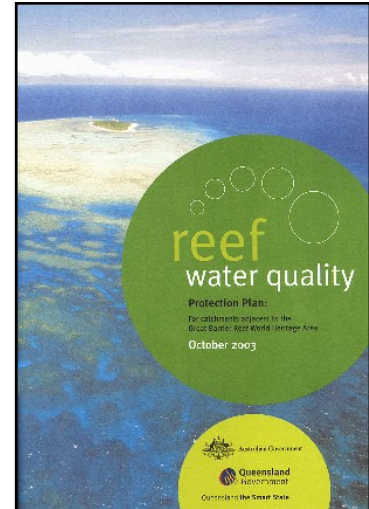


### ***Response: water quality and coastal development***

Costal developments and land use activities that result in the run-off of sediments, nutrients and other pollutants into the GBRMP are largely outside the jurisdiction of the GBRMPA. Nevertheless, the GBRMPA works closely with local governments and State agencies such as the Queensland [Environmental Protection Agency](#) and [Department of Natural Resources and Mines](#) to address water quality issues that affect the Great Barrier Reef, including the following initiatives.

#### ***Sediments, nutrients and pollutants***

In October 2003, the Australian and Queensland Governments released the [Reef Water Quality Protection Plan](#) that aims to halt and reverse declining water quality in the Great Barrier Reef within ten years. The Plan's development included a [comprehensive review](#) of the scientific information on water quality in the Great Barrier Reef, which concluded that there is presently a serious risk to the long-term future of inshore reef habitats, and that immediate action is required to avoid further damage and facilitate recovery of affected habitats. Under the Plan, regional working groups will be established to address land use practices and water quality issues in each catchment, and to set catchment specific targets for parameters such as salinity, water flow, nutrient and pesticide concentrations. Progress on the Plan's implementation will be reported to the Prime Minister and Queensland Premier in 2005, with a follow up report in 2010.



The Reef Water Quality Protection Plan aims to halt and reverse the decline of water quality in the Great Barrier Reef.

For more information about [the Reef Water Quality Protection Plan](#) and the management of water quality issues, see [Environmental Status - water quality](#).

#### ***Coastal development***

The [Great Barrier Reef Marine Park Act 1975](#) and [Environment Protection and Biodiversity Conservation Act 1999](#) both include provisions to assess and manage the environmental impact of coastal development and activities such as dredging. These provisions include consultation processes, and preparation of Environmental Impact Statements and site specific Environmental Impact Management Plans to protect habitats such as seagrasses. Where coastal development projects involve dredging activities, the dumping of any dredge spoil (material that is “dug up” during dredging activities) at sea is regulated by the [Australian Department of the Environment and Heritage](#) and is subject to the [Environment Protection \(Sea Dumping\) Act 1981](#), and the [National Ocean Disposal Guidelines for Dredged Material \(May 2002\)](#). These guidelines set out the process for testing dredge spoil for contaminants and selecting appropriate disposal practices to ensure that impact to marine habitats such as seagrass meadows are minimised.

#### ***Response: trawling***

Seagrass habitats in the Great Barrier Reef are protected from trawling by the [Great Barrier Reef Marine Park Zoning Plan 2003](#) (see [Response: legislation and protected areas](#)) and coastal strip closures implemented by the [ODPI&F](#). The new Great Barrier Reef Marine Park Zoning Plan incorporates closures implemented by the QDPI&F under fisheries management plans such as the [East Coast Trawl Fishery Management Plan \(1999\)](#). The intention of these closures is to protect populations of juvenile prawns and the seagrass habitats that support prawn populations. Originally the boundaries of the coastal strip closures were determined using data from seagrass habitat surveys. However, given the variability of seagrass habitats over time, these boundaries may be moved to reflect the latest information on seagrass distribution. Furthermore, should trawlers begin to catch significant numbers of juvenile prawns in an area, the management regime includes provisions that may result in the closure of that area.

Almost all coastal seagrasses north of Cape Tribulation are protected from trawling by these systems.<sup>14,15</sup> In total, approximately 77% of known shallow water seagrass habitat in the Marine Park is closed to trawling.

**Response: Research and monitoring**

One problem with protecting seagrass habitat with static management systems such as zoning plans is that, as discussed above, areas of seagrass habitat can change quickly. Continued monitoring of seagrass condition and distribution is crucial to provide up-to-date information for management. Furthermore, continued surveys will help Reef managers understand how human activities impact upon seagrass habitat.

The [QDPI&F](#), [James Cook University](#) and the [University of Queensland's Centre for Marine Studies](#) currently undertake research into seagrass distribution and biology. The [Cooperative Research Centre for Reef Research](#) (CRC Reef) also carries out [seagrass research programs](#) that provide updated information on the condition and distribution of seagrass habitats in the Great Barrier Reef, and the interaction between seagrass communities and nutrients. Research is also underway on seagrass reproductive biology and the processes driving population and recruitment dynamics. During the rezoning of the Marine Park, the best available scientific information on seagrass condition and distribution was used to help create [maps](#) of the biodiversity of the Great Barrier Reef (see *Response: preserving biodiversity and ecosystem function*).



Research on the biology and distribution of seagrasses is conducted by a variety of research organisations. Photo courtesy of QDPI&F.

In 1998, the QDPI&F, CRC Reef and QPWS initiated a community based seagrass monitoring project called [Seagrass Watch](#) where members of the community help to monitor the health of seagrass meadows in their local area. [Seagrass Watch](#) can provide early warning of signs of decline in seagrass habitats, but the program also provides long-term data on the extent and characteristics of seagrass meadows, and their resilience and ability to recover from disturbances. The program has been highly successful in educating and involving local communities in seagrass conservation.

**Response: climate change**

Climate change is a global phenomenon, and addressing the causes of climate change is beyond the scope of the GBRMPA. Nevertheless, the GBRMPA is committed to resolving the uncertainties concerning the effects of climate change on the Great Barrier Reef, and to identifying management strategies to mitigate these effects. The GBRMPA's [Climate Change Program](#) involves collaborative research projects with the [National Oceanic and Atmospheric Administration](#) (NOAA) in the United States and the Australian Institute of Marine Science ([AIMS](#)) to monitor sea temperatures and [coral bleaching](#), and to investigate the potential effects of climate change on other parts of the Great Barrier Reef ecosystem.

The GBRMPA is also committed to ensuring that the *resilience*<sup>##</sup> of the Reef's various habitats is not degraded by human activities. Pressure from declining water quality and



The Great Barrier Reef Marine Park was rezoned in 2004 to better protect the biodiversity, ecological functions and connections that maintain habitats such as seagrass meadows. Photo courtesy of QDPI&F.

coastal development, and losses in biodiversity will affect the ability of seagrass habitats to cope with the effects of climate change. Minimising these pressures through the [rezoning](#) of the Marine Park, the [Reef Water Quality Protection Plan](#) and improved fisheries management, will help to ensure that habitats such as seagrass communities have the best possible chance of coping with climate change.

***Response: preserving biodiversity and ecosystem function***

In 2001, the GBRMPA launched the [Representative Areas Program](#) (RAP) to provide better protection for the biodiversity and ecological functions that support the Great Barrier Reef ecosystem. The RAP used the best available scientific information to identify separate regions of biodiversity (called [bioregions](#)) in the Great Barrier Reef and compared them with the existing zoning plans. The process highlighted that under the previous zoning system, less than 5% of the Marine Park was highly protected, and that the protected areas were biased to coral reef habitats. This left some habitat types without any protection, potentially exposing entire bioregions and the organisms living within them to extractive activities. This also meant that in some regions, there was inadequate protection of the ecological resources that would be required to help adjacent habitats recover should they be subjected to some type of disturbance.

To redress this imbalance, the GBRMPA [rezoned](#) the entire Marine Park to provide adequate protection for the range of biodiversity contained within each bioregion, and to better preserve the ecological functions of these areas and the biological connections between them. The new [Great Barrier Reef Marine Park Zoning Plan 2003](#) came into effect on 1 July 2004 and under the new zoning plan, 24% of the known shallow seagrass habitats have been included in ‘green zones’ that prohibit extractive activities. The new Zoning Plan will also help to ensure that the biodiversity and ecological connections necessary to sustain healthy seagrass habitats are preserved, and to maintain the resilience of these habitats in coping with multiple pressures and phenomena such as climate change.

## Summary

- The Great Barrier Reef has extensive areas of seagrass habitat, including some 6,000 square kilometres of shallow water seagrasses and some 40,000 square kilometres of deepwater seagrass habitat.
- Seagrass meadows are an important habitat for several commercially important species of fish and prawns, and are an important food source for dugongs and green turtles.
- Seagrass condition and distribution may change dramatically over time, with seagrasses declining in response to disturbance events such as floods and cyclones, and followed by a period of recovery.
- While episodic pressures such as floods and cyclones have the most dramatic effects on seagrass communities, seagrasses are subjected to chronic and widespread pressures from human activities such as declining water quality and coastal development.
- The increased run-off of sediments, nutrients and pollutants into the Great Barrier Reef may reduce the ability of seagrasses to grow and reproduce. The [Reef Water Quality Protection Plan](#) released in October 2003 is aimed at halting and reversing the decline of water quality in the Great Barrier Reef within ten years.
- Coastal development and dredging may have direct effects on seagrass habitats. These pressures are managed through the [Great Barrier Reef Marine Park Zoning Plan 2003](#), site-specific permits and environmental impact management tools, [Fish Habitat Areas](#) and regulations relating to the disposal of dredge spoil.
- Seagrasses are also protected under the [Queensland Fisheries Act 1994](#), which includes the use of permits and [Fish Habitat Areas](#) to regulate activities that may disturb seagrasses.
- Many seagrass beds are protected from disturbance by trawling with approximately 77% of known shallow water seagrass beds closed to trawling.

- Continued research and monitoring is necessary to provide up-to-date information on seagrass habitat boundaries and condition, and to help Reef managers better understand the effects of human activities on seagrass communities.
- Under the new the [Great Barrier Reef Marine Park Zoning Plan 2003](#), some 24% of known shallow water seagrass habitats are included within zones that prohibit extractive activities. The new network of 'green zones' will also help to preserve the biodiversity and ecological functions of the Great Barrier Reef ecosystem that support healthy seagrass habitats.
- While the exact effects of climate change on seagrass habitats are unknown, seagrasses may experience decreased growth and reproductive rates, increased competition from algae and increased susceptibility to disease. Elevated sea temperature may result in seagrass 'burning'. The GBRMPA is committed to better understanding the effects of climate change on the Great Barrier Reef and addressing the human pressures on seagrass habitats. Alleviating these pressures will increase the capacity of seagrass communities to cope with the effects of climate change.

### **Further Reading:**

- [General information on seagrass habitat by Reef ED](#)
- [General information on seagrass habitat by CRC Reef](#)
- [For Kids: Seagrass Adventure Website](#)
- Seagrasses in [Coastal Habitats and Biodiversity](#), State of the Environment Queensland 2003

### **Research and Management**

- [Information on seagrass and research programs undertaken by the Queensland Department of Primary Industries & Fisheries](#)
- [Seagrass Watch website](#)
- [Information about Seagrass Watch](#) (QDPI&F website)
- [CRC Reef research projects on seagrass](#)
- [The Representative Areas Program](#)
- [Rezoning of the Great Barrier Reef Marine Park](#)
- [Zoning and management of the Great Barrier Reef Marine Park](#)
- [State of the Great Barrier Reef On-line: Environmental status – water quality](#)

### **Publications:**

- [GBRMPA Research Publications](#)
- [CRC Reef Technical Publications](#)
- [CRC Reef brochure Seagrasses in Queensland Waters, current state of knowledge March 2004](#)

### **End Notes**

\* *Sparse* - Less than 20% seagrass cover / \* *Dense* - More than 20% seagrass cover

† *Primary Production* - The conversion of inorganic nutrients and minerals into living tissue such as plant material

§ *Detritus* - Small fragments of organic matter from dead plants and animals

|| *Seed banks* - Some seagrasses produce seeds that accumulate in seed banks where they remain dormant for up to several months. When environmental conditions are favourable, the dormant seeds germinate and regenerate the seagrass bed

# *Episodic* - Events that only happen occasionally

# *Chronic* - Persists for a long period of time

\*\* *Turbidity* - The amount of sediment suspended in the water

†† *Epiphytes* - A plant that lives on another plant, but is not parasitic

§§ *Herbicides* - Chemicals used to control plants such as weeds

|| *Subtidal* - The area of the shoreline below the low tide mark

|| *Intertidal* - The area of the shore between the high tide and low tide marks

## *Resilience* - The ability of an organism or habitat to resist damage and/or recover from disturbance events



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