Sedimentation impacts in Moreton Bay: a priority knowledge synthesis

IMPACTS:

Marine Mammals

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THE MORETON BAY FOUNDATION

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This impact statement is drawn from

Sedimentation Impacts in Moreton Bay, a priority knowledge-synthesis

The report was commissioned by The Moreton Bay Foundation in 2025 to summarise key evidence on how sedimentation affects Moreton Bay's coastal and marine ecosystems, and the ecological and cultural values they support. The report brings together published and grey literature, conceptual models, and expert review to provide a clear, high-level understanding of sedimentation pressures, their impacts, and remaining knowledge gaps.

This standalone document can be found in the full report. Where references are made to other sections, these are indicated by this symbol: †. A full list of external citations, data sources, and methods used in this document is included in the complete report, available at **moretonbayfoundation.org**

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Marine Mammals: Sedimentation Impact Statement

Endangered Dugong (Dugong dugong) in Moreton Bay
Photo credit: C. Cotterell

Status and trend summary

Moreton Bay supports a unique and diverse community of marine mammals, attributed to the Bay's distinctive geography. Table 1 provides a combined qualitative assessment of the resident marine mammal populations in the Bay (Dugong, Indo-Pacific bottlenose dolphins and Australian humpback dolphins), highlighting their current condition, future trajectory and the impacts of sedimentation. Population estimates have improved over time and, in most cases, demonstrate that the current condition of these mammal species is rated as 'Good', with 'High' confidence.

The dugong population in Moreton Bay is generally considered relatively stable. However, the impacts of large floods and the associated sedimentation have reduced the population by impacting the seagrass beds on which they feed. Dolphin populations also appear to be relatively stable, although there is a lack of reliable long-term data to determine their population trends, and concerns exist about potential declines in specific subpopulations. Sedimentation is known to impact dolphin habitats, including by indirectly affecting the availability of their prey. Severe coastal flooding events, characterised by heavy freshwater and sediment discharge as well as the delivery of a range of toxic pollutants, have been linked to increased mortality rates for inshore dolphins in Queensland.

The condition trend of these resident mammal species is rated as 'Stable', with 'Medium' confidence. But there are concerns for future populations, given that they are subject to indirect changes from sedimentation impacts on their food and prey habitats. Hence, the contribution of sediment to the condition trend is rated as 'Moderate' with 'Medium' confidence. However, dugong populations may experience higher risk from sedimentation impacts because of their reliance on seagrasses. This increased risk was demonstrated following the 2011 and 2012 floods, which led to seagrass loss and increased dugong mortality rates.

Table 1. Qualitative assessment of the overall status and trend in condition, and of the likely severity and direction of sedimentation-specific impacts, on the three resident species of marine mammals in Moreton Bay: dugongs, Indo-Pacific bottlenose dolphins and Australian humpback dolphins.

Value condition assessment	Assessment	Confidence
Current condition	Good	High
Contribution of sedimentation to the current condition	Minor	High
Condition trend	Stable	Medium
Contribution of sedimentation to trend	Moderate	Medium

Overview

There are a number of marine mammals that use Moreton Bay, and their populations can be categorised into resident species and seasonal or occasional visitors. The resident mammals are dugongs (*Dugong dugon*), Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) and Australian humpback dolphins (*Sousa sahulensis*) (Chilvers *et al.*, 2005; Dudgeon *et al.*, 2019; Lanyon, 2019; Lanyon *et al.*, 2019). The seasonal or occasional visitors are Humpback whales (*Megaptera novaeangliae*) and Southern right whales (*Eubalaena australis*) (Chilvers *et al.*, 2005; Dudgeon *et al.*, 2019; Lanyon, 2019; Lanyon *et al.*, 2019; Cross *et al.*, 2024). Other cetaceans that are common offshore from Moreton Bay are Common dolphins (*Delphinus delphis*) and Dwarf minke whales (*Balaenoptera acutorostrata*).

Other sporadic visitors or strandings include Killer whales (*Orcinus orcinus*), Eden's whales (*B. edeni*), Sperm whales (*Physeter macrocephalus*), Pygmy sperm whales (*Kogia breviceps*), Blue whales (*B. musculus*), Blainville's beaked whales (*Mesoplodon densirostris*), Short-finned pilot whales (*Globicephala macrorhynchus*), Risso's dolphins (*Grampus griseus*), Fraser's dolphins (*Lagenodelphis hosei*), False-killer whales (*Pseudorca crassidens*), and Pantropical spinner dolphins (*Stenella longirostris*) (Chilvers et al., 2005; Lanyon, 2019; Lanyon et al., 2019).

The abundance and diversity of marine mammals in Moreton Bay are attributed to its unique geography at the boundary of two biogeographic regions, offering a mix of oceanic and bay environments, strong currents, and significant river inputs, which support a variety of habitats and prey (Chilvers *et al.,* 2005; Lukoschek and Chilvers, 2008; Lanyon, 2019).

This statement focuses on the resident and, to a lesser extent, the seasonal or occasional visitors.

Dugongs

Moreton Bay is home to the largest, southernmost resident population of dugongs on the east coast of Australia, and is globally unique for supporting a large dugong population in close proximity to a major city (Lanyon, 2003; Lanyon, 2019; Lanyon *et al.,* 2019). The vast majority (>95%) of dugongs in the Bay primarily inhabit the Eastern Banks area (including Maroom, Boolong, and Coonungai Banks). The environment in this region suits dugongs as the water is relatively clear, seagrass communities are abundant with their preferred genera (like *Halophila* species), the boating traffic threat is light, and deep-water refugia are nearby (Lanyon, 2003; Lanyon, 2019; Lanyon *et al.,* 2019). During winter, dugongs may disperse more widely across the Eastern Banks and move between the warmer oceanic waters of South Passage and cooler Bay waters through Rous Channel to minimise cold exposure (Lanyon, 2003; Lanyon *et al.,* 2019). Small numbers are also found in shallow seagrass areas in the western and southern parts of the Bay and Pumicestone Passage (Lanyon *et al.,* 2019). Dugongs in Moreton Bay form large grazing herds of 10 to 100 animals, with herds of up to 300 recorded (Lanyon, 2019; Lanyon *et al.,* 2019).

Indo-Pacific bottlenose dolphins

Indo-Pacific bottlenose dolphins are found throughout Moreton Bay, both within the Bay and on the oceanic side of the islands (Chilvers *et al.,* 2005). These dolphins appear to be dominant over humpback dolphins in terms of food competition and are more numerous in the Bay (Chilvers *et al.,* 2005; Lanyon *et al.,* 2019).

Australian humpback dolphins

Moreton Bay hosts the most southerly resident population of Australian humpback dolphins (Lanyon, 2019; Lanyon *et al.,* 2019). They are mainly found on the western side of the Bay in shallow, nearshore waters, often associated with rivers, particularly the lower reaches of the Brisbane River, extending north to Mud Island and the Western Banks off Scarborough (Parra *et al.*, 2004; Chilvers *et al.,* 2005; Lanyon, 2019; Lanyon *et al.,* 2019). Peripheral core habitats include southern Bribie Island and Amity Channel near Minjerribah (Lanyon, 2019; Lanyon *et al.,* 2019).

Australian humpback dolphins tend to occur in smaller groups than bottlenose dolphins, typically comprising three to four individuals. However, groups of up to 31 have been reported (Lanyon *et al.,* 2019). They are generalist piscivores (fish feeders) and opportunistically feed on trawler bycatch (Lanyon *et al.,* 2019).

Humpback whales

Humpback whales migrate along the eastern Australian coast between May and October, passing very close to Point Lookout (North Stradbroke Island) and Cape Moreton (Moreton Island) (Noad *et al.,* 2006; Lanyon, 2019; Lanyon *et al.,* 2019). Many enter the northern part of Moreton Bay during their southward spring migration (Lanyon *et al.,* 2019).

Southern right whales

Though historically depleted, small numbers have been sighted annually in Moreton Bay since 1999, often near Victoria Point (Lanyon, 2019; Lanyon *et al.,* 2019). Their presence suggests a possible range extension or return to historical grounds (Lanyon, 2019).

Population status

Dugongs

Dugongs are listed as 'Vulnerable' to extinction globally on the IUCN Red List of Threatened Species (IUCN, 2025) (Table 2). Population estimates of dugongs from aerial surveys between 2013 and 2016 ranged from 601 to 759 individuals (Lanyon *et al.,* 2019). Earlier estimates from 1995 surveys suggested a population of 850–1000 dugongs (Lanyon, 2003), with estimates generally fluctuating between 600 and 950 (Preen, 1993; Lanyon, 2003). A mark-recapture program active since 2001 identified over 780 individual dugongs by 2018, suggesting a stable population with little gene flow in or out of the Bay (Cope *et* al., 2015; Lanyon, 2019; Lanyon *et al.,* 2019). While the population appears stable with no discernible decline, it faces ongoing threats, including boat strikes, traditional Indigenous hunting (for non-commercial, communal needs), and habitat degradation due to coastal development, pollution, and the

increasing frequency and severity of storms and floods (Lanyon, 2003, 2019; Lanyon *et al.,* 2019).

Indo-Pacific bottlenose dolphins

Indo-Pacific bottlenose dolphins are listed as 'Near Threatened' on the IUCN Red List of Threatened Species (IUCN, 2025). Moreton Bay's population of Indo-Pacific bottlenose dolphins is considered large compared to many other inshore bottlenose dolphin populations globally, due to the Bay's high productivity and habitat diversity (Lukoschek and Chilvers, 2008). Two genetically and ecologically distinct subpopulations exist within Moreton Bay: one in shallow nearshore areas of the southern Bay (South sub-population) and another in deeper open waters of northern-central Moreton Bay (North sub-population) (Chilvers *et al*., 2005; Ansmann *et al.,* 2013, 2014).

The overall population size for the entire Moreton Bay region was estimated at 554 individuals (95% confidence interval: 510–598) based on surveys conducted between 2008 and 2010 (Ansmann *et al.,* 2013). The South sub-population was smaller (193 individuals), while the North sub-population was more numerous (446 individuals) (Ansmann *et al.,* 2013). Earlier estimates from 1997-1998 surveys covered a smaller central-eastern area of Moreton Bay (350 km^2) and estimated between 673 and 818 individuals (Chilvers *et al.,* 2005; Lukoschek and Chilvers, 2008). It appears that the populations of Indo-Pacific bottlenose dolphins in Moreton Bay are not exhibiting a general decline, although concerns exist about potential declines for specific subpopulations (Ansmann *et al.,* 2013). There is also a lack of reliable long-term data to determine population trends (Lanyon *et al.,* 2019).

Australian humpback dolphins

Australian humpback dolphins are listed as 'Vulnerable' on the IUCN Red List of Threatened Species (IUCN, 2025). Populations do not show a clear or consistent decline based on available population estimates, though they are considered vulnerable due to various threats (Parra and Cagnazzi, 2016; Lanyon, 2019; Lanyon *et al.,* 2019).

Population estimates of Australian humpback dolphins for Moreton Bay include 119 to 163 individuals from 1984-1987 studies, and 128 to 139 adult-sized dolphins from 2014-2016 surveys (Chilvers *et al.,* 2005; Parra and Cagnazzi, 2016; Lanyon, 2019; Lanyon *et al.,* 2019).

Genetic studies suggest limited gene flow between the Moreton Bay group and the nearest population in the Great Sandy Strait (Lanyon *et al.,* 2019).

Humpback whales

Humpback whales are listed as 'Least Concern' on the IUCN Red List of Threatened Species (IUCN, 2025). The Humpback whale population has shown a remarkable recovery since protection in 1973, with an estimated population of almost 26,000 in 2015, increasing at about 11% per annum (Lanyon, 2019; Lanyon *et al.,* 2019).

Southern right whales

Southern right whales are listed as 'Least Concern' on the IUCN Red List of Threatened Species (IUCN, 2025). Though historically depleted, small numbers have been sighted annually in Moreton Bay since 1999, often near Victoria Point (Lanyon, 2019; Lanyon *et al.*, 2019). Their increasing presence suggests a possible range extension or return to historical grounds (Lanyon, 2019; Lanyon *et al.*, 2019).

Table 2. List of the five resident or regularly visiting mammals of Moreton Bay, noting their trend categories where published (Lanyon, 2019; Lanyon et al., 2019) and their categorisation on the IUCN Red List (IUCN listings are taken from www.iucnredlist.org). Colours used are based on the IUCN Red List.

Marine mammal species	Trend	IUCN Listing
Dugongs (*Dugong dugon*)	Stable	Vulnerable
Indo-Pacific bottlenose dolphins (*Tursiops aduncus*)	Stable	Near Threatened
Australian humpback dolphins (*Sousa sahulensis*)	Stable	Vulnerable
Humpback whales (*Megaptera novaeangliae*)	Increasing	Least Concern
Southern right whales (*Eubalaena australis*)	Increasing	Least Concern

Value

Ecological value

In Moreton Bay, dugong populations hold significant ecological value within the marine ecosystem as obligate (dependent) grazers on tropical seagrass. As seagrass specialists, the distribution and abundance of dugongs are highly correlated with the presence and health of seagrass meadows (Chilvers *et al.*, 2005). Their intensive grazing habits, sometimes referred to as 'cultivation grazing', actively structure seagrass meadows (Preen, 1995; Scott *et al.*, 2022). This process can alter the species composition of seagrass beds, favouring fast-growing, nutritious pioneer species like *Halophila ovalis* over slower-growing, less preferred species like *Zostera capricorni* (Preen, 1995). This effectively improves the quality and concentration of their diet and supports the dugong population.

Given that dugongs and marine mammals are subject to a prediction of ecological extinction in other coastal areas (such as the Caribbean reef systems), they serve as a valuable indicator species for the ecological health of the Bay (Chilvers *et al.*, 2005; Lukoschek and Chilvers, 2008; Lanyon, 2019).

Dolphin populations in Moreton Bay hold significant ecological value within the marine ecosystem due to their roles as top predators. Both the Indo-Pacific bottlenose dolphins and Australian humpback dolphins are top-level carnivores and high-order predators within the Moreton Bay food web (Chilvers *et al.*, 2005; Ansmann *et al.*, 2013; Dudgeon *et al.*, 2019; Lanyon, 2019). They are generalist foragers, preying on a variety of fish and cephalopods, and some exhibit specialised foraging strategies (Lanyon, 2019; Lanyon *et al.*, 2019; Allen, 2021). Their feeding habits, including opportunistic feeding on trawler bycatch, demonstrate their adaptability within the bay's altered environments (Corkeron,1990; Lukoschek and Chilvers, 2008; Lanyon, 2019; Lanyon *et al.*, 2019).

The Indo-Pacific bottlenose dolphins in Moreton Bay are divided into two genetically distinct subpopulations, adapted to different ecological niches (Ansmann *et al*., 2013, 2014; Lanyon *et al.,* 2019). One subpopulation inhabits the deeper, northern/central parts of the bay, foraging on pelagic fish, while the other occupies shallow, nearshore/demersal habitats in the southern bay (Ansmann *et al*., 2014; Lanyon, 2019). Australian humpback dolphins exhibit a more restricted inshore distribution, preferring shallow waters near river mouths (Parra and Cagnazzi, 2016; Lanyon, 2019; Lanyon *et al.,* 2019). This resource partitioning underscores the importance of maintaining the diverse range of habitats within Moreton Bay for the preservation of these distinct populations and their genetic diversity (Ansmann *et al*., 2014).

Cultural value

Dugongs and dolphins hold significant cultural value, particularly for Indigenous communities such as the Quandamooka people in Moreton Bay. They are considered sacred Aboriginal totems for saltwater people, signifying a deep spiritual connection and ancestral links to waterways (Pinner *et al*., 2019; Ross *et al*., 2019a), as demonstrated in Quandamooka Dreaming stories (Delaney, 2013).

Dugongs contribute to the symbolic meaning of places, influencing Indigenous place names and folklore, thus connecting people to their historical, cultural, and spiritual heritage in the land and sea country (Pinner *et al*., 2019). This connection implies an intimate, reciprocal relationship where the well-being of dugongs is intrinsically tied to the well-being of the people (Pinner *et al*., 2019).

Historically and in contemporary society, dugongs are an important food source for Indigenous communities, hunted for their flesh and oil (Thurston *et al*., 2019; Townsend *et al*., 2019; Allen, 2021; Scott *et al*., 2022). This traditional hunting is essential for maintaining social relations, traditional ceremonies, and community cohesiveness (Lanyon, 2019; Townsend *et al*., 2019). This also extends to the affirmation of cultural identity and the recognition of natural elements as ‘cultural resources’, which carry deep cultural significance beyond mere consumption (Pinner *et al*., 2019).

The Indigenous Traditional Owners of Moreton Bay have legal rights under the *Native Title Act 1993* to take marine resources, including dugongs, for non-commercial communal needs.

Cetaceans, including dolphins, hold deep significance for the culture of many Aboriginal communities, as celebrated in traditional and contemporary songs, stories, dance, and art (Allen, 2021). Their presence contributes to the symbolic meaning of places and connects people to their heritage (Allen, 2021) as demonstrated by their featuring role in Quandamooka Dreaming stories (Delaney, 2013). Historically, there's evidence of mutually beneficial foraging relationships between Australian Aboriginals and Indo-Pacific bottlenose dolphins in Moreton Bay, where they cooperated to herd and capture migrating mullet (Lanyon *et al.,* 2019; Allen, 2021).

Economic value

Dugong and dolphin populations in Moreton Bay contribute to the region's economy primarily through wildlife tourism. The harvesting of dugongs for traditional use represents an important subsistence value for the Quandamooka people (Lanyon, 2019; Townsend *et al.*, 2019). Both of the Bay's dolphin species are a focus of boat-based dolphin watching tours and hand-feeding operations at two shore-based sites in Southeast Queensland (Chilvers *et al.,* 2005; Lanyon, 2019; Allen, 2021).

Marine mammals contribute significantly to the biodiversity of Moreton Bay, particularly to the visible megafauna community, which supports the growing ecotourism activity in the Bay.

History

Aboriginal people have traditionally harvested dugongs in Moreton Bay (Chilvers *et al.,* 2005). However, from 1847 (or earlier), a commercial dugong oil industry operated in Moreton Bay, continuing intermittently until about 1920 (Chilvers *et al.,* 2005; Thurston *et al.*, 2019) with a brief resurgence during World War II. This exploitation is believed to have depleted the dugong population in the Bay (Lanyon, 2003; Chilvers *et al.,* 2005; Thurston *et al.*, 2019). By the 1960s, it was thought that only a few dugongs remained in Moreton Bay. However, aerial surveys in the mid-1970s established that a population of at least 300 individuals existed, with suggestions that numbers were beginning to increase (Lanyon, 2003; Chilvers *et al.,* 2005). However, as the western shoreline of the Bay became increasingly urbanised, leading to seagrass loss and modification, the dugongs' range contracted primarily to the eastern bay (Lanyon, 2003; Lanyon, 2019). Moreton Bay's dugong population has subsequently appeared stable during the late 20th century (see Population status section above), contrasting with declines reported in other parts of the species' range. (Lanyon, 2003; Chilvers *et al.,* 2005).

Indo-Pacific bottlenose dolphins have a long history of association with people in Moreton Bay, including mutually beneficial cooperative hunting relationships with Indigenous fishers as described above. Scientific studies on both the Indo-Pacific bottlenose dolphins and Australian humpback dolphins began in Moreton Bay in the late 1970s (Chilvers *et al.,* 2005). A study in the 1980s reported high rates of shark injuries (36.6%) on bottlenose dolphins, potentially linked to a concentration of sharks and dolphins around trawlers (Lanyon *et al.,* 2019). Following a decline in trawling effort from 1999 to 2008, the distinct 'trawler' and 'non-trawler' Indo-Pacific bottlenose dolphin social structure disappeared, reverting to a more conventional fission-fusion pattern (Lanyon, 2019; Lanyon *et al.,* 2019). This pattern is a type of social organisation where the size and composition of groups change frequently through individuals frequently splitting from (fission) and merging into (fusion) different groups depending on food, predation risk, and social context.

Moreton Bay continues to support significant and diverse dolphin populations despite its proximity to a major urban centre and ongoing threats from habitat degradation,

vessel traffic, pollution, and entanglement (Chilvers *et al.,* 2005; Lukoschek and Chilvers, 2008; Lanyon*,* 2019; Lanyon *et al.,* 2019).

Impacts of sedimentation

Figure 1 provides a conceptual model to broadly describe the impacts of sedimentation on marine mammals in Moreton Bay.

Dugongs

Fine sediment deposition, particularly from major flood events, can smother seagrass beds, reduce light availability, and alter the benthic habitat from sandy to muddy (Todd *et al.,* 2015; Saeck *et al.,* 2019a; Grinham *et al.,* 2024). This directly destroys or modifies the dugongs' preferred seagrass species, which are vital for their nutrition (Preen, 1995; Lanyon, 2019).

The significant rainfall and flood event in 2011 caused severe degradation of inshore water quality and seagrass habitats in Moreton Bay (see **† Section 4**). After these events the mortality rates for dugongs along the Queensland coast increased markedly, as their seagrass food source was destroyed (Lanyon, 2019). When seagrass habitats are lost or degraded, dugong reproductive rates decline, which can lead to decreased fecundity, lower calf counts, and potentially reduced juvenile survivorship (Fuentes *et* al., 2016; Lanyon*,* 2019; Lanyon *et al.,* 2019; Lanyon *et al.,* 2025). However, the impact of seagrass losses due to sedimentation in the Bay is moderated on the Eastern Banks - the main dugong feeding area - due to its short water residence times (3-5 days) and hence, higher sediment flushing rates (Gibbes *et al*., 2014).

Meagre and Limpus (2014) found that peak mortality of dugongs followed sustained periods of elevated freshwater discharge (with an eight-month lag) and low air temperature (with a two-month lag). These were explained by food limitation (as described above for seagrass loss via exported freshwater and sediments following floods) and direct impacts on health of cold-stress syndrome (Owen *et al*., 2013).

Sediments can also act as a vehicle for transport and accumulation of toxic pollutants like Organochlorine pesticides and PCBs, Polychlorinated Dibenzo-p-dioxins and Dibenzofurans (PCDD/Fs), heavy metals, and biotoxins and harmful algal blooms (O'Shea *et al*., 2018; Grinham *et al*., 2021), into the Bay's waters and benthic habitats. The heavy metals identified in surface sediments exceeded background reference ranges and pose a medium to high risk to benthic biota (Townsend *et al.,* 2019). These contaminants become bioavailable when sediments are disturbed or water quality changes (Townsend *et al*., 2019), and dugongs can be exposed through their diet (Gaus *et al.,* 2004; Hermanussen *et al*., 2004; O'Shea *et al*., 2018; Lanyon *et al.,* 2019; Townsend *et al.,* 2019). Adverse effects from such pollutants may represent a significant health risk to dugongs (O'Shea *et al*., 2018). However, there is a lack of specific information on dugong sensitivity to these compounds, which prevents a more conclusive determination of impacts (Gaus *et al.*, 2004). These impacts are better studied for dolphins and are described below.

Dolphins

Severe coastal flooding events, characterised by heavy freshwater and sediment discharge, have been linked to increased mortality rates for inshore dolphins in Queensland (Meager and Limpus, 2014; Parra and Cagnazzi, 2016; Allen, 2021). Freshwater discharge has a strong influence on the distribution, abundance, and phenology of fish and crustaceans, which serve as primary prey resources for inshore dolphins (e.g., Gillanders and Kingsford, 2002). Sedimentation in Moreton Bay primarily impacts dolphins through habitat degradation and the transport of pollutants. The direct impact of habitat smothering through sedimentation is more pronounced on species like dugongs and turtles, which feed on seagrass that can be buried or degraded. However, similar widespread habitat alteration impacts the broader marine ecosystem (Grinham *et al.,* 2024), which indirectly affects the availability of prey for dolphins (Todd *et al.,* 2015).

Dolphins, especially the smaller southern subpopulation of Indo-Pacific bottlenose dolphins, which prefer shallow, nearshore waters and river mouths, are highly exposed to land-based pollutants through their diet (Lanyon, 2019; Lanyon *et al*., 2019).

Australian humpback dolphins also show concentrations of contaminants in their tissues (Parra and Cagnazzi, 2016; Lanyon, 2019; Townsend *et al*., 2019). As apex predators, they are susceptible to bioaccumulation, which can lead to adverse physiological effects (Parra and Cagnazzi, 2016; Lanyon, 2019). Adverse effects on dolphins from toxic pollutants (described above in Dugong section) has been studied and includes: impaired immune function and increased susceptibility to diseases (Todd *et al.,* 2015; Parra and Cagnazzi, 2016; Lanyon, 2019), reproductive anomalies such as premature pupping, calf mortality and low reproductive rates (Todd *et al.,* 2015; Townsend *et al*., 2019; Allen, 2021), neurological and developmental effects (Gaus, 2004; Todd *et al.,* 2015), metabolic impairment (Parra and Cagnazzi, 2016), skin lesions and diseases (Lanyon, 2019; Allen, 2021) and increased susceptibility to other stressors (Todd *et al.,* 2015).

Recommendations

1. Protect seagrass habitats from physical and chemical degradation caused by factors such as coastal development and increasing frequency and severity of storms and coastal flooding, which exacerbate sedimentation and poor water quality (Lanyon *et al.,* 2019; Lanyon *et al*., 2025).
2. Develop strategies to reduce the discharge of sediments and associated pollutants, such as heavy metals (e.g., lead) and persistent organic pollutants (e.g., PCBs, DDTs), into estuarine and coastal waters (Ansmann *et al.,* 2013, 2014; Parra and Cagnazzi, 2016; Lanyon, 2019; Townsend *et al*., 2019; Allen, 2021). This includes efforts to improve farming practices to minimise sediment and nutrient runoff (Parra and Cagnazzi, 2016).
3. Monitor the health of dugong and dolphin populations and individuals (e.g. through contaminant exposure and population trends) to screen for and mitigate

emerging health-related problems linked to habitat deterioration (Lanyon *et al.,* 2019), as well as to detect potential declines and understand the long-term effects of habitat degradation (Ansmann *et al.,* 2013; Lanyon, 2019; Lanyon *et al.,* 2019; Townsend *et al.*, 2019).

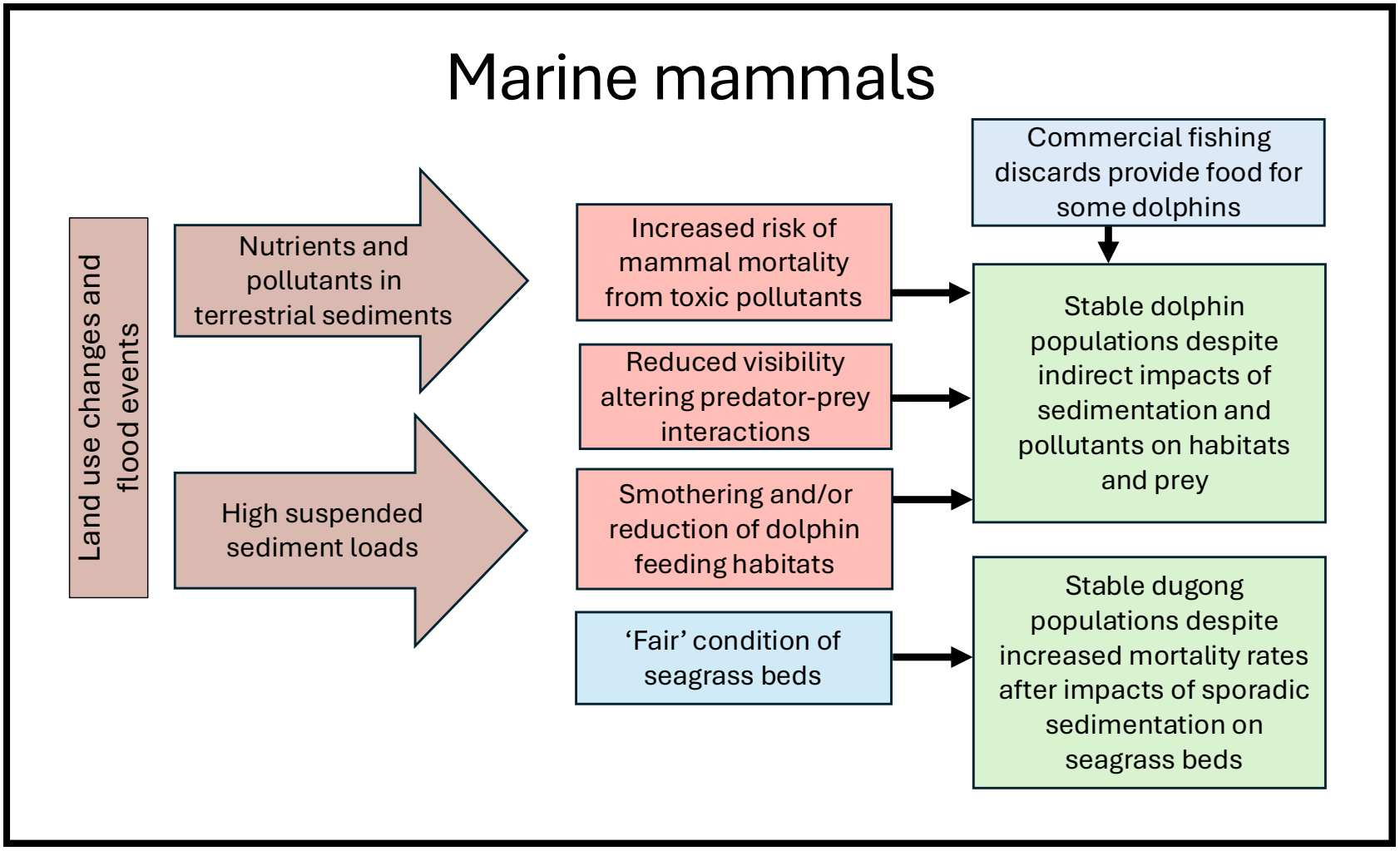
4. Implement improved pollutant management strategies, including better coordinated monitoring programs, to understand and reduce the impacts of major weather events like floods that cause significant sediment runoff (Townsend *et al.*, 2019).
5. For activities like dredging that cause sedimentation, undertake careful planning, avoid sensitive areas, and use environmental windows during critical times to minimise impacts on seagrass, shellfish reefs and marine organisms (Todd *et al.,* 2015).

Expert review

Prof. Helene Marsh (James Cook University) kindly provided an expert review of the Marine Mammals: Sedimentation Impact Statement.

Conceptual model - impacts of sedimentation on marine mammals

Figure 1. Conceptual model that qualitatively describes the major impacts of sedimentation on marine mammal populations and health in Moreton Bay. Brown boxes signify sedimentation-related processes; blue boxes signify other relevant and interacting consequential inputs or impacts; red boxes signify adverse impacts/outcomes; green boxes indicate likely positive or neutral impacts/outcomes.



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Sedimentation Impacts in Moreton Bay, a priority knowledge-synthesis

The report was commissioned by The Moreton Bay Foundation in 2025 to summarise key evidence on how sedimentation affects Moreton Bay's coastal and marine ecosystems, and the ecological and cultural values they support. The report brings together published and grey literature, conceptual models, and expert review to provide a clear, high-level understanding of sedimentation pressures, their impacts, and remaining knowledge gaps.

This standalone document corresponds to **Section 5.14** of the full report. A full list of external citations, data sources, and methods used in this document is included in the complete report, available at

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