Sedimentation impacts in Moreton Bay: a priority knowledge synthesis

IMPACTS:

Moreton Bay Fisheries

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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**

David Brewer Consulting (DBC) has prepared this report for The Moreton Bay Foundation under the contract titled 'TMBF Priority Knowledge Synthesis: Sedimentation Impacts in Moreton Bay'. Information about the Moreton Bay Foundation can be found at: https://moretonbayfoundation.org/

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Moreton Bay Fisheries: Sedimentation Impact Statement

Moreton Bay trawlers
Photo credit: S. Eayrs

Status and trend summary

Table 1 provides a qualitative assessment of fisheries in Moreton Bay, highlighting key aspects of their current condition, future trajectory and the impacts of sedimentation. Moreton Bay is heavily fished by a combination of commercial and recreational fishing. At least 28 species are commercially fished in the Bay and it has the highest concentration of recreational fishing effort in the state, despite its relatively small spatial area.

Most commercially fished species are currently assessed as being harvested sustainably, and many of these are also targeted and fished recreationally. In combination, these assessments and the management of commercially important species suggest, with 'Medium' confidence, that most fished populations in Moreton Bay are currently in 'Fair' condition. The assessments also indicate, with 'High' confidence, that the condition trend for these fished populations is relatively 'Stable'.

However, the contribution of sedimentation to their current condition and trend is difficult to assess due to the unknown impacts of ecological cascading between species and habitats that they rely on, and the potential variability of impacts between species groups fished (and hence, a variety of potential impacts). Hence, an assessment of 'Unknown' is ascribed to the impacts of sedimentation on the condition and trend of fished species. The risk to this valuable group of species should be closely monitored, given the interaction between declining environmental conditions (such as sedimentation) and the substantial impacts of fishing effort.

Table 1. Qualitative assessment of the overall status and trend in condition, and of the likely severity and direction of sedimentation-specific impacts, for fisheries in Moreton Bay.

Value condition assessment	Assessment	Confidence
Current condition	Fair	Medium
Contribution of sedimentation to the current condition	Unknown	Medium
Condition trend	Stable	High
Contribution of sedimentation to trend	Unknown	Medium

Overview

Commercial fishing

Moreton Bay commercial fisheries totalled 2,254 tonnes in the 2013-14 year and produced about 12% of Queensland's total fish catch, despite comprising only 3% of the Queensland coastline (Thurstan *et al.,* 2019). A wide range of species are commercially fished in Moreton Bay, including teleost fish, sharks and a range of invertebrates. Of the 76 species or species groups fished in Queensland that have undergone periodic fishery assessments (www.fish.gov.au/jurisdiction/queensland) by the Queensland Department of Primary Industries (QDPI), distribution maps indicate that 28 of these are fished in Moreton Bay (Fisheries Research and Development Corporation, 2023b).

Indigenous and recreational fishing

Moreton Bay also serves as an important fishing area for Indigenous peoples (see Cultural value section) and recreational anglers (Olds *et al*., 2019). A broad 2013 survey of recreation anglers who fish in Moreton Bay reported catching 74 different species (Thurstan *et al*., 2019; Webley *et al*., 2015)**.** In this survey, the most commonly harvested finfish were Trumpeter whiting (*Sillago maculata)*, Yellowfin bream (*Acanthopagrus australis*), and Sand whiting (*S. ciliata*) (Webley *et al*., 2015).

QDPI recently published the results from a 2019-20 statewide recreational fishing survey (Teixeira *et al*., 2020). They estimated that 943,000 Queenslanders participated in 2.8 million days of recreational fishing in Queensland during the 12 months preceding the survey. They also note that most of this effort occurred in South-east Queensland waters, and that Moreton Bay had the highest concentration of recreational fishing effort in the state, despite its smaller spatial area (Teixeira *et al*., 2020). Recreational fishing in Queensland is open access, meaning no licence is required. However, various size limits, in-possession limits, and gear restrictions are in place for different species (Thurstan *et al.,* 2019).

Population status

Commercially fished species

The fishery status assessments of commercially fished species by QDPI (www.fish.gov.au/jurisdiction/queensland) provide some evidence of the status of these populations, including whether they are being sustainably fished or not (Fisheries Research and Development Corporation, 2023b). In broad terms, these assessments indicate whether fished populations remain relatively stable and are not declining towards extinction, rather than whether they are maintaining natural population levels. Although it is difficult to distinguish the impacts of fishing on population changes from other factors, the fishery status of species is used here as an indicator of population status.

Of the 28 species or species groups commercially fished in Moreton Bay, none have populations that are restricted to Moreton Bay. Population status assessments for all species (or groups) are done at the whole-of-population level, making assessments for 'Moreton Bay only' complex and confounded by issues outside of the Bay. Consequently, an assessment of the population status of commercially fished species in Moreton Bay was restricted to twelve species that have a substantial proportion (usually half or more) of their Queensland fishing effort distribution in Moreton Bay (Table 2). The remainder (16) have the majority of the distribution of their fishing effort in other areas of Queensland.

Of the 12 species with substantial proportions of the fishing effort occurring in Moreton Bay, ten have been assessed as 'Sustainable', one as 'Depleted' and one as 'Undefined' (Table 2). These assessments, along with the ongoing management of commercially important species, indicate that most fished populations in Moreton Bay are currently in a relatively stable condition.

Table 2. Commercially fished species with substantial proportions of their total Queensland fishing effort occurring in Moreton Bay, along with their fishery assessment status (www.fish.gov.au/jurisdiction/queensland).

Species	Fishery status	Species	Fishery status
Eastern school prawn	Sustainable	Sea mullet	Sustainable
Dusky flathead	Sustainable	Snapper	Depleted
Luderick	Sustainable	Tailor	Sustainable
Mulloway	Undefined	Yellowfin bream	Sustainable
Sand whiting	Sustainable	Yellowtail scad	Sustainable
School mackerel	Sustainable	Common blacktip shark	Sustainable

Thurston *et al*. (2019) noted that Sea mullet (*Mugil cephalus*) and whiting (*Sillago* species) landings have shown an overall decline in the logbook time series since 1988, while Yellowfin bream landings remained more stable over the same period. Mr John Page, a well-known commercial tunnel-net fisher in Moreton Bay (see section on John Page story), noted Sea mullet have been more heavily fished in recent times due to the ability of fishers to spot a larger proportion of mullet schools using drones (J. Page, pers. comm.). Mr Page (pers. comm.) also noted that Sea mullet catches have shown substantial declines from previous years. He also suggests that the Luderick (*Girella tricuspidate)* population appears to be moving out of the Bay to more southern latitudes, as predicted from rising temperatures (Last *et al*., 2011).

Recreationally fished species

The 2019–20 statewide recreational fishing survey provides general catch trends for Queensland, but it does not offer specific, detailed catch trends for individual species within Moreton Bay for that period (Teixeira *et al*., 2020). Therefore, it is not possible to assess the population status or trends for fish impacted solely by this sector in Moreton Bay.

The most commonly targeted and caught species by recreational fishers in Moreton Bay are also targeted commercially and from the same populations (e.g. Whiting spp, Yellowfin bream, Dusky flathead, Luderick, Mulloway [*Argyrosomus japonicus*], School

mackerel [*Scomberomorus queenslandicus*], Snapper and Tailor [*Pomatomus saltatrix*]). Thurstan *et al.* (2019) and Teixeira *et al*. (2020) also note that recreational fishing pressure in Queensland continues to increase.

Indigenous cultural fishing is considered to be at very low levels of effort and, therefore, has a low impact on the species harvested (see Cultural Value section).

Although the QDPI assessments indicate that most commercially fished species are not on a declining trend, they do not generally imply that these species are near healthy population levels. Furthermore, as many species are also subject to substantial, but unquantified, recreational fishing effort, the status of populations of fished species in Moreton Bay should be considered in a precautionary manner.

Impact of the marine park rezoning

While there is evidence of increased numbers and biomass for some species targeted by recreational fishers in new protected zones (from 2010) (Haywood *et al.,* 2019), the overall impact of the marine park rezoning on recreational fisheries is uncertain due to other external factors (Pascoe *et al*., 2025). For example, catch rates in Moreton Bay were higher immediately after rezoning in 2010, but declined by 2019 to levels comparable with other regions (Pascoe *et al*., 2025). A study of no-take marine reserves that prohibit fishing has shown that this form of spatial protection promotes fish abundance and diversity in some ecosystems (e.g. coral reefs, seagrass meadows) (see Ecological value section below), but not in others (e.g. estuaries, ocean beaches) (Olds *et al*., 2019).

Value

Ecological value

Species that are commercially and recreationally fished in Moreton Bay contribute significantly to the ecosystem through various ecological functions. For example, herbivores, such as the Dusky rabbitfish (*Siganus fuscescens*), graze on algae on coral reefs and in seagrass meadows and have significant positive effects on the structure of coral reefs and the physiology of seagrass species (Gilby *et al.*, 2019c). This function helps to reduce turf algae cover and can increase coral recruits on reefs, particularly those near mangroves (Olds *et al*., 2019). This herbivory also improves the capacity of these ecosystems to recover from disturbances, such as flood impacts (Gilby *et al.*, 2019c).

Fish can also play important predatory roles that are crucial for maintaining the structure of food webs within ecosystems (Olds *et al*., 2019). Recreationally important species, like Yellowfin bream, also serve as prominent scavengers. They are omnivorous predators and scavengers, playing a crucial role in recycling nutrients within coastal food webs (Olds *et al.*, 2019). The sensitivity of this scavenging function in estuarine fish to environmental changes (e.g. water quality, fishing pressure, urbanisation) can make it a useful indicator of ecosystem health (Olds *et al*., 2019).

Many commercially and recreationally important fish and prawn species use different habitats throughout their life cycles for purposes such as feeding, seeking refuge from

predators, and serving as spawning or nursery sites (Olds *et al*., 2019). The movements of species among habitats such as mangroves, seagrasses, and coral reefs functionally connect these diverse habitats, thereby linking fish assemblages and food webs across the seascape of Moreton Bay (Olds *et al*., 2019). Shallow reefs within the Bay also act as important 'stepping stones' for some species during their migrations (Olds *et al*., 2019).

The presence and diversity of these fish assemblages are fundamental to the overall biodiversity and health of Moreton Bay's marine ecosystems (Olds *et al*., 2019). Increases in the abundance and/or biomass of targeted species within marine reserves (such as Snapper, Spangled emperor [*Lethrinus nebulosus*], Redthroat emperor [*L. miniatus*], Blackspot tuskfish [*Choerodon schoenleinii*], Maori rock cod [*Epinephelus undulatostriatus*], and Goldspot wrasse [*Bodianus perdition*]) demonstrate that these relatively new protections are having a beneficial effect on key species (Haywood *et al.,* 2019); and hence, on the overall health of the Bay's ecosystems.

Cultural value

Fishing, including for finfish and shellfish, are integral to contemporary Indigenous society and practices within Moreton Bay. Indigenous groups, such as the Quandamooka people, maintain strong cultural connections to this region and its resources (Thurstan *et al.,* 2019). Certain species hold special cultural and economic significance. For example, mullet is culturally important for the Aboriginal people of Quandamooka (Thurstan *et al.,* 2019). Oysters were also historically harvested and are currently farmed by Aboriginal people in the region (West *et al.,* 2019; J. Ladbroke-Parkin, pers. comm.). Aboriginal place names in Moreton Bay often carry symbolic meaning linked to community identity and specific species. For instance, Bribie Island is called 'Yurin,' meaning 'place of mud crabs' (Ross *et al*., 2019a).

These values are reflected in the Native Title rights recognised for the Quandamooka People, which include the right to take, use, share, and exchange traditional natural resources (including those fished) for any non-commercial purpose within their traditionally accessed waters (Thurstan *et al.,* 2019).

Economic value

Moreton Bay is considered one of Australia's most intensively used coastal systems for fisheries (Thurstan *et al.,* 2019). Recreational fisheries are the largest and most significant economic fishery activity, with direct expenditure by the sector in Moreton Bay estimated to be between $156 million and $194 million per annum (Thurstan *et al.,* 2019).

The most valuable commercially fished sector is the prawn trawl fishery, with a gross value of production of $4.6 million per annum in 2010 (Courtney *et al.,* 2012).

The farmed oyster industry in Moreton Bay had an annual value of approximately $500,000 in recent years, despite fluctuating production (West *et al.,* 2019). Land-based prawn farms, primarily for Black tiger prawns (*Penaeus monodon*), contributed over $20 million per annum in 2014, making up the bulk of Moreton Bay's aquaculture production.

History

Commercial fishing in Moreton Bay began in the 1840s in the Brisbane River. Early efforts targeted Greasyback, School, and Banana prawns (Thurstan *et al.*, 2019). The industry diversified in the early 1900s and saw rapid growth in the 1950s after a ban on otter trawling was lifted, making the Moreton Bay otter trawl fishery one of Queensland's most effort-intensive in Queensland coastal waters (Thurstan *et al.*, 2019). Historically, mullet was the finfish landed in the greatest quantities averaging 651 tonnes per year (1944–1981). Other relatively important species historically included Yellowfin bream, Whiting spp, Tailor, prawns, and crabs (Thurstan *et al.*, 2019). Since 1988, prawns, mullet, bream, whiting, Blue swimmer crabs, Mud crabs, and squid have been caught in the greatest commercial quantities.

The oyster industry, exploited by Indigenous peoples for generations, was over-exploited by early settlers (see **† Section 5.9**), leading to regulations and the start of organised farming in the 1870s (Thurstan *et al.*, 2019).

Recreational fishing has a history of over 130 years in Moreton Bay, with the Queensland Fisheries Act of 1877 formally distinguishing it from commercial activities (Thurstan *et al.*, 2019). After the 1950s, recreational fishing participation increased due to the availability of more affordable vehicles, boats, and technology (Thurstan *et al.*, 2019). While no licence is required for recreational fishing, size limits, in-possession limits, and gear restrictions have been in place since the late 19th century, with major reforms introduced in 1993 (Thurstan *et al.*, 2019).

Impacts of sedimentation

Sedimentation in Moreton Bay has both direct and indirect impacts on commercially and recreationally fished species and their supporting ecosystems (see conceptual model in Figure 1). As described in the **main report †**, overall changes in water quality due to sedimentation detrimentally impact fish habitats, altering the composition and abundance of fish assemblages in estuaries, seagrass meadows, and coral reefs (Olds *et al.*, 2019). Sedimentation impacts photosynthetic primary producers (Saeck *et al.,* 2019a) through reduced water clarity. Therefore, fished species that rely on plant-based ecosystems (such as seagrass) can be heavily affected. While herbivorous fish, such as the Dusky rabbitfish, consume algae that would otherwise overgrow seagrass and corals, and improve ecosystem recovery from past flood impacts (Olds *et al.*, 2019), chronic or increased sedimentation could overwhelm this natural resilience.

Sedimentation also impacts other benthic habitats, including seagrasses, corals and sandy bottom habitats, through smothering and increases in mud content (Grinham *et al.*, 2024; Saeck *et al.,* 2019a). For example, the decline of the oyster (*Saccostrea glomerata*) industry in Moreton Bay, once a significant fishery, was linked to flood events and poor water quality, which led to disease and over-exploitation of natural beds (Thurstan *et al.*, 2019) (see **† Section 5.9**).

The shift from sandy to muddy bottoms directly impacts species that prefer or rely on sandy substrates, such as the Greasyback prawn (*Metapenaeus bennettae*), which is

among the most numerous and commercially important species in Moreton Bay (Grinham *et al*., 2024). The smothering of seagrass meadows and coral reefs by fine sediments (Saeck *et al.,* 2019a) is detrimental to numerous commercially and recreationally important fish and prawn species, as these habitats serve as crucial feeding areas, refuges from predators, and nurseries, especially for penaeid prawns (Courtney *et al*., 2012). The long-term alteration of habitats from predominantly sandy to muddy could permanently change many areas necessary for these species (Saeck *et al.,* 2019a).

Although there is no assessment of the economic impacts of sedimentation on Moreton Bay fisheries, there is likely to be links between the habitat losses described in other sedimentation impact statements in the **main report †** and the declines in commercial fisheries. However, the combined roles of fishing effort, sedimentation, and other factors on commercial fishery catches remain unclear.

Direct impacts on recreational fisheries by sedimentation are also difficult to ascertain as the data describing the other main impacts (change in catches or effort) are not well understood and therefore cannot be compared and taken into account. However, expert information (above) suggests that many recreationally fished species are in decline, either through increased recreational fishing effort, combined fishing effort of commercial and recreational catches (as many species are targeted by both sectors), or through the loss of key habitat for fished species.

Recommendations

1. Prioritise and fund management actions that reduce diffuse sediment loads originating from the catchment (Saeck *et al*., 2019b). This action is urgent, as the adverse effects of sediment are likely to increase in the future (Saeck *et al*., 2019b).
2. Improve catchment management and rehabilitation to achieve the regional management plan target for a 50% reduction in sediment loads entering Moreton Bay (Leigh *et al*., 2013). This reduction is estimated to involve the rehabilitation of 6,000 km of the 24,000 km of waterways in priority areas, and especially in the Upper Lockyer catchment (Saeck *et al*., 2019b).
3. Improve protection and restoration of streambank vegetation (Saeck *et al*., 2019b), as the loss of riparian vegetation reduces channel protection and catchments without riparian vegetation export significantly more sediment (Olley *et al*., 2015b).
4. Implement best land management practices to reduce the loads of sediment (and nutrients) from catchments (Leigh *et al*., 2013), including management of stormwater flow from new developments and construction sites, and using innovative stormwater management practices designed into new developments (Saeck *et al*., 2019b).

Expert review

A scientific fisheries expert (anonymous) kindly provided an expert review of the Moreton Bay fisheries: Sedimentation Impact Statement.

John Page Story

John Page is an experienced and well-known tunnel-net fisher in Moreton Bay (e.g. see Leaving turtles and rays at the door: How tunnel netting ensures sustainable seafood in Moreton Bay | News and media). John recognises that in recent decades there have been beneficial changes to the Bay's ecosystems, such as improved sewage treatment and reduced toxin loads from the Brisbane River, in particular. However, John says that 'Overall, fish populations have decreased in Moreton Bay' and he has very well-honed views on why that is. He notes that a range of issues are impacting fish populations, such as migration of some species to higher latitudes due to increasing water temperatures. However, the impacts of increased sedimentation and nutrient loads have, by far, the greatest impacts on commercial fishing.

John tells of how many areas that once had consolidated substrates are now so silted up that they no longer attract the many fish species that he targets in his tunnel netting operation. Other habitats become heavily silted following flood events and can take at least three to five years to recover to the point where the pre-flood fish communities return. John has observed the stark difference in fishery production between areas in the Bay that are more protected from siltation plumes (where he continues to fish) and those that have been lost to the fishery following flooding.

John Page inspecting catches in his tunnel netting operation.

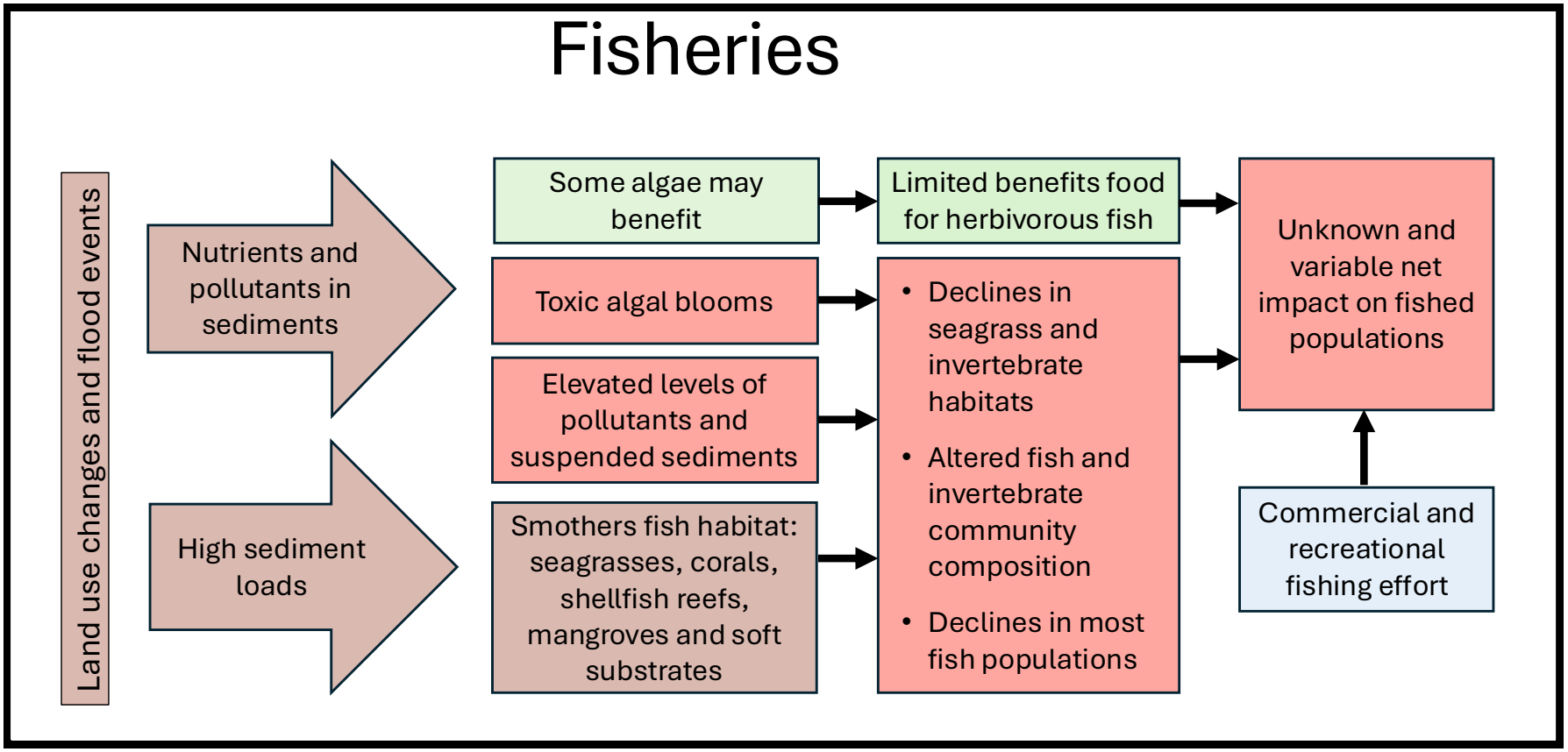
Photo courtesy of John Page.

John has also seen how the nutrient influxes that accompany flood events (and sediment resuspension events) can impact fish communities. He has noted how recent flood events are also followed by toxic algal blooms in shallow coastal waters, which can greatly reduce the productivity of inshore habitats for many months.

Consequently, John believes that urgent measures should be taken to help protect fish populations in the Bay. He recommends that sediment loads entering the Bay can and should be curtailed to help benthic habitats and the fish communities they support survive, such as seagrass beds, corals and consolidated substrates. This action would also likely reduce the high nutrient loads that have a detrimental effect on fish communities. He also notes that protecting spawning windows (e.g. using temporal closures) can be an important strategy to help rebuild fish populations.

Conceptual model - impacts of sedimentation on fisheries

Figure 1. Conceptual model that qualitatively describes the major impacts of sedimentation on Moreton Bay fisheries. 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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This standalone document corresponds to **Section 5.15** 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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Cover Images:
(Top) Photo credit: C. Roelfsema
(Bottom) John Page is inspecting catches in his tunnel netting operation. Photo courtesy of John Page

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