CQC Coal Project and our Reef: the marine values at risk in Broad Sound and surrounds

Written by the Australian Marine Conservation Society

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We are incredibly grateful for all the scientists who contributed their expert advice and data to help highlight the rich diversity of wildlife downstream and the potential impacts from the Central Queensland Coal project.

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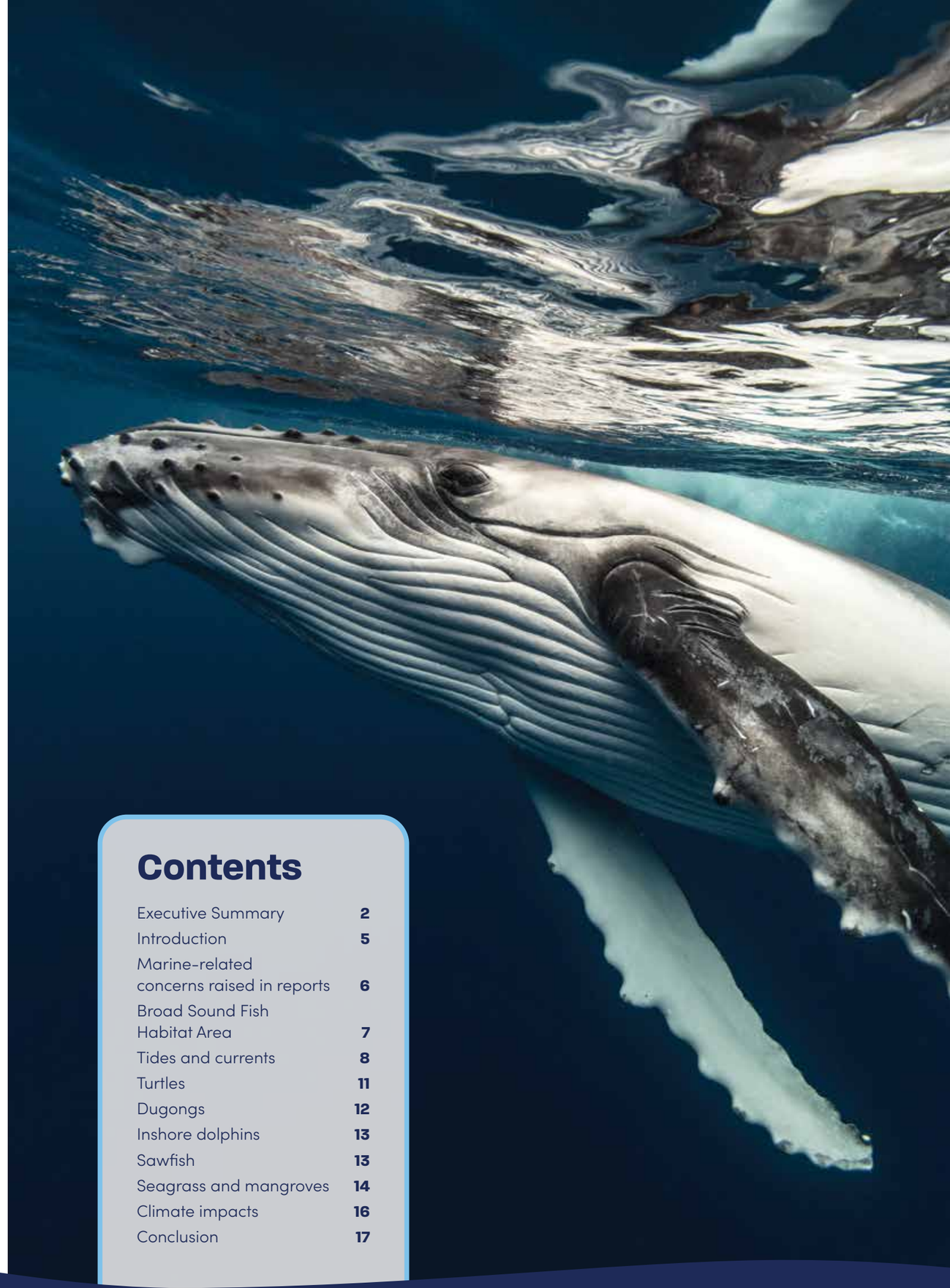

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Executive Summary

There is too much at risk to allow the proposed Central Queensland Coal (CQC) project to be built and operate so close to the Great Barrier Reef World Heritage Area. This report reviews the risks associated with the proposed development and the potential impact of the mine on the marine values of Broad Sound and the Great Barrier Reef World Heritage Area.

Broad Sound, located within the Great Barrier Reef World Heritage Area is rich in marine life, including protected migratory species like the **flatback turtle** and the **dugong**, species important for commercial and recreational fishing like **barramundi** and **mud crabs**, as well as habitats like **mangroves** and **seagrass** that provide food and refuge for many species as well as acting as vital carbon sinks. Sediment from the mine is likely to have a significant impact on the seagrass that supports these wonderful ecosystems.

In April 2021 the Queensland Government's Department of Environment and Science released its Assessment Report of the project and deemed the mine 'not suitable to proceed' because of 'unacceptable risks' to the Great Barrier Reef and surrounding environments, including a Dugong Sanctuary and Queensland's largest declared Fish Habitat Area.

The Queensland Government's EIS assessment report highlighted that despite water mitigation measures proposed by CQC, releases of mine affected water would still not be able to meet the water quality targets set out by the Queensland and Australian Governments in the Reef 2050 Plan. Meeting these targets is important to preserve the Reef's Outstanding Universal Values as a World Heritage Property. As the Great Barrier Reef comes under increasing pressure from the impacts of climate change, the Queensland and Australian Governments have a responsibility to ensure they do everything they can to protect it.

In its Environmental Impact Statement, CQC did not undertake assessments of tides and currents and surveys of the marine migratory species of Broad Sound. Peer reviewed modelling led by UCLouvain, presented in this report, has filled this gap and found that fine sediments originating from the mine could be transported up the western side of Broad Sound to the dugong stronghold and associated seagrass meadows near Clairview, as well as to the flatback turtle nesting sites at Avoid Island. This is due to the strong currents and tides present in Broad Sound (Figure 1).

Such silt and sediment in the water reduces the amount of sunlight available to seagrasses and corals. This impacts their ability to grow and can smother and kill them. Seagrass meadows, coral condition, species diversity and certain reef fish have been shown to decline following large river discharge events, likely linked to reductions in water clarity.

It is also important to understand the risks of any potential damage to seagrasses, salt marshes and mangroves in and around Broad Sound in the context of blue carbon as an emissions reduction and climate change mitigation

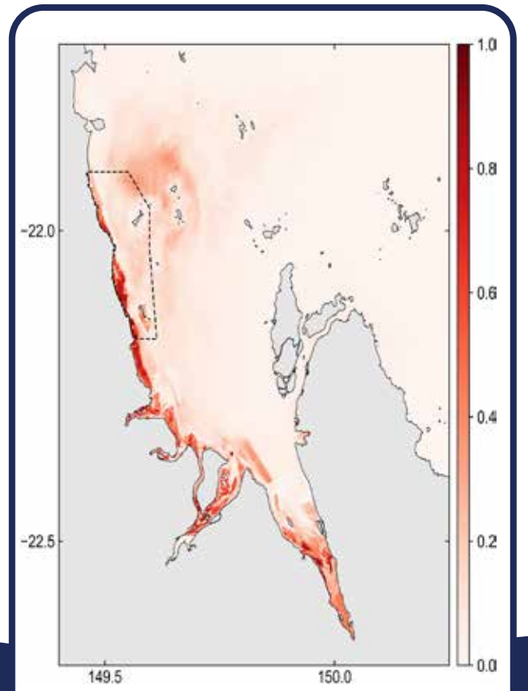
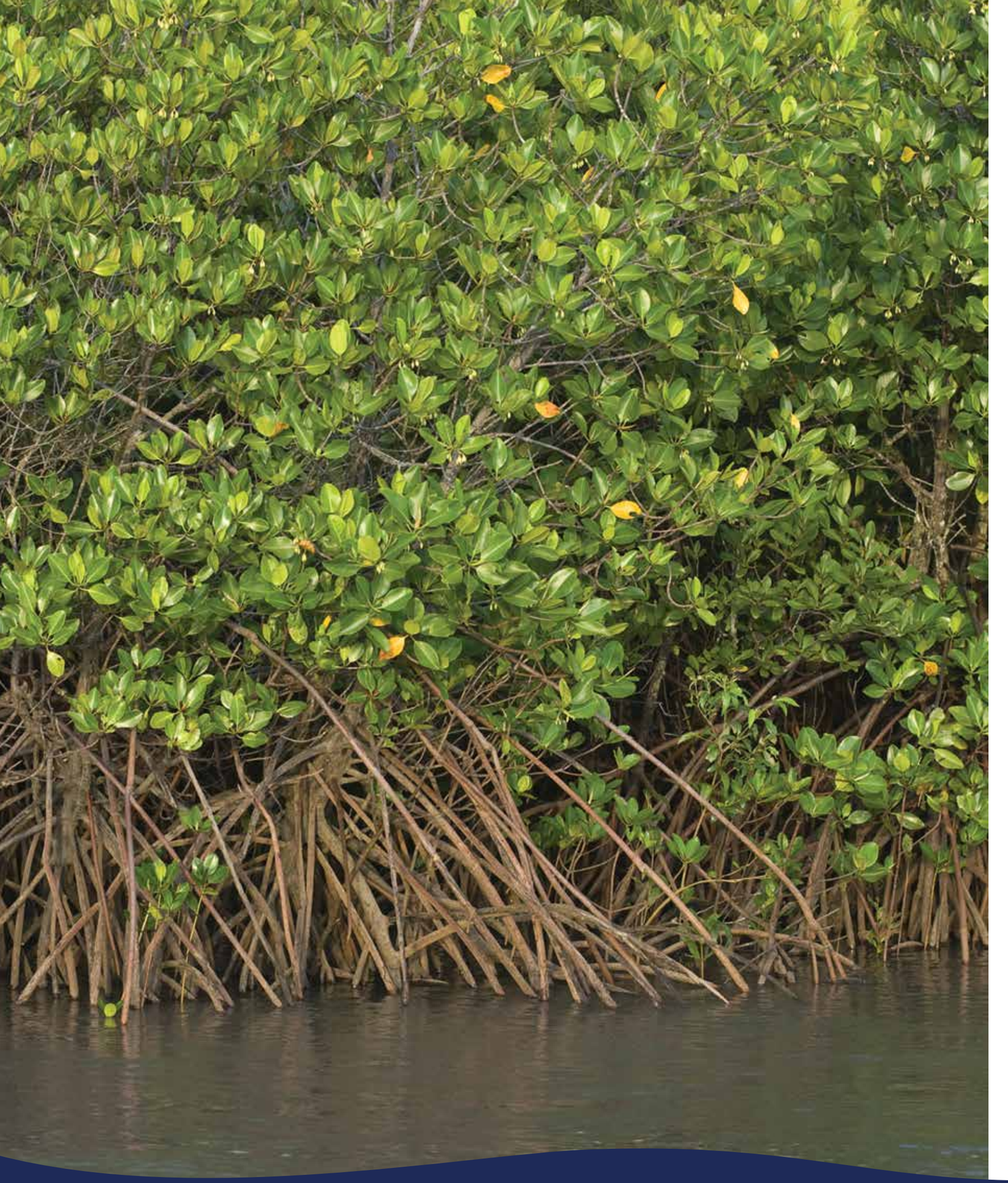


Figure 1: Risk map of seagrass exposure to sediments, as per UCLouvain report. The dugong sanctuary is delimited with the dashed line.[1]

1 Saint-Amand et. al (2022) Quantifying the environmental impact of a major coal mine project on the adjacent Great Barrier Reef ecosystems https://doi.org/10.1016/j.marpolbul.2022.113656

technique. Blue carbon ecosystems capture and store carbon for long periods of time, however when blue carbon ecosystems are disturbed there is the potential that the stored carbon can be released back into the atmosphere. A development like this proposed mine would not only contribute to greenhouse gas emissions through the burning of coal, but could impact the very habitats we should be protecting and restoring to help tackle climate change.

Based on all the evidence, approving this mine would be risky and likely lead to both direct and indirect impacts on the Reef. Decision makers must consider the impacts on marine species, marine habitats and local communities, as well as the industries in Queensland like tourism and fishing that rely on a healthy Reef. Rejecting this coal mine would show the world that the new Australian Government is serious about its intention to protect the Reef, tackle climate change and improve water quality.



Introduction

Scientists and community members have deep concerns about the impacts of the proposed CQC project on the Great Barrier Reef World Heritage Area, in particular the Broad Sound which is an important area rich in marine life. With a federal government decision overdue on the CQC project, the Australian Marine Conservation Society (AMCS) has undertaken a review of the marine wildlife of the Broad Sound area that could be threatened by this development. This report communicates the results of computer modelling of the movement of sediments and pollutants within Broad Sound, a potential impact which is yet to be fully understood in assessing this project.

Broad Sound is a large bay located in the southern Great Barrier Reef World Heritage Area, approximately 125km south-east of Mackay. The head of the Bay has the greatest tidal range on Australia's east coast at around nine metres. Broad Sound contains around 48 islands and the coastline is characterised by mudflats exposed at low tide. The Bay is fringed in areas by mangroves and saltmarshes. Its southern end has been classed by BirdLife International as an 'Important Bird Area'.[2] It is also on the Directory of Important Wetlands in Australia.[3] Broad Sound has also been declared by the Queensland government as the state's largest Fish Habitat Area[4] with barramundi, bream, mangrove jack, sea mullet and mud crabs among the species found there. Other marine wildlife seen in or close to Broad Sound include flatback, loggerhead and green turtles, dugongs, humpback whales, snubfin and humpback dolphins and sawfish.

The CQC Project is proposed for an area within the Styx Basin that discharges to Broad Sound via the Styx River. Tooloombah Creek is located to the west of the CQC site and Deep Creek is on the eastern boundary. The creeks join together 2km downstream of the project site, becoming the Styx River. If approved and built, the open cut mine will produce up to 10 million tonnes per year of coal for around 18 years, creating 400 million tonnes of carbon pollution. In April 2021, CQC was assessed as 'not suitable to proceed' by the Queensland Department of Environment and Science[5]. This was preceded by an assessment of the proposal by the Independent Expert Scientific Committee on Coal Seam Gas and Large Mining Development (IESC), which warned it could not 'envisage any feasible mitigation measures, including offsets, that could safeguard irreplaceable and internationally significant ecological assets'.[6]

Former Federal Environment Minister Sussan Ley was due to make a decision on the mine within 30 business days, however she neglected to make a decision before the 2022 Federal Election. Consequently, the decision to approve or reject the mine under the Environmental Protection and Biodiversity Conservation Act is expected from Federal Environment Minister Tanya Plibersek.

2 BirdLife International (2021) Important Bird Areas factsheet: Broad Sound. http://datazone.birdlife.org/site/factsheet/broad-sound-iba-australia
3 Department of Environment and Science, Queensland (2013) Broad Sound DIWA nationally important wetland — facts and maps. https://wetlandinfo.des.qld.gov.au/wetlands/facts-maps/diwa-wetland-broad-sound/
4 Queensland Government, Department of Environment and Science. https://parks.des.qld.gov.au/management/managed-areas/fha/area-plans/broadsound
5 Department of Environment and Science, Media Release. https://www.des.qld.gov.au/our-department/news-media/mediareleases/2021/queensland-central-coal-project
6 Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) (2020) Advice to decision maker on coal mining project: Central Queensland Coal Project. https://iesc.environment.gov.au/system/files/iesc-advice-central-queensland-2020-118.pdf

Marine-related concerns raised in reports

In the IESC assessment, concerns were raised about the discharge of mine-affected water into Broad Sound and the Great Barrier Reef World Heritage Area (GBRWHA), causing 'significant and irreversible damage to internationally valued estuarine and near-shore ecosystems'.[7] They also identified that mining activity would lead to the disturbance of sodic soils, which are prone to erosion. Weather events could lead to increased sediment loads in local waterways flowing into the GBRWHA. In line with the Reef 2050 Plan, the Australian and Queensland Governments are implementing measures to decrease sediment loads flowing from Reef catchments because of the damage they can do to key inshore Reef habitats like seagrass meadows and corals.

The Department of Environment and Science's Assessment Report[8], released on April 28 2021, said the CQC project should not proceed because of unacceptable impacts on the Reef, stating the project presented a number of significant risks because of its location, 'particularly its proximity to important environmental values, including the Great Barrier Reef Marine Park and World Heritage Area, the Broad Sound Fish Habitat Area, Tooloombah Creek, Deep Creek, the Styx River Estuary, and associated groundwater resources and groundwater dependent ecosystems'.[9] **This was a significant and historic decision, the first time the Queensland Department has recommended that a coal project should not proceed.**

In assessing the risk of sediment loss from erosive sodic soils due to mining activities, the Department's report states that 'despite the proposed water mitigation measures, there remains a risk that releases would not be able to meet the water quality targets as per the Reef 2050 Plan'.[10] The project is proposed to be located on a floodplain subject to large flood events and the assessment report states that over time, 'and with successive floods there is a high risk that dissolved, and sediment-bound contaminants from the mine may move downstream to the nearby Styx River and to the GBRWHA'.[11]

No surveys of marine migratory species in Broad Sound were conducted by the proponent for the project[12] and the tidal regime of Broad Sound was not assessed or quantified.[13] The proponent's Environmental Impact Statement (EIS) stated there would be no impacts (direct or indirect) to the coastal area but did recognise there would be potential indirect impacts on coastal environmental values from controlled and uncontrolled water releases from the mine site and associated potential reduction in downstream water quality and introduction of contaminants.

The proponent also only committed to monitoring mangrove areas in its EIS, with no clear indications of what management measures would be taken if the monitoring indicated adverse impacts on water quality.[14] There were no monitoring sites proposed for Broad Sound.[15]

This report has consulted with scientists working in and around the Broad Sound area to describe the marine values of Broad Sound that could be threatened by the CQC project. There is a relative lack of research and data on the marine values of the Broad Sound compared with other areas in the GBRWHA, and it would benefit from separate funding for projects which further examine the marine values of this unique and relatively undisturbed region.

7 Ibid, p. 2
8 Department of Environment and Science, Queensland (2021) Environmental Impact Statement (EIS) assessment report under the Environmental Protection Act 1994 Central Queensland Coal. https://www.qld.gov.au/__data/assets/pdf_file/0030/163875/central-queensland-coal-eis-assessment-report.pdf
9 Ibid p. 156.
10 Ibid p. 36.
11 Ibid p. 47.
12 Ibid p. 138.
13 Ibid p. 106.
14 Ibid p. 73.
15 Ibid.

Broad Sound Fish Habitat Area

Broad Sound is Queensland's largest declared Fish Habitat Area, providing important nursery grounds and habitat for a variety of fish and invertebrates. The region supports fishing opportunities for Traditional Owners and recreational fishers as well as a variety of commercial fisheries including trawl, line, net and crab fisheries. Declared Fish Habitat Areas (FHAs) are protected from physical disturbance associated with coastal development while still allowing fishing. There are 72 declared FHAs along the Queensland coast and they are an important part of the Queensland government's strategy for sustaining fisheries.

Critical habitats for juvenile barramundi, sea mullet, mud crab and penaeid prawns are found in the Broad Sound Fish Habitat Area[16]. The area is also home to a number of bird species, including the great knot[17] (critically endangered EPBC) and the Yellow Chat (critically endangered EPBC)[18].

A large portion of Broad Sound is also protected as a green 'no take' zone within the Great Barrier Reef Marine Park, meaning fishing is not allowed without a permit.[19] No take areas are areas set aside for their high biological diversity and have been found to protect spawning areas and nursery grounds, minimise damage to important habitats, provide refuge to protected species, increase the abundance of fish and build the resilience of the Reef against threats like climate change and water pollution.[20]

Figure 2: Broad Sound Fish Habitat (light check pattern) overlaid with Great Barrier Reef Marine Park no-take zone (green) and Dugong Conservation Park Zone (yellow).

16 Department of Environment and Science, Queensland (2013) Broad Sound fish habitat area — facts and maps. https://wetlandinfo.des.qld.gov.au/wetlands/ecology/components/fauna/birds/shore-bird/migratory-qld/repulse-shoalwater.html
17 Ibid.
18 Houston, W. and Black, R. (2013) Distribution and habitat of the critically endangered Capricorn Yellow Chat Epthianura crocea macgregori. Pacific Conservation Biology 19(1):39-54 https://www.publish.csiro.au/pc/PC130039
19 Great Barrier Reef Marine Park Authority (2016) Great Barrier Reef Marine Parks Zoning MAP 14 - Shoalwater Bay. https://elibrary.gbrmpa.gov.au/jspui/bitstream/11017/612/14/Map14-EditionV-Shoalwater-Bay.pdf
20 Great Barrier Reef Marine Park Authority (2021) What zoning is. https://www.gbrmpa.gov.au/access-and-use/zoning/about-zoning

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Tides and currents

The proponent's EIS considered that Broad Sound's large tidal range would adequately dilute any runoff from the mine and not result in any significant impact on Broad Sound and its values. However, the tides and currents of Broad Sound were not assessed by CQC.[21]

In contrast, the Queensland Government's assessment report stated it was 'likely that the proposed development would lead to indirect impacts on the GBRWHA from the release of mine affected water from the mine dam. Water quality impacts from pollutants comprising mainly sediments and trace heavy metals are likely to be transported downstream via the Styx River to the GBRWHA. Flood events may also transport these pollutants via flood plumes to the mid-shelf and outer reef'.[22]

Heavy metals including aluminium, lead and zinc, have been identified as contaminants of emerging concern (CECs) in the Great Barrier Reef. CECs have been detected in the marine ecosystems of the Reef and while they occur naturally in small concentrations found in rock and soils, concentrations can be worsened by human activities. Metals enter the environment from erosion and surface water run-off to nearby waterways, creeks and rivers. Many metals bind to sediments and accumulate in waterways. Marine organisms accumulate these metals from their surrounding environment and can become toxic to organisms above certain thresholds. Sources such as agriculture and mining runoff all contribute to elevated concentrations of metals in receiving waters.[23]

The Great Barrier Reef Marine Park Authority (GBRMPA) stated the mine could present a high risk of contamination to the Broad Sound area.[24] GBRMPA said the project was likely to result in major, possibly irreversible, impacts on the marine park. The Federal Department of Agriculture, Water and the Environment highlighted that

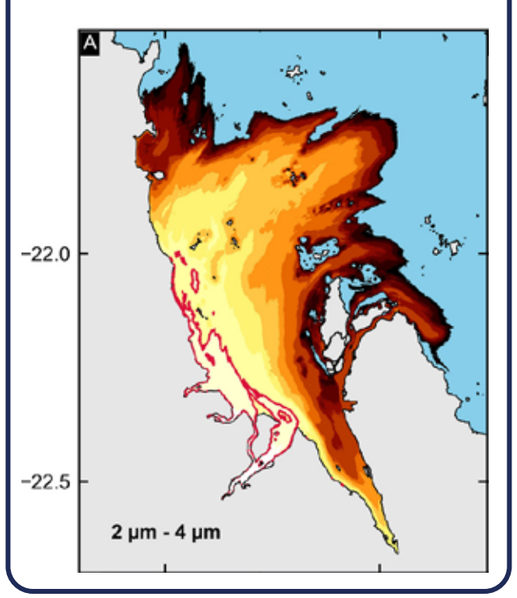


Figure 3: Footprints of sediment dispersal for 2-4 um particles, as per UCLouvain report. Colour gradient shows arrival time in weeks, where white is 1 week and black is 12 weeks.[25]

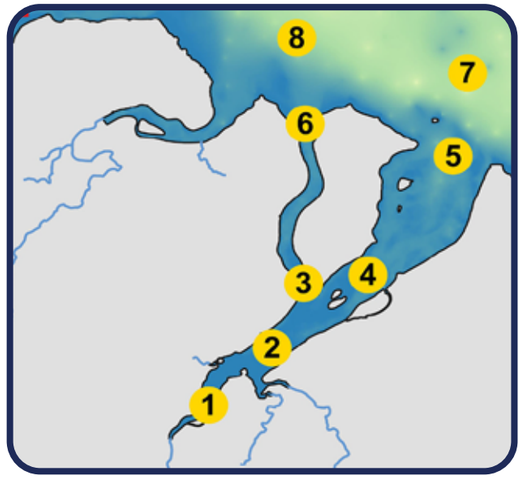
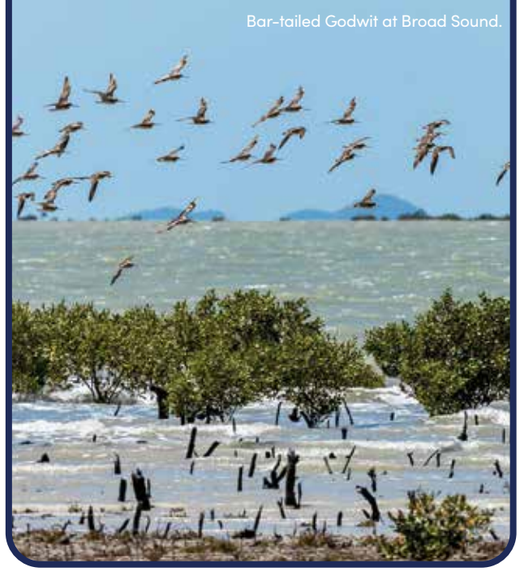


Figure 4: Close-up view on the Styx River mouth with its main tributaries, as per UCLouvain report. The eight yellow circled numbers correspond to the particle release sites.[25]

uncontrolled releases during high rainfall events can result in mangrove dieback, fish kills and sedimentation of sensitive environments. The release of mine affected water from mines in flood events had been recorded hundreds of kilometres downstream from their source in the Fitzroy River estuary.[26] The assessment report noted that the proposed dams for the CQC project are only 10kms from the GBRWHA.

21 EIS assessment report, p. 106.
22 EIS assessment report, p. 108.
23 Frederieke J. Kroon et. al (2019). Sources, presence and potential effects of contaminants of emerging concern in the marine environments of the Great Barrier Reef and Torres Strait, Australia https://doi.org/10.1016/j.scitotenv.2019.135140
24 Ibid p. 109
25 Saint-Amand et. al (2022) Quantifying the environmental impact of a major coal mine project on the adjacent Great Barrier Reef ecosystems https://doi.org/10.1016/j.marpolbul.2022.113656
26 Ibid.


Bar-tailed Godwit at Broad Sound.

How pollutants and silt may spread within Broad Sound

In new research, recently published in the scientific journal Marine Pollution Bulletin[27], the dispersal of different sediment types was simulated, using the SLIM model (Figure 3).[28] SLIM is a high resolution model that can simulate flows from river to coastal oceans. It also has the ability to simulate the dispersal of pollutants and sediments. This model has been used around the world to better understand pollution transport and tidal flows in Western Europe[29], China[30] and the Great Barrier Reef.[31]

The researchers ran the model for the Broad Sound area to simulate ocean circulation for three months, from 1 January to 1 April 2021. The model did not include average annual river discharge due to the lack of publicly available data and is therefore considered a conservative estimate.

The simulation released a wide range of particle diameters, ranging from 1 to 1000µm, covering sediment sizes from fine clay to coarse sand, which was released from eight areas - four inside and four outside the Styx River. It was assumed by the scientists that the release sites corresponded to the different strengths of river discharge events.

The simulation showed that within a few weeks of being released, sediments finer than 32µm could reach dense seagrass meadows and the dugong sanctuary at Clairview, and sea turtle nesting beaches at Avoid Island to the north. Fine sediments can smother seagrass and reduce food availability for dugongs and green turtles.

On average, the scientists found that 96% of very fine silts (2-4 µm in size) made their way to the dugong sanctuary within a few weeks of release, whether they were released from positions inside

or outside the Styx River. For the fine silts that were released in the simulation (4-8µm), 92% of the total released made it up to the sanctuary within two to three weeks. For medium silts (8-16µm) 73 % reached the sanctuary; 36% of coarse silts (16-32µm) and 3% of very coarse silts (32-64µm).

When only considering the particles released from the four sites located outside the river mouth (and so roughly equating to a flooding event), those proportions slightly increase in some cases.

27 Saint-Amand et. al (2022) Quantifying the environmental impact of a major coal mine project on the adjacent Great Barrier Reef ecosystems https://doi.org/10.1016/j.marpolbul.2022.113656
28 Hanert, E. (2021). SLIM: a multi-scale model of the land-sea continuum. https://www.slim-ocean.be/
29 Naithani, J., de Brye, B., Buyze, E., Vyverman, W., Legat, V., & Deleersnijder, E. (2016). An ecological model for the Scheldt estuary and tidal rivers ecosystem: spatial and temporal variability of plankton. Hydrobiologia, 775(1), 51–67. https://doi.org/10.1007/s10750-016-2710-1.
30 Li, Y., Wolanski, E., Dai, Z., Lambrechts, J., Tang, C., & Zhang, H. (2018). Trapping of plastics in semi-enclosed seas: Insights from the Bohai Sea, China. Marine Pollution Bulletin, 137, 509–517. https://doi.org/10.1016/j.marpolbul.2018.10.038
31 Grech, A., Hanert, E., McKenzie, L., Rasheed, M., Thomas, C., Tol, S., Wang, M., Waycott, M., Wolter, J., & Coles, R. (2018). Predicting the cumulative effect of multiple disturbances on seagrass connectivity. Global Change Biology, 24(7), 3093–3104. https://doi.org/10.1111/gcb.14127

The modelling suggested that coarse sand sediments have more localised dynamics and would tend to accumulate in the Styx River and are unlikely to reach the above-mentioned zones of ecological interest.

The model showed a particle plume extending more than 35km away north from the river mouth into Broad Sound after only two weeks. The study found that the strong tides and currents of Broad Sound did not quickly disperse the sediments released by this project, but instead may concentrate them in these valuable ecosystems. With time and funding this model should be run to mimic a series of river discharge events, similar to what you can expect in any given year.

The authors, led by Antoine Saint-Amand from UCLouvain, conclude in the paper that if the coal mine was to go ahead, 'it could have far reaching impacts on the GBRWHA and its iconic marine species'.

The model did not assess impacts from water stratification, however freshwater river plumes can float on top of denser salt water and therefore some dissolved particles and fine grained sediments may travel further from the source in significant flooding events.

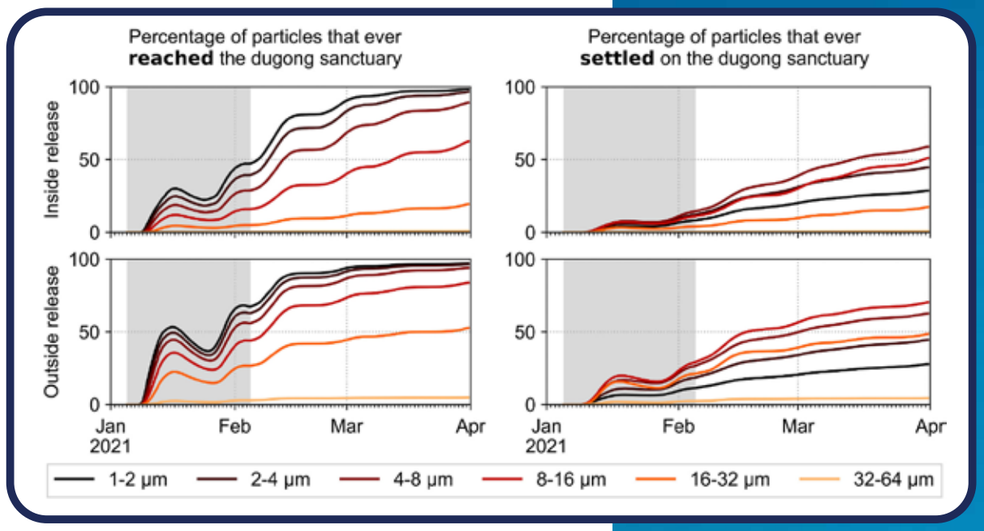
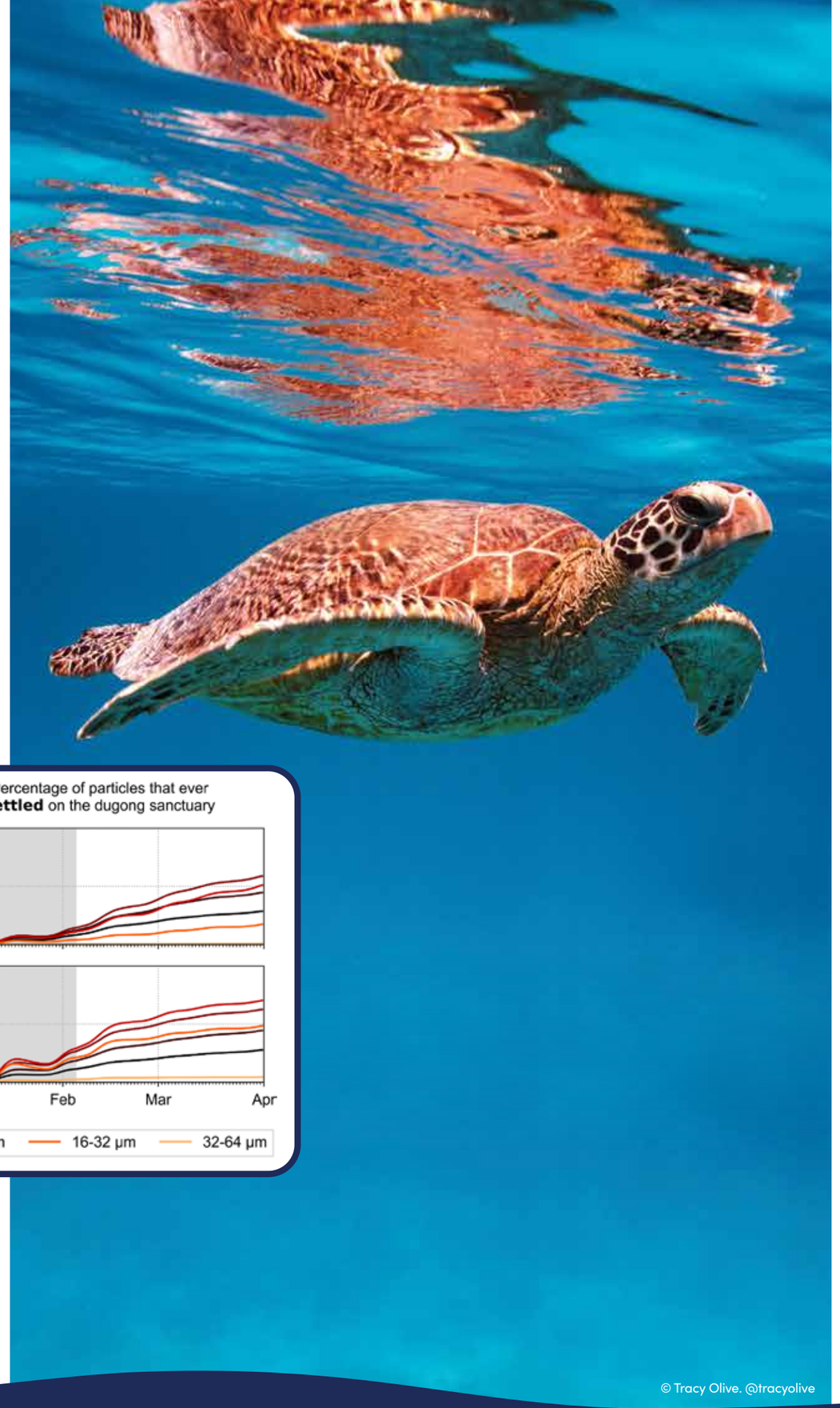


Figure 5: Model of the evolution of the percentage of particles that reach (top) and settle (bottom) on the Clairview dugong sanctuary, as per UCLouvain report[32]. Data from modelled particle released within the Styx River mouth, with shaded area representing the period of particle release. Note the vast majority of smaller sediments reach the sanctuary, and very significant percentages end up settling on the sanctuary.

32 Saint-Amand et. al (2022) Quantifying the environmental impact of a major coal mine project on the adjacent Great Barrier Reef ecosystems https://doi.org/10.1016/j.marpolbul.2022.113656



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What's at risk?

Turtles

Two of the largest and most significant flatback turtle (vulnerable, endemic to Australia) rookeries in eastern Australia are found at two of the islands in Broad Sound – Wild Duck and Avoid – located around 75km north of the project. Female turtles are known to return to these nesting beaches every three years and spend a significant inter-nesting period in the region.

Flatback, green (vulnerable EPBC) and loggerhead (endangered EPBC) turtles have all been recorded foraging in Broad Sound[33] The species are both carnivorous (flatback and loggerhead feed on jellyfish, soft cucumbers, sea urchins) and herbivorous (greens feed mostly on seagrasses and algae).

Currently Broad Sound is a good habitat for the turtles because there are lower pressures from fishing, coastal developments and water quality compared to other inshore areas in the Reef World Heritage Area[34] Avoid and Wild Duck Islands are optimum nesting sites because of minimal disturbances and the low light pollution issues in Broad Sound.[35]

There is evidence turtle hatchlings are drawn to artificial lights in their journey from nest to the sea, and when they are swimming in the ocean.[36] This interferes with their ability to reach deep water where they are safer from predators. It is not known what light pollution a large open cut mine would bring to the Broad Sound region.

Turtles could be indirectly impacted by any water quality issues emanating from the proposed mine. Seagrass and mangroves are key foraging areas for all the turtle species found in Broad Sound,[37] so any impact on these habitats due to poor water quality could cause problems.

The Great Barrier Reef Foundation is restoring and protecting the turtle nesting site at Avoid Island, making it the latest addition to its climate change refuge network[38] The island will become a hub of education and citizen science, as well as conservation efforts for flatback turtles, 80 bird species, and a diverse range

33 Limpus, C. et al. (2001) Survey of marine turtle nesting distribution in Queensland, 2000 and 2001: Broad Sound to Repulse Bay, Central Queensland https://mackayturtles.org.au/wp-content/uploads/2020/08/Survey-of-marine-turtle-nesting-2001-MTW-and-QPWS.pdf
34 Hamann, M. James Cook University. Pers comm 19 April 2021.
35 Ibid.
36 Chilton, G (2016) Light pollution is confusing baby sea turtles. https://www.australiangeographic.com.au/news/2016/05/light-pollution-is-confusing-baby-sea-turtles/
37 Commonwealth of Australia (2017) Recovery Plan for Marine Turtles in Australia https://www.environment.gov.au/system/files/resources/46eedcfc-204b-43de-99c5-4d6f6e72704f/files/recovery-plan-marine-turtles-2017.pdf
38 Great Barrier Reef Foundation (2021) Vital turtle nesting site avoid island chosen as climate change refuge. https://www.barrierreef.org/news/media-release/vital-turtle-nesting-site-avoid-island-chosen-as- climate-change-refuge


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of marine life. The project is part of the Reef Islands Initiative, supported by the Queensland and Australian governments.

The Queensland government also recently announced it had spent $1.2 million acquiring Wild Duck island's tourism lease so that land could be protected for the conservation of flatback turtles[39] In partnership with the GBRMPA, the government will rehabilitate degraded areas of the island and remove a derelict tourism resort.

Dugongs

In Queensland and nationally under the EPBC Act, the gentle and iconic dugong is listed as vulnerable to extinction. Australia is the largest and most important refuge for this species.

They are a long-lived but slow to breed animal completely dependent on seagrass for their survival. They are at risk from human impacts like habitat degradation and loss, climate change, poor water quality, coastal development and drowning in commercial gillnets[40] Populations take a long time to recover if depleted[41]

Dugong strongholds are known in two areas near the proposed mine. A Dugong Protection Area exists between Camilla Creek and Clairview Bluff, approximately 55km north of the project and another in Shoalwater Bay, approximately 100km from the proposal. The Queensland government's assessment report highlighted input on the proponent's EIS from the GBRMPA that noted studies carried out between 2016 and 2020 found dugong traversed Broad Sound when travelling between these two sites[42].

The status of dugong populations is a good indicator of ecosystem health and they play an important ecological role[43] The southern Great Barrier Reef population which is found along the urbanised coast of Queensland between south of Cooktown to the southern Great Barrier Reef, is the smallest population in Australia, and thought to be declining.

Water quality management in the Great Barrier Reef World Heritage Area is an essential component of dugong conservation in the region, along with the management of other threats like gillnet fishing[44]. This is because poor water quality can impact seagrass, as well as directly impact dugong health[45]

39 Scanlon, M (2020) Wild Duck Island to protect vulnerable nesting turtles. https://statements.qld.gov.au/statements/92167
40 Dugong and Seagrass Conservation Project (2021) About Dugong and Seagrass. https://www.dugongconservation.org/about/about-dugongs-seagrass/
41 Ibid.
42 Department of Environment and Science, Queensland (2021) Environmental Impact Statement (EIS) assessment report under the Environmental Protection Act 1994 Central Queensland Coal. https://www.qld.gov.au/__data/assets/pdf_file/0030/163875/central-queensland-coal-eis-assessment-repo
43 Great Barrier Reef Marine Park Authority (2021) Dugong https://www.gbrmpa.gov.au/the-reef/animals/dugong
44 Sobtzick, S, Cleguer, C, Hagihara, R and Marsh, H. (2017) Distribution and abundance of dugong and large marine turtles in Moreton Bay, Hervey Bay and the southern Great Barrier Reef. https://www.researchgate.net/publication/318124280_Distribution_and_abundance_of_dugong_and_large_marine_turtles_in_Moreton_Bay_Hervey_Bay_and_the_southern_Great_Barrier_Reef
45 Hodgson, A. Murdoch University. Pers comms 20 May 2021.

As indicated, the above modelling predicts fine silt sediments and contaminants from the mine could reach as high as the Dugong Protection Area in Clairview, putting the habitat of these gentle creatures at risk.

Inshore dolphins

Australian humpback dolphins and Australian snubfin dolphins (both near threatened) have been recorded in Broad Sound but their population numbers are unknown.

Transect surveys were carried out in 2013-14 covering the entire Broad Sound area, with small groups of humpback and snubfin dolphins consistently reported north of the Styx River in the Stanage Bay channel.[46] More in depth research is required to understand their population and use of Broad Sound.

Sawfish

The sawfish sightings submission campaign by Sharks And Rays Australia does not have any confirmed sightings of sawfish in Broad Sound[47]. However sawfish used to be present historically both north and south of Broad Sound.[48] Additionally, Queensland sawfish expert Dr Barbara Wueringer considers the region to be potential prime sawfish habitat.[49] Sawfish likely


Snubfin dolphin. © Christy Harrington, Murdoch Univesity.

to be found in this area of the Great Barrier Reef include green sawfish (vulnerable EPBC) and narrow sawfish (migratory EPBC). In late 2020, a mutilated dead green sawfish over 2 metres long was found washed up at Belmunda Beach, just 120 kilometres north of Broad Sound.[50]

Sawfish used to be present along the entire Reef coastline and are still found in pockets. Dr Wueringer said the lack of information on the distribution of sawfishes made informed management of their habitats and populations difficult.

46 Cagnazzi, D (2010) Conservation status of Australian snubfin dolphin, Orcaella heinsohni, and Indo-Pacific humpback dolphin, Sousa chinensis, in the Capricorn Coast, Central Queensland, Australia. https://researchportal.scu.edu.au/esploro/outputs/doctoral/Conservation-status-of-Australian-snubfin-dolphin-Orcaella-heinsohni-and-Indo-Pacific-humpback-dolphin-Sousa-chinensis-in-the-Capricorn-Coast-Central-Queensland-Australia/991012851500002368
47 Wueringer, B E. Sharks and Rays Australia, unpublished data ongoing since 2019.
48 Wueringer, B E. (2017) Sawfish captures in the Queensland Shark Control Program, 1962 to 2016. Endangered Species Research 34:293-300.
49 Wueringer, B E. Pers comms 12 May 2021.
50 Parsons, A. (2020) Mutilated sawfish on North Queensland beach sparks social media outrage, investigation. https://www.abc.net.au/news/2020-11-17/sawfish-mutilated-belmunda-beach-mackay-fisheries/12892370


Juvenile green sawfish. Photo provided by Sharks And Rays Australia, received as part of their public sawfish sightings campaign. © www.cytags.com

Seagrass and mangroves

There are limited seagrass meadows found in Broad Sound, according to the eAtlas map.[51] There are seagrass meadows reported to the north of the Styx River near Clairview (in the Dugong Protection Area), 60km north of the CQC mine site and around the peninsula to the south east in Shoalwater Bay.

Mangrove forests and thickets occur in the Styx River and around Broad Sound with most found on the eastern side of the bay.[52] Surveys of marine plants like mangrove species were not adequately taken by the proponents in its EIS, despite Broad Sound being considered one of the five main centres within the GBR for salt marsh and mangrove communities.[53]

Seagrasses are a critical food source for dugongs and green turtles. Seagrass and mangroves are considered by scientists to be a vital underwater ecosystem, supporting fisheries as nurseries and habitat for many commercially important species of fish and prawns. They are also vital habitats for fish species that are part of marine food chains that support commercially fished species. Mangroves can help to trap sediments and reduce storm surge impacts.

However, seagrasses and mangroves are highly vulnerable to human pressures, and are especially susceptible to coastal development and urban, industrial and agricultural runoff. Sediment stirred in the water by weather events like cyclones, or large flood plumes, can cut out vital sunlight, resulting in seagrass die offs that can have a devastating impact[54] on the many species they support, including dugongs. Seagrass can recover from these die offs, but it can take two to four years[55].

Seagrasses are also known as an important carbon store. Along with saltmarshes and mangroves, seagrasses can absorb and store carbon[56] 30 times faster than terrestrial forests, storing most of the carbon in their soil, these ecosystems are known as blue carbon. The Federal Government announced they will be investing in projects that aim to restore and protect coastal blue carbon ecosystems including seagrasses, salt marshes and mangroves, as a way of 'drawing down' carbon from the atmosphere.[57] A recent report by UNESCO found that the Great Barrier Reef, along with west coast sites in Shark Bay and Ningaloo contain 40% of the total blue carbon held in World Heritage Areas.[58]

Vegetation in coastal wetlands and blue carbon ecosystems, such as seagrasses and mangroves, have the ability to absorb some nutrients from coastal waters which may help other species like corals. With agriculture being the predominant land-use along the Great Barrier Reef coast, resulting in high nutrient loads flowing into the Great Barrier Reef, seagrass and mangroves habitats are too important to lose. Any additional pressures added by the CQC project could be disastrous for these critical ecosystems, and the fisheries industry that rely on them.

Figure 6: GBR Seagrass site surveys 1984 - 2018 (NESP TWQ 3.2.1 and NESP TWQ, JCU)

51 Australian Tropical Land and Seas, 2020, Seagrass on the Great Barrier Reef [Map] https://eatlas.org.au/map/gbr-seagrass
52 BirdLife International (2021) Important Bird Areas factsheet: Broad Sound. http://datazone.birdlife.org/site/factsheet/broad-sound-iba-australia
53 Great Barrier Reef Marine Park Authority (2006) Environmental Status: Mangroves and Saltmarshes. https://elibrary.gbrmpa.gov.au/jspui/bitstream/11017/666/1/State-of-the-Reef-Report-2006-Mangroves-and-saltmarshes.pdf p. 3.
54 Grech, A. (2018) Seagrasses in the Great Barrier Reef can bounce back with good stewardship of our coastal environments. ARC Centre of Excellence Coral Reef Studies.
55 Ibid. https://www.coralcoe.org.au/blog/seagrasses-in-the-great-barrier-reef-can-bounce-back-with-good-stewardship-of-our-coastal-environments
56 Fourqurean, J., Duarte, C., Kennedy, H. et al. Seagrass ecosystems as a globally significant carbon stock. Nature Geosci 5, 505–509 (2012). https://doi.org/10.1038/ngeo1477
57 Angus Taylor (2021) Australia announces $100 million initiative to protect our oceans. https://www.minister.industry.gov.au/ministers/taylor/media-releases/australia-announces-100-million-initiative-protect-our-oceans
58 UNESCO Marine World Heritage (2021) Custodians of the globe's blue carbon assets. https://whc.unesco.org/en/blue-carbon-report/

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Climate impacts

In addition to direct impacts on Reef ecosystems, mining and burning coal from the CQC mine will increase fossil fuel emissions and exacerbate climate change, which is widely understood as an existential threat to the survival of the Great Barrier Reef.

The mine is expected to operate for approximately 20 years producing up to 10 million tonnes of coal per annum.[59] The CQC project will contribute to global warming, which is causing marine heatwaves, coral bleaching, ocean acidification, and more frequent and intense weather events like cyclones and floods.

GBRMPA highlighted that the EIS had not addressed the cumulative impact of climate change on the environment when assessing ecosystem resilience.[60] From seagrasses and dugongs to turtle breeding and fish abundance, climate-fuelled floods and extreme weather events will exacerbate the adverse impacts from direct pollution upstream.

As GBRMPA notes in their climate change position paper, "only the strongest and fastest possible actions to decrease global greenhouse gas emissions will reduce the risks and limit the impacts of climate change on the Reef".[61] The International Energy Agency stated that if the world is to reach net zero emissions by 2050, and for a chance at limiting warming to 1.5°C 'no new coal mines or coal mine extensions are required'.[62]

UNESCO's State of Conservation Report to the World Heritage Committee made it clear that limiting global warming to 1.5°C is a critical threshold for coral reefs. In 2018, the Intergovernmental Panel on Climate Change predicted that at 1.5˚C of warming, coral reefs would decline by a further 70%–90%. At 2˚C of warming, that figure rises to 99%.

In 2021, UNESCO recommended inscribing the Great Barrier Reef on the list of World Heritage Sites 'In Danger' in response to climate change, which has resulted in four mass coral bleaching events since 2016. The World Heritage Committee will consider this decision at the next World Heritage Committee Meeting.

The approval of this mine would contravene the World Heritage Committee's Decision (44 COM 7B.90) that urges Australia to enact "accelerated action at all possible levels [which] is required to address the threat from climate change, in accordance with the Paris Agreement on Climate Change (2015)".

59 EIS Assessment Report p. 2.
60 EIS Assessment Report p. 144.
61 GBRMPA (n31), p. 1.
62 International Energy Agency (2021) Net Zero by 2050: A Roadmap for the Global Energy Sector. https://www.iea.org/reports/net-zero-by-2050

Conclusion

This review shows there is too much at risk by allowing the Central Queensland Coal project to be built and operate so close to the Great Barrier Reef World Heritage Area.

Broad Sound and the surrounding area is rich in marine life, from protected species like the flatback turtle and the dugong to species important for commercial and recreational fishing like barramundi and mud crabs. Habitats like mangroves and seagrass provide food and refuge for many species and act as vital carbon sinks.

Computer modelling shows the potential for dissolved pollutants and fine sediments to travel north of Broad Sound and settle into sensitive ecosystems.

As the Great Barrier Reef comes under increasing pressure from the impacts of climate change, the Australian Government has a responsibility to ensure they do everything they can to protect it. In that context, approving this mine would be too risky and irresponsible. In assessing this mine, it is important decision makers consider the impacts on marine species, marine habitats and local communities, as well as the industries in Queensland like tourism and fishing that rely on a healthy Reef.

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