Australian Government

TSRA
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Committee Secretary
Senate Standing Committees on Environment and Communications
PO Box 6100
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Canberra ACT 2600

Via electronic submission

Torres Strait Regional Authority – Submission to the Senate Inquiry into the current and future impacts of climate change on fisheries and marine biodiversity

Dear Senate Committee

Thank you for the opportunity to provide a submission in relation to the current and future impacts of climate change on fisheries and marine biodiversity. We apologise for the delay in responding.

In summary, our key points are that we wish to raise with the committee are:

- The marine environment of the Torres Strait is of national and international significance and plays a critical role in supporting the culture, wellbeing and economy of the region.
- Commercial fishing is one of the main industries for employment and economic development in the Torres Strait.
- The Torres Strait region is already observing the impacts of climate change on the marine environment.

Should you wish to discuss any of the points raised in this submission, please contact Shaun Barclay, Programme Manager, Environmental Management, on or via email at

Yours sincerely

Napau Pedro Stephen AM
Chairperson

Torres Strait Regional Authority submission to the senate inquiry: The current and future impacts of climate change on fisheries and marine biodiversity.

The Torres Strait Regional Authority (TSRA) is a Commonwealth Authority which was established on 1 July 1994 under the Aboriginal and Torres Strait Islander Commission Act 1989, now known as the Aboriginal and Torres Strait Islander Act 2005 (ATSI Act). It is the leading Commonwealth representative body for Torres Strait Islander and Aboriginal people living in the Torres Strait.

The TSRA Environmental Management Programme undertakes management and monitoring of a range of key marine species and ecosystems, and works closely with the Australian Institute of Marine Science (AIMS), CSIRO and James Cook University to manage the region's marine environment. The TSRA Fisheries Programme works to enhance the region's wealth by creating and managing an economically and environmentally sustainable fishing industry and increasing employment opportunities for the Torres Strait Islander and Aboriginal people in the region.

Torres Strait context

The Torres Strait marine environment and associated ecosystems are of national and international significance and play a critical role in supporting the culture, wellbeing and economy of both the Australian and Papua New Guinea Indigenous communities of the region. The Torres Strait forms the northern extent of the Great Barrier Reef that stretches a distance of approximately 150km from Maizab Kaur (Bramble Cay) south to the northern border of the World Heritage Listed Great Barrier Reef Marine Park adjacent to the tip of the Cape York Peninsula.

The Torres Strait region covers an area of approximately 48,000km2; of which only 3% is land. The shallow sea basin contains over 300 islands and approximately 1,200 coral reefs. The region also has extensive seagrass meadows and coastal mangrove systems, which together with the reefs provide many important ecosystem services for the region's Traditional Owners, particularly subsistence and commercial fisheries. The coral reefs of the Torres Strait are undeniably of great cultural and economic importance for the Torres Strait Islanders and Aboriginal people of the region. `Torres Strait has the world's largest population of dugong, some of the most globally extensive and intact sea grass meadows, Australia's largest population of green turtles, healthy and highly diverse tropical coral reefs (1200 reefs) and extensive and diverse intact mangrove communities.

The region supports productive marine fisheries that form the backbone of the regional Indigenous economy. Key fisheries include tropical rock lobster, beche de mer, spanish mackerel, prawn, barramundi, finfish, crab and trochus. There are traditional fisheries for dugong and turtle.

To date the region's marine ecosystems have escaped many of the impacts suffered by coastal development and commercial exploitation experienced in many other marine environments. However there is growing pressure on the regions resources, particularly from development and population growth in Papua New Guinea. Climate change will almost certainly become a significant threatening process to the marine ecosystems of the region under current climate projections.

Climate change is already impacting marine species and ecosystems globally and in Australia, and these impacts are expected to increase over time (Hobday et al. 2006).

The TSRA has developed a Torres Strait Regional Climate Change Adaptation and Resilience Plan to assist in making the region more prepared for climate change impacts.

1. **Observed and projected changes in ocean temperatures, currents and chemistry associated with climate change in the Torres Strait.**

Sea surface temperatures: Sea surface temperatures in the Pacific have increased by 0.31 degrees between 1950 and 2009, with greater changes (around 0.7 degree) in coastal boundary systems (Hoegh-Guldberg et al., 2014). Tropical marine environments are projected to experience amongst the strongest warming trends (over 4 degrees) by the end of the century.

Three permanent marine monitoring stations have been installed in the Torres Strait since 2013, through a partnership between the TSRA and Australia Institute of Marine Science. These stations will enable any trends to be identified in coming years.

Sea-level rise: Analysis of tidal data from the main Torres Strait shipping channel by Mitchum et al. (2010) indicate sea-level rise in the region is around 6mm per year. This aligns with higher levels of sea-level rise in the western pacific. Sea level rise measured near Papua New Guinea by satellite altimeters indicate an average annual increase of 7mm since 1993 (Pacific Climate Change Science Program, Vol 2, 2011). This is approximately twice the global average rise of 3.2mm per year.

Additional tide gauges and a dedicated sea level gauge have been installed in the Torres Strait in 2013 to monitor tidal dynamics and sea-level rise.

Ocean Acidification: About 30% of the anthropogenic carbon dioxide emitted into the atmosphere over the past 200 years has been absorbed by the oceans and this has led to a 0.1 unit change in the ocean's surface water pH, which represents a 26 % increase in the concentration of hydrogen ions in seawater.

Ocean acidification lowers the temperature at which corals bleach, reducing resilience to natural variability. Ocean acidification can affect fin and shellfish fisheries, aquaculture, tourism and coastal protection.

There is very high confidence that around Australia the ocean will become more acidic. There is also high confidence that the rate of ocean acidification will be proportional to the carbon dioxide emissions.

There is no targeted ocean acidification monitoring occurring in the Torres Strait.

2. **Impacts of observed and projected changes due to climate change**

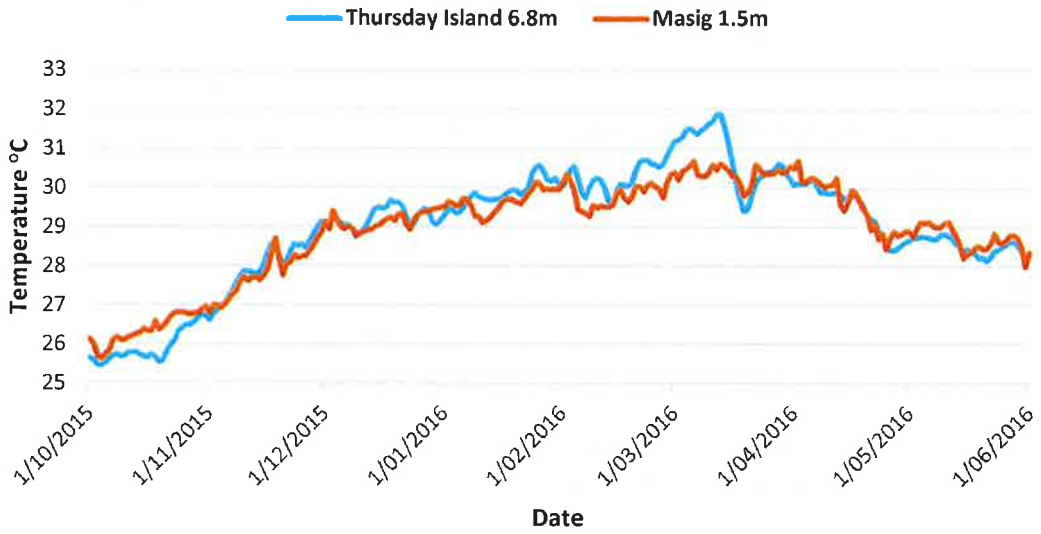
Marine biodiversity – coral reefs, seagrass, marine turtles and dugongs

Coral reefs

In comparison to the Great Barrier Reef World Heritage Area, there has been limited coral reef monitoring or research undertaken in the Torres Strait. Not much was known about the region's coral reefs until the completion of the National Environmental Research Programme Project *Monitoring the Health of Torres Strait Reefs* led by the Australian Institute of Marine Science (AIMS) (Bainbridge et al. 2015).

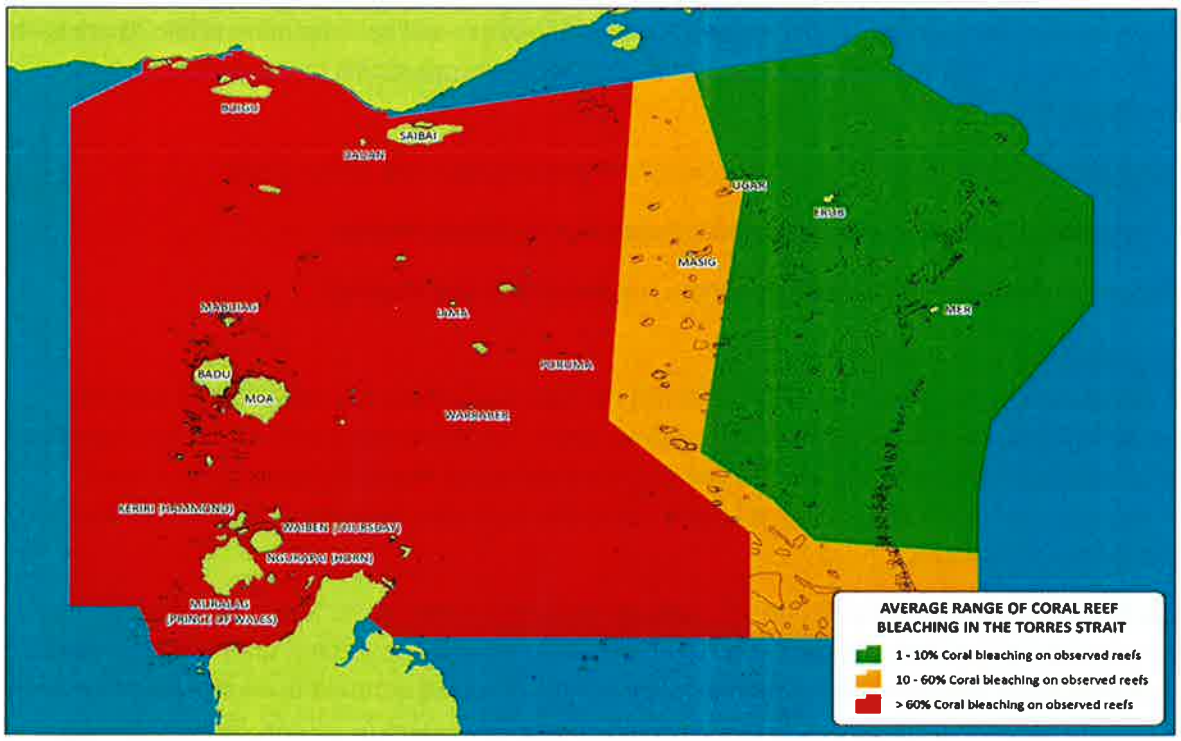
Anecdotally, coral bleaching has previously been observed in the Torres Strait, including during the mass bleaching events that occurred in 1998 and 2002; however, it was not until the 2010 mass bleaching event that coral bleaching was surveyed and reported around the coral reefs of the inner (e.g. Thursday, Horn, Prince of Wales Islands) and the near western (e.g. Moa, Badu, Mabuiag) cluster.

A major El Niño Southern Oscillation (ENSO) Event was experienced globally late in 2015, extending through into April 2016. The oceanic temperature at Thursday Island reached an average daily peak of 31.90°C on the 13th March, 2016, which was above the bleaching alert threshold of 31.4°C developed by AIMS and 0.4°C higher than the peak of 2010.



*Average daily ocean temperature at Thursday Island (at 6.8m) and Masig (at 1.5m) between 1st October 2015 and 30th May 2016 (**Source:** Australian Institute of Marine Science).*

In response to the increasing oceanic temperature and reports of coral bleaching occurring the TSRA conducted aerial surveys across the Torres Strait to identify the distribution and severity of coral bleaching.



Average range of coral bleaching in the Torres Strait during the mass bleaching event based on aerial survey outcomes in March and April, 2016.

The 2016 mass coral bleaching event is the largest on record and the most significant threat to the coral reefs of the Torres Strait. The TSRA has since established permanent coral reef monitoring sites at Mer, Erub, Ugar, Masig, Poruma and Iama to measure the relative extent of future coral bleaching events.

Seagrass

The Torres Strait is home to diverse and significant seagrass meadows, including the largest recorded single continuous seagrass meadow in Australia. The TSRA has collaborated with James Cook University to monitor and assess the status and health of the Torres Strait's seagrass ecosystems for many years. As a result there is an extensive baseline and trend analysis of the Torres Strait's seagrass ecosystems.

Projected future increases in sea temperature are likely to have negative consequences for these shallow coastal meadows, which in turn may have profound implications for local dugong, turtle and commercial fisheries species.

The TSRA has established to seagrass monitoring sites at the inhabited islands of Mabuiag, Badu, Moa, Iama, Poruma, and Mer. Any changes to the recorded baseline as a result of the increased temperatures will be identified in the future.

Marine turtles

The impacts of predicted climate change on marine turtles in the Torres Strait are difficult to isolate. The TSRA has been leading annual surveys of key index rookeries for each species of marine turtle that nest in the Torres Strait for two breeding seasons (2014-15 & 2015-16). This project aims to identify the impact of climate change on the viability of the rookeries surveyed. The TSRA only has two breeding seasons worth of data using these methods, and we anticipate that trends will be observable in coming seasons.

Commercial Fisheries

Commercial fishing is one of the main industries for employment and economic development in the Torres Strait. Key commercial species in the Torres Strait include tropical rock lobster, prawns, coral trout, Spanish mackerel and beche-de-mer. The sensitivity of these species to the potential impacts of climate change outlined in this document is broadly understood. However, there has been limited validation of these species' capacity to withstand the potential degree of change predicted for the Torres Strait in order to inform adaptive measures and management into the future.

Harvest strategies are currently being developed for most commercial fisheries in the Torres Strait. Harvest strategies outline the process for monitoring and conducting assessments of the biological and economic conditions of a fishery, and define rules that control the intensity of fishing activity according to those conditions (DAFF 2007). The development of harvest strategies for commercial fisheries in the Torres Strait should also provide mechanisms to adjust catch levels based on biological parameters affected by climate change, for example reducing total allowable catch limits in response to poor recruitment.

In addition to the sustainability concerns detailed in this document and their potential impact on species of commercial significance, climate change is also likely to have an impact on the catchability of some species. Tobin *et al.* (2010) observed significant declines in catch rates of coral trout for up to 12 months in the Queensland East Coast fishery following severe cyclones, which are predicted to become more severe with global climate change. Tropical rock lobster adults may become rare and harder to harvest in the shallower waters where most of the traditional and community fishing takes place as these animals' key adaptation strategy would be to migrate to deeper waters in response to higher sea temperatures as discussed in Welch *et al.* (2014).

The value of commercial fisheries in the Torres Strait was over $20 million in 2014/15 (Patterson *et al.* 2016). Evaluating the potential impacts of climate change on commercial species, and the identification of adaptation options, is critical to ensure the ongoing sustainability of commercial fisheries in the Torres Strait as well as the ongoing employment and economic development opportunities.

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