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SUBMISSION TO SENATE ENVIRONMENT AND COMMUNICATIONS REFERENCES COMMITTEE INQUIRY INTO ALGAL BLOOMS IN SOUTH AUSTRALIA

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This is an invited submission addressing some of the terms of reference for the *Inquiry into Algal Blooms in South Australia.* It provides some brief comments regarding two terms of reference below and makes six broad recommendations.

b). ecological, economic, cultural and social impacts of algal blooms with particular reference to:

i. tourism, commercial and recreational fishing industries,

ii. regional and coastal communities, and

iii. marine biodiversity and ecosystem health.

e). the current support and recovery arrangements for impacted industries and communities, including:

i. financial support for fishing, tourism and other impacted businesses,

ii. community resilience services, and

iii. research, monitoring and restoration efforts.

Firstly, it is important to note that the algal bloom is symptomatic of wider problems with a warming planet, as well as the long-term health of the River Murray. Although the current bloom in SA is not unique, the *Karenia* bloom is unprecedented in Australia in terms of its scale across hundreds and hundreds of kilometres of coastal waters, destruction, and forecast persistence (Biodiversity Council, 2025, Li et al. 2019). Given the difficulties to control - let alone reverse - this type of event, there is a possibility that we are witnessing a tipping point of climate change (with irreversible and long-term implications). A tipping point is where an effect has crossed a certain threshold, and from that point on it triggers a larger and more significant transformation, having an impact far wider and greater than anything that might be first predicted.

The other identified potential causal driver of the bloom is the nutrients (primarily nitrogen and phosphorus) that the 2022 flooding contributed to the ocean, which was already in a weakened state from a severe reduction of fresh flows (Colloff et al. 2024). This is reflective on the fact that the River Murray has been suffering a reduction in long-term flows for decades, and the Coorong and Lower Lakes is in poor health (Wheeler, 2024). There are also associated issues with land management across river catchments that needs addressing to effectively prevent nutrients entering rivers. This leads us to our first three key recommendations for effective long-term management of algal blooms:

Recommendation One: Recognise the importance of climate change in driving algal blooms and the need to have effective climate change policy as a country.

Recommendation Two: Recognise the importance of a healthy River Murray, with adequate river flows needed to ensure healthy marine ecosystems.

Recommendation Three: Recognise the need for integrated agricultural land, water and marine policy, with the need for best management land practices incentivised and regulated to reduce nutrient runoff into rivers.

b). Ecological, economic, cultural and social impacts of algal blooms

From an economic perspective, the destruction of the algal bloom is akin to the destruction of the capital stock of numerous unique ecosystems, with profound effects for fishing, tourism, recreation, physical and mental health and more generally the willingness of a population live close to such a compromised ecosystem (Dasgupta 2021). The following table provides an overview of the many different values attached to an algal bloom outbreak. This includes values and costs attached to the direct use of the compromised ecosystems (commercial and recreational fishing for example), but also to a lot of the non-extractive and indirect use values.

Estimates can vary, but the commercial fishing industry in SA is worth around $478million in 2023-24 (PIRSA 2025), while the recreational fishing industry was estimated at $1billion, and generating up to $10 billion in tourism value (SA Tourism Commission 2024). My team is currently conducting additional research on the value of recreational fishing in South Australia, using surveys from over 1260 fishers in SA, and our unpublished research suggests that the recreational fishing industry may have been worth about $1.73 billion in direct expenditure in 2024-25. Recreational fishers were also very willing to pay for improved seagrass habitat for improved fishing conditions, with potentially recreational fishing values up to 60% higher than just expenditure figures alone (Kandulu et al, 2025).

Other economic costs include reduced beach recreation and tourism, mental health and physical health problems, ecosystem loss, water quality degradation, disruption of marine food webs, loss of future fisheries productivity etc. There are also likely to be very large existence and cultural values placed on the loss of marine animals, given how the public is grieving over the scale of marine loss. A systematic lit review paper suggests health costs can be large from HABs, up to $14,600 per case (see Kouakou and Poder 2019). A study by Smith et al. (2019) on the economic costs of algal blooms int eh Canadian Lake Erie Basin suggested that uncontrolled blooms could cost US$5.3billion over 30 years – with tourism and non-users who value the lake's existence being the parties that suffer the largest costs, followed by property owners and recreationists. Commercial fishing and water users made up the lowest values – which is like the situation in South Australia – the costs of algal bloom are most likely very high and are highest in cost categories that are very hard for us to value and measure.

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Table I: Examples of Marine Algal Blooms Costs

Economic Value	**Examples of Marine Algal Bloom Costs** (adapted from Grafton and Wheeler 2015)
1. Direct Use Values: Values from direct human use of marine resources – includes both extractive and non-extractive values	- **Fisheries losses**: fish kills, shellfish poisoning closures, reputational damage, export bans (e.g., Japan, Chile, US Gulf Coast) – affecting both commercial and recreational. Increased shipping and port costs in bloom areas
	- **Council cleanup**: cost of removing dead marine life
	- **Tourism/Recreational losses**: beach closures, water quality warnings, hotel booking cancellations, reduced recreation
	- Property losses/Population Changes: Longterm and persistent algal blooms may lead to beachside property prices decrease, population decreases
	- **Healthcare costs**: treatment of shellfish poisoning, respiratory illness, mental health, suicide risk (fishers and affected coastal populations)
2. Indirect Use Values: Values from ecosystem services that support or protect direct uses	- **Oxygen depletion (hypoxia)** affecting fisheries productivity and biodiversity
	- **Seagrass and coral damage** reducing nursery habitats and coastal protection
	- **Disruption of marine food webs**, lowering productivity across species
	- **Water quality degradation** increasing treatment costs for coastal facilities
3. Option Values: Value of preserving marine resources for potential future uses	- **Loss of future fisheries productivity** due to long-term ecosystem degradation
	- **Potential closures of emerging aquaculture or bioprospecting sites**
	- **Risk of HAB expansion with climate change** increasing uncertainty and future costs
4. Bequest Values: Value placed on preserving marine environments for future generations	- **Degraded coastal ecosystems** reducing intergenerational access to fishing, recreation, and marine heritage
	- **Loss of marine biodiversity** impacting conservation legacies
5. Existence Values: Value people place on simply knowing a healthy marine ecosystem exists	- **Public concern over marine mammal deaths** (e.g. dolphins)
	- **Damage to iconic marine species and ecosystems** (reefs, whales, seabirds)
	- **Cultural loss** for Indigenous communities that value marine life independent of use

I think the scale of the economic costs to society of the current algal bloom (and future algal blooms) in Australia is unknown, but as the provided examples above illustrate, they are likely to be very large. This leads us to recommendation four:

> *Recommendation Four: I encourage the need to measure the scale of these losses to society in South Australia, as well as their distribution across different stakeholders or industry sectors. Without adequate interpretation and estimation, our thinking about appropriate policy responses may not be optimal.*

e). The current support and recovery arrangements for impacted industries and communities

I shall focus my comments on the current support and recovery arrangements for commercial fishing industries.

Firstly, the success of the current arrangements (fee relief, grants) in alleviating stress and staving off financial pressures is yet to be investigated. It is also unknown the extent to which fishers are /have been utilising provisions such as Farm Management Deposits (FMD) – which as primary producers – they can use to help manage financial impacts from seasonal fluctuations (which farmers often use to help cover drought periods (Zuo and Wheeler, 2025)). Greater research in this space would be beneficial, even if it is to understand how existing financial tax mechanisms could be used by fishers more in the future.

> *Recommendation Five: Investigate both how a) current business grants/fee reliefs provided have been successful in alleviating financial stress of impacted businesses and b) how much fishers in general use farm management deposits to manage seasonal fluctuations, and if not used, how this use could be increased in the future.*

The second point to note is that given climate change predictions, it is highly likely that algal blooms are here to stay. Hence, given that there is going to be increased occurrence of such blooms in the future, then any current planning for impacted commercial fishing industry should take this into account. One cannot assume that this algal bloom scenario that will not be repeated in the future, and hence, public policy should bear this in mind and seek to address long-term resilience and sustainability factors of the industry.

Given that there are significant concerns over overfishing in some commercial fishing industries in South Australia, long term policy may need to recognise this and move from subsidising current production to policy that supports exit packages and buyback of licenses, with a wider structural adjustment package. Times of crisis are often the most appropriate times to implement such policy.

> *Recommendation Six: Develop long-term policy in this space, given that this event will not be a one-off. This could include investigating the willingness of commercial fishing industries to take up potential different exit packages, which are specially designed for future sustainability and resilience of the industry.*

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