Australian Government
AUSTRALIAN INSTITUTE OF MARINE SCIENCE
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14 May 2021

Committee Secretary
Standing Committee on Agriculture and Water Resources
PO Box 6021
Parliament House
Canberra ACT 2600

Dear Committee Secretary

The Australian Institute of Marine Science (AIMS) is pleased to make a submission to the Standing Committee on Agriculture and Water Resources *inquiry into the Australian aquaculture sector.*

AIMS is Australia's tropical marine science agency, operating for almost half a century in Northern Australia. Based in Townsville, North Queensland, AIMS also has significant research facilities located in Darwin and Perth. These facilities, our world-class research aquarium (SeaSim) and our two ocean-going coastal research vessels allow AIMS to conduct innovative, world-class scientific and technological research to support sustainable growth in the use, environmental management and protection of Australia's tropical marine estate.

AIMS has a strong foundation from which to provide insights into the potential of Australia's marine aquaculture (mariculture) sector with particular regards to Northern Australia. This foundation is based on our 49 years of research in Australia's tropical north; our strategic aspiration to contribute $100 million per annum in environmental, social and economic benefit for tropical Australia by 2025; and our commitment to delivering impactful research for Indigenous and non-Indigenous Australians by forming meaningful partnerships with Traditional Owners.

In this submission, we bring to the Committee's attention three matters that we suggest be considered in any investigation into Australia's aquaculture sector:

1. the broad value of the mariculture sub-sector to the national economy, as quantified by the *AIMS Index of Marine Industry*;
2. the barriers to establishing and growing mariculture ventures in Northern Australia, despite strong community interest in sustainably developing local marine resources;
3. the emerging research into and development of coral mariculture methods, which are a crucial element of current, world-leading research efforts to help reefs resist, adapt to and recover from the increasing impacts of climate change.

The below discussion of these three matters relate to parts b) and d) of the inquiry's Terms of Reference; namely, the opportunities and barriers to the expansion of the aquaculture sector, including ability to access capital and investment, and the ability for businesses to access and commercialise new innovations to expand aquaculture.

Economic value and contribution of mariculture

Mariculture makes a significant contribution to Australia's marine industry. The 2020 *AIMS Index of Marine Industry* (the Index), a biennial economic update of Australia's marine sector

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compiled for AIMS by Deloitte Access Economics, assesses the economic output and value-add of marine based sectors of the Australian economy, including mariculture, in 2017-18. This forthcoming publication is the eighth edition in the series.

The 2020 Index shows the economic output (income) of the mariculture sub-sector in 2017-18 was approximately $1 billion, with the production of salmonid, tuna and oysters making the largest contribution.[1] The majority of this value was generated and captured by Tasmania, South Australia and New South Wales. More broadly, the sub-sector is calculated to have contributed $845 million in direct and indirect value-add to the national economy, and directly and indirectly employed a total of 5,183 full-time equivalent workers.[2] While there was a slight drop in these employment figures in the two years to 2017-18, the workforce is still more than 20 per cent larger than it was in 2013-14.[3] This economic analysis demonstrates the significant contribution the mariculture sector makes to Australia's economy. However, as also evidenced by the figures, most of this economic value is currently generated in the south of the country. There is a great – but as yet largely untapped – potential for the establishment of local mariculture industries in Northern Australia, whose communities wish to explore new economic development opportunities.

Growing mariculture in Northern Australia

Through our work with communities across Northern Australia over several decades, AIMS has learned there is a strong demand for economic development opportunities that make sustainable use of Australia's tropical marine resources. We work with these communities to provide the baseline information required to inform evidence-based decision-making on the development and management of their marine resources, including the capacity of these natural resources to support mariculture ventures. However, there are several barriers that limit the ability of these communities to establish such ventures, with the primary impediment to market entry being a paucity of baseline knowledge regarding the natural, economic and cultural values across much of Northern Australia's marine estate, which is critical to appropriately assessing risk, and measuring change.

The Traditional Owners of Northern Australia have important cultural, environmental and economic links to their sea country, built over thousands of years of continuous connection and observation. However, piecemeal efforts to understand and utilise this rich source of information, combined with limited research into the Northern Australian coastal and marine environment, constrains the ability of government, industries and communities to make strategic and operational decisions regarding the conservation and human use of, and impacts on, the marine environment. This knowledge deficit is a barrier to unlocking the economic potential of the region's marine estate; a barrier which tends to

[1] Deloitte Access Economics (2020). *AIMS Index of Marine Industry*, *December 2020* (publication forthcoming).
[2] *Ibid.*
[3] *Ibid.*; Deloitte Access Economics (2016). *AIMS Index of Marine Industry*, *December 2016*. https://www.aims.gov.au/sites/default/files/AIMS%20Index%20of%20Marine%20Industry%202016.pdf

disproportionately impact Indigenous Australians. For example, in the Northern Territory, Traditional Owners have inalienable freehold title to around 85 per cent of the coastline, including the intertidal zone (to the mean low tide mark) and native title interests in other parts of the marine environment. A lack of baseline data in this region means investors, regulators and Traditional Owners are unable to adequately assess the economic viability of business ventures.

To help address this gap in the Northern Territory, AIMS and Charles Darwin University commissioned the *NT Marine Science End User Needs Analysis*[4] to provide a foundation from which to plan for the marine research needed to support policy, regulatory, strategic and operational decisions on the Northern Territory marine environment. It found there are pressing needs relating to the engagement of Traditional Owners in the management and economic development of the marine environment. These include the need for better understanding of the opportunities and constraints on their participation in the use and management of sea country for economic benefit to their communities, and of their roles in shaping the wider social and economic life of the Northern Territory, drawing on rights and obligations to sea country and its resources.

Through our involvement in the above analysis and our work with Traditional Owners over many years, AIMS has come to recognise that greater research impact and value can be created – and new insights gained – if AIMS' science can be brought together with Indigenous knowledge, interests, capacity and capability. In doing so, AIMS has sought to work hand-in-hand with Traditional Owners to co-design research collaborations that also support their aspirations for greater capacity and empowerment in sea country monitoring, research and management. From our collaborations with our Traditional Owner partners, it is clear that there is a strong demand to build local capabilities in the collection of environmental baseline data and ongoing marine mapping and monitoring to help underpin feasibility assessments of development opportunities, including mariculture projects.

While AIMS is assisting these efforts by partnering with Traditional Owners of sea country where our resources allow, further support that enables communities to build capabilities in, and undertake, marine data collection would provide the information needed to inform improved decision-making on investments in mariculture ventures. This could help build the foundation for a mariculture industry in Northern Australia that provides economic growth, employment opportunities and career pathways for those in the north.

Mariculture helping coral reefs resist, adapt to, and recover from climate change

Over the long-term, there is a great potential for the mariculture sector to support Australia's world-leading efforts into the research and development of engineering solutions to assist coral reefs in staying healthy and resilient. The scientific evidence is clear that Australia's coral reefs are facing impacts from a number of stressors, including ocean acidification, poor water quality, and predation by Crown-of-thorns starfish – the effects of

[4] Australian Venture Consultants Pty Ltd (2018). *NT Marine Science End User Needs Analysis*. https://www.aims.gov.au/nt-end-user-needs-analysis.

which are compounded by increasing ocean temperatures as a result of climate change. Timely support for the further development of Australia's mariculture sector capabilities over the next few years could be integral to the development of coral mariculture systems that could enable the mass deployment of juvenile corals onto damaged reefs to help accelerate the growth of coral reef cover, and reef recovery from major disturbances.

AIMS is the Managing Entity for the Reef Restoration and Adaptation Program (RRAP) under the Australian Government's Reef Trust Partnership (RTP), which seeks to develop a suite of interventions to help the GBR resist, adapt to, and recover from climate change impacts. The RRAP Research & Development (R&D) Program is the world's largest effort to help a significant ecosystem survive climate change, funded by investments from the Australian Government, research partners and the philanthropic sector that could total $300 million. The 10-year R&D phase will take an integrated approach to the development, testing and deployment of science and engineering solutions to protect and restore the health of the GBR: cooling and shading the reef to help protect it from the impacts of climate change; assisting reef species to adapt to the changing environment; and supporting natural restoration of damaged and degraded reefs.

AIMS is leading the R&D program into coral mariculture focussed at developing the capability over four years to propagate up to 1 million corals per year. These corals would be produced by a range of propagation methods and with various levels of automation. Such coral seeding aims to expedite the return of coral cover to a disturbed or damaged reef – for example, following a mass coral bleaching event. Following mariculture-based propagation, the small and/or young corals would be attached to a small device, or in small fragments, be deployed from the ocean surface using a combination of diver, semi- and fully-automated methods on barges and small vessels. These approaches, if successfully developed, would amalgamate current aquaculture and automation technology to facilitate seeding of corals onto reefs – a complex, world-first undertaking.

While AIMS and the RRAP partners are currently working through the technical challenges of automating and scaling up conventional coral mariculture methods, there are other factors that present barriers to the economic opportunities that this new technology could create. This will be a new industry sector, with the need for training programs to create the required workforce. It will require significant technology transfer and upskilling along with capital investment. Government support of these areas would significantly boost their rate of progress and success. The barriers to market entry are not insurmountable. If the coral mariculture methods that AIMS is currently testing are successfully developed, and appropriate supports implemented to mitigate these capital and investment challenges, the adoption and commercialisation of this technology by small and medium-sized businesses in Northern Australia could generate significant opportunities for the region and the nation.

Regionally, local businesses would have greater confidence in commencing next-generation coral mariculture ventures, providing economic opportunities and supporting achievement of environmental outcomes. As previously mentioned, there is a known demand amongst communities across Northern Australia for mariculture ventures that make sustainable use of marine resources and support generation of local economic opportunities. Aside from the economic, employment and training opportunities such ventures could provide, the coral products could also support reef restoration and adaptation, specifically large-scale coral seeding of the Great Barrier Reef, if required. There is also further potential flow-on

benefits, as local groups – including Traditional Owner Sea Ranger groups and tourism operators – could work in partnership with government to deploy and maintain these corals once seeded onto degraded / damaged reefs.

More broadly, there is potential for Australia to develop a new export industry in coral mariculture over the coming decades. With reefs around the world experiencing an overall trend towards declining coral cover, AIMS forecasts there will be strong demand in the years to come for the rollout of reef restoration and adaptation measures, such as coral seeding via coral mariculture, particularly in the Indo-Pacific. Australia and Australian businesses would therefore be uniquely placed to capitalise on our technological capabilities and expertise in coral mariculture by propagating the corals in Northern Australia waters, before exporting them for seeding on degraded / damaged tropical reefs around the world.

Summary
In summary, AIMS suggests consideration of the following:

- support that enables Traditional Owner communities to build capabilities and capacity in, and undertake, marine data collection to provide the information needed to inform improved decision making on investments in mariculture ventures
- support for further research and development of next-generation coral mariculture methods which combine current approaches with automation technology to help expedite scale-up and commercialisation
- support for the development of training programs to commence the process of developing the technicians to needed to operate new coral mariculture methods
- support / incentives for Australian businesses, particularly in Northern Australia, to adopt next-generation coral mariculture methods (once developed) when seeking to establish new ventures or expand market reach.

AIMS welcomes the Committee's review of this submission and would be pleased to elaborate on any aspect if requested.

Yours sincerely

Dr Paul Hardisty
Chief Executive Officer