Australian Government
AUSTRALIAN INSTITUTE OF MARINE SCIENCE
TOWNSVILLE | DARWIN | PERTH

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Committee Secretary
Foreign Affairs and Aid Sub-Committee
Joint Standing Committee on Foreign Affairs, Defence and Trade
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 Foreign Affairs and Aid Sub-Committee *Inquiry into strengthening Australia's relationships with countries in the Pacific region.*

AIMS is Australia's tropical marine research agency and has historically engaged, at a modest level, with Pacific island countries via Australia's international development efforts, including as a partner agency in programs delivered by the Australian Centre for International Agricultural Research (ACIAR). However, with the increasing emergence of climate change impacts on the world's oceans, more of our work – particularly in coral reef resilience, adaptation and restoration – is becoming directly and immediately relevant to island communities with key economic and cultural dependencies on their coral reefs.

With the Indo-Pacific region home to 75 per cent of the world's coral reefs, AIMS anticipates an increased need from our Pacific island neighbours in the coming years for Australian scientific and financial assistance to help preserve and restore threatened reef ecosystems.

In addressing the inquiry's terms of reference, AIMS' submission draws on our deep scientific understanding of the challenges in preserving threatened reef ecosystems, and the opportunities and methods which may be useful in responding to these challenges. The submission also discusses our experiences in partnering with the Traditional Owners of Australia's sea country to integrate traditional ecological knowledge with Western science – an approach that has generated tangible environmental, social and economic outcomes, and which provides a useful model for engaging with Pacific island communities, consistent with the Australian Government's Pacific Step-up.

The Australian Institute of Marine Science (AIMS)

AIMS is based in Townsville, North Queensland, with significant research facilities also located in Darwin and Perth. These facilities, a world-class research aquarium (the National Sea Simulator), and two ocean-going coastal research vessels allow AIMS to conduct innovative, world-leading scientific and technological research to support sustainable growth in the use and effective environmental management and protection of Australia's tropical marine estate. AIMS leads the country in peer -reviewed publications in the field of marine and freshwater biology, and has for many years retained its position in this field of work as one of the world's top three marine science institutions.

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Protecting coral reefs and other tropical environments from the effects of climate change

With nearly 50 years' experience as a tropical marine research agency, AIMS delivers the world's longest continuous coral reef monitoring program, and our scientists publish hundreds of coral reef -related articles in world-leading scientific journals annually. As part of our broad set of marine research activities, AIMS plays a central role in the Reef Restoration and Adaptation Program (RRAP) – a global partnership which aims to provide reef managers and decision-makers with a suite of innovative, safe and acceptable interventions that could be deployed at scale to help protect the Great Barrier Reef from the impacts of climate change.

The research and development phase of the RRAP will begin in mid-2020. This follows the completion of a concept feasibility study, which was the world's most rigorous and comprehensive investigation into medium- and large-scale interventions to assist reefs to adapt and recover from severe disturbances. More than 150 scientists and engineers from four countries were involved in this work, and they found that successful intervention was possible and could double the likelihood of sustaining the Reef in good condition by 2050. The key finding – *that successful intervention requires developing an innovative and integrated toolkit of safe, acceptable interventions that work together to create compounding benefits* – whilst initially directed at solutions for the Great Barrier Reef, is equally applicable to coral reef ecosystems around the world.

AIMS understands the critical importance of coral reef ecosystems to many Pacific island countries. Many Pacific island countries rely on coral reefs to not only ensure food security though an ongoing supply of fish and other edible species, but also to support tourism industries – a key driver of economic growth in the region. Reefs are also deeply tied to Pacific islanders' cultural identity. Noting the cumulative stresses currently facing these ecosystems, ensuring healthy and resilient coastal and marine environments – of which coral reefs are a constituent part – should be considered central to the security, stability and prosperity of the Pacific region in the context of the Pacific Step-up.

Capacity development to enhance monitoring, and decision-support for coral reef management

Australia is uniquely placed to lead the world in a global effort to safeguard coral reef ecosystems, particularly within our own Pacific neighbourhood. With almost 50 per cent of reefs in the Pacific currently considered threatened, ecological monitoring is critical to inform and guide the most efficient management interventions. AIMS has embarked on a technology transformation, recognising that with growing pressure on Australia's marine estate, there is an ever increasing need to capture more high-quality environmental data from more places more efficiently to make management and decision-making more effective. AIMS is currently developing a series of next generation platforms and technologies that enable the efficient capture, processing, management, analysis and reporting of scientifically robust data. These technologies circumvent some of the traditional challenges associated with a lack of specific ecological knowledge and training that exist within some Pacific nations. There is considerable opportunity to introduce these new technologies to enhance environmental monitoring, decision-making and management.

Further, AIMS, in partnership with the Global Coral Reef Monitoring Network (GCRMN), is leading a project that seeks to utilise artificial intelligence (AI) and machine learning to assess the condition of the Pacific's coral reefs. The recently commenced ReefCloud project, supported with funding from the Department of Foreign Affairs and Trade and technical input from the Queensland University of Technology, will apply big data science to fast-track measurements of coral reef condition across large areas. ReefCloud will provide an end-to-end solution for integrating, synthesising, reporting and communicating coral reef monitoring data using AIMS-developed technology. It aims to

demonstrate that the amalgamation of machine learning technologies for automated image analysis can help monitoring and management by: 1) alleviating resource and capability limitations; 2) increasing efficiency; 3) preventing inconsistencies; 4) producing timely reports; and 5) integrating monitoring efforts.

A pilot implementation will initially be undertaken in Palau and Fiji to ensure project outcomes align with in-country needs and requirements. This will set the pathway to scale up implementation through the broader Pacific region, with the aim of empowering local communities and governments to build advanced capabilities in the resilience-based management of their reef ecosystems.

Partnering with Traditional Owners to achieve enduring, mutually-beneficial solutions

AIMS is proud to have a strong history of partnership with Traditional Owners on marine science research in sea country across tropical Northern Australia, and believes that its approach, developed over many years, provides a useful model for collaboration that recognises the richness of traditional knowledge and achieves mutually-beneficial outcomes for culturally diverse communities. Through AIMS' partnerships with Traditional Owner communities, we seek to create shared research and knowledge that integrates their traditional ecological knowledge, consisting of generations of environmental observations, with our science. These partnerships are supported by AIMS' policies, strategies and protocols for genuine co-design and co-delivery of research, which also support Traditional Owners' aspirations for greater capacity and empowerment in sea country monitoring, research, management and decision-making, and science partnering.

An example of this approach is the project AIMS has recently commenced with the Traditional Owners of the Keppel Islands (off the coast of Yeppoon, Queensland) to map the reefs in their sea country and bring new skills to the region. The Woppaburra people have actively maintained cultural connections to and responsibilities for land and sea country, and through their collaboration with AIMS, hope to strengthen these connections and better inform management of their land and sea country for future generations. For AIMS, working in the Keppels is strategically important, as it currently supports vibrant and diverse inshore coral reef communities, and there has been a long history of scientific investigation in this region. However, as with many reefs, these are threatened by warming sea temperatures, floods, cyclones and other anthropogenic pressures.

AIMS considers this project a premier example of a genuine mutually beneficial partnership with the Traditional Owners of sea country where research is jointly designed and delivered. This approach involves commencing these projects with a multi-day workshop between scientists and Traditional Owners to identify areas of special significance and determine the priorities and study locations for future research. This collaborative engagement and knowledge sharing is valuable, as it builds trust, and protecting coral reefs into the future requires management strategies that use all the possible tools available from the broad suite of traditional ecological knowledge, marine science, and new management approaches and technologies.

AIMS would be pleased to share further with the Sub-Committee the lessons we have learned in developing our approach to partnering with Traditional Owners as a potential model for collaborating with Pacific island communities on culturally appropriate reef management solutions.

Summary

In summary, AIMS suggests consideration of the following:

- that healthy and resilient coastal and marine environments, particularly coral reefs, are central to the food security, stability and prosperity of the Pacific region, and that this is reflected in the implementation of the Pacific Step-up;
- that there is an opportunity for Australia, given its scientific expertise and world-class research infrastructure, to lead efforts to safeguard the coral reef ecosystems of the Pacific region; and
- that our approach to doing so be built on meaningful, culturally sensitive and mutually beneficial partnerships with Pacific island communities which enable local resilience-based management of, and decision-making for, their coral reef ecosystems.

AIMS welcomes the Sub-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