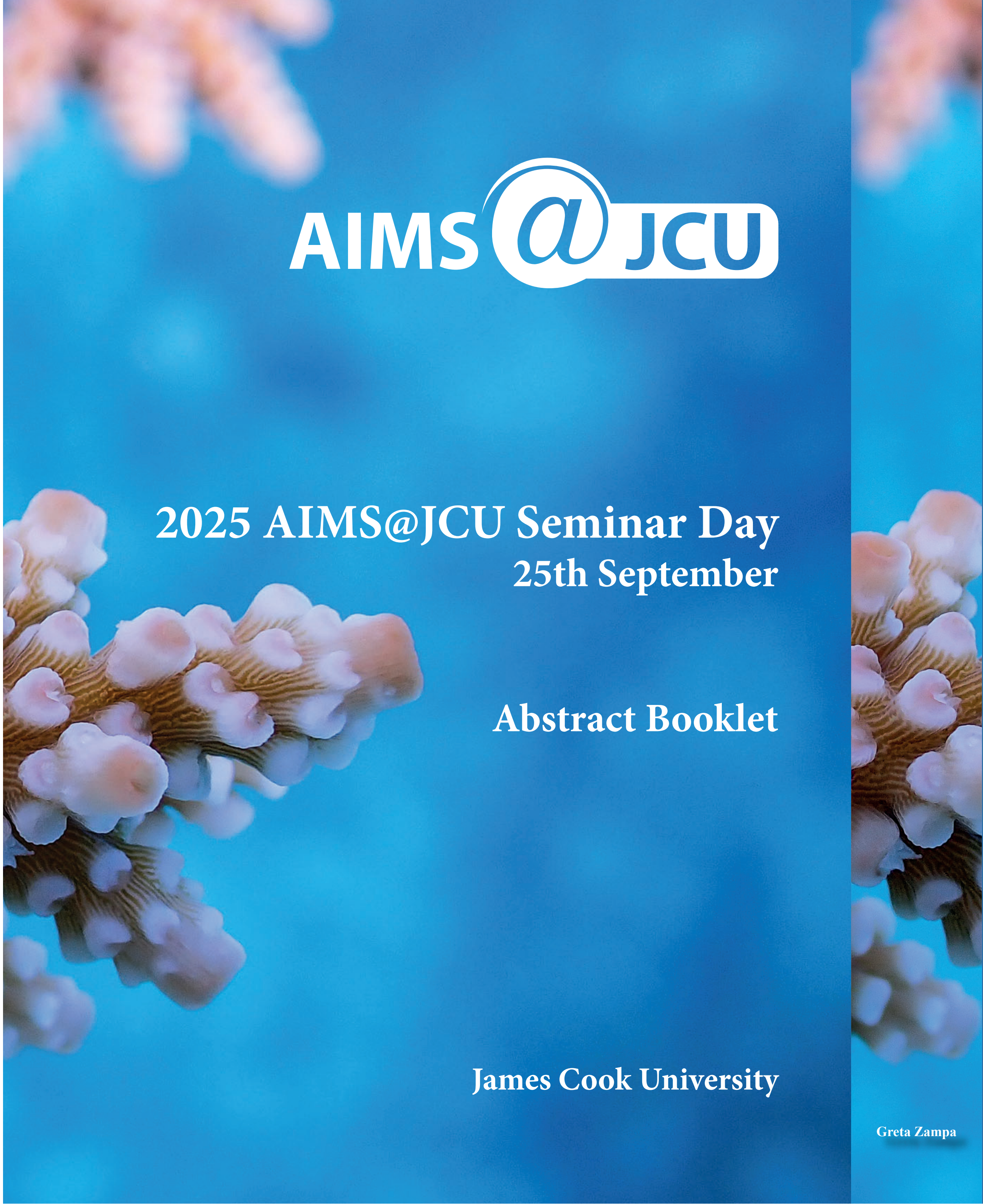

AIMS@JCU

2025 AIMS@JCU Seminar Day
25th September

Abstract Booklet

James Cook University

Greta Zampa

AIMS@JCU

Seminar Day 2025
Thursday, 25th September

James Cook University

Time	Title	Presenter/Chair
9.30am	Welcome to Country	Auntie Dorothy Savage
9.45am	Welcome & housekeeping, AIMS@JCU Research Director	Dr. Cherie Motti
10.00am	AIMS@JCU Executive Committee Welcome	Prof. Ron White & Dr. Kameron Christopher
	Session 1:	Dr. Vanessa Haller
10.15am	Giants	Ingo Miller
10.30am	Understanding the Spatial and Temporal Patterns of Marine Fauna in the Otway Basin using Marine Fauna Observer Data	Nicolas Mafla Viscarra
10.45am	Integrating microbial and viral responses to reef zoning measures in the Great Barrier Reef	Marko Terzin
11.00am	Responses of microbial gene expression to temporal and environmental factors at four IMOS microbial observatories	Grace Yarger
11.15am	Morning tea	
	Session 2:	Dr. Josephine Nielsen
11.45am	Strengthening monitoring of coral reefs and fisheries co-management in the Kingdom of Tonga	Myles Phillips
12midday	Transferring ReefSeed Coral-Seeding Technology to Remote Communities for Reef Restoration	Crystle Wee
12.15pm	The Sting of the Sea: Unveiling the Venom of the Fire Urchin *Asthenosoma varium*	Sina Ehlert
12.30pm	Spectral species concept in aquaria: Adapting a remote sensing algorithm for extreme close-range imaging of submerged algal biomass	Raf Rashid
12.45pm	RapidBenthos: extracting community composition from 3D photogrammetric models automatically	Tiny Remmers
1.00pm	Concurrent Autonomous Surface-Underwater Monitoring System: Geometric Dynamics and Nonlinear Control	Daniel Croul
1.15pm	Lunch	
	Session 3:	Dr. Mikaela Nordborg
2.15pm	Microplastics in the water column of Davies Reef, Great Barrier Reef: vertical distribution, concentration and characteristics	Lauren Beattie
2.30pm	Assessing the Impact of Macroalgae Removal and disturbance on Benthic and Fish Community Dynamics	Bambang Hermanto
2.45pm	AIMS@JCU ECR Collaboration Grant recipient	Dr. Kelly Condon
3.00pm	AIMS@JCU Post-doc panel	Dr. Line Bay
3.30pm	Posters, afternoon tea	
	Speed Talks:	Dr. Mikaela Nordborg
4.00pm	Soundscape variation between habitats on Lizard Island	Leo Chiu-Leung
4.05pm	Coral post-settlement mortality on the microhabitat scale	Matilde Drake
4.10pm	Uncovering Whale Shark Hotspots in Uncharted Waters and Predicting their Future	Ingo Miller
4.15pm	Macroalgal thresholds for device-based reef restoration of coral populations on inshore reefs of the Great Barrier Reef	Greta Zampa
4.20pm	Assessing Functional Diversity of inshore coral reefs following 7 years of restoration: Impacts on coral and macroalgal communities	Peter Lowley
4.25pm	Coral matchmaking: assisted gene flow to help corals beat the heat	Alex Macadam
4.30pm	Symbiotic secrets: Sequencing the genome of vertically transmitted coral symbionts	Sophie Renton
4.35pm	Detecting the Elusive: Monitoring Giant Tritons with environmental DNA	Merle Schlawinsky
4.40pm	Prediction of *Trichodesmium* Bloom in the Great Barrier Reefs from Hydrometeorological Parameters	Yuanning Zheng
4.45pm	Collection of people's choice nominations	
5.00pm	Alumni Function - drinks and canapes provided for all (7.30pm finish)	
5.30pm	Presentation of awards and prizes, closing remarks	

JAMES COOK UNIVERSITY AUSTRALIA

Australian Government

Australian Institute of Marine Science

AIMS@JCU Seminar talks

Judging guidelines are as follows:

12 minute presentation; 3 minutes question time. Student talks should be kept to 12 minutes with 3 minutes for questions. Student seminar talks will be judged based on the following components: The Quality of the abstract, Statement of hypotheses (introduction and statement of hypothesis), Clear Objectives, Methodology, Importance of Subject, Innovation and originality, General quality of presentation (grammar, flow, visual appeal of slides, clarity of speech), and the presenter's handling of questions.

Quality of the abstract
Student abstracts should be kept to 250 words and should be formatted as a scientific abstract for a journal article or scientific conference. Abstracts should be well written, indicate the scientific merit of the research presented (quality of science presented and leading edge of field). Usually, abstracts begin with a clear statement of an issue and end with a substantive conclusion.

Statement of hypotheses
This component is based on the introductory portion of the talk. This section of the talk sets up the context of the work and gives a statement of the hypothesis. This component will be scored based on whether the rationale is well explained and the question or hypothesis is clearly stated.

Clear Objectives
The presentation will be judged on whether the objectives of the work are clearly stated.

Clear Methodology
This judging component is to asses both the methodology of the work as well as the results presented. This component will be assessed on whether the methods and analyses used were appropriate (with regards to results presented).

Importance of Subject
This is to judge whether the speaker clearly expresses the importance of the work both in terms of the particular field and broader scientific context.

Innovation and originality
This is to assess the originality of the research and/or methodology.

Traditional Owner acknowledgement
Appropriate, respectful and genuine acknowledgement of Traditional Owners relevant to the project location.

General Quality of Presentation
This portion is to assess the general quality of the presentation visually (grammar, spelling, overall visual appeal of slides) and speaking quality of the presenter (pronunciation, ability to communicate ideas, ability to answer questions clearly). This section will be judged based on: quality of speaker, quality of slides (grammar, spelling, visual appeal, organization of talk), and speaker skills in answering questions.

Seminar Talk - 10.15am

No Model Fits All: Dynamic SDM Reveals Seasonal Habitat Use of Ocean Giants

Miller, IB[a,b,c], Niella, Y[d], Udyawer, V[e], Erdmann, MV[f], Abrantes, K[a], Pierce, SJ[g,h], Fitzpatrick, R[a], Hoopes, LA[i], Dove, ADM[i] & Branett, A[a]

[a]*Biopixel Oceans Foundation, Cairns, Qld, Australia; Ingo.miller@my.jcu.edu.au*
[b]*AIMS@JCU, College of Science & Engineering, James Cook University, Qld, Australia*
[c]*Marine Data Technology Hub, James Cook University, Qld, Australia*
[d]*Integrated Marine Observing System (IMOS), Animal Tracking Facility, Sydney Institute of Marine Science, Mosman, NSW, Australia*
[e]*Sharks Pacific, Rarotonga, Cook Islands*
[f]*Conservation International Aotearoa, University of Auckland, Auckland, New Zealand*
[g]*Marine Megafauna Foundation, West Palm Beach, FL, USA*
[h]*School of Science, Technology and Engineering, University of the Sunshine Coast, Sunshine Coast, QLD, Australia*
[i]*Georgia Aquarium, Atlanta, GA, USA*

Essential habitats support ecological functions critical for species' survival. For highly mobile and elusive marine species, aggregations in these habitats provide rare opportunities to study their ecology. This study developed a dynamic species distribution model (SDM) to predict essential habitats for migratory species, tested on whale sharks (*Rhincodon typus*). With ~30 documented aggregations globally, a major knowledge gap exists in the southwest Pacific (SWP). High-resolution SDMs assessed key environmental drivers and predicted seasonal habitat suitability using satellite telemetry and sightings data. An ensemble modelling approach combined regression and machine learning algorithms to reduce uncertainty and enhance reliability. Predictions indicate high suitability in the northern Great Barrier Reef during the monsoon season (Nov–Apr), shifting eastward into the Coral Sea in the dry season (May–Oct). Bathymetric variables were key drivers, alongside dynamic variables like sea surface temperature and currents. Variation across data sources and algorithms highlights the benefits of integrating diverse occurrence data sources. This first habitat suitability prediction for whale sharks in the SWP provides a framework for improving population assessments and guiding conservation strategies. The approach is broadly applicable, facilitating essential habitat identification, research prioritisation in data-limited regions, and targeted conservation in dynamic environments.

I acknowledge Aboriginal and Torres Strait Islander peoples as Australia's first scientists. I pay my deepest respects to Elders past, present and future, and the custodians of the land and sea country on which I work, including the Irukandji people of Cairns.

Seminar Talk - 10.30am

Understanding the Spatial and Temporal Patterns of Marine Fauna in the Otway Basin using Marine Fauna Observer Data

Mafla-Viscarra, N[a,b,c], Thums, M[b], McLean, D[b], Cerqueira Ferreira, L[b], Wheatley, K[d] & Hamann, M[a]

[a]*James Cook University, Townsville, Australia; nicolas.mafla@jcu.edu.au*
[b]*Australian Institute of Marine Science, Townsville, Australia*
[c]*AIMS@JCU, Townsville, Australia*
[d]*BMT, Hobart, Australia*

Marine fauna observations offer crucial insights into the spatial and temporal patterns of species distribution in offshore environments. Through industry partnerships, the Australian Institute of Marine Science has compiled a dataset of marine fauna sightings recorded by Marine Mammal Observers aboard vessels operating in the Otway Basin, Australia. The data provide an opportunity to investigate the spatial and temporal patterns of the reported species in this region. Data were collected during daylight hours over a period of up to seven months, capturing species identity, distance, bearing, and behavioural context. Recorded species included marine mammals, sharks, and marine turtles, along with ecological indicators such as bait balls and seabird aggregations. By applying density surface modelling, we aim to quantify habitat use, particularly for threatened species like pygmy blue whales, and assess the impact of offshore infrastructure on marine megafauna. The findings contribute to marine spatial planning efforts, including the management of proposed offshore renewable energy developments in the region.

Traditional Owners to be acknowledged: Bindal People (Townsville, place where I live) (Otway Basin, my research site)

Seminar Talk - 10.45am

Integrating microbial and viral responses to reef zoning measures in the Great Barrier Reef

Marko Terzin[a,b,c], Steven J. Robbins[d], Sara C. Bell[a], Kim-Anh Lê Cao[e], Katherine E. Dougan[d], Nicole S. Webster[a,d,f] Philip Hugenholtz[d], Yun Kit Yeoh[a,b,c], David G. Bourne[a,b,c] & Patrick W. Laffy[a,b,c]

[a]*Australian Institute of Marine Science, PMB no3 Townsville MC, Townsville QLD 4810; marko.terzin@my.jcu.edu.au*
[b]*College of Science and Engineering, James Cook University, Townsville, 4811*
[c]*AIMS@JCU, James Cook University, Townsville QLD 4811*
[d]*Australian Centre for Ecogenomics, University of Queensland, St Lucia, QLD 4072*
[e]*Melbourne Integrative Genomics and School of Mathematics and Statistics, University of Melbourne, Parkville VIC 3052*
[f]*Institute for Marine and Antarctic Studies, University of Tasmania, TAS, 7001*

Seawater viruses are increasingly recognized as key players in coral reef health through viral infection and control of microbial cell abundances. Despite this recognition, seawater viromes are largely understudied in the Great Barrier Reef (GBR). As a part of the Great Barrier Reef Microbial Genomics Database (GBR-MGD) infrastructure, we integrated viral and microbial (pMAG) community data to identify multi-omics temporal and geographic biomarker signatures of No-Take Marine Reserve (NTMR) versus fished reef zones. We successfully identified viral biomarkers distinguishing reef zoning status, particularly the Caudoviricetes that correlated with NTMRs or fished reefs, predicting zoning status with an average 72% accuracy. Integrating viral and microbial data however lowered zoning predictions (66% classification accuracy), likely due to the same microbial host being infected by different viruses. These results highlight viruses as promising (but complex) indicators of reef management impacts, and future studies should prioritize host-virus interaction mapping and time-series sampling to clarify viral roles in reef health across environmental gradients of the GBR.

Traditional Owners to be acknowledged: The seawater samples for metagenomics and physico-chemical variables were collected across 48 reefs, from the sea country of various Indigenous groups who are Traditional Owners (TOs) of that land. We acknowledge the Gudang Yadhaigana TOs, custodians of the McSweeney, Monsoon, 11-049, and 11-162 reefs, which lie within their sea country estate. We pay our respects to the Kuuku Ya'u TOs of the Mantis and Lagoon reefs, and the Lama Lama TOs of the 13-124, Davie, and Corbett reefs in the western half of their territory. We also recognise the Cape Melville, Howicks, and Flinders Island TOs of the eastern half of

Corbett and Sand bank #1 reefs, as well as the Eastern Kuku Yalanji TOs of St Crispin and Agincourt #1. We extend our respect to the Yirrgandji TOs of Hastings reef and the Gunggandji as TOs of Arlington, Thetford, and Moore reefs. We acknowledge the Gunggandji-Mandingalbay Yidinji TOs of McCulloch, Hedley, Peart, and Feather reefs, and the Mandubarra TOs of Farquaharson Reef. We honour the Girringun Aboriginal Corporation TUMRA for their connection to Taylor Reef, and the Manbarra TOs of Rib, Kelso, Little Kelso, and John Brewer reefs. We also recognise the Wulgurukaba TOs of Myrmidon, Grub, and Helix reefs, the Bindal Traditional Owners of Knife, Fork, Centipede, Chicken, and Lynchs reefs, and the continuing connection of the Manbarra TOs to Roxburgh, and Fore and Aft reefs. Lastly, we acknowledge the PCCC TUMRA for their stewardship of North, Bloomfield, Eskine, Mast Head, Hoskyn, Fairfax, and Boult reefs. We pay our respects to their Elders, past, present, and emerging, and acknowledge their enduring connection to land and sea. Further, our desktop / lab research took place at the Australian Institute of Marine Science (AIMS) headquarters at Cape Ferguson, and we wish to acknowledge the Wulgurukaba and Bindal peoples as the Traditional Owners of that land. This research was also undertaken at the JCU Townsville Bebegu Yumba campus, and the authors acknowledge that the Australian Aboriginal and Torres Strait Islander peoples are the original inhabitants and traditional custodians of this continent and have unique cultural and spiritual relationships to the land and waters.

Seminar Talk - 11.00am

Responses of microbial gene expression to temporal and environmental factors at four IMOS microbial observatories

Yarger, GC[a,b,c], Laffy, PW[b,c], Bourne, DG[a,b,c] & Yeoh, Yun Kit[b,c]

[a]*College of Science and Engineering, James Cook University, Townsville QLD 4811; gracecarolyn.yarger@ my.jcu.edu.au*

[b]*Australian Institute of Marine Sciences, PMB 3 Townsville MC QLD 4810*

[c]*AIMS@JCU, James Cook University, James Cook University, Townsville QLD 4811*

Microbes form the basis of marine ecosystems and emerging work has demonstrated their ability to be utilized as indicators of overall system health. Advances in sequencing technologies have made microbial monitoring in aquatic environments affordable to perform at scale. On the Great Barrier Reef, novel monitoring strategies are needed to inform reef management strategies and inform intervention decisions. Microbial metagenomic analysis of 48 sites on the GBR has found community structure and functional potential to be predictive of water quality and season (Terzin et al., 2025). In addition, certain taxa have been identified as indicators of reef degradation. However, metagenomics has limitations in describing reactive functional activity and gene expression. Analysis of gene function may provide a more direct link between physico-chemical conditions and ecosystem health while eliminating the confounding effects of perceived metabolic potential. The IMOS Molecular Observatories have collected quarterly metatranscriptomic, metagenomic, and environmental data for two inshore and two mid-shelf coral reef sites on the GBR. This seminar will outline methods of the upcoming analysis on IMOS Molecular Observatory data and any preliminary results. By characterizing changes in gene expression associated with seasonality, location, and changing water quality, we hope to better understand microbial community dynamics in reef-associated seawater samples, enhancing our understanding of microbial processes on coral reefs.

Traditional Owners to be acknowledged: Nywaigi, Bindal, Manbarra, and Gurambilbarra Wulgurukaba People, as well as the Gurambilbarra Wulgurukaba Aboriginal Corporation and Girringun Aboriginal Corporation

Seminar Talk - 11.45am

Ongoing decline of an isolated Nassau grouper (*Epinephelus striatus*) population at Glover's Atoll, Belize, despite two decades of protection

Phillips, M[a], Tewfik, A[b] & Burns-Perez, V[c]

[a]*AIMS@JCU, Townsville, Australia; myles.phillips@my.jcu.edu.au*
[b]*Aquatic Conservation Consulting, Kitchener, ON, Canada*
[c]*Turneffe Atoll Sustainability Association, Belize City, Belize*

Nassau grouper (Epinephelus striatus) has been declared critically endangered by the IUCN following decades of exploitation at their spawning aggregation sites during the 1900s. Once highly abundant, forming aggregations numbering in the tens of thousands, overextraction has led to regionwide population collapse and several local extinctions. The Central American country of Belize has implemented many of the best practice regulations for management of this species since 2003, including size limits, seasonal fishery closures, and year-round protection of spawning aggregation sites. Despite these measures, none of the 13 protected Nassau grouper spawning sites across Belize show signs of recovery. Analysis of reveals found an 85% decline at the only accessible spawning site, a decrease in density to virtually undetectable levels across habitats and management zones, and persistent transboundary illegal fishing. Nassau grouper are also rare in local fisher catch both at the atoll (n=118 over 20 years) and at the national level (18 of 18,383 fish sampled between 2017 and 2020). Further, most of the fish in the catch were below the size at maturity. Although the Glover's Atoll aggregation has survived well beyond its predicted date of extirpation in 2013, ongoing declines suggest imminent local extinction without novel interventions.

Traditional Owners to be acknowledged: Wulgurukaba and Bindal people.

Seminar Talk - 12midday

Transferring ReefSeed Coral-Seeding Technology to Remote Communities for Reef Restoration

Wee SYC[a], Randall CJ[b], Giuliano C[b], Severati A[b], Page C[b], Abdul Wahab M[b], Ali K[c], Mueen FS[c], Ibrahim FR[c], Ahmed N[c], Mohamed Sc, Haleem A[c] & Doropoulos C[d]

[a]*AIMS@JCU, Townsville, Australia; Crystle.wee@my.jcu.edu.au*
[b]*Australian Institute of Marine Science, Townsville, Australia*
[c]*Maldives Marine Research Institute, South Male Atoll, Maldives*
[d]*Commonwealth Scientific and Industrial Research Organisation, Townsville, Australia*

Most coral restoration projects occur at small scales, often through asexual fragmentation and requiring hours of manual labour. Larval aquaculture is an alternative method that can scale up restoration while producing genetically diverse recruits. Furthermore, it offers advantages such as selective breeding and assisted evolution, increasing the resilience of transplanted corals against thermal stress and disease. However, such aquaculture systems typically require complex infrastructure and high technical capacity, making them difficult to implement in remote locations. ReefSeed presents a solution to these constraints. ReefSeed is an inter-agency and international collaboration to produce a portable, containerised aquaculture system for the purpose of scalable larval-based restoration. Since its construction in October 2024, the system has undergone three trials in Australia and the Maldives. This presentation showcases the preliminary findings of our trials in both countries, the process of technology transfer, and the key challenges faced in understanding Maldivian coral reproduction patterns.

Traditional Owners to be acknowledged: Maldives: Maldives Marine Research Institute
Australia: Bindal and Wulgurukaba

Seminar Talk - 12.15pm

The Sting of the Sea: Unveiling the Venom of the Fire Urchin *Asthenosoma varium*

Sina Ehlert-Flaskämper[a,b], Dr. Richard Harris[c],
Assoc. Prof. Dr. Ira Cooke[a] & Dr. Cherie Motti[b]

[a]*AIMS@JCU, Townsville, Australia; Tina.ehlert@my.jcu.edu.au*
[b]*James Cook University, Townsville, Australia*
[c]*University of the Sunshine Coast, Sunshine Coast, Australia*

Venom systems in echinoderms, particularly in sea urchins, remain largely underexplored, despite their importance in understanding venom evolution and their potential as a source of novel bioactive compounds. In this study, we investigate the venom apparatus of the fire urchin *Asthenosoma varium* using an integrative, multi-method approach. Our analysis combines morphological characterization, assays, proteomic profiling, and de novo transcriptome sequencing of venom. Morphological examination revealed that the venomous spines of *A. varium* are highly specialized for toxin delivery through a hollow shaft with longitudinal perforations and a pointed, arrow-like tip. By integrating transcriptomic and proteomic data, we aim to identify novel proteins and peptides involved in venom function, contributing to the broader effort to characterize neglected marine venom systems as promising sources of novel bioactive compounds.

We acknowledge Aboriginal and Torres Strait Islander Peoples as the Traditional Owners of the lands and seas where we work, both on land and in the sea country of tropical Australia. We pay our respects to the Elders, past, present and future, and their continuing culture, beliefs, and spiritual relationships and connection to the land and sea.

Seminar Talk - 12.30pm

Spectral species concept in aquaria: Adapting a remote sensing algorithm for extreme close-range imaging of submerged algal biomass

Rashid AR[a,b,d], Joyce KE[c]; Fabricius KE[d] & Maier SW[e]

[a]*AIMS@JCU, Townsville, Australia; raf.rashid@my.jcu.edu.au*
[b]*James Cook University, Bebegu Yumba campus, Townsville, Australia*
[c]*TropWater, James Cook University, Nguma-bada campus, Cairns, Australia*
[d]*Australian Institute of Marine Science, Townsville, Australia*
[e]*maitec, Darwin, Australia*

Algae turfs are mixed-species assemblages of cyanobacteria and filamentous algae. They may be highly diverse, yet most conventional methods of benthic habitat assessments treat algal turfs as homogenous groups. While it was an acceptable trade-off in the context of coarse-scale benthic surveys of large areas of reefs, fine-scale information like taxonomic composition, canopy height and sediment content are often lost in the consolidation of these algal assemblages into the homogenous category of “turf algae”. There is a spatial mismatch between the fine scale at which algal turfs interact with other benthic organisms and the coarse scale at which they are typically assessed on the reef. In this seminar, we introduce a novel adaptation of established remote sensing techniques and analytical tools to characterise submerged algae at these very fine spatial scales. We developed a proximal hyperspectral sensing platform for extreme close-range imaging of submerged algal biomass in aquaria. We also assessed the applicability of the spectral species concept, an algorithm that had been developed for remotely-sensed spectral imagery of terrestrial plant biodiversity. Our development of a dedicated hardware for hyperspectral imaging of close-range submerged biota, and the software workflows to process, synthesise and interpret the collected data, will facilitate more objective and consistent characterisations of these complex and ecologically important benthic communities.

The authors acknowledge the Traditional Owners of the land and sea country where this research was conducted, the Bindal and Wulgurukaba Peoples.

Seminar Talk - 12.45pm

RapidBenthos: extracting community composition from 3D photogrammetric models automatically

Remmers T[a,b], Boutros, N[b], Wyatt, M[b], Gordon, S[b], Toor, M[b], Roelfsema, C[c], Fabricius, K[b], Grech, A[a], Lechene, M[b] & Ferrari, R[b]

[a]*JCU; Tiny.remmersbarry@my.jcu.edu.au*
[b]*AIMS*
[c]*UQ*

Underwater photogrammetry is routinely used to monitor large areas of complex and heterogeneous ecosystems, such as coral reefs. However, deriving data on benthic components (i.e. sand, rubble, coral and algae) from photogrammetry products has remained challenging due to the highly time-consuming process of manual data extraction. We developed a machine learning approach to quantify benthic community composition in coral reefs from orthomosaics, which requires no manual delineation of benthic components for training or implementation. The current study presents RapidBenthos, an automated workflow that segments and classifies large-area images. Our pipeline (1) uses a pre-trained segmentation model, eliminating the need for manually generated fine-scale segmented training data, and (2) classifies the resulting segments from multiple views using the underlying survey images, allowing for classification to fine taxonomic levels.

RapidBenthos has the capability to extract an unprecedented level of data from photomosaics of coral reefs or other complex environments, allowing to sustainably scale photogrammetric monitoring technique both in replicate and survey extent, which consequently can lead to new research questions and more informed ecosystem management.

We acknowledge the Wulgurukaba and Bindal people as the Traditional Owners of the land where our research was conducted. More broadly, we acknowledge the Traditional Owners of the Great Barrier Reef area and their continuing connection to their land and sea country.

Seminar Talk - 1.00pm

Concurrent Autonomous Surface-Underwater Monitoring System: Geometric Dynamics and Nonlinear Control

Croul DR[a,b]

[a]*James Cook University, Townsville, Australia; daniel.croul@my.jcu.edu.au*
[b]*AIMS@JCU, Townsville, Australia*

Marine vehicles and autonomous technologies have progressively emerged to the forefront of research due to their diverse applications, particularly in underwater exploration and environmental monitoring. Autonomous Surface Vehicles (ASVs) and Autonomous Underwater Vehicles (AUVs) have been commonly used to perform large-scale surface surveys and characterise benthic processes respectively. Unlike ASVs, an accurate localisation estimate of AUVs is hindered by poor localisation references (lack of GPS). To harness the full potential of autonomous systems in marine conservation, the individual ASV-AUV systems can be coupled by an Umbilical Cable (UC), facilitating reliable transfer of power and telemetry. Control of the concurrent system presents a difficult challenge due to the highly nonlinear system dynamics, and inability to directly manipulate the UCs configuration. Therefore, to ensure sound performance in conducting hydrography relates tasks, a novel nonlinear control theory that accurately estimates the concurrent system configuration variables in a computationally economical manner is necessary.

We acknowledge the Australian Aboriginal and Torres Strait Islander peoples as the traditional owners of the lands and waters where we live and work.

Seminar Talk - 2.15pm

Microplastics in the water column of Davies Reef, Great Barrier Reef: vertical distribution, concentration and characteristics

Beattie, L. J.[a], Smithers, S.[b] & Santana, M. F. M.[c]

[a]*AIMS@JCU, Townsville, Australia; l.beattie@aims.gov.au*
[b]*James Cook University, Townsville, Australia*
[c]*Australian Institute of Marine Science, Townsville, Australia*

Up to 23 million metric tonnes of plastic waste enter global oceans annually, of which only ~1% remains afloat. Microplastics (MPs), particles less than 5 mm in size, account for ~92% of plastic pollution in the ocean. This has prompted increasing research efforts to identify areas of high MP accumulation, known as MP sinks. Due to their complex morphology, hydrodynamics, and high biological turnover, coral reefs may be especially prone to trapping and retaining MPs, with significant ecological impacts. However, the transport dynamics, distribution, and accumulation of MPs throughout tropical coral reef systems remain poorly understood.
Despite being the largest coral reef system in the world, the Great Barrier Reef (GBR) has been the focus of only eight MP studies to date. Of these, five examined surface waters only, and none have incorporated temporal variation. Recent studies highlight the urgent need to investigate MP transport and accumulation dynamics in coral reef systems through vertically stratified and temporally repeated sampling.
This research project aims to address critical knowledge gaps by trialing novel methods to establish a snapshot baseline of MP concentrations and characteristics throughout the water column of Davies Reef, GBR. To capture spatially and temporally varied samples, a submersible pump was deployed at three depths (surface, mid-column, near-benthos), across three sites (lagoon, northwest leeward, southwest leeward), during both wet and dry seasons. Additionally, a sediment trap array was deployed near the benthos to passively collect MPs, allowing estimation of a downward transport flux rate, as a proxy for settlement potential.

I would like to acknowledge and thank the Traditional Owners of the land and sea country on which this research took place, the Wulgurukaba and Bindal people, for their contribution as the original scientists and custodians of the land (Gurumbilbarra and Thul Garrie Waja). I pay my respects to their elders past, present, and emerging, and I acknowledge that sovereignty was never ceded; it always has been and always will be, their country.

Seminar Talk - 2.30pm

Assessing the Impact of Macroalgae Removal and disturbance on Benthic and Fish Community Dynamics

Hermanto, B[a,c,e], Smith, H[a,d], Page, C[b,c] & Bourne, D[a,b,c]

[a]*College of Science and Engineering, James Cook University, Townsville QLD 4811 Australia; bambang.hermanto@my.jcu.edu.au*
[b]*Australian Institute of Marine Science, PMB3, Townsville Australia*
[c]*AIMS@JCU*
[d]*Centre for Marine Science and Innovation, School of Biology, Earth and Environmental Sciences, University of New South Wales, Sydney NSW 2052, Australia*
[e]*Research Center for Oceanography (PRO), National Research and Innovation Agency (BRIN), Jakarta 14430, Indonesia*

The health of coral reefs globally are declining due to human impacts and increasing frequency and intensity of climate change-related disturbances. In a long-term study at Magnetic Island, macroalgae has been periodically removed from established plots in Arthur and Florence Bays, allowing significant increase in coral cover. The current study extends the assessment of benthic and fish community dynamics, showing a decrease in coral cover from 55% in 2023 to approximately 30% in 2024 due to cumulative disturbance events, including Cyclone Kirilly (Category 3) and bleaching in early 2024. However, coral cover showed signs of recovery in 2025, with removal plots demonstrating a more pronounced increase compared to control plots. Removal plots exhibited ~9% coral cover increase, while controls plots recovered ~5% of coral cover. Interestingly, the impacts of the cyclone were different across the bays with sites in Arthur Bay significantly impacted with a drop of ~40% in coral cover compared to Florence Bay which experienced only a ~5%. Since commencement of the project in 2018, macroalgae removal has shown some benefits for fish communities with abundance and species richness higher in removal plots, though *Neopomacentrus bankieri* and the family Pomacentridae were the dominant species across both control and removal areas. Coral and fish populations on degraded reefs at Magnetic Island have shown high resilience to environmental disturbances. Macroalgae removal as a reef rehabilitation approach has demonstrated ecosystem benefits, however the increasing frequency and intensity of disturbances complicates interventions aimed at reef recovery.

I acknowledge the Bindal and Wulgurukaba peoples as the Traditional Custodians of the land on which we gather today and pay my respects to their Elders, past, present, and future.

AIMS@JCU Speed talks

3 minute presentation; 1 question. The required format and judging guidelines for the 3 minute speed-talks will follow those of the national 3MT competition with which most students would already be familiar, with the addition of a 100 word abstract. The 100 word abstract should be an extended title of the presentation, which indicates the importance and context of the research and its outcomes.

The presentation should follow the following format:

- A single static PowerPoint slide is permitted. No slide transitions, animations or 'movement' of any description are allowed. The slide is to be presented from the beginning of the oration.
- No additional electronic media (e.g. sound and video files) are permitted.
- No additional props (e.g. costumes, musical instruments, laboratory equipment) are permitted.
- Presentations are limited to 3 minutes maximum and competitors exceeding 3 minutes are disqualified.
- Presentations are to be spoken word (e.g. no poems, raps or songs).
- Presentations are to commence from the stage.
- Presentations are considered to have commenced when a presenter starts their presentation through either movement or speech.
- The decision of the adjudicating panel is final.

Judging guidelines are as follows:

Comprehension & Content

- Was the abstract well written, and did it capture the importance and context of the research that was presented?
- Did the presentation provide an understanding of the background to the research question being addressed and its significance?
- Did the presentation clearly describe the key results of the research including conclusions and outcomes?
- Did the presentation follow a clear and logical sequence?
- Was the thesis topic, key results and research significance and outcomes communicated in language appropriate to a non-specialist audience?
- Did the speaker avoid scientific jargon, explain terminology and provide adequate background information to illustrate points?
- Did the presenter spend adequate time on each element of their presentation - or did they elaborate for too long on one aspect or was the presentation rushed?

Engagement & Communication

- Did the oration make the audience want to know more?
- Was the presenter careful not to trivialise or generalise their research?
- Did the presenter convey enthusiasm for their research?
- Did the presenter capture and maintain their audience's attention?
- Did the speaker have sufficient stage presence, eye contact and vocal range; maintain a steady pace, and have a confident stance?
- Did the PowerPoint slide enhance the presentation - was it clear, legible, and concise?

Speed Talk - 4.00pm

Soundscape variation between habitats on Lizard Island

Chiu-Leung, LC[a,b], Hoey A[b], Azofeifa Solano JC[c,d] & Parsons M[c,d]

[a]*AIMS@JCU, Townsville, Australia; leo.chiuleung@my.jcu.edu.au*
[b]*James Cook University, Townsville, Australia*
[c]*Australian Institute of Marine Science, Crawley, Australia*
[d]*Curtin University, Bentley, Australia*

Passive acoustic monitoring (PAM) is transforming how we sample the ocean, from visually observing to listening. Techniques to analyse marine soundscapes are autonomous, unobtrusive, unaffected by visual state, and can record over periods of seconds to years with near real-time data streaming. I am examining the spatial-temporal scales for which soundscapes can give a representation of the health and quality of coral reef habitats, as well as the characteristics and limitations of PAM on the Great Barrier Reef. Preliminary results suggest that while soundscapes can discriminate between habitats over time, the intra-site variability can approach or exceed inter-site variability.

Traditional Owners to be acknowledged: The Thaanill-warra, Ngurruumungu and Dhingaal People

Speed Talk - 4.05pm

Coral post-settlement mortality on the microhabitat scale.

Drake MA[a,b,c], Fabricius KE[b], Randall CJ[b] & Hoogenboom MO[a,b]

[a]*College of Science and Engineering, James Cook University, Townsville, Australia; m.drake@aims.gov.au*
[b]*Australian Institute of Marine Science, Townsville, Australia*
[c]*AIMS@JCU, Townsville, Australia*

The entry of coral recruits to the population is a vital component to successful reef maintenance and recovery. With world-wide declines in coral recruitment, the need for restoration becomes increasingly evident. The success of coral seeding restoration efforts, aiming at bolstering recruitment, are dependent on recognizing and mitigating early life history bottlenecks. Although the greatest variability in recruit survival has been found at small (<1m) spatial scales, the key biotic and environmental factors operating on survival at the microhabitat (millimeter to centimeter) scale remain unclear. My PhD aims to improve post-settlement survival of seeded recruits by identifying the relative roles of the key small-scale biotic and environmental actors facilitating mortality.

We acknowledge the Traditional Owners of the land on which we work, the Wulgurukaba and Bindal peoples, and pay our respects to Elders past, present, and future.

Speed Talk - 4.10pm

Uncovering Whale Shark Hotspots in Uncharted Waters and Predicting their Future

Miller, IB[a,b], Abrantes, K[a], Currey-Randall, L[c] Sheaves, M[d] & Barnett, A[a]

[a]*Biopixel Oceans Foundation, Cairns, Qld, Australia; Ingo.miller@my.jcu.edu.au*
[b]*AIMS@JCU, College of Science & Engineering, James Cook University, Qld, Australia*
[c]*Australian Institute of Marine Science, Townsville, Qld, Australia*
[d]*Marine Data Technology Hub, James Cook University, Qld, Australia*

Whale sharks are the largest fish in the ocean and an endangered species, yet their movements in the Coral Sea remain poorly understood. This research confirmed the first known whale shark aggregation site on Australia's east coast, a region where none were previously documented. Using historical sightings and satellite tracking, the study predicts seasonal habitat suitability and explores how climate change may alter future distributions. Additional analyses assess risks from shipping and plastic pollution, and new models are being developed to predict unknown aggregation sites. These findings provide essential knowledge for conserving whale sharks in rapidly changing oceans.

I acknowledge Aboriginal and Torres Strait Islander peoples as Australia's first scientists. I pay my deepest respects to Elders past, present and future, and the custodians of the land and sea country on which I work, including the Irukandji people of Cairns.

Speed Talk - 4.15pm

Macroalgal thresholds for device-based reef restoration of coral populations on inshore reefs of the Great Barrier Reef

Zampa G[a,b,c], Randall CJ[b], Hoey A[c], Abdul Wahab MA[b] & Diaz-Pulido G[d]

[a]*AIMS@JCU, James Cook University, Townsville, QLD, Australia; g.zampa@aims.gov.au*
[b]*Australian Institute of Marine Science, Townsville, QLD, Australia*
[c]*College of Science and Engineering, James Cook University, Townsville QLD, Australia*
[d]*School of Environment and Science, Coastal and Marine Research Centre, Griffith University, Brisbane, QLD, Australia*

Seeding devices can help accelerate coral reef recovery by boosting coral recruit survival during their most vulnerable early stages. However, their success depends greatly on local reef conditions, particularly macroalgal communities that compete with or overgrow young corals. Coral recruits are especially susceptible to overgrowth, shading, abrasion, and allelopathy from macroalgae, limiting survival, growth, and reef recovery. It remains unclear which macroalgal taxa or metrics have the greatest impact on early coral life stages. This project will identify macroalgal thresholds and species-specific responses to inform where seeding devices can be most effectively deployed for reef restoration.

We acknowledge the Traditional Owners and Custodians of the Manbarra Sea Country, where corals will be collected, and the Bindal people, on whose Country the AIMS facility is located and where the corals will be transported and carefully maintained until spawning. Field experiments will be carried out in the Palm Islands, again within the Sea Country of the Manbarra people, whose enduring connection to these reefs and waters we recognise and deeply respect throughout this work.s.

Speed Talk - 4.20pm

Assessing Functional Diversity of inshore coral reefs following 7 years of restoration: Impacts on coral and macroalgal communities

Lowley, P[a,b,c], Smith, H[b], Bourne, D[a,c], Page, C[c] & McWilliam, M[b]

[a]*AIMS@JCU; Peterlelkes.lowley@my.jcu.edu.au*
[b]*JCU*
[c]*AIMS*

Macroalgal removal has shown to be a promising method to restore coral cover on reefs that have been degraded by macroalgal proliferation, such as inshore reefs on the GBR. This project aims to assess the effectiveness of this restoration tool from two key aspects. Firstly, to determine if macroalgal removal effectively restores the ecosystem functioning of degraded reefs through analysis of functional traits and quantifying ecosystems functions (reef accretion, habitat provisioning, recovery rate). Secondly, the project will assess changes in macroalgal community composition between control and experimental plots to determine changes in species diversity following macroalgal removal.

Traditional Owners to be acknowledged: Bindal and Wulgurukaba People

Speed Talk - 4.25pm

Coral matchmaking: assisted gene flow to help corals beat the heat

Macadam, AD[a,b,c], Cooke, IR[a,d], Laffy, P[a,b], Strugnell, JM[a,c,e] & Quigley KM[a,f,g]

[a]College of Science and Engineering, James Cook University, Townsville, Queensland, Australia; Alexander.macadam@my.jcu.edu.au
[b]Australian Institute of Marine Science, Townsville, Queensland, Australia
[c]AIMS@JCU, Townsville, Queensland, Australia
[d]Centre for Tropical Bioinformatics and Molecular Biology, James Cook University, Townsville, Queensland, Australia
[e]Centre for Sustainable Tropical Fisheries and Aquaculture, College of Science and Engineering, James Cook University, Townsville, Queensland, Australia
[f]Minderoo Foundation, Perth, Western Australia
[g]The University of Western Australia, Perth, Western Australia

As ocean temperatures rise, coral reefs face unprecedented stress, leading to widespread bleaching and mortality. One solution is assisted gene flow - a form of coral matchmaking that enhances resilience by breeding heat-tolerant northern corals with more vulnerable central corals. By introducing novel adaptive genetic variation, this approach helps corals adapt faster than natural evolution alone and boosts offspring survival under heat stress. My findings show that these inter-regional "hybrids" can inherit higher heat tolerance, offering a promising tool to support reef survival in a warming world and guide future coral restoration efforts.

Traditional Owners to be acknowledged: Wulgurukaba, Bindal, Manburra, Ngurruumungu, Walambaar, Cape Melville, Flinders & Howick Island Aboriginal Corporation, Hopevale Congress

Speed Talk - 4.30pm

Symbiotic secrets: Sequencing the genome of vertically transmitted coral symbionts

Renton, SC[a,b], Cooke, IR[b], Nitschke, MR[c] & Chan, CX[d]

[a]AIMS@JCU, Townsville, Australia; sophie.renton@my.jcu.edu.au
[b]James Cook University, Townsville, Australia
[c]Australian Institute of Marine Science, Townsville, Australia
[d]University of Queensland, Brisbane, Australia

Symbiosis between corals and dinoflagellates of the family Symbiodiniaceae has sustained coral reefs and facilitated evolutionary diversification for over 100 million years. Corals acquire symbionts via two distinct transmission modes: horizontal transmission (environmentally acquired) and vertical transmission (germ line acquisition). While numerous genomes of the former have been sequenced, only one fragmented genome of the later exists. Owing to their resistance to cultivation, the genomes of vertically transmitted lineages, such as Cladocopium C15, remain a mystery. This project develops novel methodologies to isolate and sequence the genomes of vertically transmitted Symbiodiniaceae, directly addressing this critical knowledge gap.

Traditional Owners to be acknowledged: Samples were collected in the sea country of the Manbarra people. Lab and ongoing works are being undertaken on the land of Bindal and Wulgurukaba people.

Speed Talk - 4.35pm

Detecting the Elusive: Monitoring Giant Tritons with environmental DNA

Schlawinsky, M[a,b,c,d], Motti, CA[b,c], Strugnell, JM[a], MacNeil, MA[e] & Villacorta-Rath, AC[d]

[a]*College of Science and Engineering, James Cook University (JCU), Townsville, Qld 4811, Australia; m.schlawinsky@aims.gov.au*
[b]*Australian Institute of Marine Science, Townsville, Qld 4810, Australia*
[c]*AIMS@JCU, Division of Research and Innovation, James Cook University, Townsville, Queensland 4811, Australia*
[d]*Centre for Tropical Water and Aquatic Ecosystem Research (TropWATER), James Cook University, Townsville, QLD, Australia*
[e]*Department of Biology, Dalhousie University, Halifax, Nova Scotia, Canada B3H4R2*

How do you monitor a species that's rarely seen? The giant triton snail, a predator of coral-eating crown-of-thorns starfish, is one such species—cryptic, understudied, and potentially declining. My PhD develops a species-specific environmental DNA (eDNA) assay to detect Tritons from seawater. I tested how long their DNA persists, applied the tool across reef sites, and combined eDNA with visual sightings using occupancy modelling. This approach allows us to estimate Triton presence—even without direct observations—and provides a scalable way to monitor a rare predator that may play an important role in coral reef health.

Traditional Owners to be acknowledged: Traditional Owners of the Great Barrier Reef, specifically the Yirrganydji, Wulgurukaba, Bindal and Manbarra peoples.

Speed Talk - 4.40pm

Prediction of Trichodesmium Bloom in the Great Barrier Reefs from Hydrometeorological Parameters

Yuanning Zheng[a,b,c] & Barbara Robson[b,c,d]

[a]*College of Science and Engineering, James Cook University Townsville, Australia; y.zheng@aims.gov.au*
[b]*Australian Institute of Marine Science, Townsville, Australia*
[c]*AIMS@JCU, Townsville, Australia*
[d]*Centre for Tropical Water and Aquatic Ecosystem Research, James Cook University, Townsville, Australia*

Trichodesmium is a nitrogen-fixing cyanobacterium that frequently forms extensive surface blooms in the Great Barrier Reef (GBR), influencing regional biogeochemistry and ecosystem dynamics. Blooms have been observed year-round in the GBR, with peak occurrences generally from September to November, but the environmental drivers are not fully understood. This study explores the relationship between *Trichodesmium* blooms and environmental factors such as sea surface temperature, salinity, ocean currents, and wind. Using machine learning, we aim to identify key drivers and develop a predictive model that enhances our understanding of the drivers of blooms in the GBR. Improved forecasting of *Trichodesmium* blooms could help inform ecosystem monitoring, research planning and risk assessment, particularly in relation to water quality and potential impacts on reef health.

We acknowledge all Traditional Owners along the breadth of the GBR where this work has taken place. We acknowledge Australian Aboriginal People and Torres Strait Islander People as the first inhabitants of the nation and pay our respects to Traditional Owners of the lands where our staff and students live, learn and work.

AIMS@JCU Poster Presentations

Judging guidelines are as follows:

- A clear and concise abstract (max 250 words) as per abstract guidelines
- Well planned, laid out & organised – does it pass the test of capturing attention from across the room?
- Clear and easy to read, with good use of aesthetics and colours and without excessive text
- Quality charts & images
- Made good use of literature
- Thoroughly explained visual materials, charts/graphs, etc
- An effective introduction to the research and key outcomes which makes the reader want to find out more

AIMS@JCU Photography Competition

Judging guidelines are as follows:

- Is the image in focus?
- Is the image well composed?
- Is the image interesting/eye catching?
- Does the caption capture the essence of the image?

Poster

Spatial and temporal dynamics of tropical macroalgal assemblages on inshore reefs of the central Great Barrier Reef

Burgo M[a,b], Fabricius, K[b] & Hoey, A[a]

[a]*College of Science and Engineering, James Cook University, Townsville; martina.burgo@my.jcu.edu.au*
[b]*Australian Institute of Marine Science, Townsville*

Macroalgae are key benthic components of tropical reef systems, yet their intrinsic community dynamics remain poorly understood. We investigated the spatial patterns and temporal dynamics of macroalgal assemblages across three depths at each of nine inshore reef sites (three sites on three islands) of the central Great Barrier Reef (GBR). Specifically, we quantified the macroalgal community structure and composition every ~7 weeks for 12 months across three reef zones (reef slope, outer flat, and mid flat) at nine sites on three islands (Orpheus, Havannah, and Magnetic Island). Macroalgal canopy height, thallus density, and cover varied markedly across space and time, mainly driven by seasonal growth and senescence of canopy-forming algae, particularly *Sargassum*. Canopy structure (i.e., height and density) peaked between January and March (austral summer) and cooler months, respectively, reaching up to ~1.5 m in height and ~40 thalli m^{-2} in density, with the highest values typically observed on reef flats and lower values on reef slopes. These canopy shifts were associated with changes in the cover of understorey algae, with tall and dense canopies coinciding with lower cover of understorey macroalgae. Multivariate latent variable models suggest distinct co-occurrence patterns among taxa, with strong negative associations within canopy-forming macroalgal genera (e.g., *Sargassum* and *Sirophysalis*), and more diffuse, sometimes positive, interactions among understorey macroalgal taxa. Together, these findings highlight the dynamic nature of tropical macroalgal assemblages and underscore the importance of interactions between taxa and spatial context in shaping community structure and composition on inshore reefs.

Traditional Owners to be acknowledged: Manbarra, Wulgurukaba, Bindal

Poster

Genetic Variation in Coral Heat Tolerance Reveals Capacity for Climate Adaptation

Cornish, R[a,b,c,d], Goyen, S[a,c] & Bay, L[a,b,c,d]

[a]*AIMS@JCU, Townsville Queensland Australia; Rhys.cornish@my.jcu.edu.au*
[b]*Division of Research and Innovation, James Cook University, Townsville Queensland 4811 Australia*
[c]*Australian Institute of Marine Science, Townsville MC, Queensland 4810, Australia*
[d]*College of Science and Engineering, James Cook University, Townsville, Queensland 4811, Australia*

Marine heatwaves are increasing in frequency and severity, causing widespread coral bleaching and threatening the stability of reef ecosystems. While temperature-tolerant genotypes may facilitate adaptation, their heritability and contribution to population-level resilience remain poorly understood. Predictive models often lack the resolution to detect genotypic variation and associated fitness outcomes. We tagged 350 *Acropora millepora* colonies on the southern Great Barrier Reef and tracked their bleaching responses during a 2020 heatwave, with approximately 94% recovering. These colonies exhibited a range of responses, and subsequent rapid heat-stress assays on adults identified distinct high- and low-tolerance phenotypes. This classification informed a quantitative genetic experiment during the November 2022 mass spawning. We performed controlled crosses using two dams (assumed low-tolerance) and 22 sires (11 high-tolerance, 11 low-tolerance), generating 37 successful larval families. After four days of development, larvae were exposed to control and elevated temperature treatments. Survival after 168 hours revealed large differences among families (2.3-fold increase in survival probability for larvae with the high thermal tolerance phenotype). Heritability estimates derived from mixed-effects models ($h^2 \approx 0.52$) and parent-offspring regression ($h^2 \approx 0.25$) confirming genetic variation for thermal tolerance. A single-locus selection model, approximating polygenic tolerance and informed by observed survival differences, indicates strong directional selection favouring heat-tolerant genotypes, potentially driving rapid genetic adaptation under ongoing warming scenarios. This study is the first to investigate thermal tolerance adaptation within a coral population using tracked genotypes. It reveals substantial standing genetic variation and potential for evolutionary responses by *Acropora millepora* under accelerating environmental stress.

Traditional Owners to be acknowledged: Woppaburra

Poster

Community-led marine OECMs: assessing enabling regulatory frameworks and potential cases in Indonesia

Rayhan Dudayev[ab], Beby Pane[c], Thomas Gammage[a,d,f], Georgina Gurney[afgh] & Dedi Adhuri[e]

[a]*College of Arts, Society and Education of James Cook University; Rayhan.dudayev@my.jcu.edu.au*
[b]*AIMS@JCU, To-wnsville, Queensland 4811, Australia*
[c]*Faculty of Law of Universitas Gadjah Mada*
[d]*College of Science & Engineering, James Cook University*
[e]*Research Center for Society and Culture, National Research and Innovation Agency*
[f]*Centre for Sustainable Tropical Fisheries and Aquaculture, James Cook University, Townsville, Queensland, Australia*
[g]*Institute of Marine Science, University of Tasmania, Hobart*
[h]*School of Geography, Planning, and Spatial Sciences, University of Tasmania*

The Convention on Biological Diversity's Kunming-Montreal Global Biodiversity Framework (KM-GBF) calls for conserving at least 30 percent of the planet through protected areas or Other Effective Area-based Conservation Measures (OECMs) by 2030. OECMs can complement Marine Protected Areas by recognising diverse forms of management delivering biodiversity benefits regardless of their objectives. A key barrier to their implementation is a lack of legal clarity on OECM identification, recognition, and monitoring at the national level. To address this, we examine Indonesia's marine and forestry regulations in the context of OECM criteria, identifying opportunities to adapt existing policies to support the recognition of community-led marine areas as OECMs. These regulations generally align well with Criterion A (non-protected area) and Criterion B (active governance), but gaps remain in addressing effectiveness in conserving biodiversity (Criterion C) and associated ecosystem services and socio-cultural values (Criterion D). Building on this analysis, we evaluated three Locally Managed Marine Areas in Indonesia to assess how the OECM framework could support on-ground management practices. These case studies showed conservation effectiveness, with increases in resource availability (e.g.> 65% more catch in two sites). Our findings underscore OECMs' potential as inclusive, adaptable models for advancing biodiversity targets in Indonesia and beyond.

I acknowledge the Traditional Owners of the land on which I live and work—the Bindal and Wulgurukaba (Manbarra) people—and pay my respects to Elders, past, present, and emerging.

Poster

Synthesis and Characterisation of Sustainable Plasticisers

Ghobish, S[a], Vamvounis, G[a], Motti, C[b,c] & Bissember, A[d]

[a]*AIMS@JCU, and College of Science and Engineering, James Cook University, Townsville, 4811, Queensland, Australia; Sarah.ghobish@my.jcu.edu.au*
[b]*AIMS@JCU, Division of Research and Innovation, James Cook University, Townsville, Queensland 4811, Australia*
[c]*Australian Institute of Marine Science, PMB 3, Townsville, Queensland 4810, Australia*
[d]*School of Natural Sciences – Chemistry, University of Tasmania, Hobart, Tasmania 7001, Australia*

Global plastic production has exceeded 400 million tons annually, resulting in an estimated 200 million tons of plastic waste currently present in the world's oceans. In aquatic environments, plastic waste breaks down into microplastics, which significantly accelerate the leaching of toxic chemical additives—particularly plasticizers—into the ecosystem. These compounds pose both physical and chemical threats to marine organisms. As a result, there is an increasing demand for sustainable, eco-friendly alternatives to conventional plastic additives.

This study explores bio-based plasticizers, focusing on gallic acid, which occurs naturally in algae, and eugenol, a compound derived from clove oil. Derivatives of these compounds were successfully synthesized and chemically modified to function as bio-based plasticizers. Their performance was evaluated in plastic formulations and demonstrated comparable or improved plasticizing effects relative to di(2-ethylhexyl) terephthalate (DEHT), a widely used conventional plasticizer employed as the benchmark.

Future work will include the evaluation of the leaching behavior, biodegradability, and toxicity of these newly developed plasticizers to assess their sustainability.

We acknowledge the Australian Aboriginal and Torres Strait Islander peoples as the traditional owners of the lands and waters where we live and work.

Poster

Optimising machine learning performance for monitoring turbid inshore coral reefs

Jha, D[a], González-Rivero, M[a] & Hoogenboom, MO[a]

[a]*AIMS@JCU, Townville, Australia; Dharini.jha@my.jcu.edu.au*

Climate change and human activities increasingly threaten marine ecosystems, including coral reefs. Monitoring benthic habitats typically involves analysing images of the reef benthos (photo-transects) to extract information on health status, which delays the delivery of science to inform management actions. We urgently need efficient techniques to analyse extensive imagery rapidly and accurately to monitor and assess benthic communities. This study leverages machine learning (ML) techniques, specifically Convolutional Neural Networks and transfer learning, to optimise automated benthic mapping in inshore reefs. Challenges such as data variability, resolution limitations, and label-set complexity are carefully considered to improve model accuracy. The findings underscore the importance of robust perceptron size and taxonomic resolution in ML models for accurate benthic analysis. Increasing the amount of information provided to ML models through the perceptron size improves accuracy, especially when extracting complex information or taxonomic resolution (Morphological and Genus-level) from the imagery. The taxonomic resolution used for training ML algorithms impacts the performance of automated estimations. At high-level aggregations (Functional groups), models trained with higher taxonomic resolutions improve the consistency of hard coral and algae cover estimations across survey sites. Training ML models for routinely collected data requires considering the temporal variability in reef composition. The results show that ML trained with only one year of data are less accurate in predicting coral cover estimations in the following years. Through meticulous optimisation of ML models and addressing critical challenges, this study makes significant advances in automated benthic mapping, facilitating more effective conservation efforts in marine ecosystems.

I begin by acknowledging the Traditional Custodians of the land on which we gather today, and pay my respects to their Elders past and present. I extend that respect to Aboriginal and Torres Strait Islander peoples here in Australia.

Poster

Understanding the Spatial and Temporal Patterns of Marine Fauna in the Otway Basin using Marine Fauna Observer Data

Mafla-Viscarra, N[a,b,c], Thums, M[b], McLean, D[b], Cerqueira Ferreira, L[b], Wheatley, K[d] & Hamann, M[a]

[a]*James Cook University, Townsville, Australia; nicolas.mafla@jcu.edu.au*
[b]*Australian Institute of Marine Science, Townsville, Australia*
[c]*AIMS@JCU, Townsville, Australia*
[d]*BMT, Hobart, Australia*

Marine fauna observations offer crucial insights into the spatial and temporal patterns of species distribution in offshore environments. Through industry partnerships, the Australian Institute of Marine Science has compiled a dataset of marine fauna sightings recorded by Marine Mammal Observers aboard vessels operating in the Otway Basin, Australia. The data provide an opportunity to investigate the spatial and temporal patterns of the reported species in this region. Data were collected during daylight hours over a period of up to seven months, capturing species identity, distance, bearing, and behavioural context. Recorded species included marine mammals, sharks, and marine turtles, along with ecological indicators such as bait balls and seabird aggregations. By applying density surface modelling, we aim to quantify habitat use, particularly for threatened species like pygmy blue whales, and assess the impact of offshore infrastructure on marine megafauna. The findings contribute to marine spatial planning efforts, including the management of proposed offshore renewable energy developments in the region.

Traditional Owners to be acknowledged: Bindal People (Townsville, place where I live); Gunditjmara Country (Otway Basin, my research site)

Poster

Beyond the core: Extended ultraconserved element regions as a promising approach for scalable genetic assessment in coral aquaculture and restoration

Mateos, A[a], Sato, Y[b], Cowman, P[a,c], Bridge, T[a,c], Yeoh, Y[b] & Bourne, D[a,b]

[a]*JCU, Townsville, Australia; alejandro.mateosfernandez@my.jcu.edu.au*
[b]*AIMS, Townsville, Australia*
[c]*Queensland Museum Tropics, Townsville, Australia*

Preserving coral genetic diversity and ensuring correct species identification are critical for sexual propagation of corals. Closely related coral species can be challenging to distinguish morphologically and while various methods exist for measuring interspecific and intraspecific variation, challenges remain in obtaining molecular data in a fast way. This study introduces a novel and cost-effective approach for species identification and intraspecific genetic profiling by extending flanking regions of ultraconserved elements (UCEs) to capture genetic variation. By analysing existing low-coverage genomic data from six Acropora taxa, a subset of 100 informative UCE loci was identified. When extended to 5 kb on either side, these loci provided phylogenetic resolution and intraspecific diversity estimates in most cases equivalent to whole-genome sequences. This method is suited to be integrated with fast long-read sequencing and provides an alternative for genetic assessment of coral populations, with broader applicability to support genetic assessment across taxa where taxonomic uncertainty is common.

Traditional Owners to be acknowledged: Wulgurukaba

Traditional Owners to be acknowledged for Miller, IB (following page): I acknowledge Aboriginal and Torres Strait Islander peoples as Australia's first scientists. I pay my deepest respects to Elders past, present and future, and the custodians of the land and sea country on which I work, including the Irukandji people of Cairns.

Poster

Needle in a Haystack: Uncovering the First Whale Shark (*Rhincodon typus*) Aggregation in the Coral Sea

Miller, IB[a,b,c], Fitzpatrick, R[a], Abrantes, K[a], Norman, B[d,e], Pierce, SJ[f,g], Erdmann, MV[h], Hoopes, LA[i], Dudgeon, C[a,g], Dunbabin, MD[a,j], Dove, ADM[i,k], Beaman, RJ[l], Reynolds, SD[d,e], Rohner, C[f], Williams, SM[m,n], Paton, D[o], Lewis, S[d] & Barnett, A[a]

[a]*Biopixel Oceans Foundation, Cairns, Qld, Australia; Ingo.miller@my.jcu.edu.au*
[b]*AIMS@JCU, College of Science & Engineering, James Cook University, Qld, Australia*
[c]*Marine Data Technology Hub, James Cook University, Qld, Australia*
[d]*ECOCEAN Inc, Cogee, WA, Australia*
[e]*Harry Butler Institute, Murdoch University, WA, Australia*
[f]*Marine Megafauna Foundation, West Palm Beach, FL, USA*
[g]*School of Science, Technology and Engineering, University of the Sunshine Coast, Sunshine Coast, QLD, Australia*
[h]*Conservation International Aotearoa, University of Auckland, Auckland, New Zealand*
[i]*Georgia Aquarium, Atlanta, GA, USA*
[j]*Robotics and Autonomous Systems, Institute for Future Environments, Queensland University of Technology, Brisbane, Qld, Australia*
[k]*Museum of Science and History, Jacksonville, FL, USA*
[l]*College of Science and Engineering, James Cook University, Cairns,Qld, Australia*
[m]*Queensland Department of Agriculture and Fisheries, Brisbane, Qld, Australia*
[n]*The School of Biological Sciences, The University of Queensland, St Lucia, Qld, Australia*
[o]*Blue Planet Marine, Canberra, Kingston, ACT, Australia*

Aggregations are key events, supporting critical ecological and biological functions in many species. For highly mobile and elusive species, aggregations often provide the only feasible opportunities for research. Whale sharks (*Rhincodon typus*) form at least 30 consistent seasonal aggregation sites globally, yet none have been documented in the Coral Sea, despite sporadic sightings of solitary individuals and groups. This study aimed to identify and characterise the first whale shark aggregation on Australia's east coast by predicting potential sites through a data layering approach and confirming their presence through targeted field expeditions. A combination of historical sightings data, expert and anecdotal knowledge, and scientific knowledge from other whale shark aggregation sites led to the identification of Wreck Bay, situated at the far northern Great Barrier Reef, as potential aggregation habitat. An initial field expedition in 2019 confirmed the aggregation, and three subsequent voyages in 2021–2024 gathered further demographic and movement data. A total of 59 individuals were identified, with a strong male bias (3.5:1) and all classified as immature sharks ranging from 3.5 to 8.0 m in estimated total length. Satellite tracking revealed a mean residence time of approximately 3 weeks (21.6 days ±10.1 SD; range: 7–43 days), with some individuals revisiting the aggregation in subsequent years. The peak aggregation period occurs from late November to late December, with movements concentrated along the continental shelf before dispersing into the Coral Sea. Tracked sharks (n = 18) exhibited wide- ranging movements, with a mean track duration of 144 days (range: 3–770 days) and a mean total track length of 1463 km (range: 19–11,355 km). This study provides the first evidence of a whale shark aggregation in the Coral Sea and highlights Wreck Bay as key habitat for this iconic and globally endangered species.