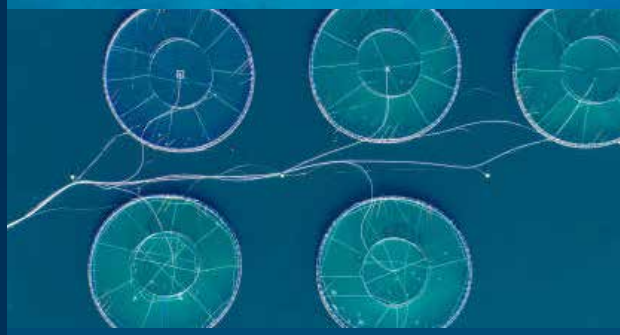
AMSA 2019

MARINE SCIENCE FOR A BLUE ECONOMY

7-11 July 2019
Fremantle, Perth

Program Handbook

Australian Marine Sciences Association Inc. 2019 Conference
Esplanade Hotel Fremantle by Rydges
amsa19.amsa.asn.au



AMSA
AUSTRALIAN MARINE SCIENCES ASSOCIATION INC.

PRESIDENT'S WELCOME ADDRESS

It is a great pleasure to welcome delegates, sponsors and exhibitors to AMSA 2019, the 56th Annual AMSA Conference 'Marine Science for a Blue Economy'. Fremantle, a port city nestled between the Swan River and the Indian Ocean, is the perfect setting for our conference theme exploring the link between marine science and the blue economy. I have happy memories of the last AMSA conference in Fremantle in 2011 and the excellent social and conference facilities provided by this same venue, the Esplanade Hotel.

The Scientific Committee have assembled a wonderful selection of keynote speakers, drawing on some of Australia's preeminent marine scientists to bring their perspective to the challenges presented to marine science by Australia's developing blue economy. We will hear from Tim Moltmann, Dr Peter Macreadie, Dr Cass Hunter, Dr Pia Winberg and Professor Graham Edgar about aspects of the blue economy from climate science to sustainability in fisheries and aquaculture, to blue carbon and indigenous knowledge. Dr Ana Parma from Argentina will bring a global perspective to issues of sustainability in fisheries.

I will have the very pleasant task of presenting the Jubilee Award for 2019 to Emeritus Professor Helene Marsh from James Cook University in recognition of her contribution to research, teaching and the conservation biology of dugongs and other cetaceans. The Jubilee Award was first given in 1988 to recognize an active marine scientist who has made an outstanding contribution to marine research in Australia during his or her career. We will also acknowledge Brett Louden, the winner of the 2019 Technical Award and hear a presentation from Kate Dodds, the winner of the Allen Award. The Joe Baker Poster session will honour Joe Baker's contribution to AMSA and marine science while providing a casual setting to check out interesting posters presented by colleagues and students.

Looking at the program I realise there will be very little down time with 29 symposia, 12 workshops, social events, the AMSA Annual General Meeting, the conference dinner and a public lecture on Wednesday about ocean plastic pollution. Thank you to the local Organising Committee and Scientific Committee for putting together such a varied and interesting program. Good luck to all those competing for one of the many student prizes. AMSA is a truly multi-disciplinary conference, so make the most of this opportunity to hear about marine science outside your immediate research interest. The conference is a great opportunity for the next generation of marine scientists to mix with the current generation in both formal and social settings. I urge students to make new contacts with other students and talk with professionals from a range of disciplines.... and most of all, have fun!

Regards

Dr Penny Berents
AMSA President

WELCOME FROM ORGANISING CHAIR

On behalf of the organising committee, welcome to the AMSA 2019 'Marine Science for a Blue Economy' Conference!

We hope all the delegates find the program to be diverse and engaging. The Organising and Scientific Committees were filled with those who have great conference experience and you'll see we have incorporated a lot of different ideas to maximise the delegate experience.

We have strived to make the conference appealing to researchers, consultants and managers alike by including symposia and workshops on traditional marine science themes as well as industry and management related themes. We have also tried to allow time for discussion among symposium presenters and have offered some optional free panels and workshops for you engage in during some of the breaks.

Your social calendar is all sorted for your week in Fremantle, with the Welcome Reception, Poster Function and Conference Dinner being ideal functions for re-connecting with colleagues and expanding your networks. There's an additional opportunity for students to network during their Student Night and for all to get schooled on how to live a more plastic free life for the benefit of our oceans during the 'Plastic Free July: thinking globally, acting locally' Public Lecture given by Rebecca Prince-Ruiz, Founder and Director of the Plastic Free July Foundation.

On the topic of plastic, we have done our best to make the AMSA19 Conference as plastic free as possible, from asking the venue to not provide plastic pens and individually wrapped mints to having plastic free name badges and GO2CUP for those who need coffee and tea! We are proud of our efforts and we hope our delegates support and share our values.

I would like to extend a warm welcome to our sponsors and exhibitors. Your contributions and presence at the conference have contributed to an exciting program and what, we hope, is a memorable conference experience for all delegates.

For those of you joining us from interstate and overseas, and to those joining us from the strong WA marine science community, we hope you enjoy AMSA19 and are inspired to forge ahead with new ideas to safeguard the health of our oceans and marine life while sustaining the economic and societal needs that accompany a growing nation.

Regards

Dr Alicia Sutton
Organising Chair

WELCOME FROM SCIENTIFIC CHAIR

On behalf of the Scientific Committee it gives me great pleasure to welcome you to the 56th Annual AMSA Conference, 'Marine Science for a Blue Economy'.

Australia is privileged to have such a vast and diverse marine environment surrounding its shores which provides us with a variety of services of economic, environmental and social benefit. The Scientific Committee have created a science program which highlights science that can help us to better understand and sustainably manage our priceless marine estate and we are excited to share it with you. We are looking forward to hearing about the linkages between marine science and the blue economy in a variety of disciplines including marine megafauna, artificial structures in marine environments, earth observation, port management, fisheries, coastal oceanography, estuarine science and marine conservation reserves, just to name a few. A number of symposia emphasise the collaborative nature of our marine science community and the number of discussion workshops planned through the program demonstrate the importance of the AMSA conference in bringing the Australian marine science community together to foster those collaborations and review and plan for the next advances in marine science.

We are thrilled to host Mr Tim Moltmann, Associate Professor Peter Macreadie, Dr Cass Hunter, Dr Pia Winberg, Dr Ana Parma and Professor Graham Edgar as plenary speakers and warmly thank them for their commitment to our program.

The Scientific Committee has worked tirelessly to shape the science program and I sincerely thank them for their time, ideas and commitment to a multitude of tasks, not just creating submission guidelines, reviewing symposia and workshop proposals and abstracts, and planning plenaries. The symposium chairs have been fantastic in providing abstract reviews and reviewing speaker order lists and we extend our gratitude to them all.

The overwhelming response of submitted abstracts for this conference suggests the community is already enthused by the scientific program on offer, and we hope that your enthusiasm and interest grow with each day. The Scientific Committee had an underlying goal to embrace and showcase the diversity of marine science and marine scientists in the Australian community and we hope that shows through the selection of speakers and the symposium, workshop and panel topics on offer. Thank you for joining us and contributing as we celebrate and share the latest advances in marine science in Australia.

Regards

Charlotte Robinson
Scientific Committee Chair

CONFERENCE APP

1. Search for 'The Event App' on the App or Google Play Store
2. Download 'The Event App by EventsAIR'
3. Open the App and enter the code 'AMSA2019'
4. Then sign in using your email and PIN which will be emailed to you in your final registration letter
5. OR SCAN these QR codes

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LOCAL ORGANISING COMMITTEE

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WA Branch President, AMSA

Director, Principal Scientist, Carijoa

Ms Charlotte Birkmanis

PhD candidate, School of Biological Sciences and Oceans Institute, The University of Western Australia

WA Branch Secretary and Student Representative, AMSA

Dr Holly Raudino

Research Scientist, Department of Biodiversity, Conservation and Attractions, Marine Science Program

Dr Tiffany Simpson

Research Associate, Trace and Environmental DNA Lab, Curtin University

Dr Elizabeth Sinclair

Senior Research Fellow, School of Biological Sciences and Oceans Institute, The University of Western Australia

Dr Simon Strydom

Research Scientist, Marine Science Program at the Department of Biodiversity, Conservation & Attractions

Jo Buckee

Principal Scientist, TLA Environmental

PhD Candidate, Environmental and Conservation Sciences, Murdoch University

Centre for Sustainable Aquatic Ecosystems, Harry Butler Institute, Murdoch University

Dr Andrew Hosie

Curator (Crustacea & Worms) Department of Aquatic Zoology, Western Australian Museum

Dr Matthew Harvey

Director, Ocean Vision Environmental Research Pty. Ltd.

Robert Pemberton

Business Support Manager, Oceans Institute, The University of Western Australia

SCIENTIFIC COMMITTEE

Dr Charlotte Robinson - Chair

Research Associate, Remote Sensing & Satellite Research Group, Curtin University

Dr Jennifer Verduin - Co-Chair

Senior Lecturer, Oceanography and Marine Pollution, Environmental and Conservation Sciences, Murdoch University, Centre for Sustainable Aquatic Ecosystems, Harry Butler Institute, Murdoch University

Dr Frances D'Souza

Senior Environmental Officer, Department of Water and Environmental Regulation

Dr Indi Hodgson-Johnston

Assistant Director, Integrated Marine Observing System

Dr. Lyndon Llewellyn

Lead, Science Impact and Stakeholder Development, Australian Institute of Marine Science

Professor Anthony Richardson

Centre for Applications in Natural Resource Mathematics, School of Mathematics and Physics, University of Queensland and CSIRO Oceans and Atmosphere

Dr Alicia Sutton

Conference Chair & WA Branch President, AMSA

Director, Principal Scientist, Carijoa

Dr James Tweedley

Lecturer of Animinal Biology, School of Veterinary and Life Sciences, Centre for Sustainable Aquatic Ecosystems, Harry Butler Institute, Murdoch University

Dr Beth Fulton

Research Group Leader Marine Systems Modelling & Informatics, CSIRO Oceans & Atmosphere

Adjunct Professor Centre of Marine Socioecology, University of Tasmania

Kevin Bancroft

Research Scientist (Marine) Marine Science Program, Biodiversity and Conservation Science Directorate, Department of Biodiversity, Conservation and Attractions, Kensington, Western Australia

Honorary Research Associate, School of Biological Sciences, The University of Western Australia

Jo Buckee

Principal Scientist, TLA Environmental

PhD Candidate, Environmental and Conservation Sciences, Murdoch University

Centre for Sustainable Aquatic Ecosystems, Harry Butler Institute, Murdoch University

Associate Professor Nicole Jones

Ocean Graduate School and The UWA Oceans Institute, Affl. School of Civil, Environmental and Mining Engineering, The University of Western Australia

SPONSORS

Silver Sponsors

CSIRO is Australia's national science agency. We solve Australia's greatest challenges through innovative science and technology. CSIRO Oceans and Atmosphere delivers world-class science that enables governments, industries and communities to make informed decisions about the sustainable use and management of the marine and atmospheric environment. Oceans and Atmosphere is uniquely placed to deliver new and improved marine scientific knowledge, information, products and services that contribute significant economic, social, cultural and environmental benefits to Australia and the region.

The UWA Oceans Institute is a multidisciplinary ocean research organisation, established in 2010 and based at The University of Western Australia (UWA). Located in Perth, Western Australia, the proximity of the Oceans Institute, adjacent to the Indian Ocean, provides a hub for world-class collaborative marine research.

Through our internal and external links, the research profile of the Oceans Institute brings together multidisciplinary research strengths in areas such as oceanography, ecology, engineering, social science, and governance to deliver answers for the grand challenges concerning the sustainable future of our Oceans.

The Western Australian Marine Science Institution (WAMSI) is a collaboration of state, federal, industry and academic organisations working together to provide world-class independent marine research.

WAMSI facilitates the Western Australian marine science community's integrated and coordinated approach to complex research issues to inform management and industry decision making.

Our research has made new discoveries, strengthened previous knowledge, developed new tools and models as well as applied existing national and global models to the Western Australian context.

WAMSI advances new knowledge and understanding of the WA marine estate and its biological resources to provide 'Better Science for Better Decisions'.

Symposia Sponsors

North Queensland Bulk Ports is the port authority for the four trading ports of Hay Point, Mackay, Abbot Point and Weipa. Our role at these ports may include marine pilotage, security, safety, maintenance, port and infrastructure development, environmental monitoring and community engagement.

BMT is a leading international design, engineering, science and risk management consultancy that provides a broad range of products and services across the environment, energy, shipping, ports and logistics and defence sectors.

The Institute for Marine and Antarctic Studies (IMAS) is a world-class centre of excellence for research and education at the University of Tasmania. Its research is innovative, relevant, and globally distinctive while its education delivers first-class programs resulting in highly trained scientists and researchers serving the needs of academic institutions, industry, government and the community. IMAS has three core research programs in Fisheries and Aquaculture, Ecology and Biodiversity, and Oceans and Cryosphere. These are linked by the cross-disciplinary themes of Climate change, Ocean-Earth systems and Oceans and Antarctic governance.

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Launched in 2016, the Regional Estuaries Initiative is a $20 million state government program to improve the health of six estuaries in Western Australia's South West: Peel-Harvey Estuary, Leschenault Estuary, Vasse-Wonnerup Estuary, Hardy Inlet, Wilson Inlet and Oyster Harbour.

Geoscience Australia is a Commonwealth Government agency that is the nation's trusted advisor on the geology and geography of Australia. We support evidence-based decisions through information, advice and services for a strong economy, resilient society and sustainable environment. We undertake baseline mapping of the seabed to better understand marine resources and assets, and to measure change over time.

Supporter

Keynote Sponsor

Murdoch University helps free thinkers discover how to make a difference, through outstanding education and translational research endeavour. Murdoch is committed to promoting an all-inclusive, nurturing environment for students and academics, and we support researchers to collaborate to tackle the world's greatest challenges in sustainability, health and food.

Conference Dinner Sponsor

The Marine Biodiversity Hub is funded by the Australian Government's National Environmental Science Program. We foster nationally-consistent research tailored to help decision-makers manage and conserve Australia's marine biodiversity. Our projects range from establishing monitoring baselines for Australian Marine Parks to quantifying the risk of shipping to large marine fauna. Lately we've helped explore seamounts off Tasmania, prioritise research needs for sharks, rays and chimeras, forge collaborations to aggregate and link research data, estimate Grey Nurse Shark numbers, and establish rescue populations for the Critically Endangered Red Handfish. This year we begin working with the Malgana Indigenous community to restore seagrasses at Shark Bay.

Joe Baker Poster Session Sponsor

The Australian Institute of Marine Science is Australia's tropical marine research agency. We provide expert knowledge to develop globally relevant research solutions for the nation.

As a world leader in marine science our research:

- improves ocean ecosystem health; and
- protects coral reefs from climate change.

This creates economic, social and environmental benefit for all Australians.

Welcome Reception Sponsor

The Harry Butler Institute, is a hub for the Community, Research, Business and the Environment. The Institute aims to carry on the work of its namesake, in creating global awareness about translational environmental research and demonstrating that with proper management, it is possible for business and the environment to co-exist.

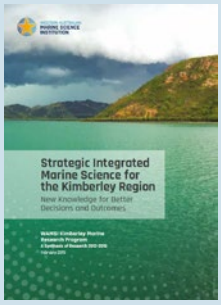
Better science
Better decisions

The Western Australian Marine Science Institution (WAMSI) is a collaboration of state, federal, industry and academic organisations working together to provide world-class independent marine research.

WAMSI facilitates the Western Australian marine science community's integrated and coordinated approach to complex research issues to inform management and industry decision making.

Strategic Integrated Marine Science

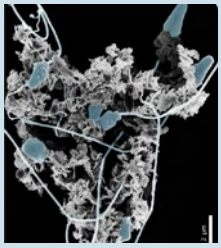
Kimberley Marine Research Program



WAMSI's $30 million Kimberley Marine Research Program has delivered the science results that give researchers and managers access to a comprehensive set of new information to monitor and understand changes in the Kimberley's unique marine environment.

The studies have produced important information that identifies biodiversity and tourism hotspots, unique habitats and species that are key to the health of the ecosystem.

Dredging Science Node



The $19 million Dredging Science Node has delivered one of the largest single issue environmental research programs in Australia.

This world-class research will vastly improve the planning and regulation of major dredging operations in Western Australia, nationally and internationally.

Government of **Western Australia** Department of **Jobs, Tourism, Science and Innovation**

Government of **Western Australia** Department of **Water and Environmental Regulation**

Australian Government | Australian Institute of Marine Science

CSIRO

ECU Australia Edith Cowan University

Government of **Western Australia** Department of **Biodiversity, Conservation and Attractions**

The University of Western Australia

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WAM Western Australian Museum

Government of **Western Australia** Department of **Primary Industries and Regional Development**

Curtin University

waGOOS western australian global ocean observing system

Murdoch University

Western Australian Marine Science Institution
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WESTERN AUSTRALIAN MARINE SCIENCE INSTITUTION

EXHIBITOR LISTING

1	In-Situ Marine Optics	In-situ Marine Optics
2	IMBROS Pty Ltd	imbros Technology for Laboratory & Marine Science
3	Marine Dynamics Academy	MARINE DYNAMICS ACADEMY
4	CAPSTAN	CAPSTAN Collaborative Australian Post-Graduate Sea Training Alliance Network
5	Commercial ROV Australia	COMMERCIAL ROV AUSTRALIA
5A	IMV Imaging	imv imaging
6	RBR Ltd. / MSI	RBR METOCEAN SERVICES INTERNATIONAL MSI

7	Australian Marine Parks	
8	eDNA Frontiers, Curtin University	
9	CSIRO	
10	Marine National Facility, CSIRO	
11	Ocean Sonics	

AMSA STUDENT PRIZES

Each year at the annual AMSA conference, student prizes are awarded to the most outstanding oral and poster presentations in a number of categories.

The Ron Kenny Prize (Oral and Poster)

The Ron Kenny Student Presentation Prize for the best full-length oral presentation of research results and the Ron Kenny Student Poster Prize for the best poster display of research results. The prizes are named in honour of Assoc. Prof. Ron Kenny, a foundation member of the Association and editor of its *Bulletin* for nine years until his death in August 1987. The purpose of the prizes is to reward excellence in scientific work by students in any field of marine science, and to encourage a high standard of scientific communication. The prizes are provided by a special Trust Fund maintained by AMSA and are the Association's major form of recognition and encouragement of student effort.

Peter Holloway Oceanography Prize (Oral)

The prize, originating in 2002, is awarded to the best full-length student oral presentation related to Oceanography. This prize is partly funded by interest on funds donated to AMSA by the Australian Physical Oceanography Division of AMSA when it ceased to function as a separate entity in mid-2002, and from the Peter Holloway Memorial Symposium at AMSA 2004 in Hobart. Peter Holloway was a highly distinguished, physical oceanographer, internationally recognized for his contribution to the observation, theory and numerical modeling of internal waves.

Sea World Research & Rescue Foundation Prize (Oral and Poster)

The Sea World Research and Rescue Foundation (SWRRFI) has made a commitment to support the annual AMSA conference by donating a prize for the Best Student Talk and Best Student Poster in the area of Science and Conservation of Marine Vertebrates. The winning student for oral presentation must provide a brief summary (<300 words) of the presentation/project suitable for general public audiences and the winning student for poster presentation must agree to their poster being included in the annual SWRRFI newsletter which is distributed to the scientific, zoological, education, corporate and general communities both nationally and internationally. The SWRRFI Committee and Sea World are pleased to be able to offer financial support to students through this forum and look forward to a rewarding association with AMSA and its members.

Fisheries Research & Development Corporation Prize (Oral and Poster)

The Fisheries Research and Development Corporation (FRDC) student prize was first awarded in 2002. FRDC student prizes are supported by funding from the FRDC on behalf of the Australian Government. The FRDC sponsored prizes are to be given to any category of student presenting within one year of completing their respective study course. The subject matter of the talk/poster must be consistent with Programs 1 or 2 of FRDC's Research and Development Plan, namely Natural Resources Sustainability and Industry Development.
As a condition of acceptance of this prize, FRDC is to be provided with profiles, photos and write-ups of the prize-winners and their research for consideration for publication in FRDC's regular newsletter, or social media.

Diversity Journal Award for Coral Reef Research (Oral and Poster)

Diversity is an international and interdisciplinary open access journal published quarterly online by MDPI. Focused on diversity; concept, assessment and preservation from the molecular through to the organismic. The journal encourages scientists to publish experimental and theoretical results with extensive detail and no restriction on length of papers. The journal also has a focus on marine diversity, with recent highlights in the theme of Coral Reef Research.

RBR Award for Innovative Marine Science (Poster)

RBR are a global company that design and produce innovative instruments for measuring the blue planet. Their products are widely used from the deepest depths of the ocean through to coastal and polar research. With a range of sensors and loggers for measuring many water parameters, RBR instruments are built on a modular platform for rapid customisation to scientists needs.

Ernest Hodgkin Estuary Research Award (Oral or Poster)

Donated by The Committee of the Ernest Hodgkin Trust for Estuary Education and Research, this prize is to be awarded annually for the best student presentation on research that will facilitate a greater understanding of estuarine processes and management.

For further information on the awards click here

KEYNOTE SPEAKERS

Mr Tim Moltmann

Director, Integrated Marine Observing Systems (IMOS)

Tim Moltmann is the Chair of Australia's National Marine Science Committee and current Director of Australia's Integrated Marine Observing System (IMOS), based at the University of Tasmania in Hobart. In this role he is responsible for planning and implementation of a large national collaborative research infrastructure program, which is deploying a wide range of observing equipment in the oceans around Australia and making all of the data openly available to the marine and climate science community and other stakeholders. Tim's other national roles include being Co-Chair of Australia's Forum for Operational Oceanography, and a member of national committees on Marine Biodiversity research, Environmental Information, and integrated monitoring and reporting for the Great Barrier Reef. He has worked in primary industries and fisheries at State Government level, and has extensive background experience in private industry in Australia and the UK. His international roles include being Chair of the Global Ocean Observing System Regional Alliance Forum, and an ex officio member of the Global Ocean Observing System Steering Committee.

A/Prof Peter Macreadie

Head of Blue Carbon Lab

Dr Peter Macreadie is the Head of the Blue Carbon Lab based at Deakin University in Victoria and the Lab is in the forefront of global efforts to advance blue carbon science and projects. Peter's research focuses on understanding and responding to the impacts of global change in aquatic ecosystems (namely marine, but also freshwater). In particular, his research focuses on capitalising on 'blue carbon' and showcasing the powerful ability of coastal vegetated ecosystems to sequester carbon, and thereby help mitigate climate change. Coastal 'blue carbon' ecosystems (seagrasses, saltmarshes, mangroves) are among earth's most efficient carbon sinks, burying carbon faster than tropical rainforests and locking away carbon in the ground for millennial time scales. His approach to research is multi-disciplinary, spanning the fields of chemistry, ecology, microbiology, economics, policy, and molecular biology.

Dr Cass Hunter

Indigenous social ecological researcher | Coastal Development and Management Program, Oceans and Atmosphere, CSIRO

Dr Cass Hunter is a Kuku Yalanji and Torres Strait Islander woman. She is an Indigenous social ecological research scientist with CSIRO Oceans and Atmosphere. Cass leads research on collaborative environmental design, useability and uptake of tools, research translation, and development of participatory tools to support sustainable livelihoods and ecosystems. Blue carbon is providing a new opportunity for emerging markets to support Indigenous-led blue carbon methodology that links Indigenous knowledge and values with wider markets and frameworks. She has strong interests in providing opportunities for Traditional Owners to engage in environmental enterprises.

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Dr Ana Parma

Center for the Study of Marine Systems, CONICET (National Scientific and Technical Research Council)

Dr. Ana Parma is a Principal Researcher of CONICET – the Argentine Council for Science & Technology, based at the National Patagonic Center in Puerto Madryn, Argentina. She earned her Ph.D. in Fisheries Science in 1989 from the University of Washington, and worked as an assessment scientist at the International Pacific Halibut Commission until 2000, when she returned to Argentina, her home country. She has worked on different aspects of fisheries modelling, assessment and management, covering a diverse range of fisheries, from artisanal coastal fisheries targeting benthic shellfish to large-scale international fisheries targeting tunas. The main focus of her research has been on the evaluation and design of harvesting strategies that can achieve sustainability in the face of the diverse technical and institutional challenges posed by these fisheries. She has always work at the interface between science and management, being involved in several scientific and policy advisory boards and review panels both at the national and international levels. Currently she is a member of the Science Council and Global Board of The Nature Conservancy, and an advisor for the Commission for the Conservation of Southern Bluefin Tuna, where she chairs the technical group in charge of the management strategy evaluation for rebuilding the southern bluefin tuna stock.

Professor Graham Edgar

Institute for Marine and Antarctic Studies, University of Tasmania

Graham Edgar's major current interests include ongoing development of the citizen science Reef Life Survey program, and demonstration that field studies with broad generality can be conducted across very large spatial, temporal and taxonomic scales at low cost. Ecological and conservation topics addressed over 40 years also include interactions between seagrasses and associated fauna, taxonomy of crustaceans and fishes, clarification of metabolic-based regularities in communities, and assessment of the magnitude of different threats to marine biodiversity. Graham's career history includes periods as Director of Marine Research at the Charles Darwin Research Station (Galapagos Islands), Senior Fulbright Fellow in Washington (USA), and JSPS Fellow in Amakusa (Japan). He has been awarded the AMSA Silver Jubilee Award (2011), the Eureka Prize for Environmental Research (2014), and was the 2017 Tasmanian STEM Researcher of the Year.

Dr Pia Winberg

CEO & Chief Scientist – Venus Shell Systems Pty. Ltd.
CEO – PhycoHealth Pty. Ltd.
Honoary Fellow – School of Medicine, University of Wollongong

Pia has worked across sustainable marine industry development and academia for the past 20 years. Her focus has gone from research to applied technology development in integrating marine food production systems with the environment, to deliver potent nutritional benefits to society. Nutrition and food is a key opportunity for a transition to a more sustainable future, and the oceans are a platform that can deliver on that if approached wisely. Seaweed is the biggest aquaculture crop globally and has a value of close to $12B. Integrating seaweed and marine systems ecology into industrial processes is an opportunity for sustainability and nutritional outcomes that are aligned with the United Nations Sustainability Development Goals. Added to our mainstream food chain, seaweed could contribute significantly to reducing malnutrition in impoverished countries, as well as chronic diseases related to western diets, including obesity which now rivals starvation. I will present the case for marine food production including seaweed, in contributing to our basic food intake in the west... for everyone... every day.

Assessing Seabed Status in 24 Trawled Regions of the World

C. Roland Pitcher[1], Jan G. Hiddink[2], Simon Jennings[3], Jeremy Collie[4], Ana M. Parma[5], Ricardo Amoroso[6], Tessa Mazor[1], Marija Sciberras[2], Robert A. McConnaughey[7], Adriaan D. Rijnsdorp[8], Michel J. Kaiser[2,10], Petri Suuronen[9,11] and Ray Hilborn[6].

1 CSIRO Oceans and Atmosphere, Brisbane, Australia
2 School of Ocean Sciences, Bangor University, Menai Bridge, Wales, UK
3 International Council for the Exploration of the Sea, Copenhagen, Denmark
4 University of Rhode Island, Narragansett, Rhode Island, USA
5 Centro Nacional Patagónico, Puerto Madryn Chubut, Argentina
6 University of Washington, Seattle, WA, USA
7 NOAA, Alaska Fisheries Science Center, Seattle, WA, USA
8 IMARES Wageningen UR, Ijmuiden, Netherlands
9 FAO Fisheries and Aquaculture, Rome, Italy.
10 Currently: Heriot-Watt University, Riccarton, Edinburgh, EH14 4AS, UK
11 Currently: Natural Resources Institute (Luke), Helsinki, Finland

Bottom-trawl fishing is widely considered to pose serious risks to seabed habitats. We apply a new method, suitable for data-poor fisheries, to quantify the relative benthic status (RBS) of the seabed: the amount of biota present, in equilibrium with trawl depletion, as a proportion of biota present without trawling. Estimating RBS for grid cells requires parameters for trawl impact and recovery rates, and maps of trawling intensity and habitats. Regional status is summarized by the average and cumulative distribution of grid-cell RBS values. Average RBS was >0.9 for 16 regions (i.e. trawling has depleted regional biota by <0.1) whereas three (European) regions had average RBS <0.7. Where trawl target species were managed within accepted sustainability limits ($F<F_{MSY}$), there was 93.3% probability that regional RBS was >0.9; thus, sustainable fisheries production and sustaining the environment are complementary and achievable. Within the five Australian regions, subsequent definition of 217 meso-scale eco-regions showed most had little or no exposure to trawling, but several have high trawl exposure and are priorities for future detailed habitat risk assessment. These results provide sea-scape scale indicators needed for balancing production and environmental sustainability objectives and for development of best practices for ecosystem-based fishery management, reporting and certification.

Sea Jellies Illuminated: Partnering with industry to deliver world-class marine research infrastructure

Kylie Pitt[1], Marnie Horton[2], Trevor Long[2] and Erin Wyatt[2]

1 Griffith University, Parklands Drive, Southport, QLD, 4222
2 Sea World, Sea World Drive, Main Beach, QLD, 4217

Partnering with industry can be an efficient way for universities to develop world-class marine research infrastructure. In 2018, Griffith University partnered with Sea World to develop 'Sea Jellies Illuminated', a combined jellyfish display and state-of-the-art jellyfish research laboratory, located at Sea World. The laboratory occupies the second floor of the exhibit and contains a wet-lab that houses banks of kreisels (specialized jellyfish aquaria) and a dry lab. The glass walls of the laboratory enable the ~1.2 million people who visit Sea World each year to watch research being done. A visitor's area outside the laboratory is equipped with videos and digital interactive displays to interpret the research and educate visitors about jellyfish and the marine environment. Our partnership is delivering mutual benefits. Griffith University benefits from access to world-class facilities, prominent exposure of the Griffith brand and the opportunity to engage the public in science. Partnering with Griffith University provides Sea World with credibility for the research it supports, access to a broader audience to share messages of conservation, and ready access to scientific expertise. The partnership between Griffith University and Sea World is a fantastic example of the synergies that can exist between universities and industry.