

# CALL FOR



AUSTRALIAN MARINE SCIENCES ASSOCIATION

PRESENTS

MARINE SCIENCE IN THE ANTHROPOCENE

27 JUNE - 2 JULY 2021  
MACQUARIE UNIVERSITY SYDNEY

THE DEADLINE FOR ABSTRACT  
SUBMISSIONS IS 1 FEBRUARY 2021.  
FOR MORE INFORMATION VISIT  
[AMSA2021.AMSA.ASN.AU](http://AMSA2021.AMSA.ASN.AU)

**AMSA**

**2021**

# ABSTRACTS

**Second Round**

**CALL FOR CONFERENCE ABSTRACTS**

**Oral Presentations and Posters**

CALL FOR ABSTRACTS DUE BY

Monday, 1 February 2021

AUTHORS WILL BE ADVISED OF THE OUTCOME OF THEIR  
SUBMISSION BY

Friday 5 March, 2021

AUTHORS TO RETURN THEIR ACCEPTANCE OF INVITATION TO  
PRESENT FORM BY

Friday, 19 March, 2021

EARLY BIRD REGISTRATION CLOSURES

Friday, 12 March, 2021

FINAL POWERPOINTS ARE DUE BY

Monday 21 June, 2021

## Invitation to Participate

On behalf of the Australian Marine Sciences Association (AMSA) it is our pleasure to invite you to participate in the second round call for Submissions for the AMSA 2021 Conference.

Commencing with the Welcome Reception on the evening of Sunday, 27 June 2021, the Conference will be held at Macquarie University, NSW from Sunday, 27 July and conclude on Friday 2 July 2021.

The theme for the 2021 Conference is:

## Marine Science in the Anthropocene

### Conference Symposia

The Conference Organising Committee is seeking submissions related to the following Conference Symposia

- A Changing Southern Ocean – Interdisciplinary Research for Responding to Antarctic Change - **NEW**
- Applications of Seabed Mapping to Resource and Environmental Management during the Anthropocene.
- Changing Oceans, Changing Culture: Elevating Aboriginal People in Sea County Management.
- Environmental Stewardship: Taking Positive Actions in Marine Social Ecological Systems.
- Future Proofing Marine Habitats: Assisted Adaptation to Synthetic Biology.
- Historical Data and Information Foundations of Anthropogenic Impacts in Marine Environments. Interdisciplinary Research to Underpin a Sustainable Anthropocene.
- Marine Bioinvasions in the Anthropocene.
- Marine Environmental Management in the Anthropocene: The Roles of Science and Scientists.
- Marine Megafauna in the Anthropocene – Challenges and Solutions.
- Maritime Emergencies: Science Informing Response and Recovery of Oil Spills at Sea.
- Molecular tools to Inform Marine Ecosystem Management.
- Morphodynamics and Management of the Shorelines and Habitats of Estuaries and Bays.
- Multiple Stressors and Cumulative Impacts of Marine Ecosystems.
- Ocean Chemistry: Using the Past and Present to Inform the Future.
- Our Future Ocean: Delivering to the UN Decade of Ocean Science.
- Pathways to Addressing the Plastic Pollution Problem in the New Decade.
- Ports in the 21st Century. Resilience of Marine Organisms to Climate Change.
- Resilience of Marine Organisms to Climate Change

- The Importance of Light at Night in the Marine Environment.
- Tiny, but Mighty: The Importance of Plankton in a Changing Ocean.
- Tropical Systems in a Time of Change - **NEW**
- Unifying Approaches to Enhancing Marine and Estuarine Habitats: Restoration, Rehabilitation and Eco-engineering.
- What Does Science Offer: Managing Marine Estates in the Anthropocene.
- What is in a name? Importance of Taxonomic Research in the Anthropocene.

Full detail of the Rationale for each Symposium is included as Appendix A of this document.

## Type of Submissions

The Conference Scientific Committee aims to create a Conference program with a mix of the following presentation types:

- Oral Presentations (12 minutes)
- Conference Posters

### Oral Presentations

Oral presentation abstracts are limited to a maximum of 200 words and can be submitted for any of the Symposia listed within this document or can be submitted under the GENERAL Stream. Oral presentations are a maximum of 12 minutes in duration. Each presenter is limited to a single oral presentation abstract, but can submit an additional abstract for a poster.

Accepted abstracts will be included on the Conference Website and display on the Conference App prior to, during and following the Conference.

### Poster Display

Presenters wishing to submit a poster presentation must submit an abstract of up to 200 words. If accepted, the poster must not exceed the size of A0 (1189-841mm) and be brought along to the Conference for display. All accepted posters will be displayed for the duration of the Conference. Poster presenters are required to attend the poster session.

### Review Criteria

Abstracts and posters will be reviewed against the following scientific criteria:

- Relevance of the abstract to the symposium or Conference theme
- Clarity in objective or question
- Evidence of results
- A clear take-home message for the audience

Based on these criteria and the number of submissions to the Conference, oral abstracts may be moved to other symposia, be accepted as a poster or be rejected at the Conference Scientific Committee's discretion.

### Submission Details

- All abstracts are to be submitted online via the Official Conference Website at [www.amsa2021.amsa.asn.au](http://www.amsa2021.amsa.asn.au)
- Abstracts should be a maximum of 200 words
- Abstracts should be submitted by no later than Friday, 1 February 2021.
- Contributors will be provided with advice of acceptance or rejection of their submission. The Committee reserves the right to accept or reject any submissions. The timelines for this advice are included on page 1 of this document.
- Presenters will be advised of the outcome of their submission by no later than Friday, 5 March 2021

### Important Information for Presenters

Please note: The presenting author/s must register to attend the Conference for at least the day in which they are scheduled to present and registration must be completed and paid for prior to the close of Early bird registration. If there are other authors on the paper who are attending the Conference to present, they must also register to attend the Conference. For all registration enquiries and details, we refer you to the conference website: [www.amsa2021.amsa.asn.au](http://www.amsa2021.amsa.asn.au)

Student presenters who wish to be considered for a prize must select this option when submitting their abstract. Students must have an active candidature at the time of the conference to be considered. Evidence of this may be requested by the Scientific Committee.

### Further Information

For further information regarding the AMSA 2021 Conference, please contact:

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# **Appendix A: Symposia Details**

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## **A Changing Southern Ocean – Interdisciplinary Research for Responding to Antarctic Change**

### Rationale

The Southern Ocean is ‘taking the heat’ in the Anthropocene. It plays a disproportionate role in global heat and carbon dioxide uptake, and areas of the Southern Ocean are amongst the fastest changing on the planet. Southern Ocean environments and ecosystems face an uncertain future, with implications for conservation and for human populations globally. Resolving these uncertainties and identifying policy options to respond to future challenges requires interdisciplinary approaches that integrate across physical, chemical, biological and socioeconomic change. This symposium welcomes presentations that showcase interdisciplinary science for understanding and responding to anthropogenic change in the Southern Ocean.

## **Applications of Seabed Mapping to Resource and Environmental Management during the Anthropocene.**

### Rationale

The use of sonar and laser technologies to map the seabed in high-resolution has grown significantly in Australia in the past 15–20 years. Improvements in technology, operability and affordability has seen wide uptake of these systems by marine industries and research groups who use the data for a diverse range of applications. Data can now be acquired rapidly at high resolution to not only fill gaps in our spatial knowledge of the seabed, but also to measure change over time for understanding seabed dynamics and better management of coastal hazards. The suite of potential applications is rapidly expanding due to the development of technologies such as multi-frequency systems, ARA for sediments, inertial sub-sea positioning methods for deep surveys, water column data for petroleum seeps and fisheries assessments, autonomous and remotely operated surface and underwater survey vehicles, and compact sub-bottom profilers for coastal geology. In addition, the AusSeabed initiative is facilitating a more cost-effective approach to seabed mapping through collaboration, providing a place for open data and encouraging new tools and applications to better prepare for the challenges of managing marine systems at a time of increasing resource use and significant environmental change. This symposium invites contributions that showcase current research and new applications of multibeam sonar, LiDAR and other technologies used for measuring and addressing human induced changes in the Anthropocene across our coastal and marine environments from the seabed, up into the water column and on to the coast.

## **Changing Oceans, Changing Culture: Elevating Aboriginal People in Sea Country Management**

### Rationale

Indigenous people have long had a significant interdependence with the ocean where they live. These marine systems and environments are vital for our survival, providing a wide array of food, shelter and materials. The sea environment is also significant for our cultural, religious, social and emotional systems. We are custodians and stewards of our cultural land/seascapes and environmental systems (Marshall, 2019).

Climate change and the anthropocene (human activities) are causing large changes to the structures, functions and resilience of our life-supporting ecosystems. These ecosystems systems are embedded in Indigenous cultural seascapes and cultural dimensions. There is therefore inherently a flow-on effect that has already begun to directly impact on culturally important plant and animal species for Indigenous communities and our cultural sustenance in health, culture, access and utilisation.

Climate change presents both an enormous global challenge and an important local opportunity for greater recognition and participation of Indigenous knowledges and peoples in marine science and management. This is a discussion and decision that needs the input and guidance of Indigenous peoples as part of leading the redesign of our future.

This symposium invites contributions from First Nations and non-First Nations presenters that highlight and discuss how the implementation and collaboration of Indigenous knowledges strategies can realise sustainable marine resource use in the era of climate change

These themes may assist presenters in the development of their abstracts but is a guide only. Submissions are not limited only to these topics.

- Rising sea levels
- Seasonal harvesting
- Responsive cultural climate art. Eg. Ghost Nets
- Legally protecting First Nations water management
- Role of cultural institutions, government and education
- Seasonal Calendars / Marine Management
- Community Managed Protected Areas
- TEK and species Management

## **Environmental Stewardship: Taking Positive Actions in Marine Social Ecological Systems.**

### Rationale

As the Anthropocene Epoch charges from concept to reality, it is increasingly urgent to understand and manage the relationship between humans and our environment. Natural systems can no longer be considered in isolation from human impacts, both positive and negative. This symposium invites contributions that develop our knowledge of the positive actions that we can take in our relationship with the marine environment. It seeks to provide a necessary counterbalance to the essential yet sometimes overwhelming focus on negative impacts. This may include research on local environmental

stewardship actions such as restoration, citizen science and sustainable use of resources, and institutional responses such as protected areas and modelling of ecosystem services. Where possible, we ask speakers to take a systems approach, conceptualising the human-environment relationship as components, flows and interactions.

## **Future Proofing Marine Habitats: Assisted Adaptation to Synthetic Biology.**

### Rationale

Environmental and climatic change is outpacing the ability of organisms to adapt at an unprecedented level resulting in range contractions and global ecosystem shifts to novel states. At the same time, global habitat deterioration of marine ecosystems is necessitating active interventions to halt loss and “future proof” marine ecosystems.

Genetic rescue, assisted adaptation and assisted evolution are emerging strategies that could be used to boost the resilience of species and populations to future climate stress. Moreover, advances in genomics and gene technology continue to accelerate, providing never-before imagined solutions to current and emerging environmental problems. Gene editing and synthetic biology are perhaps the fastest developing and transformative scientific fields with vast application to solve extant and emerging environmental problems. This symposium will bring together researchers from ecology, microbiology, synthetic biology and ethics with the aim of discussing possibilities for “future-proofing” marine habitats. This symposium invites contributions that identify where and when such strategies may play a role in halting or reversing global habitat loss, discuss challenges in this field, and identify pathways for future research to converge towards practical environmental solutions.

## **Historical Data and Information Foundations of Anthropogenic Impacts in Marine Environments.**

### Rationale

The ocean environment has experienced unprecedented anthropogenic pressures

over the past century. However, despite the growing concerns about increasing climate change, marine pollution and other human-induced impacts on marine biodiversity, ecosystem processes and services, many marine disciplines lack the adequate historical baseline data necessary to comprehensively understand these issues. Such data are essential to minimise shifting baselines, which mask the scale of anthropogenic impacts. Moreover, the reconstruction of historical time-series empowers the understanding of temporal trends and predictions of potential trajectories under different policy and management scenarios. To address this issue, marine scientists have developed a range of techniques to define baselines (e.g., biochemistry of ice cores in Antarctica) and reconstruct long- term time-series (e.g., unexploited abundance of commercially important fish stocks).

This information can be used to improve accuracy of predictive models and provide managers and decision makers with more accurate and comprehensive information on which to base decisions while minimising the effects of shifting baselines.

This symposium invites contributions from a range of marine disciplines that address the lack of historical baselines and incomplete time-series of data. The symposium will focus on advances in developing standardised methods and techniques to reconstruct historical data gaps by utilising primary and secondary data sources, such as cultural and traditional knowledge, historical records, grey literature, etc. In particular, the symposium will focus on case studies that illustrate how these reconstructed data can be used to inform the decision-making process to reduce and mitigate anthropogenic impacts in the marine environment.

### **Marine Bioinvasions in the Anthropocene.**

#### Rationale

Bioinvasions pose one of the greatest risks to marine ecosystems and the blue economy. Human activities such as aquaculture and marine aquaria, transport infrastructure development and increasing maritime trade has led to a significant increase in the spread of marine species to new environments globally.

Introduction and spread of marine species have resulted in large scale changes to ecosystems, as seen in the Mediterranean and the Caribbean seas.

Responsibility for marine biosecurity, which aims to minimise the risks posed by marine pests and aquatic diseases, is shared across government, industry, researchers and the community. Collaboration and information flow between sectors is essential for the development of robust biosecurity systems.

Australian and New Zealand marine biosecurity is underpinned by a strong foundation of scientific research, but the risks posed by marine pests and diseases are dynamic. This symposium invites contributions that share information on the ecological, societal and economic impacts of biosecurity, and future considerations in this field. This is of particular relevance due to the changes occurring in transport, climate and social expectations. It is anticipated that this symposium will provide an exciting opportunity for scientists to demonstrate the real-world applicability of their research, with a focus on practical and novel means of investigating and understanding the introduction, establishment, spread and impacts of marine bioinvasions to enable better prevention and management.

### **Marine Environmental Management in the Anthropocene: The Roles of Science and Scientists.**

#### Rationale

In the Anthropocene human activities are causing large changes to the structures, functions and resilience of our life-supporting ecosystems. To identify, understand and manage the processes/causes involved, we need reliable

knowledge to inform policies and management strategies addressing agreed social goals (e.g., UN sustainability goals).

We usually assume that a) scientific inquiry is the source of such knowledge since the scientific process has achieved much in explaining nature and b) the public, media, politicians and bureaucrats claim to privilege science for their underlying knowledge. Unfortunately, the Anthropocene has seen declining credibility and public trust in science and scientists. For example, there are:

- unintended consequences of evidence-based policies;
- shonky scientists with advocacy roles;
- beliefs that climate scientists are influenced by career advancement and political ideology;
- acrimonious scientific

disputes. Moreover, there are:

- Post-truth politics where emotion/faith trump facts/expertise;
- Post-modern philosophy with multiple equally-valid realities;
- Media sometimes distorting facts and quoting unreliable knowledge.

Some consequences/responses suggest that this anti-science situation is serious:

- “Science, the one source of objective knowledge, is in deep trouble”. Daniel Sarewitz (2016)
- The March for Science 2018 “decries that science, scientists, and evidence- based policy-making are under attack.” Balmford and Knowlton (2017).

This symposium invites contributions that address the role of science and scientists concerning marine research, policy and management. Subject matter includes a) socio- economic issues; b) tensions between fact and value, between objective and subjective language, and between witness and advocate; and c) suggestions that enhance the efficacy of science and scientists.

## **Marine Megafauna in the Anthropocene – Challenges and Solutions.**

### Rationale

Marine megafauna have been in a state of decline and extinction since the Late Pleistocene. With the Anthropocene set to accelerate this trend, the threats faced are both diverse and complex. Impacts can be devastating at both individual and population levels. While some threats such as entanglement or plastic ingestion have received considerable attention, other less obvious perturbations may influence over a range of spatial and temporal scales. In many cases impacts can be synergistic, culminating in greater overall effects that complicate research and mitigation. This symposium invites contributions on megafauna (e.g. sharks, mammals, turtles, birds) over a wide range of anthropogenic-associated research topics including climate change, shipping, fishing, exploration, pollution, terrestrial runoff, mining and other threats observed in Oceania waters. This symposium will align conservation stakeholders, including researchers and managers, to discuss emerging challenges and technological advancements set to shape megafauna conservation in the Anthropocene. Presentations that offer potential solutions to

these threats are particularly welcome.

## **Maritime Emergencies: Science Informing Response and Recovery of Oil Spills at Sea.**

### Rationale

Australia depends almost exclusively on shipping to transport its exports and imports and is the largest bulk commodities exporter in the world. Our growing offshore petroleum industry is also critical to the country's energy security. Both New Zealand and Australia maintain comprehensive capabilities to prevent maritime emergencies and to minimise the impacts of marine pollution from vessels and offshore petroleum when it all goes wrong. This includes technical, scientific and expert support to assess environmental, social, cultural and economic impacts, and advise on appropriate restoration. This symposium invites contributions from government, industry and research organisations to discuss scientific developments in spill response and the lessons learned from recent oil and chemical spills at sea.

## **Molecular tools to Inform Marine Ecosystem Management.**

### Rationale

The application of nucleic acids-based methods for biodiversity monitoring has exploded in the past decade, with technological advances in DNA and RNA analysis driving development of increasingly rapid and cost-effective approaches to describing biological communities. Environmental DNA and RNA comprise any nucleic acids retrieved from environmental samples, including those collected from sampled organisms (e.g. in plankton tows or benthic grabs) as well as nucleic acids present in material shed from living organisms through secretory processes such as the sloughing of skin, scales, mucus, eggs, sperm, blood, or defecation, or found as free molecules or attached to other particles in the environment (e.g. sediment). Detection of eDNA/eRNA in water, sediment, biofilm or any other types of samples can reveal information on the current or previous status of marine communities and may offer critical solutions to mitigate increasing anthropogenic pressure on marine systems.

As such, eDNA/eRNA-based tools can provide a wealth of information for studies of biodiversity, food web dynamics, diet analysis, and for environmental impacts assessments. The approach has broad applications in both basic and applied research, and will attract the interest of marine scientists and managers, including those involved in conservation and fisheries management, biosecurity, and the regulatory requirements of industry. We welcome papers that focus on methodological developments, comparisons with traditional morphological methods as well as those aimed at applying these recently established tools to enhance our understanding of impacts in marine ecosystems and to address important ecological or management issues that morphologically-based methods are unable to inform upon.

## **Morphodynamics and Management of the Shorelines and Habitats of**

## **Estuaries and Bays.**

### Rationale

Estuarine coasts are widespread and densely populated. Inside estuaries and bays, the nearshore and shoreline morphology is a fundamental determinant of the range and extent of the area available to support a range of critical habitats, from mangroves, saltmarsh, seagrass, through to shoals that may be exposed at lower stages of the tide and used by sea birds, and sandy beaches. This symposium invites contributions from multidisciplinary researchers and practitioners to focus on understanding the occurrence, distribution, morphology and ecosystem services provided by estuarine and bay shores and intertidal environments. Speakers are encouraged to focus on understanding relationships between shoreline morphology and the spectrum of diverse energy sources in estuaries and bays, including ocean gravity waves propagating inside, locally generated wind waves, infragravity waves, boat wakes, and currents driven by tides, river inflow, and/or waves. We aim to increase the understanding of the gradients of energy that control estuarine shorelines and available habitats, and understand the complex sedimentary exchange processes, such as with the flood tidal delta that allow the existence, and stability of these habitats. This is becoming increasingly important with the coastal squeeze, combined with an uncertain climate with predicted changes in wind, wave and storm directions.

## **Multiple Stressors and Cumulative Impacts of Marine Ecosystems.**

### Rationale

Most marine ecosystems are threatened by cumulative and multiple human stressors, yet we still have little ability to predict how multiple stressors interact to cause ecological change. This symposium invites contributions that explore the impact of multiple stressors, including fishing, pollution, infrastructure development and climate change on marine ecosystems. The focus will be on studies that tackle two or more stressors.

There are an increasing number of studies that attempt to address the effects of multiple stressors, but these topics are often spread out across a number of different symposia, often relating to the particular system under study (e.g. marine megafauna or estuaries). This symposium will provide a forum for sharing research approaches across different disciplines. This will help to identify commonalities and differences and contribute to the building a more general theory for how we can predict the impact of multiple stressors to marine ecosystems. Doing so will help to inform much needed guidelines for the management of ecosystems that are exposed to multiple stressors.

## **Ocean Chemistry: Using the Past and Present to Inform the Future.**

### Rationale

This symposium brings together the latest research on the biogeochemistry of the waters surrounding Australia and New Zealand in the past, present, and in

the current and future Anthropocene. To sustainably manage ocean resources and build a resilient Blue Economy, we need to understand the biogeochemical cycling of elements and chemical species in the modern ocean, how these cycles have changed in the past, as well as how these cycles may change in the future.

Understanding potential future changes requires both a firm understanding of modern biogeochemical processes, as well as how they may have varied under past climate states (e.g. lower and higher CO<sub>2</sub>, temperatures and sea-level), reconstructed from sedimentary archives. This symposium is linked to the global initiatives of GEOTRACES, the International Ocean Discovery Program (IODP), the Integrated Marine Observing System (IMOS), and Southern Ocean Carbon and Climate Observations and Modeling (SOCCOM).

For this symposium, we especially welcome contributions on modern and past biogeochemical cycling of elements and chemical species in the ocean. These can include nutrients, micro-nutrient elements, toxic elements, climate-active gases, species associated with ocean acidification and ocean anoxia.

## **Our Future Ocean: Delivering to the UN Decade of Ocean Science.**

### Rationale

The science we need to meet the challenges of reversing ocean ecological decline while meeting future sustainable development goals will require more than just scaling up our current approaches to business as usual. With this in mind, the United Nations General Assembly declared that a Decade of Ocean Science was needed to substantially transform the science and data that would be needed to meet the agreed upon global Sustainable Development Goals (SDGs). The United Nations Decade of Ocean Science for Sustainable Development (2021–2030) (hereafter “the Decade”), calls on those in science, business, industry, government, and the public to come together to collaboratively harness advances from all fields to better understand our ocean, how humans interact with it, the responses of the ocean to that use and develop solutions for achieving a sustainable future. The Decade aims to drive the generation of interdisciplinary science, data, and information needed by multiple stakeholders to meet the SDGs by breaking down barriers and finding new ways of better integrating data and providing the analytical tools to aid decision-making for sustainable development. This “whole earth” approach to ocean observation, analysis, modeling and delivery of information will allow society to better account and plan for the complex and often non-linear processes that drive ocean systems and the many pressures impacting them. This symposium aims to bring the science community together and invites contributions to discuss transformative approaches to achieving ocean sustainability that could contribute to the Decade.

## **Pathways to Addressing the Plastic Pollution Problem in the New Decade.**

### Rationale

Plastic pollution continues to be a major pollution issue in all aquatic environments and with plastic production projected to grow exponentially over

the coming decade there is a need to set clear directions to address this wicked problem. This symposium invites contributions explore our current scientific understanding and management of the sources and discuss the fate and impacts of plastics to aquatic environments as they relate to the Australasian region. Its focus will be to examine contemporary policy and management and the gaps that need to be addressed. Speakers are encouraged to cover strategies required for managing the plastic problem in the upcoming decade from different stakeholders' points of view.

## **Ports in the 21st Century. Resilience of Marine Organisms to Climate Change.**

### Rationale

As the pivot point for import/export activities that underpin the economies of island nations such as Australia and New Zealand, ports and associated infrastructure are of significant economic and social importance. There are over 70 ports on the Australian coastline alone. These vary in size and scale; and many are located on significant river systems that feed into productive marine environments. These nodes also concentrate activities from within the catchment that have significant risk of impacting upon environmental and social values. Ensuring these nodes, their operations, maintenance and future expansions are managed to leading practice standards is, therefore, of critical importance for ensuring sustainable operations benefit environmental protection.

Key matters include reduction of risks from dredging and placement related activities by improving scientific understanding for management benefits, master planning of land-based infrastructure to mitigate risk of impacting upon environmental and social values of adjacent urban landscapes, and identification of leading practice opportunities to improve environmental performance of ongoing port operations. Ports are also proactive in innovation and sustainability, valuing science, and are often the practical implication of science creating change for a net environmental benefit.

This symposium invites contributions from these areas. Emerging science in regards to reactive dredge management, beneficial reuse of sediments and other materials, blue carbon opportunities, sustainability initiatives, and the power/challenges of integrated monitoring data will be explored. Discussion will benefit identification of future opportunities and industry challenges to be addressed in support of sustainable interaction with environmental assets.

## **Resilience of Marine Organisms to Climate Change**

### Rationale

Over this century, our oceans are becoming warmer and more acidic. Climate change will also cause greater fluctuations in salinity, food concentrations, hypoxia and sea level rise. The last decade of research has shown that marine species are vulnerable to climate change, yet some have shown the capacity for resilience. Research is now focused on building resilience of marine organisms using a range of methods including trans- and multi-generational experiments, transplant experiments, naturally occurring resilient populations, and

determining the underlying mechanisms that are involved (e.g. genetics, epigenetics, maternal investment). This symposium invites contributions on resilience, how it can be built in a climate change context and which marine organisms are most likely to persist and why in the marine Anthropocene.

### **The Importance of Light at Night in the Marine Environment.**

#### Rationale

For most of evolutionary history, organisms have experienced invariant cycles of light days and dark nights, that shifted predictably with lunar and seasonal phases. This reliable day-night cycle has led to biological clocks—circadian rhythms—that coordinate and regulate daily behaviours and physiology for the majority of organisms on Earth. In the marine environment, the timing of significant events such as courtship, reproduction, dispersal and settlement are often closely linked to changes in light rhythms. Day-night cycles also influence species interactions (e.g. predation, competition) and habitat use, by regulating the duration and time in which organisms conduct key activities. However, the relatively recent invention and subsequent proliferation of artificial lights has altered the night environment over a substantial portion of the Earth's surface, resulting in a mismatch between evolutionary adaptations and the present environmental conditions many organisms now face. This session invites contributions on the influence of both natural and artificial light on all aspects of coastal and marine ecosystems, from individual to community or population dynamics, with the aim of gaining a thorough understanding of the many ways in which light plays an important role in regulating the marine environment.

### **Tiny, but Mighty: The Importance of Plankton in a Changing Ocean.**

#### Rationale

Species distribution and abundance of marine plankton (phyto and zooplankton) is dependent on the temperature, light, nutrients (and micro-nutrients), salinity and physical properties of the ocean. Plankton are at the base of the food web and provide food for open ocean and coastal marine ecosystems including important commercial fisheries. They are also an important sink for carbon in the oceans. In order to sustainably manage important fisheries and vulnerable marine ecosystems in Australian and New Zealand waters it is important that we understand how plankton distributions and abundances have changed from the past to the present to assess how they might alter in the Anthropocene.

This symposium welcomes contributions ranging from plankton and microbial assessments, culturing studies, flux measurements from sediment traps, satellite studies, modelling studies, and down core studies to look at changes in plankton under past climate events analogous to those expected under future anthropogenic climate change.

### **Tropical Systems in a Time of Change.**

## Rationale

Tropical regions are host to critically important marine ecosystems in terms of biodiversity, productivity and provision of ecosystem services. Unfortunately, these systems are increasingly under threat. From coastal intertidal regions and mangrove forests to seagrass beds and coral reefs (in and offshore), human impacts are pushing these systems to the brink, and sometimes past their capacity for resilience. In response to continued ocean warming, many tropical species are expanding their ranges into higher latitudes, but we know little about the consequences of these intrusions on recipient temperate systems. This session will provide an opportunity for researchers to showcase their work on these dynamic tropical and 'tropicalised' systems. Papers will look at fundamental aspects of these systems and/or the organisms that occur within them as well as works that highlight the impacts of our changing world on them and how such changes can be measured.

## **Unifying Approaches to Enhancing Marine and Estuarine Habitats: Restoration, Rehabilitation and Eco-engineering.**

### Rationale

The human population is increasing its coastal footprint and we continue to profoundly modify our coastlines both through the degradation of natural habitats and creation of new artificial structures, ranging from seawalls to entire new islands.

Approaches to enhancing these degraded or modified habitats are known by various terms - restoration, rehabilitation, reconciliation, eco- or green engineering, living shorelines - but share underlying goals of enhancing the multiple functions that these habitats must sustain. A number of key challenges to achieving these goals apply to all approaches, and here we highlight four: 1) a lack of knowledge in key areas of relevant science, 2) the general failure to scale up habitat enhancement past experimental plots to real-world spatial scales, 3) the need to "future proof" enhancements against coming environmental change, and 4) the need to unify the different approaches to habitat enhancement when considering the most effective ways to build or restore coastlines. In this symposium we invite contributions to address these four key issues in systems ranging from natural habitats, such as kelp, oysters, mangroves and corals, to the built marine environment.

## **What Does Science Offer: Managing Marine Estates in the Anthropocene:**

### Rationale

Estuarine and coastal environments are highly productive, diverse and dynamic locations that provide significant social and economic values for the Australian community. They are also adjacent to major centres of human population and, in many cases, have undergone significant changes associated with a wide range of human activities. Historically, some activities (commercial fishing, wastewater discharges) have been managed, but usually in isolation of other stressors.

Increasingly, however, strategies to proactively address the full range of risks posed by these changes have been adopted in an effort to preserve the values of marine environments for current communities and future generations. For example, a wide-ranging, 10-year Marine Estate Management Strategy was adopted in 2018 for NSW, covering 1M ha of estuary and ocean, 750 km of ocean coastline, 6,500 km of estuarine foreshore, 826 beaches, 44 offshore islands and 185 estuaries. There are 6 Marine Parks in the NSW Marine Estate, with several more in adjacent oceanic waters under Commonwealth jurisdiction.

Effective, evidence-based management of marine estates requires an evaluation and prioritisation of the threats to their environmental assets and their social and economic benefits. It also needs an accepted process for addressing policy and management challenges. Using the NSW situation as a key case study, this symposium will describe the scientific background that supported the development of integrated management actions to address the highest priority environmental and social threats. Other case studies are also encouraged. More broadly, the symposium will consider the nexus between science and the management of marine environments, explore the role of scientists in advocating for change and assess the key knowledge requirements for the future locally and globally.

## **What is in a name? Importance of Taxonomic Research in the Anthropocene.**

### Rationale

The aim of this symposium is to explore existing gaps in taxonomic knowledge of Australia's marine biodiversity and consequences of inadequate attention to taxonomy for both research and natural resource management. Taxonomy, the science of recognizing and delimiting species, is a dynamic discipline because discoveries of new organisms together with advances in methodology lead to a constant re-evaluation of the boundaries among taxonomic entities. Much of marine benthic biodiversity in Australia is still being discovered and increasingly species previously considered 'widespread' are being found to represent complexes of undescribed species. However, due often to limited communication between taxonomists and ecologists, physiologists, conservation managers, wrong names continue to appear in the literature. Such taxonomic misnomers have important consequences as they can result in the loss of valuable information associated with a species name. The consequences of incorrect identification extend to all aspects of natural resource management. The critical importance of taxonomy in the global quest to mitigate biodiversity loss and prevent biological invasions cannot be overemphasised. When ecological studies use the wrong names, any comparisons among such studies are meaningless due to the potentially different feeding modes, reproductive strategies, distribution ranges, and habitat types of misidentified species. Correct taxonomy is equally essential to ensure that potentially invasive non-native species are correctly identified and are not confused with known or undescribed native taxa. This symposium invites contributions that highlight the need to increase collaboration and communication between taxonomists and the end users of taxonomic data.