

## APPLIED MARINE AND ESTUARINE ECOLOGY

### SPECIALISTS IN APPLIED MARINE AND ESTUARINE ECOLOGY

The Applied Marine and Estuarine Ecology (AMEE) Laboratory has a highly regarded international reputation in marine and estuarine ecology and ecotoxicology.

The AMEE Lab is at the cutting edge of current understanding of human impacts in the marine environment and leads the application of effective management for positive ecological outcomes.

### THE TOOLS OF OUR TRADE

Our laboratory has access to large, state-of-the-art resources that include:

- A team of highly experienced staff comprising academics, research scientists, graduate students and support staff.
- Modern molecular laboratories for DNA and RNA extraction and storage, PCR and RT-qPCR, gel electrophoresis, fluorescent microscopy.
- Sophisticated statistical programs and analyses including modelling (linear models, generalized linear modelling, BACI impact assessment), classification (CART, Random Forrest) and multivariate ordination (nMDS, PERMANOVA, ANOSIM).
- Advanced field data collection equipment including sub-sea positioning equipment, CTDs, boats and diving equipment.



### WHAT WE DO

AMEE leads Australian research and development of novel diagnostic tools for monitoring human impacts to coastal ecosystems.

Our scientists are engaged in multiple disciplines including ecology, microbiology, ecotoxicology, biomarker research, functional genomics, invasion ecology, spatial analysis, and ecological engineering.

We undertake quantitative surveys and experiments utilising state-of-the-art field and laboratory equipment. This includes field and lab mesocosms, ecotoxicological (and WET) testing, pollution monitoring including emerging contaminants of concern, invasive species surveys and management, biomonitoring, environmental risk assessment and modelling.

Cutting edge statistical modelling techniques are applied to field and laboratory data studies to elucidate key patterns and processes, and quantify drivers of change.

Our expertise includes ARISA DNA fingerprinting tools, targeted gene sequencing, metatranscriptomics for functional assessments, targeted RT-qPCR for pathogens and genes, cellular biomarkers.

We undertake design optimisation of baseline monitoring studies and impact assessments for harbours, ports and marinas, and investigate biodiversity and multi-functional enhancements for coastal and estuarine infrastructure, restoration of native flora and fauna. We provide guidance on compliance and monitoring for water and sediment quality guidelines as well as development of codes of practice.

### OUR PARTNERS

AMEE academics collaborate extensively with university researchers both internationally and within Australia. In addition to this, extensive collaboration with government and industry is also a hallmark of AMEE.

### ACADEMIC EXCELLENCE

Our key academic disciplines include: molecular approaches to biomonitoring, interactions between pollution, invasion and community dynamics, and solutions-based research (eco-engineering and restoration) for managing urban coastal systems.

## KEYSTONE PROJECTS

- Guiding ecological principles for marine foreshore development (for UrbanGrowth NSW)
- Microplastic infiltration of food webs: cells to ecosystem consequences
- Marine urban development: how can ecology inform the design of multifunctional artificial structures?
- Novel habitat quality assessment to inform the development of recreational boating infrastructure
- Testing the waters: stormwater impacts on ecosystem structure and function of urbanized waterways
- Bioinvasions: the interactive effects of propagule pressure and pollution
- Assessing and understanding ecological changes in highly disturbed estuaries
- Do pollution events facilitate biotic invasion in marine systems?

## OUR EXPERTS



**Professor Emma Johnston** is the Director of AMEE. She combines the diverse disciplines of ecology, microbiology and ecotoxicology to expand fundamental understanding and provide

recommendations to management. Professor Johnston contributes expert opinion to state, federal and international government agencies and consults with industry through the development and implementation of environmental monitoring programs. Her research is conducted in such diverse field environments as Antarctica, the Great Barrier Reef and temperate Australian estuaries.



**Dr Katherine Dafforn** is a Senior Research Associate with extensive experience in the design, sampling and analysis of aquatic monitoring programs. She is highly trained in invertebrate taxonomy (including invasive species ID), sediment chemistry and the application of molecular tools to biomonitoring. Dr Dafforn is a scientific diver (PADI Divemaster) and holds a commercial boating qualification.



**Dr Graeme Clark** is a Senior Research Associate specialising in coastal and marine ecology. He has worked in diverse environments from the tropics to Antarctica. He has expertise in temperate and Antarctic marine biology, invasive species and impacts of human activities on coastal ecosystems. Dr Clark holds a commercial diving qualification (ADAS) and is highly experienced in advanced statistical programming using 'R'.



**Dr Mark Browne** is a Senior Research Associate who conserves biodiversity by understanding the impacts of human activities (priority pollutants, plastic debris, urbanization) on biodiversity and rehabilitating affected habitats (ecological engineering). He collaborates closely with colleagues at a wide range of national and international institutions, enabling a strong multi-disciplinary approach. Dr Browne is particularly interested in the scientific basis for biological conservation through managing environmental problems and he advises the United Nations, European Union, governments (Australia, UK, USA) and companies on this.



**Dr Mariana Mayer-Pinto** is a Research Associate and an expert in human impacts to marine systems. She has worked as a managing scientist on some of the biggest environmental monitoring programs in Australia and has extensive experience in managing monitoring programs and assessing environmental impacts. She has extensive experience in dealing with large data sets and has strong expertise in experimental design and statistical analyses. She also has strong invertebrate taxonomic skills.



**Dr Luke Hedge** is a Research Associate who takes a highly computational approach to examining large and varied datasets, particularly in the social-environmental space and user-environmental conflict. Influentially he led the first synthesis of the 'Science of Sydney Harbour' and has collaborated extensively with government, academia and consultancies. Dr Hedge has expertise in geospatial variographic modelling and advanced statistical analyses.



**Dr Ana Bugnot** is a Research Associate with experience in urbanized estuarine and coastal ecosystems, impact assessments, rehabilitation of ecosystems, field data collection and analysis.



**Simone Birrer** is a Research Associate who specializes in microbial ecology. She uses modern molecular techniques, such as qPCR and next-generation sequencing, to investigate microbial community-level responses to stressors. Her research has increased understanding of contaminant impacts on ecosystem functioning.