ARC Funding Announcement November 2018 – Summary of successful Western Australian Marine Science projects

Discovery projects:

State	Investigator(s)	Project Summary	Administering Organisation	Total Project Funding	Project Duration in years
Western Australia	Dr Kaiming Bi; Professor Dr Duc Do; Associate Professor Tongming Zhou	This project aims to develop a novel inerter-based damper to mitigate the excessive vibrations of offshore floating platforms (OFP), which are widely used in the offshore industry for oil exploration. Harsh environmental loads such as wind and waves can induce excessive vibrations to OFPs and endanger their safety and stability. This project aims to develop a novel inerter-based damper that can produce a considerable apparent mass that is much larger than its physical mass through an amplifying mechanism by translating the linear motion into high-speed rotational motion, which can significantly reduce the mass and cost of the damper. Benefits of the project include more economical and safer OFP designs, which are expected to improve the competitiveness of Australian pillar oil and gas industries.	Curtin University	$380,000	3
Western Australia	Dr Shiao Huey Chow; Associate Professor Britta Bienen; Professor Mark Randolph; Professor Dong Wang	This project aims to develop a fundamental understanding of the response of saturated sand in seabeds during rapid penetration by offshore site investigation tools and foundation construction. The research is using innovative physical and advanced numerical modelling techniques to quantify the significant increase in sand resistance caused by rapid penetration, enabling reliable design and reducing risk of material failure associated with the high impact forces. Expected outcomes of the project include a conceptual framework and scientific-based design tool to predict the geotechnical performance of offshore installations. The research will provide the necessary scientific	The University of Western Australia	$335,000	3

		advances to install, moor and service offshore wind and wave energy devices more economically and efficiently.			
Western Australia	Dr Yinghui Tian; Professor Mark Cassidy	This project aims to investigate the process of lifting objects off the seabed. Understanding this breakout process is the scientific basis for a variety of offshore applications such as oil and gas decommissioning, marine salvage and securing foundations under extreme storms. This project expects to advance the understanding of soil-fluid-structure interactions of this problem using innovative high-speed photography observations and advanced numerical coupled analyses. Outcomes will include a numerical tool, verified against a high quality experimental database, to predict the breakout process and uplift required for pressing offshore challenges. The ability for Australia's engineers to predict lift procedures more accurately will contribute to safer operations in Australian waters and to the more economic harnessing of ocean resources.	The University of Western Australia	$320,000	3
Western Australia	Associate Professor Thomas Wernberg; Dr Melinda Coleman; Dr Karen Filbee-Dexter	This project aims to use ecological models and field experiments to uncover drivers and critical thresholds for turf expansion. Habitat loss is a leading threat to goods and services from the oceans. Globally, kelp forests are collapsing and being replaced by persistent unwanted algal 'turfs'. Understanding of this habitat shift is rudimentary, and solutions to mitigate the impacts virtually non-existent. Through stress experiments and genomic analyses, this project aims to discover resilient kelps that promote forest persistence under stress. By expanding our understanding of critical habitat transitions, and exploring new solutions, this project aims to enhance our capacity to respond to the ongoing degradation of Australia's Great Southern Reef.	The University of Western Australia	$460,000	3

Discovery Early Career Researcher Award

State	Investigator(s)	Project Summary	Administering Organisation	Total Project Funding	Project Duration in years
Western Australia	Dr Karen Filbee-Dexter	This project aims to apply a comparative experimental and analytical approach to quantify linkages among multiple stressors driving kelp forest loss and expansion of turfs across three continents. Transformations of kelp forests to turf reefs are associated with a profound loss of ecological productivity and function, with significant impacts for societies reliant on the biodiversity and functioning of kelp ecosystems. Field and laboratory experiments will be used to develop and test 'green gravel', a novel restoration tool that aims to overcome reinforcing feedbacks (lack spores and hard substrate) preventing recovery of kelp forests. This will provide significant benefits by identifying solutions to address loss of kelp forests in Australia and globally.	The University of Western Australia	$414,814	3
Western Australia	Dr Hongyi Jiang	This project aims to investigate the flow transition from laminar to turbulent in the wake of a circular cylinder subjected to steady current. The project expects to generate new knowledge on the complicated flow behaviours and physical mechanisms for flow transition to turbulence through advanced numerical modelling. Expected outcomes include a physical understanding of the flow evolution to turbulence, as well as an understanding of the laminar and turbulent flow characteristics and the suppression of turbulence in the context of flow control. The knowledge generated will be applicable to improved design and safe operations of the sub-sea transmission and communication cables used in the offshore oil and gas industry and the emerging offshore renewable energy industry.	The University of Western Australia	$314,574	3
Western Australia	Dr Wenhua Zhao	This project aims to develop rigorous, physics-based models to accurately predict hydrodynamics of floating offshore structures at different scales. The project will	The University of Western Australia	$386,552	3

		address the issue between laboratory-to-field scaling, a fundamental problem in fluid dynamics. This outcome will be achieved through the integration of numerical technology, with physical modelling and field data acquisition. The outputs from this project will reduce risks and improve operability of existing offshore structures, and lead to more efficient design for potential floating offshore projects. This will benefit the whole community of floating offshore structures and cement Australia's place as a pioneer in offshore industry and emerging renewable energy sector.			

Linkage Projects

Project ID	Investigator(s)	Summary	Announced	Administering Organisation	Partner Organisation(s)	Primary FOR	Funding Awarded
LP180100024	Associate Professor Britta Bienen; Professor Mark Cassidy; Associate Professor Conleth O'Loughlin; Dr Neil Morgan	Design guideline for suction caissons supporting offshore wind turbines. This project aims to develop an industry guideline for suction caisson foundations, that are a new form of fixed platform anchor, for offshore wind turbines. The project expects to generate new knowledge of caisson response during installation and over millions of wind/wave load cycles, by integrating field experience with measurements from innovative experiments. The expected outcomes of this project include new methods to guide suction installation in difficult soil layering and predicting rotation and stiffness over a turbine's operational life. The benefits of these scientific advances will	15/08/2018	The University of Western Australia	LLOYD'S REGISTER EMEA	0905	$395,000.00

		contribute to the economic and reliable design of suction caisson foundations and a more rapid take-up of offshore wind energy.					