

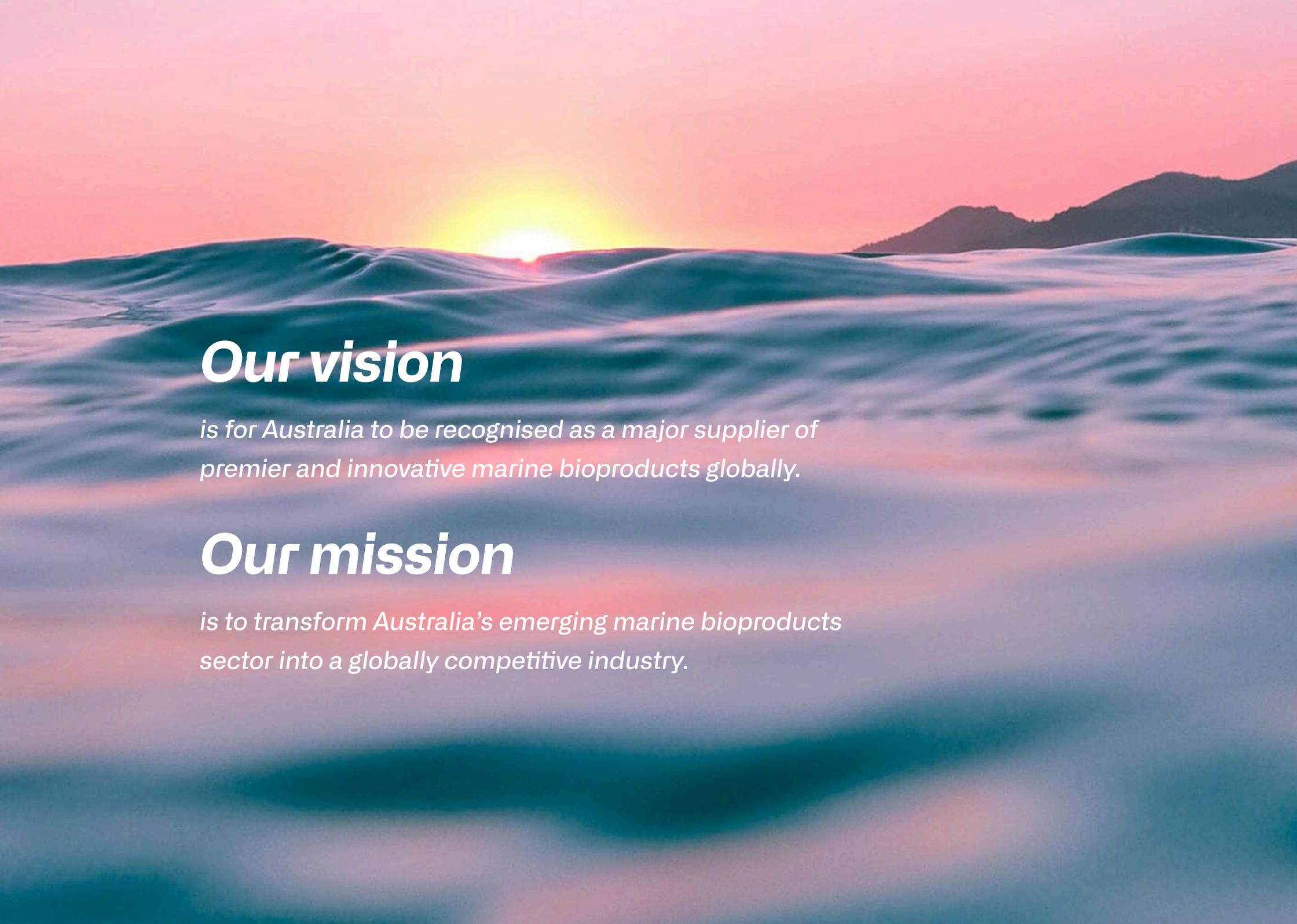


marine
bioproducts
cooperative research centre

Annual Report 2021/2022



AusIndustry
Cooperative Research
Centres Program



Our vision

is for Australia to be recognised as a major supplier of premier and innovative marine bioproducts globally.

Our mission

is to transform Australia's emerging marine bioproducts sector into a globally competitive industry.



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From the Chair



I am delighted to present the first Annual Report of the Marine Bioproducts Cooperative Research Centre (MBCRC). Within one year we have turned a letter from the Minister into a fully functioning cooperative research centre.

This has included starting the management company itself, establishing the independent Board and hiring the management team, finalising and signing collaboration agreements with all of our partners and even seeing our first projects off the ground.

The organisation now has a well experienced independent Board providing strong governance and direction, with plans in motion to expand to the full complement of seven independent directors. We also have a highly capable and skilled management team; and a world class research team comprising three specialised programs along with an education and training program.

In addition, MBCRC has established its governance and policy framework, and created a Research Development Management Committee (RDMC) to ensure that all projects start and remain focused on delivering impactful research and development to the growing Australian marine bioproducts industry. Our success in this will be based on the effective relationships that have been built between partners, the Board, the Management Team and industry.

In response to industry needs, our research program leaders are working with our partners to assemble the best research teams in the country to deliver solutions. The MBCRC Board has already approved the first four projects in diverse areas such as:

- Seaweed extracts for human health
- Microalgae bioreactors

- Seaweed 'seed' production
- Seaweed cultivation for aquaculture nutrient offset.

In addition to the clear economic benefits the CRC is seeking to realise for Australia, there is a much broader legacy that we are hoping to realise over the next ten years, including: the economic development of First Nations businesses; innovative green solutions for agriculture; the development of new biomaterials for environmental sustainability; regional jobs and development; and the development of new pharmaceutical and complementary health products.

I sincerely thank all who have given so freely of their time, experience and expertise in the establishment phase of MBCRC Ltd. I would also like to acknowledge the tremendous efforts of Flinders University and Deputy Vice-Chancellor (Research) Professor Rob Saint in particular, in securing the MBCRC bid. I am also very grateful for the hard work of our management and research teams in transitioning the CRC from concept to reality. We look forward to the next operational stage of MBCRC, and to reporting outputs from industry-relevant research, which are translatable into real-world impact.

John Gunn

Chair

From the CEO



With the formation of MBCRC we have created Australia's largest Research and Development hub dedicated to producing new and sustainable products from our marine environment, bringing together more than 50 partners from academia and industry.

Thanks to a Federal Government grant of \$59 million and co-funding from our partners, we anticipate deploying up to \$270m in cash and in-kind resources over 10 years.

In our first year we have focused on establishing governance and business systems, IT infrastructure and professional service relationships to support the work of MBCRC. Our research management system has been customised and implemented, along with a professionally implemented Google workspace, which enabled the MBCRC team to be flexible and agile throughout the COVID pandemic.

A significant amount of work has seen the development and execution of our Core Partner and Other Partner agreements, with a clear workable structure established and an Intellectual Property (IP) model that all partners have signed to. A number of potential new partners have also expressed an interest in joining MBCRC, highlighting the strong value proposition of MBCRC to our emerging marine bioproducts industry.

Building a new industry requires the application of innovation across the value chain to avoid bottlenecks upstream or downstream of technology application; MBCRC has strategically built the research program with this end in mind:

- Program 1 is to develop sustainable and cost-effective production and supply of high quality marine bioresources
- Program 2 is to deliver advanced manufacturing and biorefinery solutions to transform Australian grown marine biomass into multiple marine bioproducts
- Program 3 is to develop Australian marine bioproducts to meet global demand for Australian grown, produced and certified products.

A fourth program called Connect Educate Train (CET) works across all three research programs. With an understanding of the key role of human capital in transferring technology to industry, our CET program has been designed to incubate new talent, place graduates into research programs, assist small- to mid-size enterprises (SMEs), and increase the pool of skills in the sector.

After establishing project approval structures and research program milestones, the first MBCRC projects were Board approved by the end of the financial year, with a further 13 projects at various stages of development and approval. A number of these are at the advanced stage of development and will likely be Board approved early in the 2022/2023 financial year.

Our first Conference was held in March 2022, and further workshops to collaborate with Industry Partners and engage with SMEs were held in June 2022. An event is being planned to celebrate the official launch of Marine Bioproducts CRC, scheduled for November 2022.

The last 12 months have also seen the rebranding of MBCRC along with the launch of our new website, which includes an online magazine 'Just One Drop' of feature articles highlighting our partner stories.

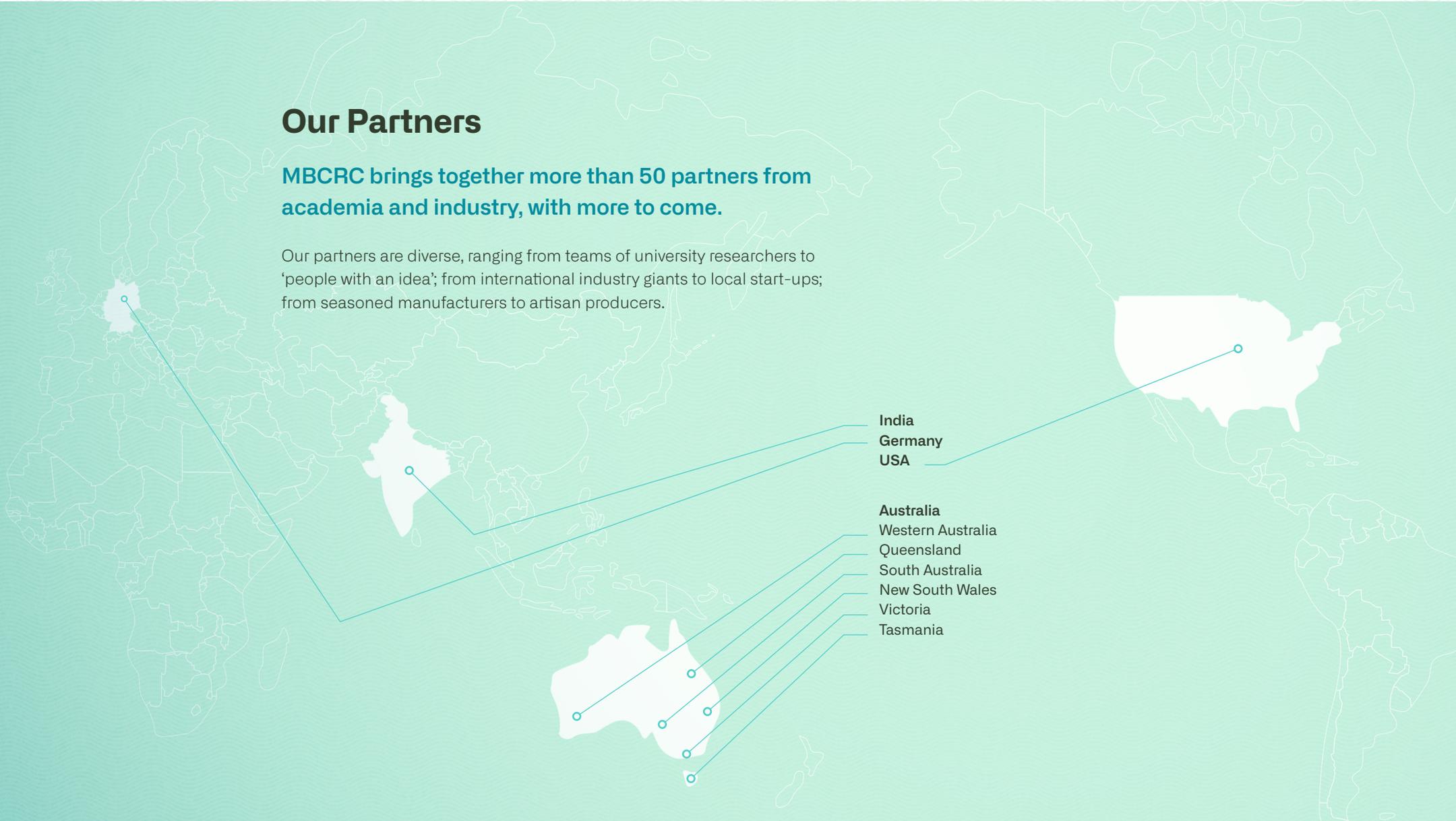
In short, a great deal has been achieved in a very short timeframe! I extend my grateful thanks to the Board, management and research teams for all of their hard work in realising the first stage of MBCRC's development. We are now well positioned to achieve our aim of making Australia a global player in marine biotechnology, an industry that is forecast to be worth more than US\$700 billion by 2035.

Dr Justin Coombs
Chief Executive Officer

Our Partners

MBCRC brings together more than 50 partners from academia and industry, with more to come.

Our partners are diverse, ranging from teams of university researchers to 'people with an idea'; from international industry giants to local start-ups; from seasoned manufacturers to artisan producers.





Core Industry Partners



Core Research Partners



Supporting Partners



Highlights *2021/2022*

A tremendous amount has been achieved in our first year to establish MBCRC and progress to a fully operational organisation. The major highlights include:

- MBCRC constitution developed, with Flinders University adopting the constitution and becoming the first member of the company
- Incorporation of the CRC management company as MBCRC Ltd, led by Dr Justin Coombs as CEO
- Appointment of the initial Independent Board with plans and approved process to expand Board membership to seven including one Indigenous member and achieving gender balance
- Brooker Consulting engaged to coordinate the process of nominating and appointing the non-executive directors to the Board, to be completed early in FY 2022/2023
- Appointment of highly skilled and qualified Management and Research Teams
- Establishment of business systems, IT infrastructure and professional service relationships
- Core Partner and Other Partner agreements developed, executed and in effect
- Recruitment of a range of new partners
- Project approval structures established with first projects approved by Board and now under way
- Rebranding and launch of new website, including *Just One Drop* magazine to highlight partner stories
- Aquamarine research management system customised and implemented
- Professionally implemented Google workspace by Cyber Security company, enabling the CRC to be flexible and agile throughout the COVID pandemic
- Auditors formally appointed
- Applied to the ACNC for charity status.



Governance

The initial Independent MBCRC Ltd Board was established in 2021 to provide oversight and governance during the CRC establishment phase. The Board is fully independent of all Partners to ensure impartiality in funding approvals and IP utilisation plans, and is chaired by John Gunn, with current non-executive Directors being Dr Tony Peacock and Professor Meera Verma as Initial Board Directors.

A process for establishing the substantive MBCRC Ltd Board was agreed by the Interim Board and involved a call for nominations of suitably qualified candidates from all signed-up CRC partners, and a ballot of Core Partners to choose the six vacant positions. Core Partners are eligible to become Members and vote on election of new Directors, up to a maximum of seven.

Chair John Gunn has commenced the process to expand the Board to the full complement of seven independent directors. As part of this process, Brooker Consulting was engaged to facilitate the Board recruitment process.

The Board is responsible for:

- setting the overall CRC strategy, with ongoing industry and partner input via the Partner Representative Committee
- hiring the specialist management company team to run the operations of the CRC, and
- approving CRC projects and commercial deals developed by management.

The Management team includes the CEO, Research Director, Operations Manager, three Research Program Leaders, Research Program Manager and a Connect Educate Train Program Leader. Our management team has a unique mix of skills spanning industry-focused academic research, technology transfer to industry, intellectual property law, start-up company development and development of higher degree students.

The aim of MBCRC Governance and Management is to ensure that:

- the CRC does industry-relevant research, and
- that this work is translatable into real-world impact.

This has been and will continue to be achieved by building effective relationships between Partners, the Board, management company and industry users of MBCRC's outputs.

A clear workable structure has been established with an Intellectual Property (IP) model that all partners have signed to. At the conclusion of projects, MBCRC is therefore well equipped to smoothly transition collaborative research outputs back into industry to deliver real world impact. Collaborative commercialisation agreements have been negotiated, for example, with Boehringer Ingelheim and the University of Queensland.

Projects are co-developed with defined groups of partners around strategic priorities and actively managed under Board-approved agreements that define industry-focused milestones, a clear path to Intellectual Property (IP) utilisation and social licence metrics.

Partner agreements accumulate all Partner Intellectual Property in the MBCRC Management Company which enables two key functions:

- Provide industry with a single and commercially focused point to negotiate access to CRC IP, and
- Distribute commercialisation benefits amongst CRC partners with proportions pre-defined in the partners' agreement and substantially smooth commercial transactions by removing benefit sharing considerations from deals.

Initial Board of Directors



John Gunn, Chair

John has conducted, led, translated and communicated science focused on the sustainable use of marine ecosystems and resources for over 35 years. Senior positions have included Chief Executive of the Australian Institute of Marine Science (AIMS), Chief Scientist of the Australian Antarctic Program, and Deputy Chief of CSIRO's Marine and Atmospheric Research Division.



Dr Tony Peacock, Director

Tony is one of Australia's most experienced innovation managers. He has managed the Pig Research and Development Corporation, the Pest Animal Control Cooperative Research Centre, the Invasive Animals CRC and most recently the Cooperative Research Centres Association (2010/2020).



Professor Meera Verma, Director

Meera is a professional executive with expertise spanning the global healthcare, product development and biotechnology delivery industries. She is Director of Headland Vision, a strategic product development advisory and consultancy company, and previously served as Site Director for the Adelaide-based R&D and manufacturing facility of Hospira Incorporation, a global specialty pharmaceutical and medication company.

Meet the team

Dr Justin Coombs

Chief Executive Officer



Justin is a biotech industry leader. By background, he is a PhD-trained scientist and a biotech specialist patent attorney. His areas of expertise are in R&D program development, intellectual property, technology transfer, and commercial strategy across a broad range of technology-focused organisations. Before joining MBCRC, Justin held a number of senior biotechnology industry roles including General Manager of the Cell Therapy Manufacturing CRC and Founder and CEO of immunotherapy start-up, Carina Biotech.

Ms Belinda Wade

Operations Manager



Belinda is a business development specialist with an honours degree in biotechnology. As Business Development Coordinator (Strategic Partnerships) for

Flinders University, she was instrumental in bringing together the key elements that saw Marine Bioproducts progress from a working concept through to a fully-fledged (and fully funded) Cooperative Research Centre.

Dr Simon Odell

Research Program Manager



Simon has an Honours Degree in Biotechnology, a PhD in Soil Science, and a Graduate Diploma in Oenology. Having worked for over 20

years across the Environmental, Wine, and Brewing industries in a mixture of technical, management and consulting roles, Simon brings to the team a wide, commercially-focused skill set.

Ms Jane Keane

Executive Assistant



Jane has been with Marine Bioproducts CRC since January 2022, overseeing office administration and providing support to the Marine Bioproducts

CRC management team. Before her appointment, she served as Executive Assistant to the Director, Centre for Marine Bioproducts Development at Flinders University for 10 years.

Research programs



Matthew Flinders Distinguished Professor Wei Zhang, Research Director for Marine Bioproducts Cooperative Research Centre

Wei has worked as a bioprocess engineer and marine biotechnologist since 1989. He is recognised internationally as an exceptional engineer and a visionary thought-leader in translational research and technology commercialisation in marine bioproducts engineering, industrial and pharmaceutical biotechnology. He has driven national and international partnerships across governments, universities, industries, professional societies and communities in driving the growth of Australia's rapidly emerging Marine Bioproducts industry.

Professor Wei Zhang and research program leaders – Professors Catriona MacLeod (UTAS), Colin Barrow (Deakin) and Rob Capon (UQ) have been working as a team with both industry and research partners to develop research projects, with the goal being to have the first projects for all eligible partners by the end of 2022. A dedicated Research Program Manager, Dr Simon Odell, was appointed to oversee the administration of the RDMC Committee and Projects on behalf of MBCRC.

Research program establishment highlights

- Appointment of Research Director and Program Leaders – the research team comprises five senior academics with broad industry experience
- Establishment of Research Development Management Committee (RDMC) and completion of policy and procedures framework
- Completion of the refinement of MBCRC Commonwealth milestones for CRC Agreement
- Development and completion of the guidelines for project development, assessment, approval and contracting
- Completion of the kick-starter project scoping with all Industry Partners, and engagement with all Research Partners
- Engagement with partners and development of the first-batch MBCRC research projects, with over 30 projects in various stages of development ranging from early project scoping to formally contracted projects
- First four research projects Board approved with these projects proceeding to execution by 30 June 2022
- A further 13 projects are currently at advanced stages of development ready for approval by September 2022
- Substantial progress made on the development of the Research Management Software; AquaMarine to be used for project application, assessment, approvals and project reporting in MBCRC (Omnistar). Customisation completed and the user testing phase initiated.



Driven by industry needs, our research leaders work with Industry Partners and Research Partners to assemble the best research teams in the country to deliver solutions. New projects within MBCRC are born out of this matching and the process is catalysed by financial contributions from all stakeholders – industry, research partners and the CRC grant, with a defined financial model.

Funding supports collaborative work in four key spaces:

- Establishing pathways from biomarine discovery to markets in health, nutrition, agriculture, aquaculture and biomaterials
- Creating and expanding sustainable marine bioresource production facilities
- The integration of marine science and biotechnology with industries in Australia and overseas, and
- Creating industry-ready graduates focused on taking discoveries out of the lab and into the economy.

MBCRC has established a Research Development Management Committee (RDMC) to oversee projects and ensure they deliver innovative and impactful R&D solutions for the Australian marine bioproducts industry. One early example of this is our collaboration with Tasmanian SME Marinova to enable them to access significantly boosted research capacity via two Australian universities for two projects.

Marinova's high purity fucoidan extract. Courtesy Marinova

Program 1: Sustainable Marine Resources Growing marine bioproducts



Professor Catriona Macleod

Catriona has a PhD in Aquaculture from the University of Tasmania. Her research focus is on sustainable development in marine and coastal systems, and science-based management and decision-making, with specific expertise in environmental, economic, and social sustainability.

Program 1 aims to increase the range and yield of Australian marine biomass available for processing and bioproduct development. It is also essential to ensure that production systems are sustainable, and key to this is making sure that governance and management mechanisms are appropriate and that any risks are addressed. As such the program deals not only with the practical aspects of growing macro/micro algae (site selection, species selection, biofouling/contamination management, environment conservation) but also best practice governance (social license and regulatory frameworks – transparency, accountability, certification, biosecurity issues, risk assessment, carbon trading).

Partners/Stakeholders

Program 1 includes a number of primary production partners with a focus on macro- and micro-algae, some with well established production capacity and others with production aspirations. We also have a number of partners with an interest in value-adding to other species production models. Our research partners have skills and capabilities in primary production, sustainable management and in governance. We currently have four projects underway, all investigating the potential in target species – so linking production with opportunity to ensure that growing to a product endpoint.

Six additional projects are currently being developed, focusing on both technical development and sustainable governance. In addition to producing projects within the MBCRC directly we are also focused on developing links between other funding initiatives such as the Blue Economy CRC and RDC partners more broadly, with the aim of maximising benefits to the marine bioproducts sector.

“ For the Marine Bioproducts industry to be sustainable it needs to understand not only how to grow the products but also what the market wants and in what form. The three MBCRC programs are explicitly linked so ideas and outcomes can be shared and help develop the industry as a whole. ”

Professor Catriona Macleod

Program 2: Innovative Bioprocessing Technologies Making marine bioproducts



Professor Colin Barrow

Colin is an Alfred Deakin Professor in Biotechnology and Deputy Director of the ARC funded ITTC for Green Chemistry in Manufacturing. His research interests are in omega-3 biotechnology, bioprocessing, lipases

as catalysts, amyloid fibres and nanomaterials. His PhD is in marine natural products chemistry and much of his research remains within the area of marine bioproducts.

The aim of this program is to convert marine biomass into marine bioproducts using advanced biomanufacturing. The ultimate goal is complete biomass utilisation where a biorefinery approach is applied to make multiple products from each single biomass input material. The combination of biobusiness toolbox and biorefinery pilot scale testing will de-risk industry partner investment in scale-up and biomanufacturing.

Partners/Stakeholders

Partners in Program 2 include Research Partners with bioprocessing capability and Industry Partners that aim to develop biomanufacturing capability or have equipment or other technology that can assist in the development of innovative bioprocessing technologies.

Two research projects jointly led by a Core Industry Partner and Core Research Partner have been approved. Seven additional projects are at various stages of development.

In addition to industry led projects we are also working to network bioprocessing capability together across Australia, including building new bioprocessing capability, in conjunction with both research and industry partners.

“ Innovative bioprocessing technology is critical to building advanced biomanufacturing capability in Australia and will enable bioproduct manufacturing close to the site of biomass production, increasing Australia’s competitiveness in the growing marine bioproducts industry. ”

Professor Colin Barrow

Program 3: Australian Marine Bioproducts Delivering marine bioproducts



Professor Rob Capon

Rob leads an internationally renowned lab specialising in the discovery of biologically active molecules (natural products) from Australian marine invertebrates, algae and microbes. Rob and his team have leveraged the chemical and biological properties of many thousands of natural products to inspire innovative solutions for scientific, commercial, and societal challenges – including new human and animal health products, and new crop and environmental protection agents.

The aim of this program is to improve existing and develop new environmentally sustainably marine bioproducts from Australian macroalgae, microalgae and microbes, as well as bycatch, biofouling and other marine biowaste streams. We will also develop specialist biobusiness tools to fast-track commercial success across the Australian (and global) marine bioproducts sector.

Partners/Stakeholders

Partners that have successfully launched projects in 2022 include those looking to improve formulations and validate mechanism-of-action and therapeutic, nutraceutical and/or environmental claims for existing marine bioproducts. They also include those looking to discover and develop new animal and human health products, as well as new analytical tools to detect, identify and quantify essential bioactives, and business tools to map future opportunities across the marine bioproducts sector.

“ We are delighted to see so many of our industry and research partners team up to launch exciting new research projects, to both improve and develop new Australian marine bioproducts as well as critical analytical and business tools. ”

Professor Rob Capon

Program 4: Connect Educate Train Growing the marine bioproducts sector



Associate Professor Kirsten Heimann

Kirsten was Principal Research Scientist at the Centre for Marine Bioproducts Development, Flinders University and she was also the Research Director of the China-Australia joint laboratory for Native Bioresource Industry Innovation (CANBI2).

She was the Course Coordinator of the Master of Biotechnology at Flinders University.

The aim of the Connect Educate Train (CET) program is to train the required workforce and develop the industry leaders for the Australian Marine Bioproducts Industry. This, together with building necessary national and international networks, is fundamental to ensuring that Australia plays a leading and internationally recognised role in this industry sector.

Partners and stakeholders in the CET program include: research providers, where students conduct research directly with Industry Partners to solve challenges by providing answers and innovation; Vocational Education and Training (VET), utilising and shaping government training portfolios for the industry to build the future workforce; and a specific Indigenous VET program (drafted) to create opportunity for Indigenous school leavers to join the workforce and realise business opportunity. Industry upskilling will also be pursued to strengthen business performances of the Australian Marine Bioproducts Industry.

Highlights of the CET program

- CET program established to work across all research programs and provide the full range of education outcomes including Vocational and Education Training (VET), First Nations training and upskilling, along with traditional university higher degree programs such as Honours, Masters and PhDs
- CET Advisory Committee established to determine focus, priorities and timeline and ensure delivery of networks, mentoring, industry education and research education
- Student agreements developed and finalised
- Targets for student completions established with a projected 40+ PhD completions; 80+ Honours / Masters completions
- Policies and procedures established and implemented
- Ongoing engagement with research partners for recruiting students
- A full curriculum (125 pages) for the Marine Bioproducts CRC Indigenous VET program has been drafted.

“ *For Australia to be competitive and recognised globally in the marine bioproducts industry sector, it needs innovation, excellent science and business aptitude, and increased investment into research and development. This is synthesised in the Marine Bioproducts CRC CET program.* ”

Associate Professor Kirsten Heimann

Case study

Indigenous Vocational Education and Training program

The Indigenous VET program aims to contribute to the economic development of First Nations businesses, and provide First Nations-specific education and training programs to upskill young people to work in the emerging marine bioproducts industry.

A full curriculum (125 pages) for the MBCRC Indigenous VET program has been drafted, detailing the content of all units. This draft was submitted to the working group for feedback on June 27.

The syllabus details essential outcomes, performance needed to demonstrate achievement, evidence of performance and knowledge, and assessment conditions for all units.

Essential foundation skills required for successful completion of the units are summarised at the end of the syllabus to allow for streamlined development of extra-curriculum modules to lay these foundations.

Following agreement by the working group, the MBCRC Indigenous VET curriculum will be distributed to stakeholders for feedback and additional input.

According to the draft timeline developed at the working group meeting, the consultation period will take until the end of August.

Following implementation of all feedback received, the working group will discuss funding requirements, advertising/recruitment, and timeline for delivery. Delivery is expected in FY 2022/2023.

Case study

Collaboration with Marinova

Marine Bioproducts CRC Core Industry Partner, Tasmanian-based Marinova, is the world's only organic-certified producer of high purity fucoidan, a health-giving natural extract.



Each year, the company reinvests more than 20 percent of annual sales in R&D. *“The value proposition for our products is very much linked to the research we undertake. It’s the science that has gone into validating the specific extracts that dictates the price in terms*

of our markets. It’s also about growing the demand – in our case, garnering interest from nutritional and pharmaceutical companies around the world.”

Paul Garrott, CEO and Managing Director of Marinova.

Through its Core Partners Griffith University (Queensland) and the University of Tasmania, MBCRC enabled Marinova access to significant research capacity for two collaborative projects: one focusing on a chronic inflammatory disease of the respiratory tract, called eosinophilic oesophagitis (EoE); the other building on Marinova’s dossier of science relating to fucoidans and healthy ageing.

The scale of these Marinova research projects would not be possible without MBCRC’s collaboration and Core Research Partners. This was also the first collaboration using MBCRC’s systems, with many other projects now following suit.

just one drop

Stories from Marine Bioproducts CRC partners, changing our planet one drop at a time...

As part of the rebranding process and launch of its new website, Marine Bioproducts CRC created an online 'magazine' section entitled *Just One Drop*. This section highlights and promotes the great work of our Partners in the marine bioproducts sector via feature magazine-style articles.



White truffles, saffron, beluga caviar... fucoidan?

Marinova



Stronger together

Cygnets Bay Pearls



From little things...

Byron Bioreactor Technologies

By 30 June 2022, *Just One Drop* had published two articles with the first highlighting the work of Partner Marinova in fucoidan purification from seaweed and product development. A second article highlights the work of Cygnet Bay Pearls and how they conduct research and development in remote North-Western WA.

More articles are already in preparation for publication throughout the 2022/2023 financial year.

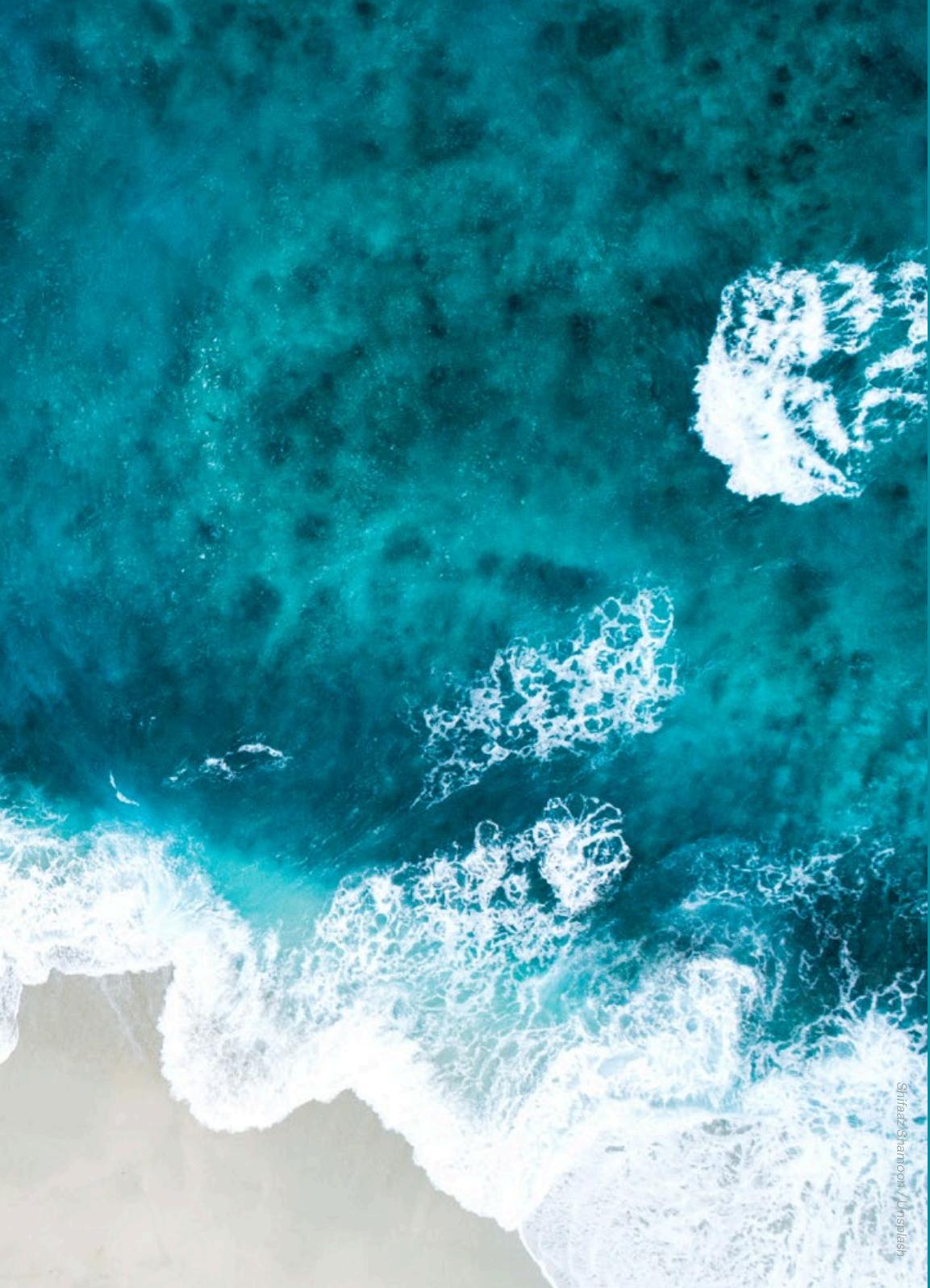


Thomas Ashlock / Unsplash

Our impact

In addition to the clear industry and economic benefits that Marine Bioproducts CRC is seeking to realise for Australia, there is a much broader legacy we are hoping to realise over the next ten years, including:

- **First Nations** – economic development of First Nations businesses, and First Nations specific education and training programs to upskill young people to work in the emerging marine bioproducts industry
- **Green solutions for agriculture** – technologies for greenhouse gas abatement, development of new agrochemicals derived from marine natural products
- **Environmental sustainability** – development of new biomaterials including novel bioplastics and textiles
- **Health and Food Security** – development of new pharmaceutical and complementary health products
- **Regional jobs and development** – the bulk of the industry development around marine bioproducts is projected to occur in the regions, thus MBCRC has a strong regional development focus.



Shiraz Shamoon / Unsplash

**SHARED
THINKING
AND UNIQUE
COLLABORATIONS
ARE THE KEY
TO PROBLEM
SOLVING AND
ACCELERATING
CHANGE**

Isaac Asimov



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