FISH

FISHERIES RESEARCH & DEVELOPMENT CORPORATION **NEWS**

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JUNE 2022

SEAFOOD'S CARBON FOOTPRINT

OUR NEW EXTENSION TEAM

PRIMING ABALONE IMMUNITY

On the climate frontline

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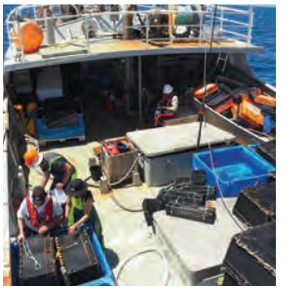

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REGULAR

FISH is published by the FISHERIES RESEARCH AND DEVELOPMENT CORPORATION (FRDC)

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FRDC acknowledges Australia's Indigenous people who are the traditional owners of country throughout Australia and recognises their continuing connection to lands, waters and culture. We pay our respects to their Elders past, present and emerging.

Change of pace, platforms for FRDC's communications

FRDC's Managing Director Patrick Hone pays tribute to *FISH* magazine and outlines the organisation's new communication initiatives

Dear Readers,

It is with mixed emotions that I write this editorial for our final edition of *FISH* magazine. For almost three decades, it has been a powerful communications vehicle for imparting insights from hundreds of research projects funded by FRDC. The key purpose of *FISH* magazine was to provide a resource to help share information and support the adoption of the R&D to build a strong fishing and aquaculture community.

Throughout its history, *FISH* magazine has been produced by a succession of dedicated writers and editors with great fishing and aquaculture knowledge and passion and we are very grateful for their commitment.

Evolution of *FISH*

It began when FRDC developed its corporate image with the help of one of its directors, Dale Bryan. Dale was the Executive Officer of the Tasmanian Fishing Industry Council (TFIC) and was experienced in fishing and aquaculture communication. He and Mal Mahoney wrote the content for TFIC's magazine, and Dale's wife Daphne 'Duckie' assisted with its production.

The magazine was significantly rebranded as *FISH* in June 2007 and evolved into the current *FISH* magazine format under the direction of former FRDC General Manager Communications, Trade and Marketing Peter Horvat.

Over the past decade, *FISH* magazine has been edited by Catherine Norwood and colleagues from Coretext. We would like to acknowledge this valued service from Catherine, her team, and all the past writers and editors who have provided a crucial link between FRDC and the users of the R&D produced with investment from industry organisations and the Australian Government.

As Indigenous fishing, aquaculture, commercial wildcatch and recreational fishing have evolved significantly over the past three decades, so too have the communications platforms and mechanisms for sharing our R&D with stakeholders. As such, we have decided to move away from the hard-copy print publication of *FISH* magazine.

Digital channels

While some readers may be disappointed that the traditional *FISH* magazine format is wrapping up, rest assured, our communications team will be busier than ever. We are focused on ensuring our R&D information and stakeholder engagement activities target audiences in more ways that are better suited to your needs.

The research project articles and media releases that were shared through *FISH* magazine will still be written but will be communicated through a range of other channels. Our primary communications channel will be the monthly electronic *FRDC News*. As a digital platform, it allows us to monitor and measure the effectiveness of our communications though defined metrics and analytics that inform us of the type of information that readers are engaging with most often.

These insights will help us refine our information to best respond to our stakeholders' interests and to deliver a better reader experience. In addition, we will also provide our articles and research updates to our partner organisations to be shared in their own hard-copy or electronic publications for their members. When relevant, FRDC will also distribute media releases to print, broadcast and online media outlets.

Patrick Hone
Photo: Liz Oldmeadow

Person to person

FRDC will also communicate directly through our new extension officer (EO) network, with seven new EOs located throughout Australia. Their role is to engage with the people involved in Indigenous fishing, aquaculture, commercial wildcatch and recreational fishing on research outputs and help them transition to new practices and methods to remain profitable, sustainable and agile. We have an article on our EO network and functions on page 10 of this magazine.

Fishing and aquaculture are facing a range of global and sector challenges such as resource and environment sustainability, diminishing social licence, workforce challenges, climate change and biosecurity risks, and these challenges will only be resolved through the intersection of culture change and people. Building capacity and capability from the grass roots up is a key element in FRDC's strategy for the future.

To this end, we have employed a Capability, Capacity and Culture Change Manager, Sally Roberts, whose remit is to support fishing and aquaculture to attract, develop and retain capable people. Read more about FRDC's plan to build workforce capability and capacity on page 9 of this magazine. (You can also read more about these challenges in FRDC's Annual Operating Plan on the FRDC website.)

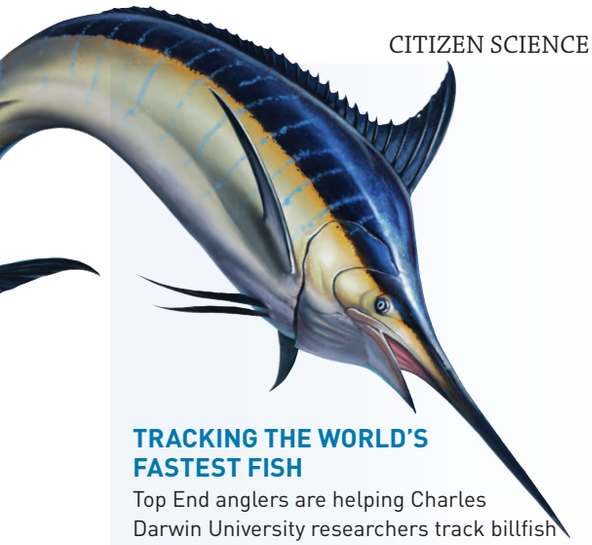
FRDC has an important role to play in converting these challenges into opportunities, hence we're adapting our approach to communications and stakeholder engagement. This is the biggest transformational change that FRDC has implemented in the past 20 years, and we're hopeful that you will find our new communication and engagement methods more effective and targeted in the future.

We invite you to continue receiving FRDC's latest news and research developments by signing up to our e-newsletter via the QR code on the back of this magazine. **F**

Kind regards,
Patrick Hone,
Managing Director

As Indigenous fishing, aquaculture, commercial wildcatch and recreational fishing have evolved significantly over the past three decades, so too have the communications platforms and mechanisms for sharing our R&D with stakeholders.

CITIZEN SCIENCE



TRACKING THE WORLD'S FASTEST FISH

Top End anglers are helping Charles Darwin University researchers track billfish – the iconic and highly sought-after sports species that include marlin and sailfish.

The research project is led by Dr Keller Kopf, Professor Hamish Campbell and PhD candidate Matt Hammond. It aims to learn more about how billfish move and why northern Australia is so productive for certain types of billfish.

They hope to track 25 billfish in waters around the Northern Territory and have called on the fishing community to help catch and tag the fish.

"Billfish are notoriously difficult to catch. It's considered an achievement just to get a marlin or a sailfish to take an interest in your bait," says Matt.

Along with billfish movement and ecology, he hopes to learn more about how the acoustic and satellite tags work and the effect they have on the fish.

Acoustic tags emit a signal picked up by buoys stationed in billfish hotspots. Satellite tags collect data on the fish's location, depth and movement. They are released within 12 months, floating to the surface and transmitting data to a satellite.

"The billfish's size and speed make them sought-after trophies for anglers, which means there is potential scope to develop sustainable fisheries tourism in the Top End," Matt says.

Supported by FRDC, the project is a collaboration between the Northern Territory Department of Industry, Tourism and Trade, the Australian Institute of Marine Science, the Amateur Fishermen's Association of the Northern Territory, and fisheries ecologists. F

More information: www.cdu.edu.au/riel/news/tracking-worlds-fastest-fish

ENVIRONMENT

Microplastics could cause parasite spread

Microplastics can carry disease-causing pathogens from the land into the ocean, with negative consequences for human and wildlife health, according to a study from the University of California, Davis.

The study is the first to connect microplastics in the ocean with land-based pathogens. The findings indicate that, by hitchhiking on microplastics, pathogens can disperse throughout the ocean, reaching places a land parasite would normally never be found.

The pathogens studied – *Toxoplasma gondii* (found in cat faeces) and the gastrointestinal disease-causing Cryptosporidium and Giardia – can infect humans and animals. These are now found throughout the ocean and are recognised by the World Health Organization as underestimated causes of illness from shellfish consumption.

"It's easy for people to dismiss plastic problems as something that doesn't matter for them, like, 'I'm not a turtle in the ocean; I won't choke on this thing'," says corresponding author Associate Professor Karen Shapiro. "But once you start talking about disease and health, there's more power to implement change. Microplastics can actually move germs around, and these germs end up in our water and our food."

Microplastics are tiny plastic particles smaller than five millimetres, no bigger than a grain of rice. They've contaminated waters as remote as Antarctica.

Two types of microplastics were examined: polyethylene microbeads (found in cosmetics) and polyester microfibres (from clothing and fishing nets). The research found more parasites adhered to microfibres than to microbeads, though both can carry land pathogens.

Co-author Assistant Professor Chelsea Rochman from the University of Toronto says the work demonstrates the importance of preventing sources of microplastics from reaching the oceans. "Mitigation strategies include filters on washing machines … bioretention cells or other technologies to treat stormwater, and best management practices to prevent microplastic release from plastic industries and construction sites." F

More information: www.ucdavis.edu/health/news/pathogens-can-hitch-ride-plastic-reach-sea

Photo: Shutterstock

AQUACULTURE

FISH-FREE FEED 'FEASIBLE'

Total replacement of fishmeal and fish oil in feed for Largemouth Bass (*Micropterus salmoides*) is both feasible and economically viable, according to a new study published in the journal *Aquaculture Research*.

The fish fed experimental feeds without fishmeal or fish oil had higher ratios of DHA (docosahexaenoic acid) to EPA (eicosapentaenoic acid) than those fed commercial feeds. DHA and EPA are omega-3 fatty acids that are known for boosting brain and heart health, and for their anti-inflammatory effects. Experimental feeds using algae produced the highest ratio.

This study is a step towards removing the supply chain bottlenecks by testing more available and sustainable ingredients that will make seafood available into the future. The study was supported by the F3 – Future of Fish Feed's Feed Innovation Network. F

More information: onlinelibrary.wiley.com/doi/10.1111/are.15815?af=R

Largemouth Bass. Photo: Shutterstock

In brief

FRDC board members in Port Stephens. Photo: Liz Oldmeadow

FRDC Board visits Hunter region, Sydney

The FRDC Board recently travelled to Port Stephens in the New South Wales Hunter region for its April Board meeting and had field trips in the local area and in Sydney. This was the Board's first regional trip since the easing of COVID-19 restrictions.

In Port Stephens, presentations were made to the Board by local representatives of the Indigenous, wildcatch and recreational fishing and aquaculture sectors.

NSW Professional Fishers Association Chief Executive Officer Tricia Beatty presented on strategic priorities for local wildcatch fishing, and Phil Duncan of Alluvium Consulting gave a presentation on the importance of the involvement of Indigenous people in leadership and decisions about the environment because of their intrinsic knowledge of the landscape and water.

Insights and research suggestions were presented by local recreational fishing representatives Bob Baldwin of the Australian Fishing Trade Association, local recreational charter fishing operator Paul Lennon, and fishing commentator John Clarke.

Field visits included the Commercial Fishermen's Co-Operative at the Nelson Bay Marina, the Nelson Bay Fish Market and the Port Stephens Fisheries Institute. The tour of the institute was led by Senior Principal Research Scientist Wayne O'Connor and included the new nutrition facility and research hatchery, and the refurbished oyster hatchery.

On the final day, the Board toured the Sydney Fish Market and spoke to Paul Bagnato, a Sydney-based commercial fisher. There were also presentations from Simon Rowe, Program Manager for Environment from OceanWatch; and John Susman, Director of Fishtales. These were followed by a visit to the seafood outlet in Harris Farm Markets at Drummoyne, where Seafood Industry Australia Chief Executive Officer Veronica Papacosta discussed retail trends, and a tour of the Shimano warehouse, hosted by Colin Tannahill, Managing Director of Shimano Fishing Australia.

The next regional FRDC Board meeting is planned for Darwin in June. F

ABALONE STOCK ASSESSMENT WORKSHOP

The Western Abalone Divers Association (WADA) and Victorian Fisheries Authority recently held the annual Western Zone Stock Assessment and Quota Setting Workshop in Port Fairy, Victoria. The fishery is the only one in Australia to run a stock assessment that is fully delegated to the sector, now in its fourth year.

WADA presented its assessment of abalone stocks in the Western Zone of Victoria, and recommendations were finalised for the total allowable commercial catch for Greenlip Abalone (*Haliotis laevigata*) and Blacklip Abalone (*Haliotis rubra rubra*).

WADA presented FRDC Managing Director Dr Patrick Hone with an award in recognition of FRDC's support for the association, particularly in response to abalone viral ganglioneuritis, including projects to rebuild abalone populations, assist the fishery to recover and help re-establish quotas.

FRDC has also funded projects on the use of underwater remote-operated vehicles and a mobile phone app reporting tool to collect data. F

Pictured at the WADA workshop are (from left) WADA Executive Officer Harry Peeters, WADA member Craig Fox, FRDC Managing Director Dr Patrick Hone and workshop chair Professor Keith Sainsbury. Photo: Supplied

ROB'S LEADERSHIP JOURNEY

Rob Fish will join Cohort 29 of the Australian Rural Leadership Program when it begins later this year. FRDC will sponsor Rob's participation in the ARLP. Rob is based in Ballina, New South Wales, and has been operating his own fisheries consultancy for the past 20 years. His current work is focused on fishers and government agencies to improve fisheries management.

Rob says the chance to join the ARLP feels "a little surreal" after the past two years. "But I am genuinely excited about the opportunity. The ARLP is Australia's most in-depth experiential leadership development program and will give me an amazing opportunity to grow my leadership skills and be part of a network of rural leaders across regional and remote Australia." F

Partnering in change to realise opportunities

By **Michelle Daw and Brad Collis**

Fishing and aquaculture face unprecedented environmental, economic, technical, social and political challenges that require a collaborative response from all stakeholders.

These challenges are recognised in FRDC's *Research and Development Plan 2020–25* and include improving resilience of fishing and aquaculture to a changing climate, accelerating transition to circular economies, ensuring equitable sharing and security of access to Australia's aquatic resources, increasing opportunities for Indigenous communities in fishing and aquaculture, and understanding and responding to threats and opportunities presented by alternative protein sources.

FRDC Managing Director Dr Patrick Hone says challenges inherently create opportunities but securing them will require sweeping changes in thinking and behaviour. "The good news is that fishing and aquaculture are not grappling with these challenges alone," he says.

"As part of our strategic response, FRDC is expanding its partnerships with other aligned primary industries, research organisations, private businesses and other organisations to leverage applicable research, knowledge and experience to achieve maximum impact for all involved," he says.

"As examples, we are a strategic partner in the Marine Bioproducts Cooperative Research Centre and the Australian Research Council Centre of Aquaculture Excellence, a partner in the AgriFood Data Exchange [see story page 14] and we are working with Agricultural Innovation Australia on pitches to government on agriculture policy priorities.

"In response to some of these challenges and opportunities, we are also seeing new players – private individuals, corporate and philanthropic entities – entering the seafood innovation space. They represent some of the different thinking that is needed, and it makes sense for FRDC as Australia's principal research investment body for fishing and aquaculture, to reach out to form dynamic new R&D partnerships."

FRDC has engaged Strategic Partnerships Manager Dr Jamin Forbes (see below) to help establish and maintain new partnerships, realise fresh opportunities, acquire additional resources and enable co-investment to deliver more value for stakeholders in fishing and aquaculture. **F**

Dr Jamin Forbes
Photo: Supplied

NEW APPOINTMENT TO BUILD PARTNERSHIPS

Experienced fisheries professional and scientist Dr Jamin Forbes has been appointed as the FRDC Strategic Partnerships Manager to establish mutually beneficial opportunities in R&D.

Jamin says he is keen to expand FRDC's range of partnerships to help tackle the challenges facing aquaculture and fishing and realise associated opportunities.

"I'm particularly looking forward to working with non-traditional partners outside of fishing and aquaculture, such as in agriculture, the environment sector and technology companies to achieve strategically aligned outcomes and deliver impact at scale."

Jamin, who is based in Wagga Wagga, New South Wales, has a PhD in freshwater ecology, a master's degree in biotechnology and an undergraduate degree in medical science.

He was most recently Director of Business Development at Charles Sturt University (CSU). During this time, he wrote a submission for the Southern New South Wales Drought Resilience Adoption and Innovation Hub and helped secure funding from the Department of Agriculture, Water and the Environment for the Biosecurity Training Centre established at CSU. He also helped secure the $3.8 million Next Generation Water Engineering and River Management Hub at CSU, which aims to provide eco-hydraulic solutions to improve ecological conditions and fish migration in rivers.

Jamin previously worked for the NSW Department of Primary Industries as a research scientist, specialising in recreational inland fisheries for Murray Cod (*Maccullochella peelii*) and Golden Perch (*Macquaria ambigua*) and trout fisheries in the Snowy Mountains.

He is a keen recreational fisher and previously owned a charter fishing business, which took guests on fishing trips on the Murrumbidgee River and rivers in the Top End of the Northern Territory.

Jamin has written a number of books, including the *Fishing Atlas for Murrumbidgee River: Gundagai to Balranald* (co-author) and *Reel Time: Fishy Tales from a Serious Angler!* and has been a regular contributor to fishing magazines.

Shaping our future by developing our people

FRDC is working with stakeholders to develop the skills and leadership essential to the future of fishing and aquaculture

By **Michelle Daw**

The ability to attract, develop and retain capable people is one of the major challenges facing Australian fishing and aquaculture.

FRDC is working with stakeholders to invest in the potential of people to thrive in an uncertain world through a plan to build capability and capacity.

FRDC Managing Director Dr Patrick Hone says it is imperative that people involved in fishing and aquaculture are supported to be innovative and resilient to change and that the sector builds a culture of lifelong learning.

"The fishing and aquaculture workforce is ageing, and there is strong competition with other industries to attract and retain capable people," he says.

"Our stakeholders have said we need to do things differently. We need to create workforce sustainability in fishing and aquaculture to contribute to regional and remote communities.

"This was one of the strongest signals we received from the consultation with stakeholders to inform our Research and Development Plan 2020–2025," he says.

Delivery of the Capability and Capacity Plan will be co-designed with stakeholders and take a multipronged approach.

"It's about building connections and trust, creating visible career and development opportunities, improving how we attract and retain great people and encouraging different perspectives to solve challenges," Patrick says.

The 'Capability and Capacity Plan' is focused on:

- determining future workforce needs;
- attracting and retaining capable people;
- connecting people and promoting collaboration;
- growing and nurturing diverse leaders;
- supporting innovation, learning and adaptation; and
- developing tools and resources to help people navigate career, leadership and development pathways.

Over the next 10 years, 41 per cent of jobs in agriculture, forestry and fisheries will be transformed by technology. One in three new jobs created in these industries will be tech-related, making digital and data literacy essential. People who can lead, solve problems, think differently and adapt are also critical to the success of fishing and aquaculture.

The new plan will build on current FRDC investment in people development, including the National Seafood Industry Leadership Program and bursaries and scholarships specific to fishing and aquaculture.

The plan will encourage students, educators and parents to explore careers in fishing and aquaculture and showcase science and research pathways, aiming to attract people with STEM (science, technology, engineering and maths) capabilities into fishing and aquaculture.

Resources and information will be available through a new online fishing and aquaculture people hub. New learning opportunities will also be developed, offering a combination of delivery methods, including self-directed, peer-to-peer, hybrid, face-to-face, and hands-on activities. F

Sally Roberts
Photo: Supplied

LEADING THE CHARGE FOR CHANGE

FRDC's Capability and Capacity Program is being led by Sally Roberts, who recently joined FRDC as Capability, Capacity and Culture Change Manager. She is passionate about unlocking individual and collective potential by developing people, and is experienced in leading collaborative research, development and extension projects to transform workplace practices and drive adoption of new technologies and methods.

"Fishing and aquaculture offer a vast range of rewarding careers, from hands-on technical work through to applied science and the professions, such as management, marketing and accounting," she says.

"I'm looking forward to working with our stakeholders to attract, retain and empower people to enable change in fishing and aquaculture."

Prior to joining FRDC, Sally worked for Dairy Australia, where she led research and development projects focused on attracting, retaining and transitioning people to enable a capable workforce and safe, positive workplaces. She also worked in a variety of roles at the Department of Education and Training Victoria and with not-for-profit organisations in the UK.

MORE INFORMATION
www.frdc.com.au/capability-capacity-and-culture-change

New regional extension officer network to strengthen grassroots engagement

FRDC's new network of extension officers across Australia is focused on improving the two-way exchange of information between the people in fishing and aquaculture and researchers

By **Michelle Daw**

Extension officer Nathan Bicknell with Nabin Bohara of Fair Fish (SA) at Port Adelaide. Photo: Greg Adams

FRDC is appointing regionally based extension officers across Australia to directly engage with the people involved in Indigenous, commercial and recreational fishing and aquaculture to increase the adoption of research outcomes and help tailor research and development (R&D) to their needs.

Managing director Dr Patrick Hone says FRDC is creating the network based on feedback from fishing and aquaculture stakeholders.

"They told us that we needed a team on the ground, in the regions, to help accelerate the adoption of R&D outcomes and drive practice change," he says.

"The extension officers will help increase our engagement with people at the grassroots."

The extension officers are Nathan Bicknell (South Australia), Kris Cooling (New South Wales), Felicity Horn (Western Australia), Matthew Jones (Victoria), Lauren Thornton (Northern Territory) and Steve Eayrs (Queensland). Recruitment is underway for an extension officer in Tasmania.

Patrick says the new staff have been chosen for their extension skills, experience and knowledge of fishing and aquaculture and their connections to sectors and regional communities.

"Their broad remit is to work with people and stakeholders to extend R&D outputs that meet user needs, incorporate their input into R&D priorities and bring people together to solve problems," he says.

The extension officers will look at solutions for regional issues in ways that can be adapted across the country, and will help all stakeholders tap into previous, current and future research to find workable solutions.

Seafood Industry Australia (SIA) Chief Executive Officer Veronica Papacosta has welcomed the extension officers and the greater engagement with industry to share knowledge.

"SIA looks forward to these officers growing FRDC's R&D outputs and providing solutions to industry problems and challenges," she says.

Amateur Fishermen's Association Northern Territory Chief Executive Officer David Ciaravolo has also welcomed the embedding of extension officers in the states and territories.

"I am hopeful that the new model will foster closer relationships between end-users and FRDC, which should ensure better uptake of research and improved identification of local research, development and extension needs," he says.

"Having dedicated resources in the form of local extension officers should help the recreational sector to better identify key opportunities to connect fishers, leaders and managers to relevant research. As a sector we are usually lacking in human resources, so the additional FRDC capacity in extension and engagement at the jurisdictional level is a real positive."

MORE INFORMATION
FRDC extension officers are contacting stakeholders in their jurisdictions.
You are welcome to email them at: frdc@frdc.com.au

Nathan Bicknell, SA. Photo: Greg Adams

Kris Cooling, NSW. Photo: Supplied

"I enjoy meeting people in their own area. They are often more comfortable and open to productive conversations when they are in familiar surroundings, and they appreciate you making the effort to visit."

Kris Cooling, NSW

Extension officers

Nathan Bicknell, SA

Nathan grew up in a rock lobster–fishing family in Port Lincoln, South Australia, and studied environmental science, majoring in fisheries management. He has worked for the Australian Fisheries Management Authority and OceanWatch Australia, and was Executive Officer of the Marine Fishers Association for seven years.

In that role, he represented the interests of licence holders in pursuit of co-management of the state's Marine Scalefish Fishery. He promoted the public profile of commercial fishing and empowered consumers through an integrated public relations initiative, which enabled them to reduce their food miles and support local fishers. This concept underpinned the award-winning Fair Fish (SA) Co-Operative, Australia's first community-supported fishery, of which Nathan is an inaugural director.

Most recently, he has been a sector consultant, which has included developing the SA Australian Marine Scalefish Master Fisherman training module in partnership with another consultant on behalf of Wildcatch Fisheries SA and OceanWatch Australia.

Of his role with FRDC, Nathan says he is keen to ensure that commercial, recreational and Indigenous fishers and people working in aquaculture have a chance to be involved in all phases of R&D.

"Traditionally, there has been a linear approach to extension, so after research was done, it was given to the industry to adopt. But I prefer a circular approach where you bring the stakeholders together at the start and involve them in all steps of the process for research, development and extension," he says.

"Climate change is one of the biggest challenges facing fishing and aquaculture, but it also creates opportunities through new ventures in the blue economy. Examples are aquaculture companies that are growing seaweed as livestock feed to reduce methane emissions or to sequester carbon from the atmosphere.

"These opportunities require an integrated approach to R&D within and across sectors and industries, rather than a business-by-business approach," he says.

Kris Cooling, New South Wales

Kris has worked across a wide spectrum of roles in fisheries and aquaculture since completing First Class Honours in Marine Science and Management at Southern Cross University in 2011.

He has worked for the NSW Department of Primary Industries as a technician and researcher and as an observer on commercial fishing vessels, as a technician at a trout hatchery, as a research assistant for universities, and as floor manager for one of the largest fishing tackle stores in Australia.

While he was working as a fisheries observer in the NSW Estuary General Fishery, it became clear that bait cost and access were a concern, so Kris ran a study comparing the pest species, European Carp (*Cyprinus carpio*), to two commonly used trap baits, Sea Mullet (*Mugil cephalus*) and Luderick (*Girella tricuspidata*).

"Our results showed Carp to be as effective a bait as Luderick and Mullet for male Blue Swimmer Crabs," he says. "In the right context, carp is cheaper than both native fish and offered the bonus of using a pest species and making the luderick or mullet available for sale."

Kris says the fishers enjoyed contributing to research and the findings were well received by the local sector.

Kris grew up in Taree, NSW, and is a keen fisher, diver and surfer. He has done volunteer work on cuttlefish behaviour studies and coral health, and aquatic conservation projects with traditional owners in the NT.

He enjoys connecting fishers and other stakeholders to relevant research and is keen to include their insights and innovations in regional and national projects.

"Meeting face to face with people is really valuable, even if it is just kicking tubs down at the local fishing co-op," he says. "I enjoy meeting people in their own area. They are often more comfortable

➔

and open to productive conversations when they are in familiar surroundings, and they appreciate you making the effort to visit."

Felicity Horn, Western Australia

Felicity has 20 years of advocacy experience representing WA's commercial fishing and aquaculture sectors, and a Bachelor of Science in Aquatic Resource Management – Aquaculture.

She was formerly Executive Officer of the Shark Bay Prawn Trawler Operators' Association and part-time Administrative Officer for the Aquaculture Council of WA. She has also served as a Board Member of the WA Fishing Industry Council (WAFIC) and the Australian Council of Prawn Fisheries, and she worked for WAFIC for 14 years, including as Executive Officer. During this time, she travelled extensively throughout WA to meet with stakeholders in recreational and commercial fishing, traditional owners, conservation groups and government representatives.

Among her career achievements, Felicity played a key role in assisting commercial, recreational and charter fishing interests to reach agreement on resource sharing issues and had a lead role in the Shark Bay Prawn Fishery's Marine Stewardship Council certification program.

Felicity grew up in a rock lobster fishing family in Dongara, WA, and is passionate about ensuring that the state's seafood sector is recognised by the broader community as sustainable, responsible and valuable.

She is keen to support sector and other stakeholder groups to access R&D.

"I think there's been a gap in this area for a while with many across our sectors wanting to invest in research but not having the time to look into it or knowing how to go about it. I'd like to see my new role bridge that gap."

Felicity says as a Board Member for the Australian Council of Prawn Fisheries, she saw the practical value of investment in research on topics such as onboard processing and is keen to help other seafood sectors reap similar benefits.

"People in the industry have had their heads down in survival mode, so I'm keen to support them to maximise R&D in areas that will make a tangible difference to their future," she says.

Dr Matthew Jones, Victoria

Matt has worked across the fisheries, aquaculture and maritime sectors for 12 years in Victoria and Tasmania. He graduated with dual degrees of Bachelor of Applied Science (Aquaculture) and Bachelor of Aquaculture from the University of Tasmania, followed by honours and a PhD in aquatic animal nutrition and disease management.

He then took up a role as Fish Health Specialist with Huon Aquaculture, providing technical advice and spending time on the company's vessels and its broader operations.

He later became a Training and Industry Liaison Officer with Seafood and Maritime Training, working with industries including Atlantic Salmon, oyster and abalone. Matt helped design onboard training on topics such as disease identification, biosecurity, epidemiology and aquatic nutrition and delivered short science courses relevant to finfish, oyster and abalone production.

Matt is an experienced research scientist with a strong emphasis on producing sector-relevant research and communicating outcomes to the sector. He has also worked on farm biosecurity, environmental monitoring and compliance, sea cage and land-based farm design, fishing methods, feeding systems and trials, and animal ethics requirements.

Matt's most recent role was as Primary Industries Learning and Training Specialist at public training provider, Bendigo Kangan Institute, where he oversaw vocational courses.

"There is an enormous output of scientific research relevant to fishing and aquaculture in this country and it's not theoretical science, it's applied science, but it's difficult for people in the industry to distil that information in a way that is tangible to them," he says.

He enjoys developing practical approaches to bridge the gap between scientific outcomes and sector. "I'm keen to get science down to the farms and onto the boats and find out

Felicity Horn, WA.
Photo: Supplied

Dr Matthew Jones, Victoria.
Photo: FRDC

"There is an enormous output of scientific research relevant to fishing and aquaculture in this country and it's not theoretical science, it's applied science, but it's difficult for people in the industry to distil that information in a way that is tangible to them."

Dr Matthew Jones, Vic.

industry's R&D needs. Good, old-fashioned face-to-face contact is so valuable. People get hundreds of emails a day but one hour spent together can make such a difference."

Lauren Thornton, Northern Territory

A keen angler with a background in natural resource management and stakeholder relations, Lauren has worked in various capacities for Kakadu National Park, through Parks Australia, since 2017. She has been based in Darwin for the past eight months, working with Aboriginal communities to develop new tourism businesses and commercial activities connected with the park.

Previously, she was based in Jabiru, where she managed customer service staff and developed strong networks with traditional owners, local businesses and government agencies. Lauren has a Bachelor of Applied Science in Ecotourism, and she engaged with professionals and scientists to learn more about their work so that she could educate stakeholders and visitors about the work of Parks Australia. She also travelled to remote areas for activities and consultation and coordinated cross-cultural teams of up to six staff to provide interpretation of Kakadu National Park.

While with Parks Australia, Lauren took part in many fishing, camping and boating shows to talk to recreational fishers and other members of the public about regulations that apply to Kakadu National Park and to provide safety information.

Lauren Thornton, NT.
Photo: Supplied

Steve Eayrs, Queensland.
Photo: Supplied

Living within the park gave her opportunities to explore its many rivers and fish for Barramundi *(Lates calcarifer)*, despite many close encounters with crocodiles.

Lauren gained an insight into fishing and aquaculture while working on sea-going pearl farm vessels in the NT and WA after leaving school.

She is keen to develop productive relationships between all sectors connected to fishing and aquaculture, and to build on her established networks with Top End stakeholders.

"Having the opportunity to learn about the research and working out the best ways to get it out to the community as an FRDC Extension Officer is a really exciting prospect," she says. She believes regular contact is key and is keen to immerse herself in community events, such as fishing competitions.

Steve Eayrs, Queensland

Steve began his career in the 1980s as a commercial fisher working in prawn trawl fisheries in northern Australia, Saudi Arabia and Burma, and fishing for Orange Roughy *(Hoplostethus atlanticus)* in Tasmania.

He was then a Fishing Technologist at the Australian Maritime College in Tasmania and was involved in efforts to reduce bycatch in prawn fisheries in Australia, the Middle East, Africa and South-East Asia.

Steve spent 11 years at the Gulf of Maine Research Institute in Portland, Maine, US, where he worked on selective fish-trawl designs and prawn bycatch reduction projects in the Middle East and South America.

He is the Principal Investigator of the SeSAFE project, funded by FRDC, the Australian Maritime Safety Authority and other seafood sector bodies. The SeSAFE project provides online safety training for skippers and crew working in fishing and aquaculture, and Steve will continue in this role part time.

Steve holds a Bachelor of Applied Science in Fishing Technology, a Master of Philosophy in Fisheries, and a PhD in Natural Resources and Earth Sciences.

He enjoys working collaboratively with fishers and other stakeholders to build momentum and inspire change in the seafood sector, including facilitating uptake of research outcomes.

"As an FRDC extension officer, my approach will be to work closely with all stakeholders, recognising their issues, concerns and perspectives, and working towards novel win-win solutions," he says. F

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Digital exchange to transform fisheries

FRDC is taking a lead role in the Australian AgriFood Data Exchange initiative, which aims to develop digital infrastructure to transform operations in primary production and food supply chains

By **Catherine Norwood**

A cohesive and secure data value chain has the potential to drive major efficiencies across fisheries, aquaculture and other food production systems. It will provide business insights and operational improvements, and offer marketing advantages.

But there is a gap in existing underlying infrastructure and platforms that makes it hard to bring together the greatly fragmented data pools along the primary production supply chain.

To address this gap, the Australian AgriFood Data Exchange was launched in 2021 as a collaborative initiative. It aims to drive the development of an optimised data-sharing platform to meet the present and future needs of primary producers and food supply networks.

Connecting data highway

The vision of the Australian AgriFood Data Exchange is to create an interconnected data highway for Australia's agrifood value chain, enabling permitted, secure and timely access to information along every step of the production and supply chain.

FRDC is one of the leading partners in the AgriFood Data Exchange, which has attracted more than $3 million in funding from a diverse range of industry, government, research and technology partners.

FRDC Managing Director Dr Patrick Hone sees it as critical national infrastructure, with the potential to transform fishing and aquaculture, along with other Australian primary production and food production systems. "It will help address many of the complex challenges that Australian primary producers are facing – continued access to global markets, increasing competition, climate and water related risks, global economic shocks," he says.

He believes it will add value beyond digitising analogue processes and systems. "It will connect fishers and aquaculture operators into their broader communities and supply chains and allow the data that may be stored in many disparate systems to come together as a distributed system.

"The challenges and opportunities of extracting the most from true digital transformation are more than fishing and aquaculture can tackle alone," he says. "That's why the collaboration with other industries and stakeholders through the AgriFood Data Exchange is so important."

In the past year, the AgriFood Data Exchange has undertaken four experiments, testing different data protocols and different user requirements. These include:

- **Experiment #1:** reducing the burden of regulatory compliance (red meat industry);
- **Experiment #2:** identifying and anticipating biosecurity risks (wine industry);
- **Experiment #3:** benchmarking performance to inform decision-making (grains industry); and
- **Experiment #4:** improving compliance and traceability (fisheries industry).

Results of the four experiments were showcased in late March at a virtual demonstration day. This showed the different methods of enabling data exchange and how these could add value to agrifood industries, with specific use cases across biosecurity, traceability, benchmarking and compliance.

Fisheries use case

Australian Western Rock Lobster (*Panulirus cygnus*) was chosen as the commercial species use case for Experiment #4. Chair of this project team was Kyaw Kyaw Soe Hlaing, FRDC's General Manager of ICT and Digitalisation. Kyaw Kyaw says the team, while working on showcasing traceability, also addressed other pressing issues such as logistics planning, accelerating quota reconciliation of fishers' catches and streamlining compliance reporting.

The technology partners for the use case were Telstra and IBM, which combined their capabilities and platforms, including Telstra Data Hub and IBM's Blockchain Transparent Supply. Industry partners in the fisheries experiment included lobster fishers represented by the Western Rock Lobster Council Inc (WRL), rock lobster processors Geraldton Fishermen's Co-operative and Indian

Illustration: Adapted /Creative Market

Ocean Rock Lobster, and the Western Australian Department of Primary Industries and Regional Development (DPIRD).

The aim of the 12-week experiment was to demonstrate how permitted data sharing underpinned by robust security and access control can result in trust and collaboration to unlock more value from collected data.

Mark Cason from IBM says the prototype stitched together existing technologies in a new way. It also resolved the challenges of standardising datasets collected in different ways. It anonymised data when necessary and provided secure specific permissions that allowed the data to be shared between multiple users while meeting privacy, confidentiality and security requirements.

Data possibilities

Under the current manual quota reporting processes in Western Australia, it can take up to two weeks to reconcile landed catch with a fisher's remaining entitlement. In the experiment, the digital exchange of information between fishers, processors and DPIRD provided a near real-time reconciliation – a result that would allow fishers to plan future trips more readily and with more certainty.

Other efficiencies identified through the exchange of data included real-time tracking of catch on-board and landing locations. This would allow processors to coordinate the timely collection of catch from port using vehicles of the right size, while also delivering correct bait needs to fishers, thereby reducing waste.

Matt Taylor is CEO of project partner WRL and says the experiment generated significant goodwill between the industry partners. "There's been a lot of groundbreaking just to take this first step, in terms of sharing information that wasn't shared before and creating new connections.

"It's been a great opportunity to identify how we can resolve the inefficiency in quota reconciliation, but also how we can generate and use new information for current and new innovative uses for fishers, government and researchers," he explains.

"For example, fishers could potentially put lobster grades, bait, fuel and labour costs into a smartphone or tablet app and come up with a trip profitability analysis. They can then compare trips where similar grades of lobster were landed or compare grades at similar times across years and establish industry benchmarks over time."

Taking part in the experiment aligned with WRL's broader digital strategy, launched in 2021. Matt says the WRL digital strategy identifies traceability as essential to the industry's future. Having the right digital infrastructure and protocols to share information across the industry is central to this.

General Manager – Supply Chain Operations at Geraldton Fishermen's Co-Operative Glen Davidson says the ability to exchange data with fishers and DPIRD to better understand who is fishing where and when will provide real improvements from a logistics management perspective. Nikki Thompson at Indian Ocean Rock Lobster agreed, saying the project highlighted how archaic some compliance processes are and the potential gains that digitisation can bring.

Future developments

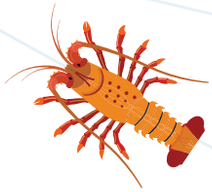
Matt Taylor says all project partners seem keen to move forward with putting the prototype into practice.

The key to being able to do this will be to continue to collaborate and to align each participant's digital projects, leveraging the user stories, future state mappings and recommendations that will come out of the final report for the experiment.

An example is the DPIRD's Fisheries Digital Transformation Project that began recently. The experiment has helped document existing processes for DPIRD, fishers and processors, and provided evidence of what can be achieved.

Matt says that although the current data exchange prototype has been developed for the Western Rock Lobster industry, it provides a model that other fisheries can use, particularly given DPIRD's involvement in WRL's digital transformation program, which could allow for data exchange technology to be rolled out more broadly across WA's fisheries in coming years.

Kyaw Kyaw Soe Hlaing will outline FRDC's vision of a data-enabled future for Australian fisheries, with Matt Taylor discussing the Western Rock Lobster industry as a case study, at the 2022 Seafood Directions conference in Brisbane from 13 to 15 September. F



MORE INFORMATION

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FRDC RESEARCH CODES

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Advocate for action to help fisheries adapt

Gretta Pecl has built a global reputation as a marine science communicator and advocate for citizen science. She is a leading voice in the call for urgent science-driven climate action to help fisheries survive

By **Corrina Ridgway**

Not even a poor Zoom connection across 2600 kilometres can diminish the clarity of Professor Gretta Pecl's conviction for the urgency of science-driven climate action.

That sense of urgency has only increased with the completion of her recent work as a lead author for the Intergovernmental Panel for Climate Change (IPCC) Working Group II, which released the IPPC's sixth climate report in February.

She says positive outcomes will be defined by proactive measures, and urgent changes are needed in human economic and social systems to limit climate impacts on marine systems. As Professor of Climate Change Ecology at the University of Tasmania (UTAS) and Director of the Centre for Marine Socioecology (CMS), it is a message that Gretta is well positioned to share.

Her long-time advocacy for citizen science and its role in informing and inducing positive change adds further weight and reach to her message.

But it has not been a straightforward path for Gretta to reach her current position. There was little in her childhood in Ballarat that linked her to either academia or the marine environment. After high school, she spent a few unsatisfying years as an insurance clerk before diving into a marine ecology degree that she started at UTAS and completed at James Cook University (JCU) in Queensland. A PhD at JCU followed.

In the competitive marine science field, her career has involved juggling a series of short-term grants and appointments to fund her work, including part-time work while her children were young. In all, there were 12 contracts over 19 years. Gretta was appointed as a professor and Director of the CMS before being awarded a permanent staff position.

In the first 15 years of her research career, Gretta focused on squid and other cephalopods. And as she studied their migration patterns, they provided her entrée into climate science, which led to her Redmap initiative.

Mapping change

Redmap is the Range Extension Database and Mapping project, which Gretta launched in Tasmania in 2009, combining marine ecology and citizen science. Redmap allows the public to photograph and log marine species that appear to be outside their expected geographic range. Images are then formally identified by species experts, adding to a living map of species distribution. The project went national in 2012.

"Knowledge is not just the domain of scientists; there are many different types of knowledge," says Gretta. "People working in other roles in the marine environment and associated industries know heaps of things, and I see the Redmap project as a way of valuing and acknowledging some of the knowledge that they have."

Redmap has highlighted the benefits of integrating scientific and public knowledge via citizen science. The collected data has been used for more than 25 journal articles and has been an important early indicator of species range shifts.

"In fact, about 20 per cent of all the knowledge we have on species range shifts in Australia comes from citizen science," says Gretta.

The project has also helped build a positive perception of and trust in scientists and scientific methods. Recent research has shown that 97 per cent of people trust information from Redmap.

"I think there's a long way to go, but projects that act as an interface between science and the public are really important for exposing how science works and what motivates scientists.

"Growing up with almost zero family or community interest in science has given me a strong sense of how siloed we are – it's very easy when you're in the field to forget what non-scientists don't know and don't get exposed to."

But she stresses that dialogue and knowledge are a two-way street.

Public engagement has become a key factor in much of her work, including the 'curious climate' project. This was a joint initiative between the research community in Tasmania and ABC Radio for National Science Week 2019, designed to facilitate public education through dialogue, allowing the audience to ask questions and effectively control the topics discussed.

In 2021, the program was extended to involve school students across Tasmania. Almost 300 questions posed by more than 1000 school students were answered by 57 experts, using a combination of written material, videos and school visits.

The school program was timed to coincide with the United Nations Climate Change Conference in Scotland in November 2021, recognising heightened environmental and climate anxiety in children.

"Research shows the anxiety in kids is more about them seeing little government action around climate change, rather than a response to climate change itself," Gretta says.

"We know that doom and gloom switches people off, but I personally feel quite hypocritical only doing optimism, because that's not where we're going."

"I want to be able to look my kids in the eye and say that I did the best that I could with what I had at the time to try and engage people on the issue, answer questions, be approachable as a scientist – to really do the best that I can to communicate these things."

Photo: Peter Whyte

Some ecosystems, such as the Great Barrier Reef, are likely to suffer irreversible damage as a result of climate change. Photo: Francesco Ungaro

Facilitating collaboration

One of her most recent projects is Future Seas 2030, an international and interdisciplinary collaboration led by the CMS in Tasmania. It explores both 'business-as-usual' (that is, where we are headed) and 'more sustainable' futures for our oceans.

Gretta's work in Future Seas resulted in a special issue of the journal *Reviews in Fish Biology and Fisheries*, published in March 2022, and a multidimensional arts performance showcasing possible dual scenarios for the world with or without the changes we need to make for climate and environmental action.

The project involved 130 researchers, including a traditional owner and an Indigenous working group. Expertise was contributed from diverse perspectives: engineers, health experts, climate modellers, fisheries scientists and psychologists. Gretta believes that this type of societal, cultural and professional collaboration is needed when addressing climate change.

Gretta says it was an invaluable experience for researchers in their early careers, who led most of the research papers. It gave them an opportunity to lead big teams, learn to think in an interdisciplinary way, gain exposure to different aspects and use different lenses to look at their problem from all these different viewpoints. Senior researchers supported in advisory capacities.

Gretta says it was an incredible, eye-opening process. "As scientists, we don't often get to sit back and look at the broader picture."

Teamwork and mentoring are particularly

Above Gretta Pecl, centre, with some of her students at their graduation. Photo: Supplied

satisfying for Gretta. "The best thing about my career is that I'm now in a position where I can facilitate other people's careers and experiences."

She is impatient with the hyper competitiveness of academia. "We don't have time to muck around. Everyone works better if you're lifting people up around you. I'm a trained ecologist. I'm not a social scientist, I'm not a professional communicator, nor a psychologist, but I partner and work with other people who have those skills."

Ecology and climate

Beyond this sea of science communication and collaboration, Gretta has been active in several research fields, both in ecology and as CMS Director.

She also leads multiple research projects centred on climate-induced marine range shifts and responses. Her work in this area has evolved from her ecology background, driven by personal observations and a desire for answers.

Gretta says she became aware that things were changing in the early 2000s, but the enormity of climate change already underway hit home with the 2016 Great Barrier Reef bleaching event.

"I really expected that it would be the moment that Australia and the world would go, 'Hang on a minute, this is going to disappear in our lifetime, this is serious' and then do something. But nothing happened."

The necessity for monitoring and understanding the ecological effects of climate change has influenced several of Gretta's research projects. That work has included devising an assessment system to prioritise species that are vulnerable to climate change and have high ecological, economic and recreational value. In Tasmania, the Southern Rock Lobster (*Jasus edwardsii*) was identified as one of those species.

"Large changes induced by climate can happen on time scales that are relevant to commercial operations. We've seen this in range shifts of lobster and squid fisheries in Maine, in the US, and also in fisheries in Iceland."

Gretta has most recently contributed to an FRDC research project analysing the opportunities and impacts of range-extending scalefish species. Led by UTAS colleague Associate Professor Sean Tracey, the research models the speed of range shifts for commercial target species, their likely ability to adapt to their new territory and impacts they may have there.

In some ways, it is a synthesis of Gretta's previous work, combining citizen science with ecosystem modelling, population dynamics, range shifts and fisheries management.

She points out that damage to ecosystem-engineering species, such as the corals that form reefs and the kelps that create forests, may well be outpacing the range shift of commercial species. These changes may be driving the movement of species and may also jeopardise their ability to survive in new, but already damaged, locations.

Climate impacts

This issue was emphasised during her work as a lead author for the IPCC's Working Group II that produced *Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the IPCC Sixth Assessment Report.*

The report, released on 28 February 2022, outlined the trends and probabilities of climate

change–induced impact on global systems.

"The findings from the report and the strength of the language were orders of magnitude stronger than in those reports preceding it," Gretta says.

Her involvement originated from a desire to understand the IPCC process and to qualify the robustness of its reporting.

"In my science communication, I felt I spent a lot of time defending the IPCC, but it's a very confusing beast. I wanted to be able to put my hand on heart and say conclusively that I knew how it worked, and knew it was robust, and be able to defend it in an honest way."

The Australasian chapter identified nine key risks, of which over half related to natural system consequences.

Headline marine findings included damning evidence for increased habitat loss, particularly for coral reefs and kelp systems.

"Over 140,000 kilometres of kelp habitat has been lost since 2011 – we've already lost 90 per cent of our Giant Kelp in Tasmania," says Gretta.

The increasing prevalence of extreme events in Australia was also reinforced. Of critical importance is that climate trends and extreme events have started to overlap, causing major ecosystem impacts. The report's team found a very high level of confidence that some ecosystems, such as the Great Barrier Reef, would suffer irreversible damage.

The potential for all these disturbing developments to overwhelm us continues to rise, but Gretta is adamant that society must start to account for the true cost of activities that impact our natural world.

"We've not been factoring in the costs of carbon emissions and environmental damage that industries and businesses have been getting for free. Our world doesn't work that way any longer. We have to factor in those costs."

Marine futures

Climate change impacts will be numerous and cascading for fisheries. As the health of marine environments declines further, climate change impacts will not be restricted to economic loss due to changing catch or increased disease. Physical degradation of coastal communities, social disintegration, cultural loss and associated mental health issues are all clear and present dangers.

Gretta stresses that positive action will involve proactive adaptation in conjunction with expeditious mitigation. She outlines how extreme events could drain our society and economy so much that very few resources will be left to invest in adaptation.

"You've only got to look at the floods and fires recently to see that the events are happening so regularly that we're getting compound events. It creates so many impacts that the potential for overwhelming the system is extremely high."

She says real-time monitoring and information needs to underpin fisheries management plans that are more flexible and adaptive, and integrated 'whole of ecosystem' approaches should become a priority.

"Transparency, equity and trust are all going to be very critical, as there are going to be so many changes, and that means a lot of decisions need to be made."

Gretta stresses how important fisheries and aquaculture are for Australia in terms of jobs, food production and other socioeconomic benefits. "It is really important we do all that we can to be prepared for climate change so that these industries continue to thrive.

"Being forewarned is forearmed. The more information we have, the more we work together and the stronger we collaborate across sectors and regions, the better off everyone will be."

Motivation

Gretta admits that the weeks since the IPCC report's release have been emotionally draining. "I've had multiple reporters cry on me," she says heavily.

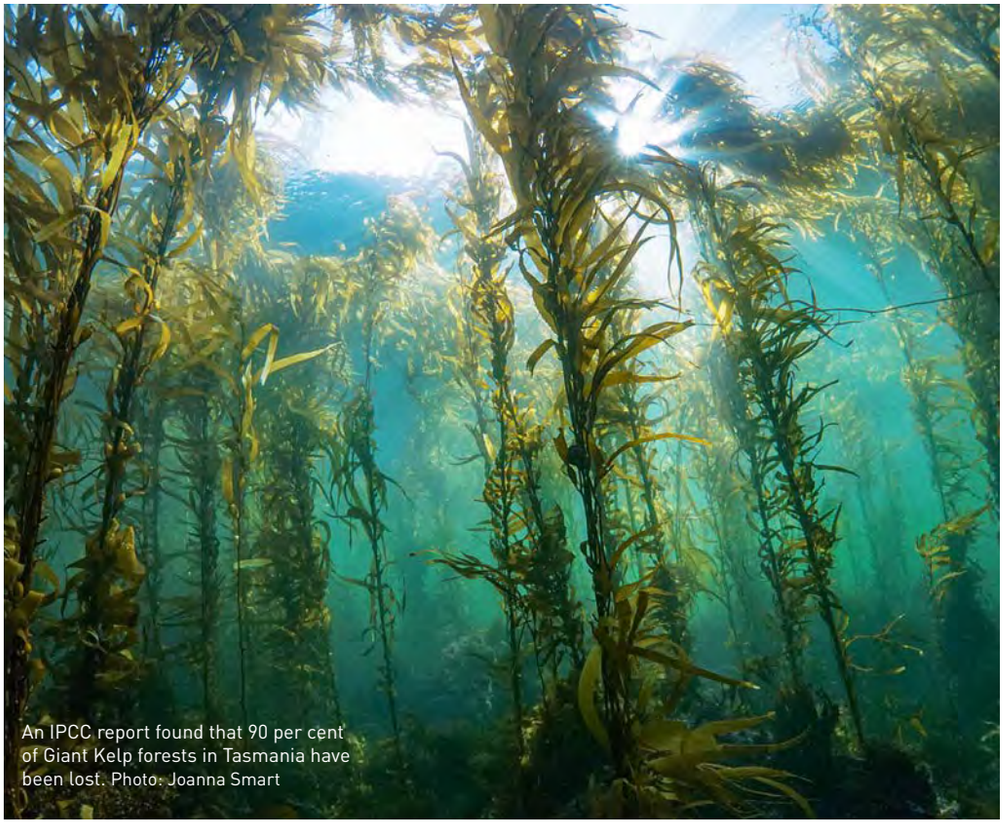
She constantly reminds herself that every fraction of a degree of warming avoided leads to less pain and suffering.

"I'm really passionate about marine systems and fishing and diving and ecology – so I really want to have a role in making sure Australia's marine sectors are prepared."

However, her ultimate motivator is the next generation.

"I want to be able to look my kids in the eye and say that I did the best that I could with what I had at the time to try and engage people on the issue, answer questions, be approachable as a scientist – to really do the best that I can to communicate these things." F

MORE INFORMATION
www.ipcc.ch/report/ar6/wg2;
redmap.org.au
www.redmap.org.au/article/what-is-climate-change
FRDC RESEARCH CODE 2011-088



An IPCC report found that 90 per cent of Giant Kelp forests in Tasmania have been lost. Photo: Joanna Smart

Campaigns mobilise communities for fisheries health

Building on evidence-based stock assessments and fisheries regulations, behavioural science and social marketing are providing new strategies to help fishers rebuild and maintain stocks of Australia's favourite fish species

By **Catherine Norwood**

Fishers are being urged to help rebuild populations of several popular fish species by diversifying their catch to alternative species.

Campaigns with this aim have been launched in South Australia and Queensland and discussions are underway in Western Australia as high-profile species in all three states struggle to recover despite management plans in place to reduce fishing impacts.

SA has already closed two of its Snapper *(Chrysophrys auratus)* fisheries to all fishers for three years to 2023, with stocks designated as depleted in the *2020 Status of Australian Fish Stocks Reports* (SAFS).

This is a drastic step that fisheries managers across the country are keen to avoid for other stocks and species, and it has led to new approaches to effect change being trialled.

Although fisheries regulations make it easier to control commercial catches, the dispersed nature of recreational fishing makes it difficult to direct fishing activities away from a few favourite species. Consumers also have a role to play, whether eating their recreational catch at home, or buying it for dinner.

Current efforts to direct fishing to alternative species touch on these three aspects: commercial and recreational fishing activity and consumption choices.

SA challenges

In SA, four species are 'in need of a break' says Dr Mike Steer, Research Director, Aquatic and Livestock Sciences at the Department of Primary Industries and Regions' (PIRSA) research arm, the South Australian Research and Development Institute (SARDI).

These are Snapper (*Chrysophrys auratus*), King George Whiting (*Sillaginodes punctatus*), Southern Garfish (*Hyporhamphus melanochir*) and Southern Calamari (*Sepioteuthis australis*).

Although the Snapper fisheries in Gulf St Vincent and Spencer Gulf/West Coast are depleted, the south-east stock, which is shared with Victoria, remains sustainable. SA's stocks of King George Whiting and Southern Calamari are also sustainable. The Southern Garfish stock in the Spencer Gulf is recovering but is depleted in Gulf St Vincent.

These are considered 'Tier 1' species under a reformed management structure in SA's marine scalefish fishery, which has recently introduced more regionally-based management of fish stocks and quotas for the commercial sector.

Right
The campaign provides information for seafood consumers and recreational fishers. A collection of recipes by chef Callum Hann is featured, pictured here are Australian Salmon tacos.
Photo: PIRSA

Mike says reliance on just a few high-profile species poses a risk to the long-term sustainability of the stocks and the productivity of the fishery. "But there was also concern when quotas were introduced for key species that it would shift fishing effort to other species," he says. "We needed to identify those species that could support higher levels of production before promoting them as alternative targets."

Identifying alternatives

In SA, there are more than 60 species that can be targeted by commercial fishers within the community-shared marine scalefish fishery. These range from premium finfish, such as King George Whiting, to lesser-known species such as Blue Mackerel (*Scomber australasicus*), leatherjackets (*Monacanthidae* spp.), Sea Sweep (*Scorpis aequipinnis*), octopus (*Octopodidae* spp.) and sand crabs (*Ovalipes* spp.).

With funding from FRDC, SARDI conducted a risk assessment to evaluate which species could support higher catches. Researchers identified 26 species for in-depth assessment. They found that Ocean Jacket (*Nelusetta ayraudi*) and Australian Salmon (*Arripis truttaceus*) would support the greatest increases in catch, possibly hundreds of tonnes more.

Although the risk assessment primarily focused on capacity for commercial fishing, there is also interest from recreational fishers in these alternative species. Researchers recognised that barriers to changing target species for both commercial and recreational sectors included the different gear and know-how needed to catch those alternative species.

Following this study, the PIRSA took the lead to promote the catch and consumption of several of these less popular species, launching the 'Same Dish, New Fish' campaign in 2020.

Top Sally Jenyns from Channel 7's *Creek to Coast* program cooking up a Cobia dish.
Photo: Kieran Tunbridge

Above Pan-fried Snook with celeriac and grilled radicchio is one of South Australia's alternative fish recipes.
Photo: PIRSA

Get hooked on something different and take the #SameDishNewFish challenge. By choosing a wider variety of local seafood, you can help support sustainability.

www.samedishnewfish.sa.gov.au

This ongoing campaign provides information for seafood consumers and recreational fishers on how they can change dining, shopping, cooking and fishing habits to choose alternative species.

The campaign includes details about the location and best techniques to catch and handle each species, and a collection of recipes created by chef Callum Hann and Paul Baker. The SA television program *Out of the Blue* (part travel log, part cooking show) also featured the campaign and alternative species during 12 shows in 2020 and 2021.

Mike says building consumer confidence in other species will also give commercial fishers the confidence

to diversify their catch. Previously, they may have felt locked into the few top species that consumers were after. "Even though they can fish for a range of species, many specialise in targeting one or two, relying on their expertise and fishing for the market," he notes.

In the recreational fishing community, a state-wide survey underway this year is expected to provide data on what is being caught and evidence of any changes in species targeted. The 2022 survey is being partly funded by FRDC as it is trialling a new smart phone app to collect data, in conjunction with traditional telephone surveys.

Queensland pilot

Recreational fishers are also involved in a Queensland program that assesses fishing favourites Snapper and Pearl Perch (*Glaucosoma scapulare*) as being depleted. Stocks have failed to recover under previous management measures, requiring a tightening of regulations, which most recently have included an annual closed season, increases in the size of legal fish and reduced bag limits for recreational fishers.

Managers are also exploring other strategies to help rebuild stocks and, in 2020, FRDC funded the 'Fishing for change' project in partnership with the recreational fishing sector, which is responsible for the largest share of the catch of both species.

The project was conducted jointly by Currie Communications, Griffith University, the Queensland Department of Agriculture and Fisheries (DAF) and the Centre for Marine Socioecology. The primary output was the 'Switch your fish' social marketing campaign to help influence the decisions of recreational fishers.

The research team began with a co-design and stakeholder engagement process, including interviews and surveys, to identify solutions to the central issue: what can fishers and other interested parties do to help increase Pearl Perch and Snapper stocks? This engagement process involved 239 stakeholders representing 14 stakeholder groups, and they identified 923 possible solutions. There was strong interest from fishers in contributing to the process and supporting a positive message. Further consultation whittled the priority actions down to 25, and these were taken to a workshop to co-design a strategy with stakeholders.

Workshop participants included fisheries managers and regulators, researchers, fishing club representatives and recreational fishers, charter boat operators, tackle and equipment retailers, fishing sector bodies and behaviour change experts.

The emerging priority was to encourage fishers to catch alternative species. This resulted in the highly targeted 'Switch your fish' pilot campaign. A Senior Consultant at Currie Communications, Sophie Clayton, says the campaign principally used social media and was largely focused on the Sunshine Coast between April and September, the months when Pearl Perch and Snapper are traditionally targeted.

Switch your fish

The alternative species promoted were mahi mahi (*Coryphaena* spp.), Amberjack (*Seriola dumerili*) and Cobia (*Rachycentron canadum*), which all offer comparable eating and fishing experiences for fishers.

Sophie says the campaign worked closely with Sunshine Coast fishing identities and influencers, including the organisation SCF Australia, which promotes sustainable fishing and clean waterways for future generations and which led local activities. There was strong local support for the campaign, with content shared across social media platforms. This included influencer-generated content that helped to provide information and education for fishers targeting new species, what gear to use and how to find the new species, effectively showcasing the desired behaviour.

The campaign featured signage at boat ramps, social media posts, media releases, a website, newsletter and local events. The target audience was Sunshine Coast males aged 25 to 55 years with an interest in fishing. Sophie says Facebook analytics show that they successfully reached at least 20,000 people in their target audience. Survey results also showed that recreational fishers landed more of the alternative species that the campaign promoted than they had previously.

Evidence of impact

To understand the on-ground impact in detail, Dr Sam Williams, a Senior Fisheries Biologist from Queensland's DAF, analysed data collected from the state's boat ramp survey program. He compared fishers' targeting behaviour and catches during the campaign period with those of previous years, and he compared data from a control location on the Gold Coast with data from the Sunshine Coast. Sam says that although there are signs that the campaign positively influenced fishers to target new species, the short timeframe makes it difficult to understand how widespread the influence was.

"There was an increase in the fishers' intention to target mahi mahi and Cobia on the Sunshine Coast during the campaign period. We also observed an increase in the actual catch of Amberjack," he says.

Analysis of fisher intent to target Pearl Perch and Snapper showed a decline, but the campaign period included a one-month closed season for these species. "There was a slight increase in the actual catch of these species landed during the campaign period, which was not the result we were after," Sam says. However, he points out that campaign messaging did not focus on reducing the catch of these species.

Sophie says stakeholders in the campaign were keen to see it expanded to foster active involvement by charter fishing operators, bait and tackle shops, local fishmongers and restaurants in promoting alternative species. The 'Fishing for change' webinar outlining details of the project can be viewed on YouTube: www.youtube.com/watch?v=REbdUvgR2pU

"There was an increase in the fishers' intention to target mahi mahi and Cobia on the Sunshine Coast during the campaign period. We also observed an increase in the actual catch of Amberjack."

Dr Sam Williams,
Senior Fisheries Biologist

Recovery in WA

WA is facing challenges with its iconic West Australian Dhufish (*Glaucosoma hebraicum*), Baldchin Groper (*Choerodon rubescens*) and snapper. Recreational fishers catch more of all three species than commercial fishers do.

Stocks of all three were assessed as 'recovering' in the 2020 SAFS reports. A 20-year management plan designed to help rebuild their populations is midway through; however, the stocks are not recovering as quickly as anticipated.

CEO of Recfishwest Dr Andrew Rowland says that, in the coming months, recreational fishers will join other fisheries stakeholders to discuss further initiatives. Encouraging fishers to target alternative species is seen as one such solution.

"It's about finding alternative opportunities for people to continue to put their boat on the water and spend time on the beach fishing," says Andrew. "Whatever alternative species we are looking at, we will be considering the biological impact and how resilient to the shift in effort those species will be."

Options include a shift to open-ocean species such as mahi mahi or marlin (*Istiophoridae* spp.), which would provide a different kind of experience, more akin to sportfishing, although these fish can be good eating too.

Andrew hopes a focus on alternative species can build on the dining trends that emerged during the past two years of COVID-19 restrictions, when diners proved more adventurous in their choices and willing to try new culinary experiences and new fish species.

He expects the Queensland 'Fishing for change' project will help to guide the approaches WA may take to shift effort towards the less vulnerable fisheries.

He has welcomed the behavioural science approaches being used as having equal value to the biological and regulatory approaches.

"It is great to see these social elements being considered," he says. "We need to understand how we can modify and influence behaviour in a way that still delivers people's quality fishing experiences and allows them time to enjoy the benefits of fishing, but at the same time protects the vulnerable components of the fishery." **F**

Playing the long game

Dr Emily Ogier leads FRDC's Human Dimensions Research Coordination Program, which co-sponsored the Queensland project, along with FRDC's Queensland Research Advisory Council. She says the 'Fishing for change' project demonstrates how behavioural insights can be used to encourage more positive behaviours across all levels of commercial and recreational fisheries and aquaculture.

"FRDC wants to harness these insights alongside the important sustainability science it invests in, to help processes of change for enduring prosperity," she says. She sees the co-design of the campaign with stakeholders as important to build trust in the process of identifying target behaviours, to support the campaign and the positive reach of its messages.

But the results also show how difficult it is to generate change. "There is something positive in asking people to seek new experiences and adopt new behaviours, such as targeting different species. But asking them to forgo something, such as a species they may have a long-term attachment to, is not the same thing," she says.

"Targeting a new species does not mean fishers have stopped targeting the old species. Behaviour change is a long game to play. The campaign's positive impacts can include greater acceptance of changes to fishing rules to protect species in future. That would be a measure of success, too."

Top Benjamin Glass, SCF Australia, with a mahi mahi he caught.
Photo: Kieran Tunbridge

Above Social media played an important role in the 'Switch your fish' campaign.

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FRDC RESEARCH CODES
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Tuna Champions looks beyond bluefin

Engaging fishers as champions of change is leading to better practices for Southern Bluefin Tuna fishing, and for other species including sharks and rays

By **Bianca Nogrady**

As the research leader of Australia's Tuna Champions Initiative, Associate Professor Sean Tracey knew it had been a success when he discovered recreational fishers teaching each other the best way to care for their catch of Southern Bluefin Tuna (*Thunnus maccoyii*).

"If people are not taking ice on the boat, someone will actually comment 'you should take some ice, look after the fish, and have you heard about Tuna Champions?'," he says.

Sean is based at the Institute for Marine and Antarctic Studies at the University of Tasmania, and he helped to launch the Tuna Champions initiative five years ago, in collaboration with the Australian Recreational Fishing Foundation.

Tuna Champions is a grassroots education campaign supported by high-profile fishing personalities, celebrity chefs, sporting stars, charter operators and recreational fishers, and it has spread the word that Southern Bluefin Tuna is a resource worth nurturing and respecting.

The initiative has used in-person and social media messaging to generate a high level of engagement with the recreational fishing community, and there are early indications of behaviour change in fishers.

Now there is a push to expand the initiative to include not only other species of tuna, but also other recreationally fished species such as sharks and rays.

Research to engagement

FRDC has helped fund the Tuna Champions initiative, which teaches recreational Bluefin Tuna fishers how to care for both the fish they catch and the fish they release.

Tuna Champions is a grassroots education campaign that spreads the word that Southern Bluefin Tuna is a resource worth nurturing and respecting.
Photo: Al McGlashan

This initiative evolved out of work that Sean had been doing with the recreational fishing sector looking at how Southern Bluefin Tuna survived after being caught and released.

After spending time with recreational fishers around Australia, Sean says he realised that there were some gaps in fishers' understanding about how to handle caught fish to preserve the meat in the best possible condition, and also how to improve the survival chances of a released fish.

Some of the Tuna Champions' key messages in handling Southern Bluefin Tuna include:

- brain-spike and bleed fish as quickly as possible if you intend to keep the catch;
- store the fish in plenty of ice;
- keep only what you intend to eat; and
- if you intend to release a fish, keep it in the water as much as possible and keep water moving over its gills to improve its chance of survival.

But recreational fishers often have their own ways of doing things. One of the biggest challenges was how to achieve behaviour change in such a diverse and passionate community.

That is where the idea of Tuna Champions was born. Sean wanted the behaviour change to be driven from within the sector, not imposed on it.

"That's why it had its own brand," he says. "We want to make sure that we're getting ambassadors from the sector to drive it as champions of change, and really push the messaging out from within the sector that this is a good thing to do."

High-profile recreational fisher and TV star Al McGlashan is one of the champions of change. While filming the Southern Bluefin Tuna documentary *Life on the Line*, he became aware of a knowledge gap between commercial and recreational fishers – himself included – about how to handle the tuna. He wanted to do better as an individual and as part of the recreational fishing community.

"It's not a right to catch them, it's an absolute privilege," he says. "So, you can't catch them and waste them, you can't catch them and dump them, or weigh them and throw them out."

Al says most fishers want to do the right thing by this precious resource, and he has found that anglers were receptive to learning when he spoke to them on behalf of Tuna Champions. "We want to do everything we can to make it better and we can't do it unless we get everyone on board," he says.

The initiative has also made use of social media because recreational fishers are often very active in these spaces.

"Particularly in these niche fisheries like bluefin, that are quite seasonal in their movements, a lot of the main guys that target these species will follow social media quite closely to see where schools are and where fishers are going," Sean says.

Tuna Champions is active on social media and has its own social media presence with a Facebook page, YouTube channel and Instagram feed, which combined have more than 10,000 followers.

At the same time, the initiative has worked with media outlets such as *BlueWater* magazine, which is read by a large number of recreational fishers.

Below Program founder, IMAS Associate Professor Sean Tracey.
Photo: IMAS

Fishers teaching fishers

Most gratifying for Sean has been the snowballing effect in spreading the core messages of the Tuna Champions initiative through the recreational fishing community, starting with the most avid fishers.

"They're the ones that do this a lot, they have a real passion and interest in doing it, so they tend to follow the news about it," he says. This group is likely to have the biggest impact because they fish the most, they catch the most fish and they have the most followers on social media due to their experience in the fishery.

Getting this group of dedicated recreational fishers on board had an additional benefit. →

"They're teaching their friends, who might only go out once or twice in their life or maybe a year," Sean says. "They're instilling good practices and they're communicating that back to others. We didn't necessarily need to target the really infrequent fishers, as hopefully they are learning good behaviours from their experienced peers."

Australian sports fisher and TV personality Paul Worsteling is another champion of change in the Tuna Champions initiative. He became involved because he saw the initiative as a way to cut through with a strong message about caring for Southern Bluefin Tuna. "There is just such an information overload that we need to keep telling the same story again and again and again and again for people to finally understand it," he says.

Initially, Paul found some resistance among recreational fishers to the initiative's message. "The story is, if you're fortunate enough to go out and catch a Southern Bluefin Tuna, it is an absolute privilege," he says. "That privilege has come about because people have done research, and people have brought the Southern Bluefin Tuna back from the brink of extinction."

When Paul started talking to recreational fishers about how to make the most of this privilege, some wondered why they should bother when they only used the fish for shark burley.

"I now see them taking on the Tuna Champion protocols because they just see how incredible that change is," he says. "It takes time, but I'd like to think in a decade, people wouldn't treat a tuna any other way."

He may be right. Sean and his colleagues have been surveying a random sample of recreational Bluefin Tuna fishers around the country as part of a broader research project that gave them the opportunity to look more closely at the effects of the Tuna Champions initiative. What they have found so far is encouraging.

"We've got a positive response of behavioural change," he says. A good number of respondents report that they have changed how they handle Southern Bluefin Tuna. "That ties in with the anecdotal evidence we're seeing on social media, where that snowball effect is starting to happen."

With the early success of Tuna Champions, there is interest in expanding the program to other fish species. FRDC has invested in 'Tuna Champions 2.0: Bluefin and beyond', which will not only include other species but will also help extend the program's geographic reach.

"In states like New South Wales, the Bluefin traditionally only show up for a month or so," Sean says. "We have reach in NSW, but nowhere near the reach that we have in some of the southern states where the Bluefin hang around a lot longer."

Above Rays are also part of a fisher awareness campaign that has evolved from the Tuna Champions program. Photo: PT Hirschfield

The new funding will extend the initiative to include tuna species such as Yellowfin (*Thunnus albacares*) and Longtail (*Thunnus tonggol*) Tuna, which are both commonly fished on the east and west coasts, and in northern Australia in the case of Longtail Tuna.

Shark and ray safety

As well as attracting international interest, the Tuna Champions approach has helped guide an initiative that aims to reduce the harm caused to sharks and rays caught as recreational bycatch. The Shark Mates program is a joint initiative of Monash University, VRFish (the organisation for Victorian recreational fishers), the Victorian Fisheries Authority, Flinders University and FRDC. It aims to educate recreational fishers about how to handle a shark or ray to give the fish the best possible chance of survival after release.

Marine biologist Professor Richard Reina from Monash University has been working with sharks and ray fisheries for many years to understand the stress these animals suffer when they are caught by fishers. Together with his colleagues, Richard has been studying the effects of capture and release on sharks and rays, both in experimental semi-captive settings and on fishing vessels.

"We found that the outcomes for these discarded animals were often pretty poor, including negative reproductive consequences," Richard says. He explains that even lifting a large shark out of the water for a photo can do significant damage to its internal organs, especially for female sharks.

Those findings are also relevant to both commercial and recreational fishers. Sharks and rays are vulnerable to population decline because of their long life spans and low reproductive output. One of Shark Mates' messages is to not prolong the capture by taking photos. If a photo must be taken, fishers should photograph the shark in the water before releasing, rather than removing it from the water.

Richard says that, in an interaction with sharks, the potential for fishers to injure themselves is quite high, and the potential for them to unintentionally injure the animal is likewise quite high.

Informed by his research, Shark Mates has created an education resource for recreational fishers shared through social media – including a YouTube channel – and an information guide that is distributed to members of VRFish. "What we've got so far says that people find the information useful; we get plenty of hits on the channel, we get plenty of visits to the website," Richard says.

As with the Tuna Champions initiative, it is the fishers themselves who are driving the changes in behaviour, underpinned by a research-backed understanding of best practice and better fishing outcomes. **F**

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Fishing in the good old days – was it really better?

Author Bob Kearney shares some critical perspectives about the future of fishing along with spectacular stories of past adventures

By **Professor Colin Buxton**

Few people with even a passing interest in fishing would doubt that fishing was better in days gone by. Like the old surfing adage: 'You should have been here yesterday!', it is perhaps in our nature to reflect fondly on the best of past experiences and forget about the many days when we caught nothing or sat on the beach in poor weather, waiting for the right conditions.

Bob Kearney is one of the lucky individuals who has combined a passion for fishing with a distinguished career in fisheries science and marine ecosystem management. In this book of short stories, he recalls his many fishing adventures: his obsession as a five-year-old with catching a jewfish, the characters he met along the way, the evolution of fishing gear and techniques, his run-in with the local fisheries inspector and the many spectacular fishing days.

This book is a very good read. After all, who can boast about catching more than 100 Tailor in one night, jewfish of more than 50 pounds (22.7 kilograms) rather regularly, or the excitement of catching Pacific Bonefish on light tackle on the sandflats of New Caledonia?

What makes this book so entertaining is how Bob uses his academic training to constantly ask questions about why things happen in a particular way, what bait is best for an area or species, or why fish behave this way or that. It constantly challenges the reader.

Aside from the fish tales, to my mind the book is a call to action – one from a highly respected and credentialled member of both the recreational fishing fraternity and Australia's scientific community. He notes that the present day recreational take for many inshore species often exceeds that of the commercial sector (which is often blamed for a lack of fish). Importantly, he notes that knowledge of and the management of the recreational take lags well behind that of the commercial sector. Like so many things that affect the environment, it is a numbers game; the growing numbers of recreational fishers are having an ever-increasing impact on the fishery.

Recognising that fishing reduces the numbers of fish in a population, Bob explores the often-controversial topics of overfishing, fisheries management and the threats to the marine environment. Where these issues have been scientifically assessed, fishing activity is often well down the list in terms of greatest impacts on the health of a fishery.

He is highly critical of the practice of locking fishers out of so-called marine protected areas, which he says does little to address more pervasive threats such as habitat destruction, pollution, introduced marine pests and climate change. Bob says the time is now for both sectors, commercial and recreational, to work together to address environmental threats and to ensure sustainable fishing for the future.

Was fishing really better in the good old days? As the author says, there is no easy answer to the question. So, I recommend you read the book to find out. F

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Aboriginal fishers build commercial cultural market for abalone

With access to the commercial abalone quota, Tasmania's Indigenous fishers will focus on cultural tourism and sharing food and culture while developing new jobs and skills for their community

By **Nicole Baxter**

Tasmanian Aboriginal people now hold rights under Tasmanian legislation to fish for abalone and profit from their catch.

In March 2022, an agreement was signed at a ceremony on Aboriginal land at Murrayfield on Bruny Island that enables the Land and Sea Aboriginal Corporation of Tasmania to fish 40 state-owned abalone quota units under a three-year lease.

Since 2008, the Tasmanian Government has put these abalone units up for tender, but they will now form part of the state's Aboriginal fishery. The agreement on the quota was reached in conjunction with investment from the national Indigenous Land and Sea Corporation. The 40 units equate to an allowable annual catch of about 10 tonnes of abalone.

Tasmanian Primary Industries and Water Minister Guy Barnett says associated fisheries rules will still apply, and the agreement means Tasmanian Aboriginal people will have long-term access to the abalone fishery to develop cultural and commercial fishing activities that have a local, national and international benefit.

"At a local level, this agreement will create nine full-time equivalent direct and indirect jobs enabling Tasmanian Aboriginal people to gain skills and experience that will provide new pathways for career, culture and business development, including meeting the demand for Indigenous produced abalone," Guy says.

Assistant Minister for Forestry and Fisheries Senator Jonathon Duniam says the Australian Government is committed to continuing to pursue closer, meaningful engagement with Aboriginal fishers into the future.

"The history of Aboriginal and Torres Strait Islander fishing in Australia is rich, and the signing of the abalone agreement will allow for this long and proud tradition of Aboriginal fishing to continue well into the future," he says.

Research background

Paving the way for the signing of the agreement was 50 years of advocacy by a range of people including Emma Lee, Associate Professor in Indigenous Leadership at Swinburne University of Technology. Emma has also conducted six years of research, starting in early 2017 with an FRDC project looking at the barriers and opportunities for establishing a market for cultural fisheries in Tasmania.

"But because we're Aboriginal people and we know how to stretch a dollar and an

Below Signing the abalone agreement is Land and Sea Aboriginal Corporation of Tasmania Director Rodney Dillon, witnessed by Minister for Primary Industries Guy Barnett and Land and Sea Aboriginal Corporation of Tasmania Director Rob Anders. Photo: NRE Tas

Indigenous fisher Trent Prouse
Photo: Adam Gibson

idea, having a poke around in the theory wasn't enough. We actually went out and established a market," Emma says.

The first part of her project 'Wave to Plate – establishing a market for cultural fisheries in Tasmania' laid the groundwork. This included ensuring that Aboriginal Elders and their knowledge is respected, and that sea country is sustainably managed for future generations.

The second part of 'Wave to Plate' involved testing the appetite in Tasmania for cultural fisheries at a restaurant at Eaglehawk Neck.

Emma's strategy was to bring together Tasmanian Aboriginal people and representatives from the government, universities, marine research, food sector specialists and catering experts to road test local diners' appetites for eating Indigenous wild-caught seafood.

"We were able to serve cultural catch abalone while we held a fisheries workshop," she says. "The workshop lunch demonstrated how network chains can provide opportunities to improve employment and business acumen together with increasing pride in recovery, or continuance, of cultural practices."

The third part of 'Wave to Plate' was to trial cultural fisheries with commercial partners and test the public's appetite for the concept.

Hospitality Design Consultant and Food Curator Jo Cook attended the fisheries workshop at Eaglehawk Neck and later met with Emma to establish the Palawa Fire Pit at the 2018 Dark Mofo Winter Feast, a series of food stalls and food experiences.

Shared story

"Emma and I developed a ticketed program that she used as part of her research to show that people were interested not only in eating cultural catch but also in hearing the story around it," Jo says.

"She developed an amazing program of people including Uncle Rodney Dillon to speak and I organised the chefs who prepared a menu around the cultural catch of abalone.

"It sold out every night over seven nights and was a really amazing experience."

Jo says that the abalone and its story will provide a valuable experience that will be highly sought after locally.

"I recommended that they don't export the product but build cultural experiences so people can come to Tasmania to eat the abalone," she says. "There will be a huge amount of interest because we rarely see Tasmanian abalone in restaurants because so much of it is exported."

Rob Anders
Photo: Adam Gibson

Emma says the Land and Sea Aboriginal Corporation of Tasmania hopes to value-add to local restaurants and hospitality venues while building the relationship between Aboriginal people and other Tasmanians through a meal.

"We also want to look at the social impact of fisheries and be able to build a cradle-to-the-grave sea country program so that our young people have pathways to employment, businesses and social enterprise, rather than the jail and fail model for our young people that they face," Emma says.

Social impact

"We want to end juvenile justice interventions by developing a market for cultural fisheries. We do that by working with the people who help us succeed and continue that reciprocity.

"We are looking at creating nine jobs for Aboriginal Tasmanian people over the next two years as a starting position and we look to increase that as we replicate our success in our abalone model for social impact in sea country."

Emma says that the board of the Land and Sea Aboriginal Corporation of Tasmania is starting to explore what will come next, and cultural food experiences are on the menu.

"We know there is a massive appetite for cultural provenance and local seafood to go together to value-add what fisheries and food tourism can be for our future generations," she says.

Indigenous Elder Uncle Rodney Dillon is Chair of the Land and Sea Aboriginal Corporation of Tasmania. He hopes to gather some more quota units, so the six Aboriginal organisations involved in the governance of the corporation can earn an independent income and will not need to live off government funds.

"We want to consolidate what we've got and build a bit of wealth ... but ... the fish should be eaten here and not all sent overseas," he says.

"This is our prize food and we should be looking at tourism with some of our local Aboriginal people to do that."

Uncle Rodney wants to help other Aboriginal organisations to also become licensed.

"Not just here in Tasmania, but also in New South Wales and South Australia," he says. F

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FRDC RESEARCH CODE
2016-204

Arming abalone against disease

World-first research to transfer immunity against a deadly abalone virus through the generations is underway

By **Melissa Marino**

Abalone viral ganglioneuritis (AVG) is a killer and an ongoing threat to wild abalone (*Haliotidae*) populations. In 2005, it infected two of Australia's abalone farms, wiping out stock that then took three years to rebuild.

After lying dormant for some years, an outbreak of AVG was detected among wild abalone along the Victorian coastline in May 2021.

"Our farm and the Yumbah [Aquaculture] facility at Narrawong near Portland both got destroyed by the virus in 2005," says Mark Gervis, General Manager at Southern Ocean Mariculture at Port Fairy. "We lost everything. And unfortunately, the virus is back out in the wild now."

Yumbah Chief Executive David Wood shares Mark's concern. "The ocean water is the vector that the virus comes through. And given that it's done so in the past, we certainly treat it as a real threat and risk within our business. If it gets onto the farm, it's a major concern, potentially causing significant biological and economic loss," David says.

AVG is related to the herpes virus and is endemic in the Southern Ocean water that is pumped into aquaculture farms on the Victorian and South Australian coast. The outbreak in May 2021 prompted a swift response from the wild and farmed sectors. At their request, the Victorian State Government enacted a biosecurity plan, including establishing exclusion zones to minimise spread.

The virus was contained, but such mitigation measures are a short-term fix. Similar to the herpes virus that causes cold sores in humans, AVG tends to reappear when abalone are under stress.

Without in-built defences, the threat of another outbreak is an ever-present concern for the high-value, high-risk abalone sector. "With good populations of wild abalone off the coast, there's a potential threat the whole time," Mark says. "For us and for Yumbah, we are pretty much in the firing line with the disease, so we're pretty desperate for a solution."

Game changer

Karla Helbig, an Associate Professor at La Trobe University, is leading new research and working closely with sector partners to build immunity against AVG in abalone populations. It is the first time such a project has been undertaken on abalone. And it could be the game changer that the sector is seeking.

The four-year project kicked off in 2021 with funding from FRDC and the Australian Abalone Growers Association (AAGA). It involves Southern Ocean Mariculture, Yumbah Aquaculture and Jade Tiger Abalone as sector partners, with trial sites at

Left PhD student Jacinta Agius and Masters student Angus Watson work closely with the farms to develop immune-priming strategies against AVG infection.
Photo: Karla Helbig

> "It's been shown that if you immune prime some animals just before they procreate, they can have a heightened level of immunity against pathogens."
>
> Karla Helbig

Left Associate Professor Karla Helbig and Professor Travis Beddoe will challenge primed abalone in the laboratory at La Trobe University with the virus and monitor the response.
Photo: Karla Helbig

Port Fairy, Narrawong near Portland and Indented Head on the Bellarine Peninsula, respectively.

David says AVG is a major concern for abalone farming and the wild-caught sector. "If there's a way that we can prevent it through immune programs, then that would be a fantastic breakthrough," he says.

For Karla, the aim is to offer abalone producers a strategy to protect their stock against wipe-out from AVG. "That's the goal. And we think we've got a very good shot of getting there."

Vaccinating invertebrates against viruses has always been a challenge, says Karla, who is a virologist and innate immunologist. Her previous work has largely focused on humans, and, to a lesser degree, oysters.

Unlike people, but similar to insects and oysters, abalone do not have a specific immune system and cannot make antibodies to protect themselves against a particular virus.

In humans, those antibodies provide protection against the virus should a person be reinfected. "And that's how a vaccine works," Karla explains. "In [humans or other vertebrates (animals with a backbone)], you try to trigger an immune response by delivering a harmless replica of the virus or its components. And then your body will remember that it's seen that particular virus and it can protect itself when it sees it again."

Without the capacity to generate these specific virus-fighting antibodies, vaccination strategies used in humans and other vertebrates cannot be applied to invertebrates such as abalone.

But Karla and her team have shown that, in the laboratory, an immune response can be triggered in abalone through what is known as immune priming.

Priming for protection

Immune priming replicates a naturally occurring mechanism in some insects. Priming stimulates the immune system through the injection of a synthetic non-viral nucleic acid, which causes a non-specific, or innate, immune response that protects the animal from the virus.

Although effective, this approach is not practical in a real-world context because it requires injecting each abalone to trigger the immune response. "It's not that useful for a farm because they have millions of abalone and you can't inject all of them," Karla notes.

The researchers are investigating whether injected abalone broodstock will pass the same immunity onto their progeny. This technique, known as transgenerational immune priming, has been demonstrated in insects and oysters, she says.

"It's been shown that if you immune prime some animals just before they procreate, they can have a heightened level of immunity against pathogens," she says.

The 'D' in R&D

Her research is testing whether transgenerational immune priming is effective in abalone and how long protection in progeny will last.

To achieve this, the researchers are working hand-in-hand with sector partners. →

Australian hybrid abalone are housed in aquariums within constant temperature rooms at La Trobe University for use during the trials.
Photo: Karla Helbig

"We're taking our in-lab experiments to the farms and injecting their brood stock, and then we're going to follow the babies, to see if they are afforded protection," she says. "So it's a really good collaborative project."

In addition to his role at Southern Ocean Mariculture, Mark is also Chair of the AAGA. He says the project's design will ensure that abalone producers will be equipped with the skills and knowledge to apply the research and vaccinate their stock on-site.

"This is really your 'D' part of R&D. Getting on-farm experience as the research progresses will make it much easier to apply," he says. "And if it's successful, we will be looking to use it as a stock standard methodology on our farm."

Tangible impact

With the involvement of three producers, who also advised on the project and trial design, the research can cover more bases and be protected against risk.

"The beauty about having multiple farms involved is that spawning can be a bit of a hit-and-miss operation, and so by spreading it across the farms, it's likely that we will have success. If we get failures on any single farm, there should be back-up from another," Mark says.

It also ensures the project will have a broad scope. Three different abalone species (Greenlip [*Haliotis laevigata*], Blacklip [*Haliotis rubra rubra*] and a hybrid) will be tested, and each farm will prime abalone at different times to determine when it is most effective.

"We can cover off more experiments," Mark says. "For example, we want to know the optimum time for priming abalone before you spawn them. So, our farm will prime a month out from spawning. Another farm is doing two months out. And we're also priming a couple of days before spawning. It increases the power of the project."

The researchers and producers are also keenly watching to see whether increased disease resistance corresponds with poorer abalone growth – an outcome that has been observed in some fish species.

The farms will keep a proportion of primed animals on-farm to monitor their growth outcomes in a real-world setting against a control group of animals. "And because every farm has different temperatures and environments, it will give us a much clearer understanding of whether any impediment is across the board or related to something more specific," Mark says.

To test for disease resistance and whether it wanes over time, Karla will take primed abalone progeny at various growth stages from the farms to her biosecure laboratory at La Trobe University. "We will challenge them with the virus to see whether they can protect themselves," she says. "And we'll keep doing that every few months and track their response."

New frontiers

On-farm abalone priming is already underway and Karla expects to have an understanding of its efficacy later in 2022.

Further efficiencies and improvements will also be investigated. In the project's second phase, Karla is working with La Trobe University protein chemist Professor Travis Beddoe on new ways to trigger the immune-priming response in abalone without injections.

"We're investigating the development of a synthetic product that might be ingested, or the animal might be immersed in it to protect them against viral infection," she says. "And that's quite a new concept.

"If abalone could be primed for an immune response en masse through a feed or water source, without relying on intergenerational transfer, it could help protect them more quickly from a specific AVG threat, such as the 2021 outbreak," she says.

For David, the collaborative nature of the project is significant. "It's a terrific display of industry cooperation, and we are fortunate that we've got scientists of the calibre of Karla and her team taking the lead on a project like this. Both in our industry and more broadly in aquaculture, the research arm is extremely important."

Transferring immunity from treated broodstock to juveniles to prevent disease would be a cost-effective solution long sought by the sector to mitigate its biggest risk, says David. "Not only would it be a significant breakthrough in terms of risk management for the farms, but it would be done in a highly efficient manner."

David says business confidence would be markedly boosted if it had virus-resistant stock as its first line of defence against the devastating AVG disease. "If the project delivers the outcomes we hope, it will be extremely significant. It doesn't mean we would drop or reduce our biosecurity awareness, but it would mean a lot of our farmers would undoubtedly sleep better at night."

Karla says working with the sector to achieve a tangible impact is proving to be an incredibly satisfying part of the project. "As a scientist, that's what we all live for – to be able to do something that changes the game for somebody else," she says.

Workshops and guidelines will be developed to help ensure the project's findings can be adopted on-farm. **F**

MORE INFORMATION
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FRDC RESEARCH CODE 2021-085

One Voice, One Future

Seafood Directions Conference to be held for the first time since 2019

For the first time since 2019, the national seafood industry will converge in Queensland for the industry's premier ideas, innovation and networking event, the Seafood Directions conference.

Seafood Industry Australia (SIA), the national peak body representing Australia's commercial seafood industry, will host the biennial national conference from 13 to 15 September at the Sofitel Brisbane. The conference provides an exciting platform for national and international speakers to share their expertise around the theme: One Voice, One Future.

"The seafood landscape both domestically and internationally has changed considerably since the conference was last held in 2019," SIA CEO Veronica Papacosta says.

"As an industry we are excited to come together at this year's conference for what will be a thought-provoking and enjoyable few days. We'll tackle industry issues, from water to plate – bringing together leaders, innovators and disruptors from all sectors of the seafood industry.

"This year's conference theme reinforces the unity of our industry and the ties that bind our sub-sectors together. As we look towards a new chapter of growth for the industry it was important our theme captured this."

The conference program will feature more than 45 informative sessions highlighting essential issues, seafood trends, innovation and technology, all approached with a focus on togetherness and harmonisation. It will end with the industry's night of nights, the National Seafood Industry Awards Gala dinner.

"Five carefully considered topics of: innovation and technology, the global consumer, resource security, wellness – from water to plate, and energy and renewables, will be discussed during the conference, and managed by conference MC Paul West," Veronica says.

Paul is a passionate advocate of real food, community, regional living and sustainable agriculture, including commercial seafood production. He is a chef and TV presenter, best known as the host of four series of *River Cottage Australia* and his appearances on the ABC's *Catalyst*.

"The conference is shaping up to feature an exciting and diverse line-up of speakers who will present innovative, challenging and forward-thinking ideas around long-term improvements for the seafood industry," Veronica says.

"As we look towards our exciting future it's important for our industry to be together in a face-to-face setting to discuss the topical issues we are facing as one, including international trade and market access, climate change and the move towards net zero emissions, the United Nations Ocean Decade, along with ongoing important topics including social licence, consumer engagement and marketing, safety and mental health. All approached with a focus on togetherness and harmonisation."

Secure your early bird ticket to the Seafood Directions conference 2022 by Friday 24 June at www.seafooddirections.com.au

To discuss sponsorship opportunities, please contact SIA Business and Events Manager Rosie Love on 0403 615 038, email rosie@seafoodindustryaustralia.com.au F

EMERGING LEADERS

Is there an emerging leader in your sector who should come to Seafood Directions?

SIA is pleased to offer a special conference rate to encourage emerging industry leaders to attend and participate in Seafood Directions 2022. Emerging leaders can come from any area of the seafood industry – from water to plate.

An emerging leader is someone who:

- is passionate about the seafood industry and their role;
- wants to hear from industry leaders;
- wants to grow their network;
- is future-focused; and
- has not attended Seafood Directions before.

Do you know someone who would qualify to attend the conference as an emerging leader? Email kylie@cornerstoneevents.com.au with details of your nominee and what makes them an emerging leader.

SEAFOOD DIRECTIONS

MORE INFORMATION
www.seafooddirections.com.au

Calculating seafood's carbon footprint


Rob Bell
Photo: Blueshift Consulting

The development of the first carbon footprint of Australia's seafood industry could give our product a competitive edge when it comes to consumer preferences for low-emission proteins

By **Annabel Boyer**

A recent FRDC-funded study has lifted the lid on the energy use and greenhouse gases emitted by Australia's seafood industry, resulting in the first ever mapping of its carbon footprint.

The project has been carried out by specialist blue economy consultancy Blueshift Consulting. Principal Investigator Rob Bell says the information is a vital step in providing a competitive advantage for seafood as a low-emissions protein. It also highlighs how seafood production may need to adapt in the future.

"As we get more and more information about the impacts of climate change, consumers are going to want to know about the carbon footprints," he says.

"To remain competitive and to highlight the comparative benefits of eating seafood compared to other proteins, it behoves the industry to start measuring and managing these emissions profiles. Seafood comes out, typically, pretty well compared to other proteins, but there is always room for improvement," he adds.

Unique characteristics

Until now, emissions from fishing and aquaculture have been included within the agriculture and forestry sector, as part of the total emissions reported in the Australian National Greenhouse Accounts.

But on closer inspection, Rob says there were some issues. "Fishing and aquaculture were a relatively tiny little blip that got buried in all of the other information.

"Instead of being directly measured and calculated, it was calculated by proxy mechanisms, allocated percentages of total emissions like percentages of total fuels, consumed directly or indirectly."

But this use of proxy calculations was problematic because of the unique characteristics of fishing and aquaculture. In land-based food production, large amounts of emissions occur through land use and modifications. There are fewer of these emissions in fishing and aquaculture.

Complex calculations

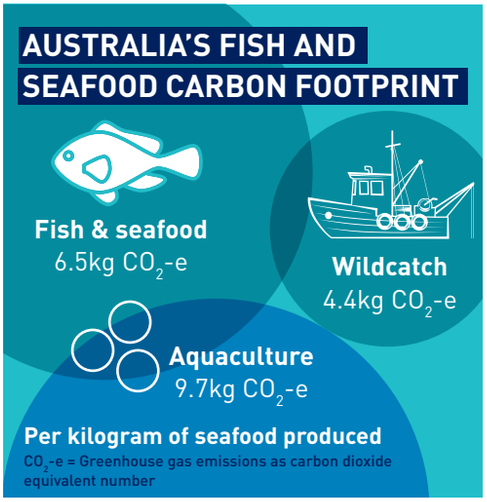
Measuring the carbon footprint of a sector is a complicated task that requires an account of all of the emissions generated directly and indirectly. This includes everything from fuel burnt directly to power fishing vessels, to purchased electricity, refrigeration emissions and the emissions from services and products bought from external suppliers such as bait and aquaculture feed. This last category is the most difficult to calculate as it requires information from third parties.

Rob says getting information from suppliers can be a significant challenge. "In the case of aquaculture, the embodied emissions in feeds are a major contributor. But it is hard to get a handle on. Many aquaculture companies are making progress, but they are still grappling with this."

Table 1: Greenhouse gas emissions from Australian fisheries and aquaculture (CO_2-e)*

FISHERY/ SPECIES	TOTAL EMISSIONS (CO_2-e)	KG CO_2-e PER KG FISH PRODUCED
Sardines – wildcatch	68,066	1.6
Other finfish – wildcatch	280,260	4.5
Oysters – farmed	42,248	5.1
Sharks and rays – wildcatch	27,671	5.5
Scallops – wild catch	41,741	6.3
Prawns – wildcatch	117,749	6.7
Salmonids – farmed	561,128	8.5
Rock lobsters – wildcatch	89,851	11.2
Barramundi – farmed	46,265	13.5
Prawns – farmed	102,515	15.2
Tuna – farmed	149,459	17.9
	Total: 1,526,951	Average: 6.5

* CO_2-e = Greenhouse gas emissions as carbon dioxide equivalent number. Source: Blueshift Consulting



Carbon footprint discussions often centre on carbon emissions, but different activities produce different types of greenhouse gases (GHG). Methane released from aquaculture ponds and cages is an example of this. These emissions are recorded using a carbon dioxide equivalent number (CO_2-e), which indicates their warming impact relative to carbon dioxide. As an example, methane has a global warming potential 25 times that of carbon dioxide. One kilogram of methane emissions has a GHG equivalence of 25 kilograms CO_2-e.

Sector emissions

The study measured the carbon emissions and energy use from the largest sectors within fishing and aquaculture, which contribute 82 per cent of the total gross value of production (see Table 1). The remaining 18 per cent of fisheries account for a small percentage of total emissions.

"Most of those others are small boutique fisheries – inshore, gillnetting or similar – that are likely to have very low carbon impact," Rob explains.

The study estimated the total emissions for Australian fishing and aquaculture to be approximately 1.5 million tonnes CO_2-e. This has further been extrapolated to estimate that each kilogram of Australian seafood produced generates 6.5 kilograms CO_2-e.

Aquaculture constitutes 59 per cent of the Australian seafood industry's total emissions and fishing contributes 41 per cent. GHG emissions from aquaculture averaged 9.7 kilograms CO_2-e per kilogram of seafood produced compared to 4.4 kilograms CO_2-e per kilogram from wild-caught seafood.

The farmed Salmonids sector – Atlantic Salmon (*Salmo salar*) – predominantly produces the most seafood and also accounts for the greatest proportion of seafood-related emissions, at 37 per cent.

Farmed Southern Bluefin Tuna *(Thunnus maccoyii)* has the highest intensity of GHG emissions, at nearly 18 kilograms CO2-e per kilogram of seafood produced. This comes from a combination of the fuel used to catch the juvenile fish, greenhouse gas-intensive feed inputs and high transport costs to deliver products to distant export markets.

"For our big fishing fleets, the majority of the emissions come from diesel fuel consumption. There is a little bit associated with freezing and then a little bit associated with transport of the product," says Rob.

"In land-based aquaculture most direct emissions come from the use of electricity. Emissions embodied in the capture, transport and processing of feed for pond-farmed prawns and fish and coastal cage-grown fish are also major contributors."

More than half of seafood and aquaculture's combined GHG emissions (52 per cent) comes from products and services bought from external suppliers, many of which are imported. Rob says this further complicated getting access to required information. The study also found that many of these external emissions (known as 'Scope 3') have been left out of Australia's National Greenhouse Accounts due to the difficulty in accounting for them.

Energy initiatives

When fishers and aquaculture operators understand how their businesses create emissions, they can make appropriate changes to reduce both emissions and energy costs.

This may include using alternative fuels, driving vehicles or vessels to conserve fuel or changing suppliers. Relevant FRDC research includes trawl net modifications that reduce drag and therefore fuel use, and investigations into alternative fuel sources. Northern Territory Barramundi (*Lates calcarifer*) producer Humpty Doo is building a solar plant that will power its operations and drastically reduce its emissions. Austral Fisheries, known as an industry leader for innovation and sustainability, has acquired several hybrid fishing vessels that use electricity as well as diesel, giving greater control over its energy costs and emissions.

A way forward

Blueshift Consulting has developed a 'toolbox' of resources to help smaller operators begin their own journey by measuring and managing emissions,

"It includes things as simple as asking your suppliers what their greenhouse inputs are," Rob says. "It provides a series of examples of how other companies go about measuring, managing and marketing their emissions."

A new self-assessment tool will help operators convert their costs into a carbon number. They can then track their operations year by year and compare themselves within their sector or to other sectors.

"Seafood consumers are increasingly wanting to know the stories behind the products they're buying, including efforts by fishers and farmers to reduce their carbon footprint. So this process may also help with marketing."

Three GHG emissions self-assessment tools will soon be available for download from the Blueshift Consulting website, under the 'Projects' tab, blueshiftconsulting.com.au/projects F

COMPARING PROTEINS

There are many different fishing and farming techniques used in seafood production. This makes it difficult to provide direct 'like-for-like' comparisons with the greenhouse gas emissions for other proteins. The CSIRO report, *Carbon footprint for Australian agricultural products and downstream food products in the supermarket*, provides some indicative comparisons.

Table 2: Australian farmed animal proteins – whole of life CO_2-e emissions per kilogram of meat on supermarket shelves

Beef, fresh boned	Lamb, fresh boned	Pork, fresh boned	Chicken, fresh boned
25.2	19.4	6.3	2.9

SOURCE: CSIRO

MORE INFORMATION
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FRDC RESEARCH CODE
2020-089

Safer seismic surveys the goal for Bass Strait fisheries

Southern Rock Lobsters exposed to seismic blasts are collected for longer-term monitoring of the impacts.
Photo: Davis Huston

A two-year FRDC-funded study is investigating different seismic survey methods that could protect fisheries while giving oil and gas explorers the data they need

By **Chris Clark**

Following a growing number of studies that identify the impact of traditional seismic survey techniques on marine species, FRDC has backed new research in Bass Strait to investigate alternative technologies.

The project focuses on two species, the Commercial Scallop (*Pecten fumatus*) and the Southern Rock Lobster (*Jasus edwardsii*).

The project's principal investigator is Dr Ryan Day from the Institute for Marine and Antarctic Studies (IMAS) at the University of Tasmania. He says there is an urgent need to compare the current industry standard seismic techniques to alternative methods and determine the relative impact of each on marine animals.

"It would move us into a position to start mitigating the impacts of seismic surveys, rather than the situation we currently have, where each individual seismic survey causes a large degree of angst for a large number of stakeholders," he adds.

IMAS has partnered with Curtin University in Western Australia on the project. Both have a long history of researching scallops and rock lobsters and the impacts of seismic surveys. FRDC has provided funding and support, and Beach Energy has funded critical access to a seismic survey vessel.

Other partners include the Bass Strait Scallop Industry Association, which represents commercial scallop fishers working the Commonwealth Bass Strait Central Zone Scallop Fishery, and Tasmania's Department of Primary Industries, Park, Water and Environment. Ryan says that research from 2012 to 2016 showed that standard air gun seismic surveys damaged the biochemistry of the scallop haemolymph – the equivalent of its blood.

"Scallops weren't able to regulate the different components of the blood, which indicates they were physiologically compromised. They changed their behaviour as well. They tended to bury themselves more quickly into the sand when exposed to seismic waves – the higher the seismic level, the more quickly they recessed into the sand," Ryan says.

In the case of rock lobsters, research found that the sensory organ that functions in a similar way to a human inner ear is principally affected, impacting their sense of gravity and movement. "Seismic activity impaired their coordination, so they couldn't easily right themselves when placed on their backs," he explains.

In the current research project, the research team placed scallops and lobsters in baskets 60 metres down onto the sea floor off King Island, in

Commercial Scallops exposed to seismic surveys are monitored in tanks at the University of Tasmania. Photo: Davis Huson

western Bass Strait. The animals were then subjected to three different seismic techniques: an industry standard approach and two emerging seismic techniques.

To test the standard technique, a seismic testing vessel was fitted with three arrays of seismic air guns. "Each array totalled about 2480 cubic inches of air gun volume, which is a pretty standard set-up for a seismic survey," Ryan says. The second technique used only one of the three seismic arrays to reduce the total volume of air guns.

The third technique, known as eSource™, has been developed by Beach Energy. It gradually releases air bubbles to create sound waves with reduced high frequencies.

Ryan says the different techniques being trialled respond to existing knowledge about which sound frequencies may be most damaging to marine animals.

The techniques have also been applied at different distances – directly above the scallops and lobsters, and at 500 and 1000 metres distance – because research shows that seismic impacts on marine animals vary with distance.

"If we can provide survey operators with a 500 or 1000-metre range, that at least gives them something to work on," he says.

Evaluating seismic impacts on marine animals is a complex, multidisciplinary task, and Ryan says there are a lot of questions requiring answers.

"When we first started in this field of research, we concentrated on the intensity of the pressure wave that is created. But in recent years, we've started looking at another characteristic of seismic waves, known as particle acceleration, which is how, over short distances, the wave is moving water or anything else," he explains.

"In our earlier work on scallops, we think that the shaking of the ground as a result of an air gun was what caused the damage, and that's something we're just starting to get a handle on measuring and evaluating," he says.

Earlier research has already observed general indicators of damage to scallops and lobsters, and the new project is starting to delve a little deeper into those impacts. This includes more sophisticated measures such as oxidative stress indicators, DNA damage and immune function.

The researchers also know that impacts vary over time. After being exposed to seismic waves in Bass Strait, the scallops and lobsters have been taken back to the IMAS research facility in Hobart and put in tanks to be analysed three months after exposure and again six months after exposure.

"When we did our first scallop study, we noticed increasing mortality over time, particularly at the highest level of seismic exposure," says Ryan.

That also ties in with anecdotal reports by scallop fishers, according to Andrew Sullivan, the Executive Officer of the Bass Strait Scallop Industry Association.

"Going back over a decade ago, a few months after some seismic surveys, scallop fishers started dredging up dead scallops east of Flinders Island, but we weren't able to gather the scientific evidence at the time to prove a link," he says.

"Ten or 12 years ago, there wasn't a recognition that seismic surveys could have that impact on scallops. In the meantime, I think it's fair to say, there's probably been a lot of angst between the commercial fishing industry and oil and gas companies because of conjecture over the impacts," Andrew adds.

He says his members don't oppose oil and gas exploration because they rely on the end products but they believe the most effective way to limit damage is to find the technology that is least damaging.

Andrew says that, while legislation requires seismic surveys to have impacts as low as reasonably practicable, without research to find lower impact methods the benchmark won't change from current industry standards. "If we know that one seismic method has a lower chance of impact and still delivers the level of information the oil and gas companies need then, straightaway, we can say 'let's use that'.

"My view is that the fishing industry needs to base its engagement with the oil and gas companies on better data. To Beach Energy's credit, they have been extremely supportive of that approach by helping to fund this research project," he says.

The research project runs until September 2023. **F**

Beach Energy is assisting with vessels and technology to assess the impact of different survey technologies. Photo: Davis Huston

> "Ten or 12 years ago, there wasn't a recognition that seismic surveys could have that impact on scallops. In the meantime, I think it's fair to say, there's probably been a lot of angst between the commercial fishing industry and oil and gas companies because of conjecture over the impacts."
>
> Andrew Sullivan

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FRDC RESEARCH CODE
2021-028

Winner to unlock seaweed benefits for aquaculture

The untapped potential of marine plants is being investigated by a growing number of researchers around the world – and, among them, the winner of a national award

By **Michelle Daw**

The compounds that help seaweed defend itself against viruses, fungi and bacteria could hold the key to a promising natural supplement for farmed aquatic animals to boost their immunity and growth.

This potential is being investigated by Dr Valentin Thépot, winner of the Fishing and Aquaculture Award, a part of the 2022 Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry, sponsored by FRDC.

Valentin is a researcher at the University of the Sunshine Coast and the aquaculture coordinator for the Anindilyakwa Land Council on Groote Eylandt in the Northern Territory.

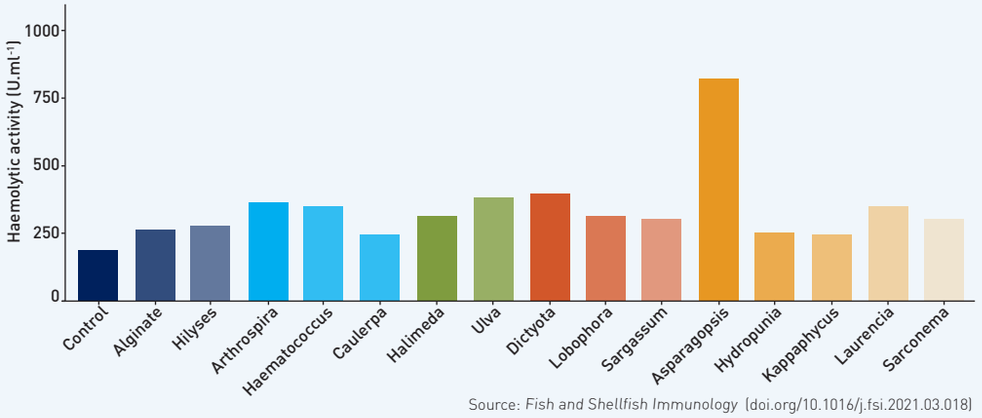
The award will allow him to test if the benefits found when feeding fish with a red seaweed supplement can be replicated for farmed Black Tiger Prawns (*Penaeus monodon*) and novel aquaculture species.

"Aquaculture provides half of the seafood consumed globally, yet disease outbreaks pose a serious threat to the sustainable development of the industry, costing more than $8 billion annually," he says.

"Australia is free of many diseases that are crippling prawn farms overseas. However, the outbreak of incurable White Spot Disease in Queensland, which led to losses of more than $32 million in 2016–17, showed that we need innovative solutions for disease management and prawn welfare that don't compromise productivity."

Valentin says that he saw a 400 per cent increase in immunity (Figure 1) and a 19 per cent boost in growth when the red seaweed (*Asparagopsis taxiformis*) was included at less than three per cent in pellets fed to Black Rabbitfish (*Siganus fuscescens*), a tropical herbivorous species and Atlantic Salmon (*Salmo salar*), a temperate carnivore.

Figure 1 Asparagopsis-fed rabbitfish showed a 400 per cent increase in haemolytic activity, a key non-specific immune defence in fish, which was the highest increase when compared to all the other seaweed and commercial supplements tested.



Source: *Fish and Shellfish Immunology* (doi.org/10.1016/j.fsi.2021.03.018)

"We also found that this seaweed is stronger than four immunostimulants currently used in aquaculture, including beta-glucan and sodium alginate," Valentin says.

"This means that a seaweed-based feed additive could one day replace, or at least complement and minimise, the use of veterinary drugs such as antibiotics in aquaculture."

Valentin says he chose to work on Black Rabbitfish because it is low in the food chain, has tasty white flesh and can produce long-chain unsaturated fatty acids (omega 3s) from short-chain fatty acids. Unlike its carnivorous counterparts, it does not require fish meat and fish oil in its diet.

"This fish also has a wide geographical range in the Indo-West Pacific, as it is found from north of Japan to south of Australia, and it copes with temperatures from 17°C to 31°C," he says.

"The warming of the oceans due to climate change is already putting pressure on fish farmers growing temperate species with limited thermal ranges. The robustness of Black Rabbitfish in response to some of the effects of climate change is another reason why I wanted to work with this species."

Valentin found that Atlantic Salmon fed a double dose of Asparagopsis extract supplement had significantly better growth and improved feed efficiency than the Atlantic Salmon fed the control diet.

His new project will evaluate if this feed innovation translates from fish to Tiger Prawns, Australia's most valuable farmed crustacean. It will also look at whether it can be used in emerging aquaculture species important for traditional owners in northern Australia.

Data from the feeding trial with Tiger Prawns will inform direct-feeding trials on

Dr Valentin Thépot and Scott Warramarrba of the Anindilyakwa Land Council check the water quality parameters at the site where they will conduct a tropical rock lobster survey. Photo: Supplied.

Groote Eylandt with tropical rock lobsters (*Panulirus* spp.) and sea cucumbers.

Valentin says that winning the award means he can continue working on the project to help establish the potential economic, environmental and social benefits the red seaweed could offer at local, national and global levels.

"The use of novel aquafeed ingredients, such as seaweed, can change the way we treat and prevent disease outbreaks in aquaculture and reduce our reliance on antibiotics," he says.

"From an environmental and human health point of view, I believe that any effort to reduce our use and reliance on antibiotics in aquaculture is a positive step forward.

"Seaweed dietary supplements can also improve productivity while reducing the environmental impact of the industry. This is especially key in pristine and remote areas such as prawn farms adjacent to the Great Barrier Reef."

Valentin says being able to use farmed seaweed to replace or limit the use of wild-sourced ingredients in aquaculture feeds, such as fish meal and fish oil, will reduce the pressure on wild fish stocks and associated impacts including bycatch.

Another key output of the project will be to estimate the financial benefits from improvements in productivity to ensure broad uptake of seaweed-based feeds in aquaculture. This could include spending less on antibiotics, reduced losses through fish mortality and better profitability through improvements in the feed conversion ratio and growth rates.

Valentin says growing seaweed for feed production can also directly benefit the marine environment as seaweed uses sunlight to take carbon dioxide from the water, which reduces acidification and sequesters carbon in the plant itself.

There is also the potential for aquaculture effluent to be used as fertiliser for the seaweed. This integration of seaweed biofilters would further reduce the impact aquaculture may have on the natural environment. The discovery that Asparagopsis can reduce methane emissions in cattle has sparked the development of seaweed farming in Australia, and Valentin says its potential as a feed supplement for farmed seafood could create another market opportunity for the product.

He says Anindilyakwa Land Council's vision for the development of aquaculture is driven by the need to secure a sustainable future beyond the closure of the local manganese mine, which is the main contributor to the local economy.

Valentin has been working with the land council on a fly-in, fly-out basis, but he and his family are moving to Groote Eylandt in mid-2022 to allow him to work more closely with traditional owners on the development of sustainable aquaculture enterprises.

He is excited to be working on a project on the frontiers of scientific knowledge with potentially huge social, environmental and economic benefits.

"There are more than 12,000 species of seaweed on the planet, but we only know a handful of the compounds they contain," he says.

"Seaweeds produce various biologically active compounds as defences against grazers and pathogens, and these can have amazing properties including antivirals, antibiotics and antifungal compounds, which could offer incredible benefits for aquaculture.

"In Australia, we are lagging well behind countries in Asia that grow a lot of seaweed biomass.

"We have thousands of kilometres of amazing coastline, a range of native seaweed species, and growing demand for seaweed for a huge range of products. We need to do more." **F**

MORE INFORMATION

usc.edu.au/research/seaweed-research-group; anindilyakwa.com.au/creation-of-northern-aquaculture-program

New projects

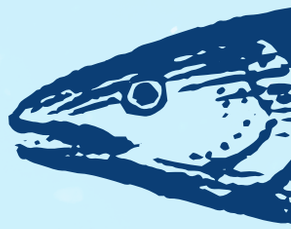
The FRDC Board has recently approved the following research projects

Project number	Project	Applicant	R&D Plan outcome
2022-006	Developing a harvest control rule to use in situations where depletion can no longer be calculated relative to unfished levels	CSIRO Oceans and Atmosphere	2
2022-003	Evaluating the economic and environmental return on investment of modern fish screens	NSW Department of Primary Industries	1, 2
2022-001	Exploring changes in recreational fishing participation and catch due to COVID-19 – a West Australian case study	Department of Primary Industries and Regions, South Australia	1, 4, 5
2021-121	Capability and culture building – strategic program and integration development	KAL Analysis	3
2021-108	Risk profile for paralytic shellfish toxins in Tasmanian Periwinkles	Institute for Marine and Antarctic Studies	2, 5
2021-102	Commercial use of ATPase for the prediction of smoltification on Atlantic Salmon stock in Tasmania	Petuna	1, 2
2021-100	FRDC extension officer network	Fisheries Research and Development Corporation	1, 2
2021-099	National seafood industry leadership project 2022	Affectus Pty Ltd	3
2021-097	Environmental risk factors that may contribute to vibrio outbreaks – a South Australian case study	Department of Primary Industries and Regions, South Australia	2, 5
2021-092	Assessing effective approaches to engaging the food service sector	Australian Council of Prawn Fisheries Ltd	3, 5
2021-091	Whale entanglement mitigation program – understanding whale population dynamics, entanglement dynamics and gear modifications to reduce entanglements in WRL (Western Rock Lobster) gear	Department of Primary Industries and Regions, South Australian	2, 5
2021-089	Climate resilient wildcatch fisheries	Seafood Industry Australia	1, 2, 3, 5
2021-083	Developing the tools and articulating the value proposition for genomic selection in Pacific Oyster selective breeding	Institute for Marine and Antarctic Studies	1
2021-070	The multiple values attained through partially protected areas	University of Tasmania	4
2021-065	Industry moving towards a zero-waste fishery: a case study to future-proofing South Australia's marine scalefish fishery	Marine Fishers Association Inc	2, 5
2021-064	The multiple values attained through partially protected areas	Queensland University of Technology	4
2021-060	Analysis of historical *Centrostephanus* spp. research to underpin collaborative management of nearshore fisheries in NSW	University of Wollongong	2
2021-017	Basement Jacks - Where's your stock at? Understanding stock structure and connectivity of Mangrove Jack in northern Australia	Department of Industry, Tourism and Trade	2
2021-003	Maintaining productivity and access to Estuary Cockle across sectors through improved science-based decision making	NSW Department of Primary Industries	1, 2
2020-108	Seafood market access and trade: Part 1. Australia-European Union FTA negotiations (non-tariff barriers), Part 2. Australia – India FTA negotiations, Part 3. Reports – India/EU/GCC identifying opportunities and impediments	Seafood Industry Australia	1

R&D Plan 2020-2025 outcomes

1 Growth for enduring prosperity
2 Best practices and production systems
3 A culture that is inclusive and forward-thinking
4 Fair and secure access to aquatic resources
5 Community trust respect and value

Final reports



Impacts of water development in the Gulf of Carpentaria
2018-079

Using an ecosystem modelling approach, this study quantified the impacts and risks of water resource developments (anthropogenic alteration of freshwater discharge) to the Gulf of Carpentaria ecosystem. Key model targets included Banana Prawns (*Penaeus merguiensis*), Barramundi (*Lates calcarifer*), mud crabs (*Scylla* spp.) and Largetooth Sawfish (*Pristis pristis*), as well as mangrove and seagrass habitats.

The research provided some considerations and recommendations with respect to water resource development implementation. In particular, it provided helpful guidelines on the time of flow, the quantity of water allocated for extraction or impoundment, the number of water resource developments and their types and settings. The work also identified existing knowledge gaps and discussed how differences in catchments and the effect of climate change need to be taken into account. One important knowledge gap that this study did not consider was wider ecosystem components and secondary impacts from water resource developments, such as increased sediment load.

More information: **Eva Plaganyi-Lloyd**
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Accurate toxin testing for WA molluscs
2018-107

The lack of accurate toxin tests for bivalve molluscs in Western Australia has caused significant economic losses to the sector due to precautionary closures that could have been avoided by using more sensitive tests. This project identified a reliable toxin test that can be safely used to analyse mollusc flesh and provide accurate information to inform management decisions.

Bivalve molluscs for human consumption in WA are regularly tested for the presence of phytoplankton species that potentially produce marine biotoxins and for the marine biotoxins themselves.

Some *Pseudo-nitzschia* species are producers of the toxic domoic acid (DA), but not all strains of *Pseudo-nitzschia* produce toxins. Previously, the detection of this phytoplankton has triggered sector closures regardless of the presence or absence of DA in the molluscs.

These extensive closures were the catalyst for this study, which found a test that can detect DA in shellfish flesh and therefore ensure that closures only occur when a health risk is present.

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Reporting on bycatch
2018-114

Bycatch (non-target species or sizes caught while fishing) remains an important issue concerning the world's fisheries. There is growing acceptance and international, national and regional agreements and instruments that encourage and/or require governments to report on the status of bycatch.

This project, and its precursor 'Developing a National Bycatch Reporting System' (FRDC Project 2015-208), constitutes Australia's first national attempt to report on bycatch from its commercial fisheries. It is the result of the application of a five-step method developed in the first project.

The latest project has yielded: (i) a baseline to be used by Australia to track performance in managing discards, endangered, threatened and protected species (ETPs) interactions and the quality of its bycatch information; (ii) the identification of key information gaps where future work to monitor and reduce discards should focus; (iii) a method that may be used by other countries and jurisdictions to estimate and report on bycatch to various entities and processes, including the general public.

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Impact of stocking on Queensland's east coast Barramundi catch
2018-047

Researchers from Queensland's Department of Agriculture and Fisheries, James Cook University and the University of Western Australia tested a range of otolith-based and genetic methods to differentiate between hatchery-born and wild-born Barramundi (*Lates calcarifer*). The project took place in the Dry Tropics region, where extensive historical and ongoing impoundment stocking (release of hatchery-born Barramundi into freshwater bodies) may be contributing to the downstream wildcatch marine and estuarine fishery.

Fish samples were collected from the commercial and recreational wildcatch marine and estuarine fishery in 2019 and 2020, following the major Townsville floods in February 2019. The team identified a cost-effective means of using trace elements in fish otoliths to reliably differentiate between hatchery-origin and wild-origin fish, measure the contribution of stocked fish to the wild population, and assess the sustainability of the wildcatch fishery. The report found that Barramundi that spend time in freshwater as juveniles grow faster and larger than those that spend their entire lives in salt water. It found that 33 per cent of the Barramundi caught in the Townsville and Burdekin marine fishery had spent at least one year in fresh water as juveniles.

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See also: **frdc.com.au/barramundi-benefit-gap-year-fresh-water**

Monitoring recreational catch of Southern Rock Lobsters
2019-183

Southern Rock Lobster (*Jasus edwardsii*) is an important fishery species in Tasmania. The commercial sector harvests approximately 1000 tonnes per year to a landed value of approximately $90 million, while more than 18,000 recreational licensees harvested more than 80 tonnes in the 2020–21 season. Lobsters are also taken as part of Indigenous cultural activities and by Indigenous individuals, thought to be more than 1000 participants.

The East Coast Stock Rebuilding Strategy was introduced in 2013 to limit the recreational and commercial catch in this zone. Based on historical usage, 79 per cent of the total zone catch was allocated to the commercial sector and 21 per cent was allocated to the recreational sector. The catch share arrangement does not →

apply to the Indigenous sector. Since then, the recreational sector has exceeded its notional limit four times, including an over-catch of 46 per cent in the 2020–21 season.

This project investigated alternative options to monitor and manage recreational catch. It found that effective catch constraints could be achieved by shortening the season, decreasing the bag limit or introducing an individual season limit. A smartphone app for real-time monitoring of individual season limits without the need for other measures, such as catch tags, was developed. The app was trialled in April 2021 by recreational fishers who had previously taken part in a survey, with most finding it easy to use. The app was rolled out on a voluntary basis by Tasmania's Department of Primary Industries, Parks, Water and Environment (DPIPWE) (now the Department of Natural Resources and Environment Tasmania) for the 2021–22 recreational rock lobster season. This voluntary trial period will help ensure the app meets the objectives of catch monitoring and is practically acceptable to fishers. Findings from this trial, and a literature review of alternative management and monitoring options included in the project, will be used by the department to determine changes to current management arrangements over coming fishing seasons.

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Modelling environmental changes and effects on wild-caught species in Queensland

2019-013

This project studied environmental factors that may be influencing the recruitment, catchability or productivity of Snapper (*Chrysophrys auratus*), Pearl Perch (*Glaucosoma scapulare*) and Spanner Crab (*Ranina ranina*) stocks in Queensland. Two environmental variables (gridded sea level anomaly [GSLA] and chlorophyll a concentration [Chl-a]) were found to have strong associations with either abundance or catchability across the three target species. A third variable, sea surface temperature (SST), also had strong associations with Snapper numbers.

All three environment variables were found to have consistent long-term trends, with rates of change depending on the region under consideration. Using stock assessment modelling, this project demonstrated that these environmental variables significantly influence stock recovery.

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The benefits of restoring tidal connectivity

2019-079

This project focused on how restoring tidal connectivity to a portion of the Clarence River estuary (Lake Wooloweyah) can benefit fishery productivity.

Recent legislation has highlighted the importance of ecological restoration via key initiatives, such as the *NSW Marine Estate Management Act 2014*, *Coastal Management Act 2016* and Biodiversity Offsets Scheme, and has resulted in funds for works becoming more readily available (for example, recreational fishing grants and natural infrastructure grants).

Previous research in the Clarence River estuary has demonstrated the substantial economic returns in prawn catches from repairing intertidal habitats. This foundational research demonstrated that the benefits to prawns can serve as an indicator of all ecological benefits, including other target species.

The findings from this work suggest that there is potential for adding significant value to the fisheries by modifying the hydrology of the estuary system. The approach is replicable in most other estuaries where commercial fisheries occur and can be used to inform management of estuarine habitats and therefore fishery productivity.

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Trialling automated longlines

2019-129

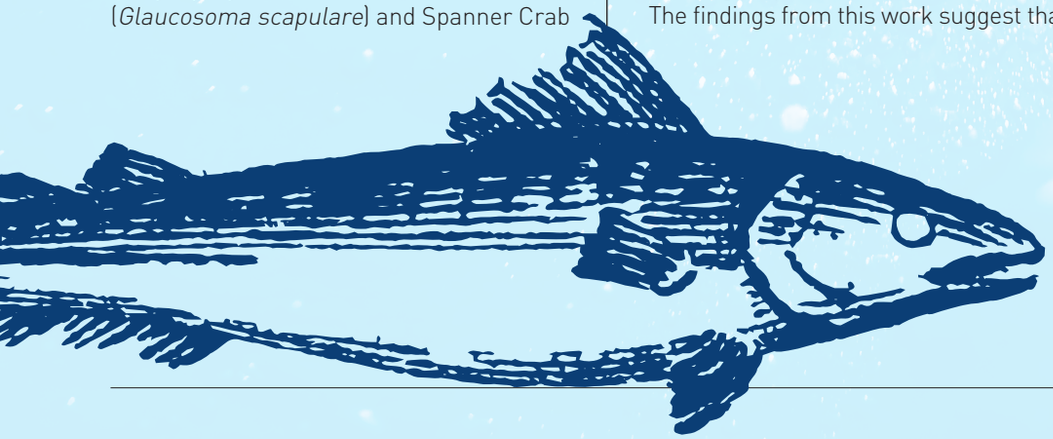
This project explored the use of automated longlines as an alternative to traditional gillnet fishing for Gummy Shark (*Mustelus antarcticus*) in the Bass Strait with a view to assessing the economic and ecological ramifications of a fundamental gear change. The investigation also included monitoring of bycatch of species of interest to other commercial fishing sectors and conservation.

Previous research in waters off South Australia has demonstrated the effectiveness of automated longlines in targeting Gummy Shark and reducing interactions with endangered, threatened and protected species (ETPs). However, the ecological and economic implications of changing from gillnets to automated longlines in Bass Strait were unknown.

During the trials, interactions with ETPs were low, with animals incidentally caught or entangled released unharmed. Similarly, despite numerous observations, there were no recorded interactions with seabirds, reflecting the development and application of effective mitigation measures.

An economic analysis based on discounted cash-flow analysis, which forecast revenue and operating cost over a 10-year term, showed that this investment in gear change may be worthwhile for an average operation (fishing more than 50 days per year). However, when analysed for a full-time operation (more than 150 days per year), converting to automated longline is unattractive at catch rates achieved in the trials.

When considering these results, however, it is important to keep in mind that the trials of automated longlines were limited spatially and temporally, and the results should be treated cautiously when extending the findings to broader areas of Bass Strait and to other times of the year. In particular,



catches and catch rates of commercial and bycatch species and interactions with ETPs may vary from those observed in the trials.

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Fishing apps in COVID-19 times
2019-213

This project set out to use the Australian Recreational Fishing Foundation (ARFF) Tackle Box mobile application to assess the impact of COVID-19 restrictions on recreational fishing (effort and behaviour) in Queensland.

The data revealed that fishers travelled shorter distances to go fishing in 2020 than in 2019, and there was a drop in interstate fishers followed by a spike when the Queensland border reopened after a lengthy closure.

During 2020, the inability to compete in traditional fishing competitions around Australia accelerated a shift to photo-based online competitions and the development of alternative formats such as Tackle Box, Track My Fish and other apps. App-based fishing competitions have created several new ways to engage recreational fishers in citizen science. They also provide the opportunity to examine demographics in ways not previously possible.

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Understanding seafood traceability and labelling
2020-093

This project consists of two discussion papers, one on seafood traceability and one on labelling.

The first paper defines traceability; explains why it is important; identifies barriers to adoption; documents laws, standards and guidelines; describes traceability elements, systems and technologies; and suggests recommended actions and associated risks going forward.

The second paper provides an update on the issues, challenges and relevant laws in labelling, as well as suggesting options and risks going forward.

Both papers are living documents and will be reviewed every 12 to 18 months.

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Demonstrating Australian Southern Bluefin Tuna sustainability credentials
2021-037

The project established that Southern Bluefin Tuna (*Thunnus maccoyii*) significantly exceeds the Marine Stewardship Council sustainability criteria required to meet Marine Stewardship Council Principle 1: Sustainable fish stocks. The method used by CSIRO was confirmed by the Commission for the Conservation of Southern Bluefin Tuna Extended Scientific Committee in August 2021 and may be seen as a model to be used by other fisheries facing similar challenges with certification bodies.

This research project is an important step for the Australian Southern Bluefin Tuna fishery being allowed to catch fish for farms. The project directly addressed the point that is seen as the remaining barrier to the fishery achieving Marine Stewardship Council certification.

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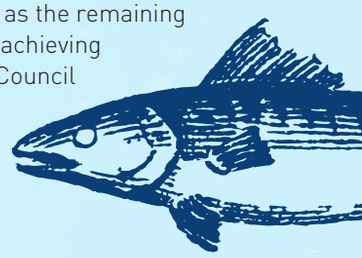

Movers and ...

Professor Giovanni Turchini has moved from Deakin University to Melbourne University to lead the School of Agriculture and Food.

Mark Grubert, formerly Senior Fisheries Scientist with the Northern Territory Government, has moved to the Australian Fisheries Management Authority.

David Crook, formerly Associate Professor at La Trobe University, has moved to New South Wales Department of Primary Industry (Fisheries).

Michael Salini has been appointed to the role of Research Fellow in Aquaculture Nutrition, School of Life and Environmental Sciences, at Deakin University. Michael was previously at Ridley Aquafeeds for almost six years.

Professor Lee Baumgartner has been appointed as the Interim Academic Director of the Gulbali Institute at Charles Sturt University. Lee has significant research leadership experience including with the NSW Department of Primary Industries and La Trobe University, and he currently holds a board position on the North East Catchment Management Authority.

Philip Wiese has been appointed as CEO of Huon Aquaculture Group. He has been with the company for more than 14 years in a range of roles including Deputy Chief Executive and Chief Financial Officer.

Matt Tybell is the new NT Mud Crab Licensee Committee Chair, taking over from Dr Chris Calogeras (FRDC Board Member) who stepped down from the role after seven years. Matt is also on the board of the NT Seafood Council.

Phillipa Nott became FRDC's Human Resources Manager in April.

The Sydney Seafood School has a new catch! **Sally Webb** has taken the helm as manager and is working closely with Sydney Fish Market. She has more than 20 years' experience in food, hospitality, media and publishing.

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and thanks for all the FISH

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