

# FISH

FISHERIES RESEARCH & DEVELOPMENT CORPORATION NEWS



VOLUME 29  
NUMBER 2

JUNE 2021

## Aquaculture's new horizons

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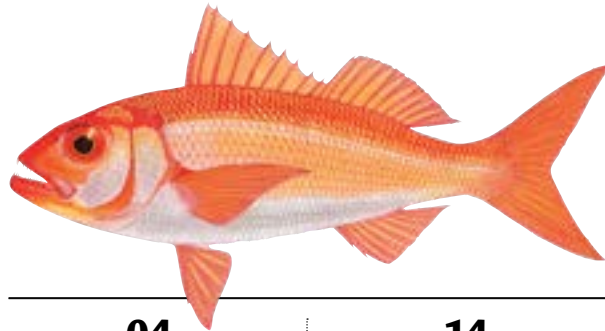
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FISH is published by the FISHERIES RESEARCH AND DEVELOPMENT CORPORATION (FRDC)

The FRDC plans, invests in and manages fisheries research, development and extension activities throughout Australia. It is a statutory authority within the portfolio of the Federal Minister for Agriculture, jointly funded by the Australian Government and the fishing industry.

**FRDC**  
Fisheries Research House,  
25 Geils Court, Deakin, ACT 2600;  
Locked Bag 222, Deakin West,  
ACT 2600  
T 02 6122 2100  
E frdc@frdc.com.au  
W www.frdc.com.au  
To contact individual staff members see:  
www.frdc.com.au/  
About-us/FRDC-Staff

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FISH is written and produced by the FRDC and Coretext Pty Ltd.

**FRDC editor:** Annabel Boyer  
**Coretext editor:** Catherine Norwood  
**Senior designer:** Fiona James  
**Coretext:** PO Box 12542,  
Melbourne, Vic 8006  
T 03 9670 1168 F 03 9670 1127  
E enquiries@coretext.com.au  
W www.coretext.com.au  
ISSN: 1833-4784 (Print)  
ISSN: 2202-7122 (Digital)

**Cover:** *Asparagopsis*  
Photo: Shutterstock

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# Fisheries sustainability reports expand



Blue Morwong

Ruby Snapper

Teraglin

The fifth edition of the Status of Australian Fish Stocks, launched on World Oceans Day, 8 June 2021, marks a decade of expanded national assessments of Australia's fisheries

Words **Annabel Boyer** Illustrations **efishalbum.com**

**W**ith its fifth edition completed, the Status of Australian Fish Stocks (SAFS) Reports mark a decade of assessments that provide a national overview on the health of Australia's fisheries. The fifth edition is the largest assessment of Australia's fish stocks ever completed and a mighty achievement of coordination and collaboration by scientists and agencies around the country. Their size and scope, too, puts Australia ahead of the game globally compared to similar reports produced overseas.

The latest edition of SAFS Reports assess 477 stocks of 148 of Australia's fish species, adding 71 stocks of 25 species to the 2018 reports. The SAFS framework uses stock status categories of sustainable, depleting, depleted, recovering, undefined and negligible to give an indication of the sustainability of each fish stock. The SAFS Reports not only provide the opportunity to highlight sustainable species, but also to understand where there are issues such as data gaps or the need for management intervention or additional research to resolve status concerns or uncertainty.

With greatly expanded coverage since the original SAFS Reports of 2012, the fifth edition demonstrates a trend towards sustainability (see Figure 3).

Among the highlights in the new reports are the improved status of Spanner Crab (*Ranina ranina*) (east coast biological stock), which has transitioned from depleting to sustainable, and Yellowtail Kingfish (*Seriola lalandi*) (eastern Australia biological stock), which has transitioned from undefined to sustainable.

A result of adding species and stocks to the reports is an increase in the proportion that have an 'undefined' status. This is because these stocks have limited data, making an assessment very difficult. This highlights the need to find out more about the species and stock, as well as increase the level of data collected relating to its harvest, whether commercial, recreational or Indigenous.

In some cases, the latest assessments incorporate new knowledge. For example, the importance of multiple spawning locations for the eastern Australian stocks of Tailor (*Pomatomus saltatrix*), revealed by recent research, has been recognised. Assessments of tropical snappers (Saddletail Snapper, Crimson Snapper and

## WHAT IS A 'FISH STOCK'?

A stock is another way of saying population or sub-population. Use of the term fish stock usually implies that the particular population is more or less isolated from other stocks of the same species and hence self-sustaining.

The Status of Australian Fish Stocks (SAFS) Reports uses the term 'stock' generically for populations of fish defined at any of three levels – biological, management units and populations assessed at the jurisdictional level.

A biological stock is a discrete genetic

population or a population of fish that is not interacting with other fish populations of the same species. That means this population size can be treated as relatively constant and changes to its structure and size can be measured. It is not always practical to measure an entire biological population, so the unit may be defined in other ways such as who manages it or where it is. A key aim of fisheries management is to ensure that biological stocks are maintained at sustainable levels.



Goldband Snapper in the Lutjanidae family) also include insights from the analysis of otoliths (fish ear bones) and parasites to understand the stocks to a more refined level.

### New species, new challenges

Several new species included in the latest SAFS Reports (released in 2021) have provided both challenges and novelty to the assessment process, says the FRDC's SAFS program manager Toby Pidcocke.

For instance, two eel species – Longfin Eel (*Anguilla reinhardtii*) and Southern Shortfin Eel (*Anguilla australis*) – are both being reported on for the first time.

Eels have an unusual biology: they only spawn once in their life and take a long time to reach maturity. Female Longfin Eels do not reach maturity until they are in their 50s.

They spend most of their lives in rivers or estuaries before heading to the Coral Sea where they spawn before dying. Their young then travel back to the waterways where they spend most of their lives.

“It’s a really unusual biology that throws up a lot of assessment challenges and a lot of jurisdictional particularities, so they are interesting species to report on,” Pidcocke says.

Another new species to present some interesting questions for the SAFS Reports is the Longspined Sea Urchin (*Centrostephanus rodgersii*). This species has moved south from its traditional range as waters have warmed, causing ecological issues.

“This is a really interesting issue from the point of view of SAFS reporting because, in these instances, the removal of urchins is considered necessary to minimise ecological impacts. This can lead to the preference to reduce the biomass to really low levels in those areas.”

The new SAFS Reports also include some species well known to fishers, but which have yet to be formally described by science. Among these

is a fish from the tropical Ruby Snapper group, of the genus *Etelis*.

SAFS authors identified that the species that makes up the largest share of the Ruby Snapper catch is one that has not formally been described by taxonomists. Known as Giant Ruby Snapper, this warm-water species inhabits deep reefs off northern Australia. There is a paper underway to have the species formally described and recognised as *Etelis boweni*.

Another new species in SAFS that is yet to be formally described by science has previously been referred to as the western stock of the Gloomy Octopus (*Octopus tetricus*). For many years it has been recognised that the western species is distinctly different to the Gloomy Octopus found on the east coast of Australia, and so the western species will be included in SAFS as *Octopus djinda*. The formal naming process is the subject of an FRDC project 2018-178. *Djinda* means ‘star’ in the Noongar language and has been chosen because it is uniquely Western Australian. Formal acceptance of the name by the scientific community is expected by the end of the year.

### More than a rating system

While the changing status of different species understandably grabs the headlines, the national nature of the SAFS Reports as an overview of Australia’s fisheries health has other less obvious, but equally important, benefits.

Pidcocke says as well as providing a national overview, the reports give researchers, who otherwise may not be able to work together, the opportunity to collaborate and learn from one another.

“Obviously the product we put out at the end is the reports, and we want people to read those and get value from them. However, the cross-jurisdictional relationships SAFS fosters among fisheries scientists are equally important.” →

## STATUS OF AUSTRALIAN FISH STOCKS (SAFS) REPORTS SUMMARY

FIGURE 1: NUMBER OF SPECIES AND STOCKS, 2018 AND 2020

	SAFS 2018	SAFS 2020	Change
Number of species	120	148	+25 new species*
Number of stocks	406	477	+71 new stocks

\* Some species previously reported on as species groups (i.e. two or more species combined into a single reporting unit, such “Australian Salmon”) have been split into distinct species reports for SAFS 2020. These newly separated species complexes are NOT included in the count of new species. A species complex is a group of similar species that are often difficult to differentiate without detailed examination.

## NEW SPECIES INCLUDED IN SAFS REPORTS 2020

- Australian Bonito (*Sarda australis*)
- Barred Javelin (*Pomadasys kaakan*)
- Blue Morwong (*Nemadactylus valenciennesi*)
- Bronze Whaler (*Carcharhinus brachyurus*)
- Brownstripe Snapper (*Lutjanus vitta*)
- Burrowing Blackfish (*Actinopyga spinea*)
- Champagne Crab (*Hypothalassia acerba*)
- Cobia (*Rachycentron canadum*)
- Crystal Crab (*Chaceon albus*)
- Eastern Shovelnose Ray (*Aptychotrema rostrata*)
- Golden Perch (*Macquaria ambigua*)
- Greenback Flounder (*Rhombosolea tapirina*)
- Hammer Octopus (*Octopus australis*)
- Longfin Eel (*Anguilla reinhardtii*)
- Longspined Sea Urchin (*Centrostephanus rodgersii*)
- Ocean Sand Crab (*Ovalipes australiensis*)
- Redspot King Prawn (*Melicertus longistylus*)
- Ruby Snapper (*Etelis carbunculus* and *Etelis boweni* description pending)
- Southern Shortfin Eel (*Anguilla australis*)
- Striped Trumpeter (*Latris lineata*)
- Stripey Snapper (*Lutjanus carponotatus*)
- Teraglin (*Atractoscion aequidens*)
- Trumpeter Whiting (*Sillago maculata*)
- Western Blue Groper (*Achoerodus gouldii*)
- Western Rock Octopus (*Octopus djinda*, description pending)



Golden Perch



Cobia

Piddocke says the benefits of these relationships extend beyond SAFS, with several authors noting that, as a result of participating in SAFS, they are now more likely to pick up the phone and discuss relevant issues with their colleagues in other jurisdictions.

“SAFS also provides a unique national perspective on the status of the stocks it addresses. Fisheries management falls to state, territory and Commonwealth jurisdictions, so the fisheries science tends to be divided the same way. SAFS provides an opportunity to get a higher level perspective across jurisdictions on stock performance and data needs.”

The new SAFS online reporting form is contributing towards greater reporting consistency across jurisdictions and also helps Australia meet obligations to report against the UN Sustainable Development Goals.

**A consistent framework**

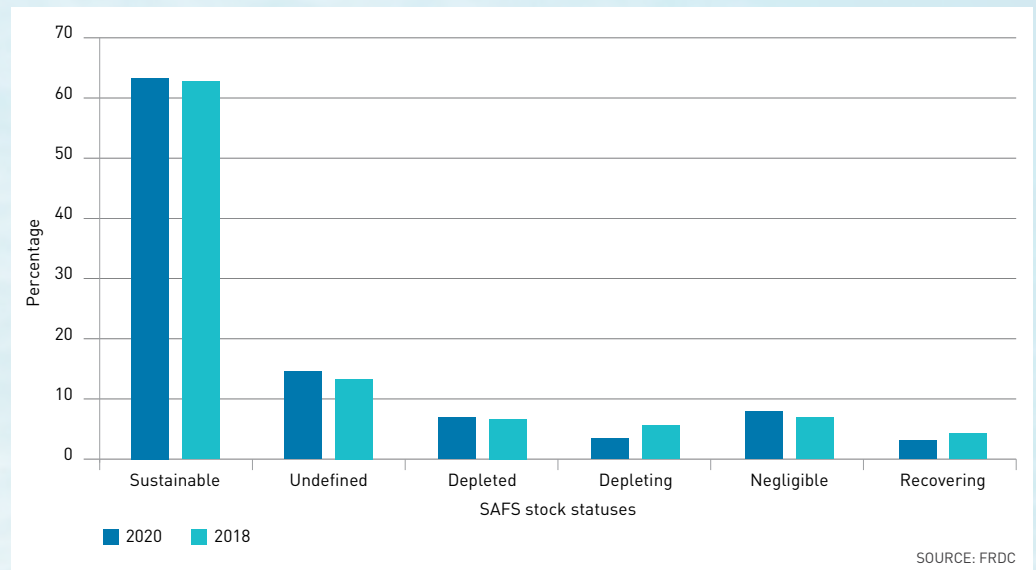
The latest edition has seen a big change in how the reports are produced. For the first time, an online authoring form using dropdown menus and tick-box selections was used to standardise terminology for things like fishing methods. “Previously, we’d end up with this huge list of different methods that were all essentially the same,” Piddocke says.

The Northern Territory and Western Australia are already using the SAFS framework for their own jurisdictional assessments, with other jurisdictions assessing how it might work for them. Piddocke says the ultimate goal of the reporting framework is to reduce duplication and increase efficiency.

The SAFS Reports is available at [www.fish.gov.au](http://www.fish.gov.au) and as a smartphone app.

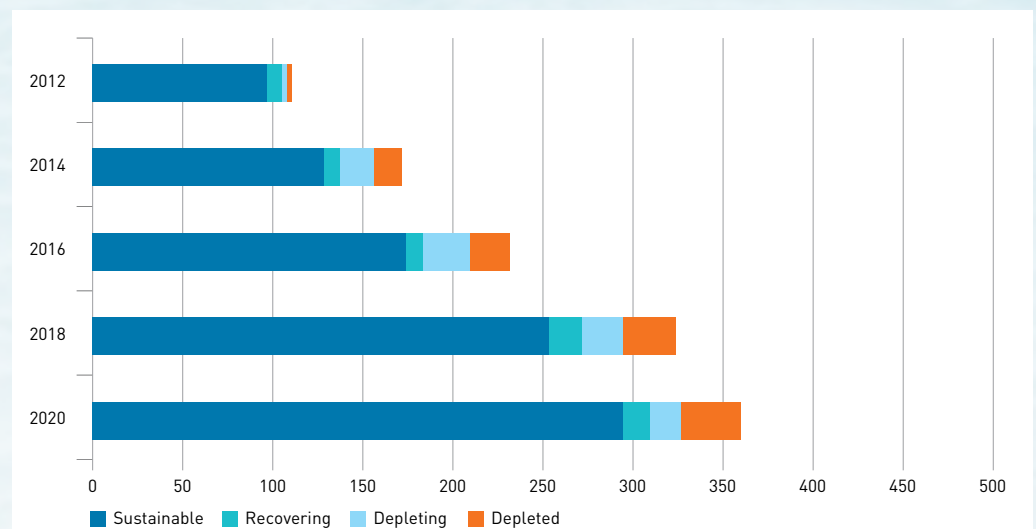
It includes [interactive modelling](https://www.fish.gov.au/en/reports/data-tools/stock-status-trends) of trends in the sustainability of Australia’s fish stocks, with users able to select species to see trends from 2012 through to 2020, at <https://www.fish.gov.au/en/reports/data-tools/stock-status-trends>. **F**

FIGURE 2: PERCENTAGE OF STOCKS BY CATEGORY, 2018 AND 2020



SOURCE: FRDC

FIGURE 3: TRENDS IN SUSTAINABILITY OF AUSTRALIAN FISH STOCKS 2012-2020



Stocks assessed as negligible and undefined have not been included in this figure due to the indeterminate nature of these assessments: An **undefined** assessment indicates that there is not enough information to determine stock status. A **negligible** assessment indicates that catches are so low as to be considered negligible and inadequate information exists to determine stock status.

SOURCE: FRDC



**MEASURING PROGRESS**

The Status of Australian Fish Stocks (SAFS) Reports brings together available biological, catch and effort information to

determine the status of Australia’s key wildcatch fish stocks. As of July 2018, SAFS summary information has been used to inform Australia’s progress against United Nations Sustainable Development Goal 14: Life below water.

Target 14.4 is: By 2020, effectively regulate

harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics.

The indicator used to assess progress towards this target is 14.4.1: Proportion of fish stocks within biologically sustainable levels. **F**

**MORE INFORMATION**

Toby Piddocke, FRDC, [toby.piddocke@frdc.com.au](mailto:toby.piddocke@frdc.com.au); Status of Australian Fish Stocks Reports [www.fish.gov.au](http://www.fish.gov.au)

**FRDC RESEARCH CODE**  
2019-149



# In brief

## Seafood leadership program

The National Seafood Industry Leadership Program (NSILP), funded by the FRDC, is running three courses in 2021 – two are a continuation of disrupted 2020 courses, and a third course will also be completed this year.

The ongoing Port Lincoln group includes Anthony Tennant, Cassandra Pert, Daniel Chien, Darci Wallis, Jaime McAllister, Luke Cordwell, Meaghan Dodd, Natalie Manahan, Patrick Cavalli, Rattana Wiriyakiat, Sally Bolton and Sean Larby. It had its first residential session in March 2020 in Port Lincoln before the program was disrupted by COVID-19 restrictions. It has resumed with a residential session on the Gold Coast in May 2021 and a Canberra session in September.

The second 2020 cohort, based in Cairns, includes Amie Steele, Amrik Singh Aulakh, Anita Lee, Ben Stobart, Brandon Panebianco, Cindy Manu, Geovanny Danilo Gomez Rios, James Thomas, Kirsten Rough, Lewis Christensen, Luke Dutney, Maxwell Bayly, Rebecca Marks, Rhett Bartz, Sam Bock, Siobhan Threlfall, Tom Hatley and William Conn. It has residential sessions in Cairns in May, Adelaide in August and Canberra in October 2021.

The 2021 cohort includes Claire Denamur, Delahay Miller, Frederic Bailleul, Gerard Dennis, Griffin Grounds, Heidi Mippy, James Baker, Jessica McInerney, Jock Mure, Linda Wiberg, Lou Cathro, Phillip Ravanello, Rachel Ong, Rebecca Sellers, Rhys Barton, Sarah Gorst, Steve Paleologoudias and Steven Rust. It will have residential sessions on the Gold Coast in June, Adelaide in September and Canberra in November 2021.

These sessions are combined with ongoing project work that participants undertake in teams during the course, putting the leadership skills they are learning into action. **F**

**More information:** [Affectus, https://affectusaus.com.au](https://affectusaus.com.au)

## FISH AND CHIPS AWARDS TO CONTINUE

Starting this year, Seafood Industry Australia will run the Australian Fish and Chips Awards under the Great Australian Seafood banner, taking over from the FRDC. The FRDC will continue to provide support to the competition.

The FRDC initiated the awards in 2017 to raise awareness of the importance of seafood sourcing and labelling in food service, and to promote the iconic Australian meal experience of fish and chips – which, for some, is their only interaction with seafood.

Tobin Fish Tales in Townsville, Queensland, was named Australia's best fish and chipper in 2019, the most recent awards. The awards were not held in 2020 due to COVID-19 restrictions.

Details of the 2021 competition are still to be finalised. **F**



### More information:

Contact Seafood Industry Australia by emailing [info@seafoodindustryaustralia.com.au](mailto:info@seafoodindustryaustralia.com.au) or visit <https://www.fishandchipsawards.com.au/> to sign up for updates.



## Recreational fishing survey

A survey of recreational fishing is underway in South Australia, and researchers leading the survey are encouraging people to take part. Crystal Beckman, from the South Australian Research and Development Institute, says the survey of recreational fishing participation, catch and effort will assist with fisheries management decisions. The year-long survey will include telephone interviews, boat ramp surveys and self-reporting via the SA Fishing app.

Recreational fishers are encouraged to download the smartphone app and submit their activities when they go fishing at any time during the year.

Beckman says the more people who take part in the survey, the more accurate the results will be in assessing recreational fishing in the state. The survey and use of the app will also help to evaluate the potential of apps in assessing recreational fishing effort and supporting fisheries management decisions. **F**

## SKILLS FOR RURAL LEADERS

Applications for the 29th course of the Australian Rural Leadership Program (ARLP) will open from 4 July and close on 19 August 2021. The FRDC has regularly supported participants in the program, which provides a dynamic learning experience focused on the development of leadership for individuals and organisations contributing to the future prosperity of rural and regional Australia.

In each cohort, approximately 30 leaders are engaged in a series of unique, immersive experiences delivered in real-world contexts to help them develop the adaptive skills to confidently overcome future challenges and act for the 'greater good' of rural and regional Australia.

The course runs over 15 months and includes three in-person sessions in Australia and one held overseas. The most recent FRDC-sponsored graduates include Hayley Abbott, Narooma, New South Wales (Course 27); Lukina Lukin, Port Lincoln, South Australia (Course 27); and Kylie Dunstan, Canberra, Australian Capital Territory (Course 26). Andrew Sullivan, executive officer of the Commonwealth Fisheries Association, will take part in the 28th course. **F**

**More information:** <https://rural-leaders.org.au>

GENETICS



Common Dolphin (*Delphinus delphis*). Photo: Kerstin Bilgmann

### Trans-Tasman dolphin collaboration

While consumers look out for the Dolphin Safe mark on seafood purchases, a major research stocktake of Australian–New Zealand waters gives new guidelines to marine managers.

An extensive genomic study of almost 500 Common Dolphins (*Delphinus delphis*) across the southern and east coast of Australia to Tasmania and New Zealand suggests connectivity between several populations of Common Dolphin across the Tasman Sea.

The study, published in *Frontiers in Marine Science*, calls for greater collaboration in Australian and New Zealand conservation and fisheries plans.

Common Dolphins of the Pacific Ocean (eastern Australia and New Zealand) are genetically distinct from those in the Indian Ocean (southern Australia).

Lead author Andrea Barceló, a PhD candidate from Flinders University, says this species is considered one of the most abundant dolphin species in temperate and subtropical waters in Australia and New Zealand. However, the dolphins also suffer from frequent interactions with commercial vessels and related mortalities in several fisheries.

The study calls for inter-jurisdictional collaboration to mitigate fisheries interactions with Common Dolphins across multiple spatial scales in the Australasian region. The findings are also important for future conservation policies relating to marine ecosystems, given the increase in anthropogenic impacts and ongoing changes of Earth’s climate. **F**

ENGAGEMENT

### A WHALE-LIKE TAKE ON WORLD’S LARGEST MARINE OBSERVATORY

The soon-to-be constructed Australian Underwater Discovery Centre (AUDC) at Busselton, Western Australia, is expected to be the largest natural marine observatory in the world. The \$32 million project includes a whale-shaped structure that will be partially submerged at the end of the Busselton Jetty, which extends 1.8 kilometres out into Geographe Bay. The design pays homage to the Humpback, Southern Right and Blue

whales that visit the bay.

The observatory will incorporate the world’s largest ocean windows peering into the Indian Ocean, as well as a Marine Parks Discovery Centre, underwater dining, art galleries and exhibition spaces.

It will add to the current marine observatory at Busselton, which is one of only six in the world; the others are in Guam, Israel, Japan and New Zealand (which has two). It will increase

capacity from 44 to 140 people and include a much larger viewing area, better technology, more interactive facilities, underwater dining areas, function space and more marine educational resources, including a marine laboratory and facilities for school groups. The project is an initiative of the community organisation and registered charity Busselton Jetty Inc. **More information:** [www.busseltonjetty.com.au/australian-underwater-discovery-centre/](http://www.busseltonjetty.com.au/australian-underwater-discovery-centre/) **F**

CITIZEN SCIENCE

### SEEKING OLD DIVE PHOTOS

Scientists from the University of New South Wales (UNSW Sydney) are seeking old diving photographs, videos and observations from Sydney and the NSW north coast to help document how marine life has changed at dive sites over the years.

The research project ‘In Bygone Dives’ aims to better understand how the underwater world has changed over recent decades.

Lead researcher and PhD candidate at UNSW Sydney Chris Roberts says old photos and

videos from recreational divers hold a wealth of information and potentially valuable scientific data on the past health of reefs and the species that were present.

“We can use these photos and observations to document how the marine life at dive sites has changed from the past and also to monitor them into the future,” Roberts says.

Specific Sydney sites of interest include Shelly Beach, Fairy Bower, Camp Cove, Fairlight, Clifton

Gardens, Gordons Bay, Clovelly Pool, Shark Point, Bare Island, Kurnell and Ship Rock. Sites of interest on the NSW north coast include those that might help track location of the loss of underwater forests such as kelp from between Byron Bay and Tweed Heads.

Divers who want to contribute photos to the project can upload them to the ‘In Bygone Dives’ page as part of the smartphone app iNaturalist. **F**

WORD-WISE

**COASTAL FISHING:** the waters extending seaward from the territorial sea baseline to a distance of three nautical miles. The states and the Northern Territory have jurisdiction over the coastal waters adjacent to them.

**INSHORE WATERS:** waters of the shallower part of the continental shelf, usually less than three nautical miles from the coast.

**EXCLUSIVE ECONOMIC ZONE (EEZ):** the area that

extends from the limit of the territorial sea, which is 12 nautical miles offshore from the territorial sea baseline, to a maximum of 200 nautical miles, measured from the territorial sea baseline.

**HIGH SEAS:** waters outside national jurisdictions (that is, outside Exclusive Economic Zones). **F**



Source: *Glossary for the Status of Australian Fish Stocks Reports*





Left A Sergeant Baker (*Latropiscis purpurissatus*), a warm-water species now being seen further south of its previously recorded range. Photo: Erik Schlögl

# Risky business: equipping Australia's fisheries for climate change

A new handbook offers a step-by-step guide to managing the risks of climate change in Australian fisheries

By Chris Clark

Climate change is wreaking havoc in natural systems, and the plans that fisheries managers and other fisheries stakeholders have in place today may quickly prove inadequate to deal with ongoing environmental changes. A fast and efficient re-evaluation may be needed.

That is where the new *Adaptation of Commonwealth fisheries management to climate change* handbook comes in.

It provides fisheries managers and other stakeholders with a systematic approach to identify climate change-related risks and develop timely and appropriate responses. The handbook has been developed based on 30 years of observed changes in the environment and other accumulated science.

CSIRO ecosystem modeller Beth Fulton

led a team of CSIRO and University of Tasmania researchers to develop the handbook. Fulton says it is about knowing where the breaking points are, because although many of the climate change forecasts are long term, extreme events can suddenly produce an urgent need for action.

"In 2015-16 there was a 251-day heatwave in the ocean off Tasmania that produced conditions which, on average, were not expected for another 20 years. That really puts your planning under stress, because if you're living season to season or on a four-to-five-year plan, to suddenly have to change everything overnight because a heatwave has hit is going to bring things to the fore."

## Identifying responses

She describes how qualitative modelling is used to assess a range of management responses to

different climate change impacts. "You can say, 'how would you respond to this situation?'"

"The managers, the fishers tell you, the economists, the other experts tell you, and when you press on that response in the model you see whether the answer leads to what you want in terms of the fishery's responses or whether something unexpected pops up."

When fish move, for instance, Fulton suggests one option is to allow fishers to follow the fish by developing flexible access rules across jurisdictions. Another option is diversifying the species they fish by finding some new local targets.

The handbook is the result of an FRDC-funded project run by CSIRO and the Australian Fisheries Management Authority (AFMA) and involved extensive consultation with AFMA managers and fisheries representatives. It includes a complete worked example, based on a hypothetical fishery, that lays out all the steps from the initial risk assessment to management recommendations.

The research team created regional summaries for each region around Australia as background material for the risk assessment.

"That's 30 years or more of accumulated science and observation of changes that are already happening," says Fulton.

"For example, the East Australian Current has moved a couple of hundred kilometres further south and that's already seen more than 50 species move, so that's observed science."

She adds that the project also highlighted the challenge of collecting enough up-to-date information on the state of our fisheries, since old collection timeframes are no longer sufficient to meet the climate change challenge.

"Visiting a location every 20 years as the science vessel potters its way about Australia was enough to keep us ticking over, but with the change happening so quickly, that's not going to work anymore," she says.

The handbook will be publicly available later in 2021. **F**

## MORE INFORMATION

Beth Fulton, [beth.fulton@csiro.au](mailto:beth.fulton@csiro.au);  
Ryan Murphy, [ryan.murphy@afma.gov.au](mailto:ryan.murphy@afma.gov.au)

FRDC RESEARCH CODE  
2016-059





**R&D PLAN OUTCOME 2**  
Best practices and production systems

# Experimenting to improve delivery

The FRDC has been exploring new ways of working to improve efficiency and client focus

By **Chris Izzo** and **Annabel Boyer**

Throughout 2020, COVID-19 outbreaks across Australia severely impacted everyone’s lives. While many Australians were struggling to purchase basic groceries, others had to adapt quickly to keep their businesses afloat in the face of overwhelming disruption. This included many in the fishing and aquaculture sectors.

The FRDC responded by modifying its publications and focusing on research projects that could continue while lockdowns were in place around the country. But the challenges of 2020 also crystallised the need for the organisation to improve its processes, find new ways to meet the needs of its stakeholders and better use the resources at its disposal.

In the last quarter of 2020, the FRDC embarked upon a process to explore changes to its business that would result in improvements to the purpose, processes, functions and, ultimately, services delivered by the FRDC to its stakeholders. During this period, nearly half of the FRDC’s staff were seconded to work on an ‘agile’ management and delivery project, stepping away from their regular stakeholder engagement and related activities.

The group was tasked with the brief that no potential solution or proposed goal was too unconventional or wild to warrant consideration. The group experimented with ‘agile’ ways of working – a method which promotes a staged approach to problem-solving that is focused on delivering outputs to best meet the needs of clients.

## Identifying improvements

This agile process will deliver some tightly outcome-focused changes to the FRDC’s processes and services.

In 2021 the FRDC will explore more flexible approaches to managing its research investments. Newly appointed transformation adoption lead Jamie Allnut will also drive a review of research adoption and extension models.

Incremental changes being rolled out this year include new research application formats and a refreshed FishNet research application portal. The content, functionality and overall experience for users of the FRDC’s website are also being enhanced.

There will be other less obvious changes to the FRDC’s internal systems and processes to improve service delivery.

The FRDC anticipates that further exploration and adoption of principles of agile project management will be used to better streamline aspects of its business and optimise value for stakeholders. This aligns with its mandate of continual improvement. It builds on feedback collected through the FRDC’s recent stakeholder surveys and on the recommendations from the review of the FRDC’s advisory structures and services.

The FRDC invites and will seek feedback from our stakeholders on the changes and new approaches trialled to ensure these meet the needs of clients and stakeholders. **F**

### KEY CHANGES UNDERWAY

- New research application processes and form
- Revised FishNet research application portal
- New website designed with user experience at the centre
- Revised project management system
- Experiments to better deliver extension and adoption
- Internal and external-facing ‘intelligence systems’ for improved situational awareness both within and external to the FRDC

### MORE INFORMATION

Matt Barwick, [matt.barwick@frdc.com.au](mailto:matt.barwick@frdc.com.au)



## Tracking R&D in FISH magazine

With a new research and development plan guiding our activities and investments, the FRDC is keen for stakeholders and *FISH* magazine readers to understand the broader goals we are working towards and how they are connected to the research we report on within the magazine.

To make those connections clear, we will flag which stories in *FISH* magazine are connected to which of the five key outcomes in FRDC’s new [R&D Plan 2020-2025](#) using the corresponding icon to represent each outcome where relevant.



**R&D PLAN OUTCOME 1**  
Growth for enduring prosperity



**R&D PLAN OUTCOME 2**  
Best practices and production systems



**R&D PLAN OUTCOME 3**  
A culture that is inclusive and forward thinking



**R&D PLAN OUTCOME 4**  
Fair and secure access to aquatic resources



**R&D PLAN OUTCOME 5**  
Community trust, respect and value

# FRDC revises advisory structures

Revamped advisory committees have broadened their membership while tightening their focus on outcomes for end users

**T**he FRDC's new Research and Development Plan 2020-2025 has set the direction for the organisation's research activities over the next five years. The FRDC has also revamped its Research Advisory Committees (RACs) to make them better fit for purpose with the organisation's new long-term goals.

The FRDC's general manager of research, development and investment Crispian Ashby says in the future the RACs will focus on setting priorities rather than assessing applications.

"We found that a lot of time was spent on applications and not enough time spent on priorities, and we really wanted to flip that around to focus on the need and who the end users are and how to deliver the information to get the best impact."

While applications will no longer be reviewed by the RACs themselves, RAC members will still be able to review applications as part of a separate process. This is expected to reduce any committee-specific conflict of interest that might arise.

While there will still be eight RACs – one for each fisheries jurisdiction including the Commonwealth – the FRDC has halved the number of chairs that oversee the RACs, meaning each new chair will oversee two RACs.

Ashby says this aims to further improve linkages between jurisdictions and use or address any interconnections that might exist. The types of members who sit on RACs has also been expanded from purely expertise-based individuals to include representatives of industry or sectors, to enhance the RACs' focus on the end users of research.

Earlier in the year, the FRDC put out a call for the new chair positions and these have now been filled. **F**

## THE ROLE OF RACS

The FRDC's Research Advisory Committees (RACs):

- act as the lead mechanism to identify, synthesise and aggregate priorities articulated by stakeholders;
- consider avenues for delivery of R&D outputs to end users through identification of suitable extension activities;
- assist in monitoring invested activities to aid in the delivery of outputs to end users; and
- aid in identifying potential external technical reviewers of applications – this may include RAC members with suitable expertise (and where there are no conflicts of interest).

### MORE INFORMATION

Chris Izzo,  
[christopher.izzo@frdc.com.au](mailto:christopher.izzo@frdc.com.au),  
Nicole Stubing,  
[nicole.stubing@frdc.com.au](mailto:nicole.stubing@frdc.com.au),  
Alison Connelly,  
[alison.connelly@frdc.com.au](mailto:alison.connelly@frdc.com.au)



## NEW RAC APPOINTMENTS

### QUEENSLAND

James Findlay (chair)  
Sian Breen  
Andrew Gosbell  
Jessica Hoey  
Stephen Murphy  
Samuel Pagano  
Jan Strugnell

### NEW SOUTH WALES

James Findlay (chair)  
Patricia Beatty  
Troy Billin  
Leslie Duncan

Natalie Moltschaniwskyj  
Ana Rubio  
Bruce Schumacher  
Peter Turnell

### WESTERN AUSTRALIA

Brett McCallum (chair)  
Justine Arnold  
Leyland Campbell

Steven Davies  
Dan Gaughan  
Heidi Mippy  
Matt Pember  
Linda Williams

### SOUTH AUSTRALIA

Brett McCallum (chair)  
Gavin Begg  
Neil MacDonald  
Delahay Miller  
Mike Steer  
Lee Van Soest

### TASMANIA

Heidi Mumme (chair)  
Molly Christensen  
Bryan Denny  
Jen Fry  
Jane Gallichan

Caleb Gardner  
Grant Pullen

### VICTORIA

Heidi Mumme (chair)  
Dallas D'Silva  
Mark Gervis  
Rohan Henry  
Braeden Lampard  
Josiah Pit

### NORTHERN TERRITORY

Cathy Dichmont (chair)  
Nicole Anderson

David Ciaravolo  
Steven Matthews  
Michael O'Brien  
Matt Osborne

### COMMONWEALTH

Cathy Dichmont (chair)  
Patrick Caleo  
George Day  
Alistair Hobday  
Adam Martin  
David Smith  
Andrew Sullivan



## Knowing where to fish: tracking tuna with the latest climate and habitat models

Ocean modelling technologies continue to push the envelope when it comes to finding fish with greater accuracy in ever less-predictable circumstances

Words **Chris Clark**

**Above** Southern Bluefin Tuna have become more widely distributed and harder to find as they travel along Australia's southern coast. Photo: Australian Southern Bluefin Tuna Industry Association

Australia's Southern Bluefin Tuna (*Thunnus maccoyii*) fishery boats routinely travel hundreds of kilometres across the Great Australian Bight to capture live fish, which are then farmed in pens until they are market-ready. The distances involved mean that fruitless forays are simply not an option for the Southern Bluefin Tuna (SBT) sector, which has long used forecasting tools to more effectively find their fish. But in season 2020-21, fishers used a new climate model, called the Australian Community Climate Earth-System Simulator – Seasonal (ACCESS-S) for the first time.

ACCESS-S is an upgrade of the Bureau of Meteorology's legacy climate model Predictive Ocean Atmosphere Model for Australia (POAMA).

This latest forecasting technology has been developed jointly by the Bureau of Meteorology (BoM), CSIRO and the Australian Southern Bluefin Tuna Industry Association (ASBTIA) – the industry body for SBT fishers and farmers. The ACCESS-S project was born when the BoM decided to upgrade POAMA.

The project, co-funded by the FRDC and ASBTIA, uses a new state-of-the-art seasonal climate forecasting model developed by the BoM. This links it to an updated habitat model developed by CSIRO that is based on new fish tag data that tracks SBT behaviour. The result is higher resolution of mapping that identifies where SBT of different ages are most likely to be found.

The SBT fishery has become an increasingly challenging commercial prospect over the past decade or so because of changes in fish behaviour that are not well understood.

"Where we used to fish along 200 kilometres of the shelf break, it was easy to send boats and towing pontoons out and wait for the fish to school at the surface," ASBTIA's Kirsten Rough explains.

"Now, in some years, the fish are distributed across a thousand kilometres, so we need reliable and predictable areas that are consistently attractive to the fish for periods of weeks to months. That's why this forecasting model has become essential."

### High resolution

ACCESS-S increases the spatial resolution of the old ocean model from about 200 x 100 kilometres to 25 x 25 kilometres. "There is a lot more detail in the model and you can see oceanic features like eddies, if they're big enough," according to the BoM's Claire Spillman.

ACCESS-S provides sea surface temperature (SST) estimates for up to six months for Australian waters (<http://www.bom.gov.au/oceanography/oceantemp/sst-outlook-map.shtml>).

The estimates are run through the habitat distribution model to give a probability map of where tuna might be found. The forecasts are available at <http://www.cmar.csiro.au/gab-forecasts/index.html>

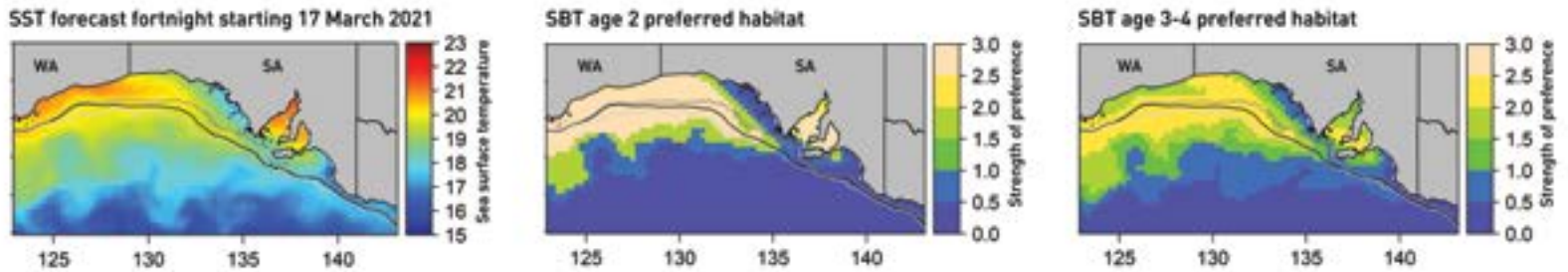
### Industry-led research

The SBT aquaculture sector targets three to four-year-old fish for growing out, and was interested in having age-specific habitat models, says research team leader Paige Eveson, from CSIRO Oceans and Atmosphere. "They wanted to know if the conditions the younger fish were found in were different from the conditions for the older fish."

And it turns out that quite small temperature changes can have a big impact on where different age classes of fish might be.

"The difference in preferred temperature is only about half a degree between two-year-old and three to four-year-old fish, but that's enough to change the areas you would expect to find fish," says Eveson.

Figure 1: Forecast sea surface temperatures (SST) and corresponding areas of preferred habitat for Southern Bluefin Tuna (SBT) in the Great Australian Bight



Maps showing forecast temperatures and corresponding areas of preferred habitat for fish aged two and three to four, respectively. Values > 1 indicate more preferred habitat, values < 1 indicate less preferred habitat. Source: Paige Eveson

This is critical because the feed costs of growing the fish to meet customer size demands can have a big impact on profits.

“Young tuna grow very quickly, and can double their size through the ranching period, but you still need the majority of your fish to be in a certain size range,” says Rough.

Fishers can see forecasts for up to two months to help plan their seasonal operations. These include the need to order in supplementary feed well ahead of the quota season opening on 1 December. Typically, by November they will be using spotter aircraft to find SBT schooling at the surface as water temperatures rise.

The fish can only be captured when they school at the surface, so being where the fish are is vital. It requires timely and accurate decisions on where to send the boats with the pontoons that will hold the live fish that are ultimately towed back to Port Lincoln in South Australia and grown to marketable size. It takes weeks to get the boats set up on location and many more weeks to tow a catch back to port.

### Streamlined operations

Rough says ASBTIA needed intuitive and easy-to-understand forecasts. “One of the things that was very important with this project was to make sure information was easy to use and accessible.” This includes free access and an easy-to-navigate interface. “Limited phone and internet coverage at sea means you can’t waste time searching through website menus for information,” she says.

The updated model also includes habitat ‘nowcasts’, which provide

estimates of where fish are likely to be found now, by combining SST and the level of chlorophyll in the water. Younger fish tend to be found where temperature and chlorophyll are higher. The nowcasts complement the habitat forecasts, which are based only on SST; ACCESS-S does not provide chlorophyll forecasts.

Rough says the nowcasts help fine-tune decision-making out on the water. “You can compare what you’re seeing on a daily basis from spotter aircraft with up-to-date temperature and chlorophyll data and then relate that to longer term forecasts for tuna size, based on age classes,” she says.

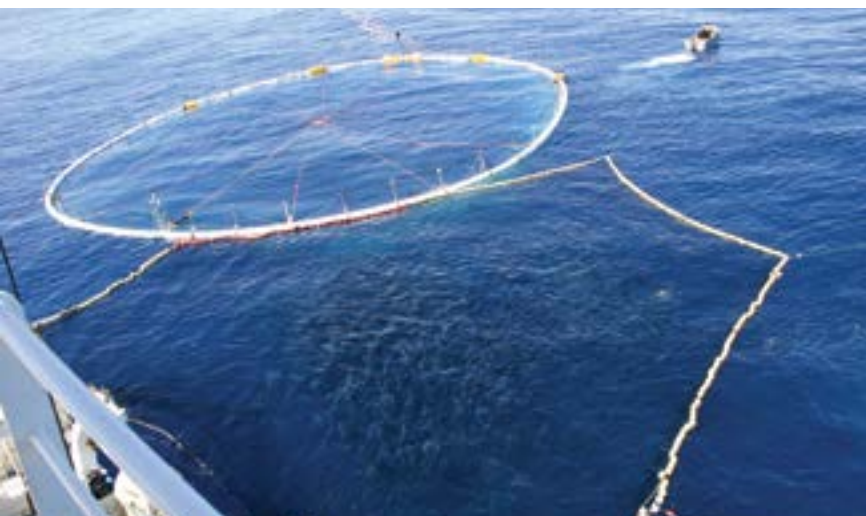
An updated version of ACCESS-S will be online later in 2021 and will include more of the BoM’s own data, which should further improve forecasting accuracy.

At CSIRO, Eveson says a fresh round of tuna tagging is also a priority because the current data is getting close to its use-by date. “The tagging data we’re using starts in 1998 and is quite extensive up to about 2010, but there hasn’t been a lot since. We need new data on fish behaviour because things have been changing, not only with the climate but also with activities such as oil and gas exploration,” she says.

Claire Spillman from the BoM says it has been satisfying working on a project with such a direct industry impact. “I think this is a really good example of applied ocean forecasting, and we’re one of the first groups in the world to do it. There are not many other industries doing this kind of work in the marine sector and there is a lot of opportunity and potential for growth there.” **F**

“Now, in some years, the fish are distributed across a thousand kilometres, so we need reliable and predictable areas that are consistently attractive to the fish for periods of weeks to months. That’s why this forecasting model has become essential.”

Kirsten Rough



Left New modelling is improving the efficiency of operations to catch Southern Bluefin Tuna, to grow out to market size. Photo: Australian Southern Bluefin Tuna Industry Association

#### MORE INFORMATION

[claire.spillman@bom.gov.au](mailto:claire.spillman@bom.gov.au)  
[paige.eveson@csiro.au](mailto:paige.eveson@csiro.au)  
[kirstenrough@bigpond.com](mailto:kirstenrough@bigpond.com)

**FRDC RESEARCH CODE**  
2018-194





Adelaide will host the World Fisheries Congress in September, with virtual attendance also an option. Photo: Shutterstock

# World Fisheries Congress on track for September

By Catherine Norwood

A hybrid event will allow people to gather in person in Adelaide, and online from around the world, to share the latest research driving a sustainable future for our fisheries

After a year of disruption resulting from the COVID-19 pandemic, the eighth World Fisheries Congress (WFC2021) is back on. Early bird registrations for the event in Adelaide in September are closing at the end of June.

WFC2021 will run from 20 to 24 September at the Adelaide Convention Centre, with the theme of 'Sharing our oceans and rivers – a vision for the world's fisheries'. A hybrid format offers in-person or virtual attendance.

The congress is the largest international gathering of fisheries research, industry and management sectors. Normally held every four years to discuss the latest advances in fisheries worldwide, it aims to foster cooperation and engagement in commercial, recreational and Indigenous fisheries.

World leaders in research, industry and international fisheries policy are expected to provide inspiring forums on key developments needed to ensure the future sustainable development of the world's oceans, lakes, estuaries and rivers.

Organisers say the response to the call for presentation and poster abstracts was overwhelming with more than 1400 submissions under the four key themes:

- Sustainable Fisheries (Assessment, Regulation, Enforcement)
- Fish and Aquatic Ecosystems (Biodiversity, Conservation, Ecosystem Function, Integrated Management)
- Fisheries and Society (Contributions to Sustainable Development)
- Future of Fish and Fisheries (Innovations in Fisheries).

With multiple concurrent sessions over four days, the program is set to be dynamic, comprehensive and engaging. The congress is expected to attract about 1500 delegates and they will have access to recordings of all sessions for up to six months after the event.

The FRDC and the Government of South Australia are founding sponsors for the WFC2021. CSIRO and the US [National Oceanic and Atmospheric Administration \(NOAA\)](#) are premium sponsors and Austral Fisheries is the event's major industry sponsor.

Austral Fisheries CEO David Carter says events such as WFC2021 provide important forums for learning about the global challenges facing fisheries and the enormous opportunities for growth, innovation and change.

"It provides a unique opportunity for representatives from commercial, recreational and Indigenous sectors to come together and engage on topics that concern the fishing industry as a collective," he says.

"It's an important opportunity to raise awareness of the fantastic work being done to develop safer and more sustainable fisheries for the future."



**R&D PLAN OUTCOME 3**  
A culture that is inclusive  
and forward thinking

### Keynote speakers

Ambassador Peter Thomson, who is the United Nations secretary-general's special envoy for the ocean, will deliver the opening keynote address. His role with the UN is to drive global support for the UN Sustainable Development Goal 14, to conserve and sustainably use the ocean's resources.

The Fijian diplomat is a founding co-chair of the Friends of Ocean Action. He is also a supporting member of the High Level Panel for a Sustainable Ocean Economy, of which Australia is a member.

Plenary speakers will include:

Martin Exel of Austral Fisheries, who is also the managing director of SeaBOS (Seafood Business for Ocean Stewardship). This is a collaborative venture involving 10 of the world's largest seafood businesses and the Stockholm Resilience Centre in Sweden, which aims to transform wild capture and aquaculture fisheries to sustainable seafood production and promote a healthy ocean, globally.

Meryl Williams has more than 40 years' experience in fisheries, aquaculture, conservation and human development. Her past roles include director-general of WorldFish, director of the Australian Institute of Marine Science, and executive director of the then Bureau of Rural Sciences (Australia). In her recent work Williams focuses on trends in fish value chains, impacts on women and gender equality, and public knowledge for responsible fish production.

Matthew Osborne is a Kurna and Narungga man with extensive experience in Indigenous fisheries. As program leader, aquaculture and regional development in Northern Territory Fisheries, he oversees a range of Aboriginal and industry development programs and supports small-scale fishing and aquaculture operations in remote Aboriginal communities.

Beth Fulton is a principal research scientist with CSIRO Oceans and Atmosphere. Her work

Below Special Envoy for the Ocean, Ambassador Peter Thomson will open the World Fisheries Congress in September. Photo: United Nations



focuses on sustainably managing multiple uses of marine environments and adaptation to global change, including effective means of conserving and monitoring marine and coastal ecosystems. International speakers will include:

Toyoji Kaneko from the University of Tokyo, who will offer insights on behalf of his colleague Katsumi Tsukamoto, an expert on freshwater eel biology, ecology and conservation in Japan, who is unable to attend.

Manuel Barange, director of the Fisheries and Aquaculture Policy and Resources Division at the Food and Agriculture Organization, will provide an overview of climate and anthropogenic impacts on marine ecosystems and related management and policy needs.

Ratana Chuenpagdee a professor at Memorial University of Newfoundland in Canada, will address the major global research partnership she leads, 'Too Big To Ignore', which is raising the profile and importance of small-scale fisheries in national and international economies.

Kerstin Forsberg, founder and director of Planeta Océano, will discuss the Peruvian non-profit organisation empowering coastal communities in marine conservation through research, education, policy and sustainable development efforts.

Nicholas Mandrak, a professor and director of the

### OTHER EVENTS

Events held as part of or in conjunction with WFC2021 include celebrations for the 50th anniversary of the Australian Society for Fish Biology, with drinks and networking on the evening of Tuesday 20 September.

Seafood Industry Australia will host a 'Celebration of Great Australian Seafood' dinner on Wednesday 22 September, and on Thursday 23 September, Women in Seafood Australasia will host an International Power Up Breakfast.

A grand congress dinner on Friday 24 September will close off the week's events.

University of Toronto's Conservation and Biodiversity master's program, will present on research related to freshwater fisheries conservation, on behalf of Olaf Weyl who was chief scientist at the South African Institute for Aquatic Biodiversity.

### Business participation grants

WFC2021 business participants are invited to apply for the Australian Federal Government's \$50 million Business Events Grant program. This offers up to 50 per cent of eligible costs to support attendance, with grants of between \$10,000 and \$250,000 available.

Expenses can include but are not limited to travel, accommodation, registration, exhibition costs and sponsorship packages.

Grant applications close on 30 June or earlier if the funding runs out. Visit the Business Events Grant program website for more information: <https://business.gov.au/grants-and-programs/business-events-grants>

To discuss WFC2021 sponsorship or exhibits, contact event coordinator Rebecca Gabriel [rebecca.gabriel@aomevents.com](mailto:rebecca.gabriel@aomevents.com).

Early bird registrations end on 28 June, after which standard registration rates apply. To register, go to [www.wfc2021.com.au/register](http://www.wfc2021.com.au/register) **F**



**WORLD FISHERIES  
CONGRESS**  
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**20-24  
SEPTEMBER  
2021**

#### MORE INFORMATION

[www.wfc2021.com.au](http://www.wfc2021.com.au)

#### FRDC RESEARCH CODES

2018-059, 2019-152

#### INDIGENOUS HERITAGE

The World Fisheries Congress will be hosted on the lands of the Kurna people of the Adelaide region.





# Fish science ‘incubator’ celebrates 50 years

The Australian Society for Fish Biology turns 50 this year, with a legacy of hard science and supportive networking that has underpinned the careers of many researchers and progressed the sustainability of Australia’s fisheries

By **Melissa Marino**

If ever there was a talent incubator for fisheries scientists and managers, the [Australian Society for Fish Biology](#) (ASFB) would be it.

Established in 1971, it has surpassed its stated aims to promote the study of fish and fisheries science in Australia and provide a communications medium for those involved.

It has created a vibrant community that gives critical support to its younger members and provides a foothold for careers that go on to have impact and influence in the realms of research and management, policy and practice.

The success of the society lies not just in what it does but how it goes about it. Built into its manifesto from day one was an intent to promote information sharing in an effective and relaxed manner.

At its annual conferences serious science and management findings are presented in an informal, non-hierarchical atmosphere. Conversations in the breaks are considered as important as formalities. Students and early career researchers attend sessions alongside more experienced practitioners and are also honoured with dedicated awards.

It is an approach built on the intellectual capital of diverse regions, fostering synergy across Australian and New Zealand jurisdictions and the intergenerational transfer of knowledge. The conference location also constantly changes; inner Melbourne one year, Darwin, Albany or Hobart the next, which has contributed to connections and collaborations that transcend geographical distance.

## A warm welcome

Angela Arthington, now emeritus professor, still remembers the thrill of meeting the “very

famous, accomplished” biologist John Lake at her first ASFB conference in the 1970s. Nor has she forgotten the warmth with which she was greeted.

“As a young woman, I was only just starting out in my career and it was such a lovely, casual and happy way to meet people at all levels of their careers and to feel welcome,” she says.

Fast forward 25 years and it was she who became the subject of admiration. In the lunch queue a young Brendan Ebner (now ASFB workshop and conference coordinator) was new to freshwater ecology and feeling “pretty small and insignificant” at his first ASFB conference. Then Arthington struck up a conversation.

“To meet one of those gurus very early on was pretty cool,” he says. “That she gave me the time of day, sat down for lunch and then chatted to me was just really nice. And I’m a pretty chatty person so after that the society never got rid of me.”

## Global recognition

Gary Jackson, a 30-year member of the ASFB and a past president, says the society draws esteemed personnel to conferences and into its membership.

There are directors of government agencies, heads of laboratories, and representatives on the world stage, including another past president, Bronwyn Gillanders, who today heads the World Council of Fisheries Societies.

The ASFB represents Australia in this global

society composed of 10 member organisations committed to promoting international cooperation in fisheries science, conservation and management.

For young researchers and students to mix with such “heavy hitters” in an informal atmosphere provides valuable mentoring opportunities, Jackson says. And to present their first papers in a consciously supportive environment helps the next generation of leaders to develop.

“At my first conference in 1992, to rub shoulders and talk at the bar with some of these people whose reports I had read built my confidence,” he says.

Today Jackson is a principal fisheries scientist with the Western Australian government, but he has lifelong professional and personal relationships formed with people he met in his earliest ASFB days.

“I get quite emotional when I think about it actually,” he says of the impact of the society on his career. “I don’t think I would be here in a senior position, having done the things I’ve done and been to the places I’ve been without the ASFB and the people I’ve met through it.

“I can pick up a phone and call every fisheries lab in the country and know the person personally and say, ‘here’s an idea’ or ‘do you want to write a funding application’ and vice versa. To put a price on that is impossible.”

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Gary Jackson





Left ASFB founding member and former president Richard Tilzey, a retired fisheries scientist, pictured here with participants at the 2017 Albany conference encapsulating the convivial nature of society events.

Photo: Supplied

41-year society member. And this is important for both practitioners and students, he says.

“Doing a degree, it’s very important to know other people working in the same area so you can bounce ideas around and not double up,” he says.

Connections made at the ASFB have also led to members combining their efforts, particularly in field work, which is important in Australia with its limited research resources, he says.

In his own work as a taxonomist classifying fish species, Gomon has been helped by his ASFB contacts to identify and gain access to collections all over the world.

“Although you get it through formal presentations, I often find out who is collecting the material which I’m interested in over a meal and glass of wine,” Gomon says. “It’s actually about developing those networks and they’re often friendships as well.”

Current ASFB president and freshwater ecologist Alison King says the society’s role in facilitating networking not only helps progress careers and collaborative work, but also ensures fish-related issues can be raised, discussed and progressed.

Particular issues are then interrogated through more formal ASFB structures such as the executive council, workshops and committees as well as state-based one-off events and forums.

“National conferences and associated workshops, for example, focus on timely issues in fisheries management and research,” says King.

This occurred at the 2010 conference, where a climate change theme first emerged that spurred journal articles and a focus on the issue in the management of freshwater and marine environments. And in 2020 the issue was highlighted again with ASFB being one of 111 aquatic science societies signing a statement sounding an urgent alarm about the effects of climate change on marine and freshwater ecosystems.

### Expert contributions

Back in 1985, Gomon was involved in the society’s first workshop, categorising Australia’s threatened freshwater



### Career support

As a world-renowned freshwater ecologist, Angela Arthington’s research on rare and endemic species and fish distribution supported the World Heritage classification of Fraser Island. Her work has helped to protect this and other dune islands from sand mining.

After moving into ecohydrology, her work has informed state policies on dams and provision of environmental flows to sustain fish and other aquatic biota. She now participates in world policy discourse with the International Union for Conservation of Nature (IUCN) and member agencies to reverse the decline of freshwater biodiversity.

Arthington attributes the progression of her career to contacts she made through the ASFB. “As I moved through different fields, I would seek out the experts at ASFB meetings who could help me,” she says. “It was very useful to have a friendly chat that didn’t make you feel intimidated

when you’re treading on new territory.”

Because conferences move from state to state – and to New Zealand in the past 10 years – members can tap more deeply into regional knowledge.

As an ASFB workshop and conference coordinator for nine years, Jackson adds that members at host locations also benefit enormously from the experience involved in helping to stage the events, which can involve up to 500 people.

“It teaches people a lot of skills beyond their pure science which are useful in their working lives. You have to communicate, plan, project manage, obtain sponsorships and work within budgets.”

### The value of networks

The beauty of meeting your peers annually is discovering exactly what is happening in other jurisdictions says Martin Gomon, senior ichthyology curator at Museums Victoria and a



Above Freshwater ecologist and ASFB Hall of Famer Angela Arthington took her young son Mark on research assignments in the 1970s, including a North Stradbroke Island fauna survey. Photo: Supplied



Above Mark Lintermans, who convened the ASFB Threatened Fishes Committee for a decade, at work in the 1990s releasing national endangered trout cod fingerlings into the Murrumbidgee River. Photo: Supplied

fish species. That workshop evolved into a dedicated Threatened Fishes Committee.

Each year the committee updates its threatened species list, which is the only comprehensive and continuously maintained record of these species to stretch across a significant time span: 35 years. Using IUCN criteria, the list provides a definitive record of Australia’s threatened fish species and is widely cited in global as well as Australian literature. More than 60 native Australian freshwater fish species are listed as nationally threatened.

University of Canberra freshwater scientist Mark Lintermans has been a member of the ASFB’s Threatened Fishes Committee for 30 years and was its convener for a decade.

“The fact that we have this long-term national overview of how the status of threatened fishes has changed over time is really important,” he says.

In 2020 the committee formed the nucleus of a Commonwealth-funded assessment of the most imperilled fish species in Australia, listing 22 that are likely to become extinct within 20 years. The committee also advised the IUCN assessment of Australian freshwater fish for its ‘Red List’ – the world’s most authoritative record of threatened species.

Of similarly long standing is the Alien Species Committee. It operates as an ‘information exchange’ where jurisdictions share intelligence on introduced species outbreaks or new control techniques for invasive species such as tilapia and carp.

“Committee members come from universities and state fisheries agencies and meetings are open to all ASFB members. So, students can come

along and learn about what’s happening in alien fish control or threatened fish management,” says Lintermans, who is also an ASFB ex-president.

The subcommittees provide a continuity of information and a bank of corporate knowledge that is built upon over time, he says. That information is then fed back into agency deliberations, policies and programs.

Because the ASFB is a science-based organisation without business or political affiliation, it provides an independent source of knowledge and expertise for governments and industry.

Commercial fishers, aquaculture enterprises and the recreational sector have gained from society activities over the years, with scientists, managers and industry coming together to share their insights and experience, Jackson says.

An annual conference recently covered the topic of stock enhancement and sea ranching and included a “very successful” forum on the conservation of Murray–Darling Basin native fish species, which held particular interest for recreational fishers, he says.

The society also provides an important forum for fisheries managers through its newest committee. The Fisheries Management Committee was created in 2018 to help fisheries managers connect with each other and the broader fisheries community, bridging the gap between management and science across jurisdictions.

Committee chair Patrick Cavalli says it provides collaborative development and networking opportunities for fisheries managers across Australia and New Zealand. In 2020,

in response to COVID-19, the committee instigated virtual workshops focusing on issues and challenges faced by fisheries managers.

The first of these – a series on electronic reporting – was well received by more than 100 managers across the nation who tuned in, Cavalli says. “We are now aiming for quarterly workshops to continue to promote information sharing between fisheries managers and scientists and foster improved policy development,” he says.

### Learning opportunities

Education is the focus of the ASFB’s fourth committee. Dedicated to thinking about the needs of students and how best to meet them, the Education Committee formalises the longstanding commitment of the ASFB to support and encourage young researchers through mentoring and practical measures.

The FRDC has been a long-time supporter of the ASFB, particularly in providing valuable financial support for student awards and to fund student travel for conferences and for research.

“There’s a lot of opportunities if students want to make their research known and get support outside of what their normal institution would be providing,” says Stacy Bierwagen, co-chair of the committee.

As a past recipient of the ASFB’s John Glover Award, funded by the FRDC, she was able to attend conferences and pursue her PhD research into the roles of reef sharks and reef ecosystems.

Bierwagen, now a fish ecologist with the Australian Institute of Marine Science, is using her role with the Education Committee to encourage



Left Stacy Bierwagen (left) valued her involvement with the ASFB so much as a student researching reef sharks that she is now co-chair of the society's Education Committee. Photo: Mark Royer



Above ASFB member Martin Gomon is senior ichthyology curator at Museums Victoria. Photo: Brad Collis

“People tend to think of those involved in the fishing industry as only men, so just seeing there are women involved across a whole range of areas is important. It’s that concept of ‘you can’t be what you can’t see.’”

Alison King

more students, including undergraduates and school students, to participate.

For example, a video competition in science communication she initiated with Steve Beatty, in conjunction with the Education Committee, lets students take part in conferences even if they cannot personally attend. This competition came into its own at the 2020 conference, which was held online for the first time amid COVID-19 restrictions.

The silver lining of the online-only event was that the conference became accessible to more people who otherwise could not have travelled to it. And it gave the student videos exposure to wide local and international audiences, she says.

### Leading by example

As a young researcher, Bierwagen says she has always felt included and empowered at the ASFB. There is a concerted effort within the society to push for gender equity and

honour the work of its female members.

Among those honoured in this way is Angela Arthington. In what she considers a “pinnacle” of her career, Arthington was inducted into the ASFB Hall of Fame at its 2016 Hobart conference, which had a specific theme of celebrating women’s achievements.

This included a “wonderful session” where she was among a number of awardees who spoke about their experiences juggling children with their “adventurous” fishy careers – a challenge with which she was familiar.

“I took my young son over to the sand islands where I was working on the ecology of dune lakes in the late 1970s. There were several children, and we’d give them trays of wet sand and they would pick out all the wriggly things. So we had all of these research assistants, one of whom was two years old.”

Alison King says she wants to build on the society’s track record of inclusivity by providing

more opportunities and encouragement for women and diversity – particularly at a senior level.

As the society’s third female president, she hopes to provide “a visual” of the possibilities for women.

“People tend to think of those involved in the fishing industry as only men, so just seeing there are women involved across a whole range of areas is important,” she says. “It’s that concept of ‘you can’t be what you can’t see.’”

Leading by example could almost be a motto for the ASFB, whose modus operandi sees the most senior professionals proactively supporting the next generations through the society’s many inclusive activities.

And it is the relationships formed through these activities that ultimately drive diversity and excellence in research and the fisheries sector, says Gary Jackson. “Until you join a society like this, you are not aware that the world can work in these ways,” he says. “It is just priceless.”

### Anniversary celebrations

The ASFB’s 50th anniversary celebrations will be held in conjunction with the World Fisheries Congress in Adelaide, from 20 to 24 September. For details of celebration events visit the ASFB website [www.asfb.org.au](http://www.asfb.org.au) **F**

**MORE INFORMATION**  
Australian Society for Fish Biology  
[www.asfb.org.au](http://www.asfb.org.au)

**FRDC RESEARCH CODE**  
2020-055



# Traceability, illegal fishing and the challenge of regulation

National labelling policies have the potential to level the playing field for fisheries that do the right thing



By Bianca Nogrady

**Above** Where does your seafood come from? Sonia Garcia Garcia has investigated seafood labelling and traceability regulations.  
Photo: Chris Elliott

**S**ustainability is built into the regulations that underpin Australia's fisheries management, much like food safety is built into preparation and processing of food for consumers.

But while food safety and consumer information on packaging is regulated, that is not the case with sustainability information.

This gap in the labelling information puts Australian seafood products at a disadvantage against international seafood, which may not incorporate the same sustainability standards into its harvesting or production.

Given that more than 70 per cent of seafood eaten in Australia is imported, it is a significant issue for

Australian producers, says Sonia Garcia Garcia, who has been researching this issue as a PhD candidate at the University of Technology, Sydney.

## Guiding choice

As a native of Spain with a family background in a fishing community, Garcia Garcia says fish and seafood were an integral part of her diet and cooking. She knew what to buy, where it had come from, how it had been kept and what to call it.

But buying fish in Australia was a different story, a whole new world. The fish were different, they were presented and labelled differently, and she found the labels were not really helping her decide what to buy.

"Labels are the primary interface between consumers and retailers," Garcia Garcia says. "So, if you understand labels, you get insights about the whole chain, all the way back to the fish."

The regulatory environment behind a label can involve actors across the harvest and the post-harvest space, and variations between countries can reveal much about that country's or region's regulation of fishing.

That observation set her on a research quest to understand the regulatory environment that governs the Australian seafood sector, and how those regulations compare to those overseas.

## Sustainability imperative

In the late 1990s, Australia introduced ecologically sustainable development principles into the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* and into fisheries legislation.

Since then, the Australian seafood sector and fisheries managers have worked together towards sustainable exploitation of its seafood resources to prevent overfishing and depletion of those resources.

"There's this shared commitment to manage fisheries for environmental and economic sustainability objectives, but these objectives are not pursued beyond the wharf," Garcia Garcia says.

Australia has done so well that it is internationally recognised for its sustainable fisheries management and as an exporter of quality product.

However, these principles only govern seafood harvested in Australian waters. Australian fisheries management regulations do not extend to the entirety of fish and seafood products that are sold in Australia – including imports. And this, she says, is an issue for the sector.

## Information gaps

"In the post-harvest, when fish goes through the food regulatory environment, the objectives are to provide safety and consumer protection, so food safety and information requirements are regulated," Garcia Garcia says.

"But sustainability is considered a 'consumer' value, and it is left to the consumer to demand the private sector to satisfy these values."



## R&D PLAN OUTCOME 5

Community trust, respect and value

While individual producers or retailers might go the extra step of documenting and advertising the sustainability of all the produce they sell, they are under no regulatory obligation to do this. And Australia has no regulated market obligation to only sell sustainably produced seafood.

This leaves a significant gap in information for consumers who might seek out sustainable seafood – and be happy to pay a higher price for it. It also potentially disadvantages Australian fisheries, who are obliged by regulations to operate in a sustainable fashion.

“Sustainably managed fisheries, in Australia and overseas, are competing against product that is not bearing those costs,” Garcia Garcia says.

### The IUU risk

A particular challenge is catch from illegal, unreported and unregulated (IUU) fisheries entering the market. IUU fishing is a major global concern. In 1999, the then United Nations secretary-general described it as one of the most severe problems affecting world fisheries.

IUU fishing refers not just to environmentally unsustainable fishing practices, but also to human rights abuses such as trafficking and slavery, which was recently highlighted as a concern in the Thai prawn fishing industry.

Traceability is one way to combat this. The European Union is gradually introducing measures to increase the traceability of all seafood products sold within the EU.

Most recently, the EU voted to adopt regulations that require all fishery and aquaculture products to be traceable through the entire supply chain, even back to the location, date and time of catching, and the type of gear used to catch it.

The US has implemented similar regulations, with a focus on fish and seafood products considered at risk of IUU harvest, such as abalone, snapper, shark, prawns and tuna.

The US traceability program extends from the harvest location to entry into the US market, but not as far as point of sale. Japan also passed a law in January 2021 for similar traceability requirements.

### Extended traceability

Back in the 1990s, Australia pioneered traceability requirements to prevent IUU fishing for Patagonian Toothfish (*Dissostichus eleginoides*) and Southern Bluefin Tuna (*Thunnus maccoyii*). These are international species and Australia is just one of several countries that has a share of catch quota.

But this international effort has not translated into a similar policy on IUU fishing being incorporated into regulations governing the country’s seafood sector and supply chain.

Garcia Garcia says it is not a straightforward issue to extend traceability requirements to a consumer level.

“Does the consumer need to be making an informed choice on all these parameters, when probably a) the label

is a small space, and b) consumer may or may not be reading or caring about the information?” she asks.

Ultimately, it may depend on whether the aim is to assist consumer buying decisions or to inform members of the public as part of a national policy decision about the importance of the source of seafood.



Garcia Garcia suggests a bigger conversation about traceability and measures against IUU fishing generally might be needed, given that more than half of the seafood sold in Australia is imported.

If such a policy is implemented, what might be the end result? One fisheries stakeholder she interviewed for her report raised the prospect of all seafood around the world being traced back to the boat. The latest EU, US and Japanese moves suggest the scenario is not that far-fetched.

But these measures will be effort-intensive and potentially costly, particularly for smaller operators.

“It is important that the playing field is level and equitable,” Garcia Garcia says. “You can disadvantage many actors in the process, for example, small-scale fisheries around the world that may need government support and regulation to prevent inequalities.”

But if those challenges can be overcome, the end result is an industry that is more transparent, accountable and equitable, giving consumers as much information as possible about where their seafood products have come from and ensuring a more sustainable future for fisheries around the world. **F**

Illustration: adapted 123rf

#### MORE INFORMATION

Sonia Garcia Garcia, [sonia.garciagarcia@alumni.uts.edu.au](mailto:sonia.garciagarcia@alumni.uts.edu.au); [songarcia@yahoo.com](mailto:songarcia@yahoo.com)



Investing in people and habitat management are priorities for the recreational fishing sector.  
Photo: Unsplash/Frankie Dixon



# Casting an eye to the future of recreational fishing

A joint approach with recreational fishing stakeholders is expected to drive the future of the FRDC's research investment in the sector

By **Annabel Boyer**

**T**he face of recreational fishing in Australia is changing. Not only is there greater professionalisation in the sector, but recreational fishers have emerged as effective advocates and stewards of the environment, a role that may have seemed incongruous not so long ago.

Another change is the widespread uptake of recreational fishing apps and the data streams these subsequently generate. That move is generating better visibility and understanding of a sector that, in the past, has been difficult to get a handle on.

With these changes in play, the FRDC will reset the way it engages with Australia's recreational sector to improve the impact of its research investments. It will close its Recfishing Research subprogram, which has previously provided support for relevant research, and transition to a new research partnership model with sector stakeholders.

Moving forward, there is agreement that a joint approach between the sector and the FRDC is

required to most effectively address issues and take advantage of the many emerging opportunities.

Discussions are currently underway with recreational fishing peak bodies and other sector stakeholders about the potential vehicles to encourage investment in joint projects.

Aligned with this, representatives from the sector attended an April meeting with the FRDC's board of directors, providing presentations about what they see as some of the priorities.

Among the speakers was Andrew Rowland from Recfishwest, Cassie Price, national director of habitat programs with OzFish, and Adam Martin, executive officer of the Australian Recreational Fishing Foundation (ARFF).

## Capacity building

Rowland said there was a need to invest in both people and systems.

"One of the strategies for the rec sector is capacity building in people and the systems that support them. How do we effectively utilise our



**R&D PLAN OUTCOME 3**  
A culture that is inclusive and forward thinking

existing expertise and structures to get better input into policy and resource sharing discussions?"

## Telling a new story

OzFish is an organisation that supports rec fishers around the country to undertake activities to repair and care for fish habitat.

Price spoke of the need to build a narrative around the emerging importance of rec fishers as effective and dynamic environmental stewards, using evidence to both build that narrative and understand how best to craft it effectively.

"It is important to understand how the rest of the community views rec fishers, so that we can start to raise the profile by showing the impact rec fishers are having as stewards through citizen science, habitat restoration and spreading that knowledge.

"It's important to gather the data and evidence to tell that story through projects that do things like quantify the positive effects of catch and release and the involvement of rec fishers in habitat restoration," she said.

## Greater engagement

Martin said greater collaboration between researchers and engaged, knowledgeable rec fishers could be of great benefit to all.

"We need the resources to more effectively engage the rec sector and citizen science is a critical component of stewardship."

Another item high on the ARFF's agenda is to develop a data policy, so that data streams being generated from the myriad of recfishing apps around the country can be effectively used to drive beneficial policy and commercial outcomes.

"We need to work out how best to use it in order to make informed decisions and develop revenue streams," Martin says.

"If we take the lead in a culture that is inclusive, working together in data collection to determine the problems and necessities we need to address, and by developing products and services for these problems, we can build capacity within the current and future generations of recreational fishers, employing them as forward-thinking world-class stewards of fishes." **F**

**MORE INFORMATION**  
Christopher Izzo, FRDC,  
[christopher.izzo@frdc.com.au](mailto:christopher.izzo@frdc.com.au)





# Guide to better marketing for the seafood sector

A new guide has been created to help players in the seafood sector adopt cost-effective strategies to tell their stories and to evaluate the effectiveness of their storytelling strategies

By Barbara Adam

A handbook has been developed to help Australian seafood producers harness the power of social media to drive home the message that their product is sustainable.

The 'how to' manual guides producers through the process of developing strategies to maximise their media impact even when resources are limited. This includes engaging with influencers to help promote their sustainability credentials.

Chefs, bloggers and nutritionists can play an important role through their ability to tell influential stories about 'good' food, the guide says. But they must be selected carefully to ensure there is appropriate alignment with a producer's key message.

*Media engagement: a best practice guide for the Australian seafood industry* was developed as part of a series of FRDC-funded research projects by the universities of Adelaide, Wollongong and Tasmania. They were motivated by a concern that the efforts of the fisheries sector to ensure Australian seafood is sustainable were not being effectively conveyed to the community, says project lead Michelle Phillipov from the University of Adelaide.

Packed with practical advice, the guide includes best practice principles and strategies to help producers plan, carry out and evaluate communication activities using both traditional and social media.

It is designed to help producers, particularly those with limited time and resources, quickly improve their skills and know-how in engaging with the media.

Planning, the guide says, is key and should answer questions such as:

- What is your objective?
- Who is your target audience?
- What is your most important or 'key' message?

Adopting a single, focused message – for example, that your product is sustainable – is crucial. That core idea can then be worded in different ways and presented in many forms: a story, a photograph, video, speech, advertisement, media release or social media post.

The guide provides advice on creating content for these various communication channels. This includes developing a social media profile and content appropriate for specific platforms such as Instagram, Facebook and Twitter to form relationships with target audiences. It also clearly lays out the process of working with influencers to spread messages to a broader following.

When it comes to mainstream media, the 'trick' is to present information in a media release or other form that can be easily included in news stories, TV shows, magazine features, radio programs or podcasts. Local newspapers are also an effective medium.

## Big picture

The researchers produced the guide as part of a suite of projects looking at media messages about sustainable seafood, and specifically how influencers affect consumer attitudes.

The first stage of the project involved a media survey of seafood-related messages. The second stage used interviews with consumer focus groups and chefs who are influencers to identify the impacts of influencers on consumer attitudes



towards the sustainability of Australian seafood.

The results are published in the report *Media messages about sustainable seafood: #how do media influencers affect consumer attitudes?*

The survey found that using influencers such as chefs was not a magic bullet and might not be the most effective communications strategy for all issues. While chefs can successfully influence media agendas, their influence on consumer attitudes is less clear.

Phillipov says the focus groups show there is a perception among some consumers that celebrity chefs are "elite" and that their →





recommendations and recipes are too difficult or expensive for the everyday home cook.

“Even when you look at an influencer or chef with a national profile, there are still segmented differences in how people engage with them,” she says.

### Mixed messages

The interviews and focus groups also shed light on how the notion of sustainability is used and understood in the context of seafood.

Work with the focus groups made it clear that many consumers misunderstand the term ‘sustainability’.

“Sustainability was often conflated with a range of other issues, like freshness, local origin and food safety,” Phillipov says. “The environmental sustainability side of things was poorly understood and was not really factoring into people’s purchasing decisions.”

She believes this point of misunderstanding can be easily corrected. However, the findings also highlight that the safety of Australian seafood is a more significant issue for consumers than originally thought.

### Media mentions

The media survey identified mentions of seafood sector news from 2015 and 2018 in the news and social and lifestyle media. It looked at news, television food programs, cookbooks, foodie magazines, Twitter, Facebook and Instagram. The findings were published as the report *Media messages about sustainable seafood (media survey results)*.

## PROMOTION

To better promote sustainable seafood, the report recommends a number of approaches:

- Sustainability messages should be positive and allow people to feel good about eating Australian seafood.
- Consumer-focused media messages should be targeted to relevant consumer niches.
- Consumers’ health concerns should be proactively addressed.
- Increased support is needed for seafood brands and industry organisations engaging with media.

Source: *Media messages about sustainable seafood: how do media influencers affect consumer attitudes?*

Key findings from the survey include:

- On controversial issues, much of the industry response is reactive to stories generated from other sources (such as governments, non-government organisations and community groups).
- Issues related to fisheries management receive the greatest amount of coverage in news media, with industry often responding to opponents in combative terms.
- When the term ‘sustainable’ is used by media or influencers, it is typically not defined or explained.
- Chefs and other influencers can be powerful advocates for industry, but clear alignment between their public personas and industry messages is essential for a successful partnership.

The survey found the seafood sector’s messages were being conveyed effectively in the news media. However, the sustainability message was conveyed less effectively in lifestyle and social media, and these are the channels where celebrity chefs and other influencers can have the greatest impact.

### Evaluating impact

The best practice guide advises seafood businesses to continually evaluate the effectiveness of their communication. This might include reviewing the online engagement analytics from social media to determine which types of posts are generating the most interest from target audiences.

The guide also provides a template to assess the impact of a range of communication activities, including an increase in positive attitudes about the seafood sector.

Building on the work of Phillipov and her team, Emily Ogier from the University of Tasmania has coordinated the project ‘Engagement for success’ – an easy-to-follow framework and a digital toolkit to help businesses and other organisations set up and monitor their communications and engagement strategies.

The framework helps producers evaluate their success.

“How do you know that having a stand at a seafood festival or a regional festival, or a screen media campaign, is an effective way of telling your story to the groups you want to engage?” Ogier asks.

“How do you know what the best combination of media or face-to-face activities is to achieve your communication goals, and ultimately to build

trust with sections of the Australian community?”

The framework poses a series of questions to help identify the best target audience and the strategies to reach that audience. It also helps pinpoint what businesses hope to achieve from their community engagement. Is it, for example, increasing seafood consumption or encouraging people to work in the seafood sector?

‘Engagement for success’ evaluation resources can be accessed from OceanWatch Australia’s website: <https://www.oceanwatch.org.au/engagement-for-success-resources/>

The program includes four videos and 11 downloadable PDFs as part of a digital toolkit. It is divided into three sections: Getting started, Gathering evidence and Bringing it all together.

### Effective storytelling

Ogier says there are already many great examples of effective storytelling in the Australian seafood sector, such as that done by Coorong Wild Seafood from Meningie, South Australia.

“Your story could be your individual business or your product, which could be Goolwa PipiCo or Southern Bluefin Tuna, Yellowtail Kingfish or Sydney Rock Oysters.”

The wider seafood sector also has a story to tell, says Ogier. Or, more precisely, a story to reframe so it reflects the factors that drive community trust and acceptance of Australia’s seafood sector, namely its:

- responsiveness to its environmental responsibility;
- commitment to its seafood product; and
- sharing of the benefits with the Australian community, particularly those in regional and rural Australia.

These insights come from the Community Trust in Rural Industries Program, a joint initiative involving all rural development corporations, including the FRDC. Ogier points to Seafood Industry Australia’s ‘Our Pledge’ as an example of how this bigger, long-term community trust story is already being built. **F**

#### MORE INFORMATION

Michelle Phillipov,  
michelle.phillipov@adelaide.edu.au;  
Emily Ogier, emily.ogier@utas.edu.au;  
OceanWatch [www.oceanwatch.org.au](http://www.oceanwatch.org.au)

FRDC RESEARCH CODES  
2017-131, 2018-201, 2019-042





# Your media communication strategy

## 1 PLANNING

### WHAT IS YOUR OBJECTIVE?

Without a firm objective, a plan does not have a clear destination, which makes it impossible to know where to go. Your objective should meet five criteria that can be remembered using the acronym SMART:

- Specific
- Measurable
- Attainable
- Relevant
- Timely.

The more specific your objective, the more focused your communication strategy will be. One way to zero in on a specific goal is to answer the question:

What is the most important thing you are trying to achieve with your communication?

## 2 IMPLEMENTATION

### CONTENT

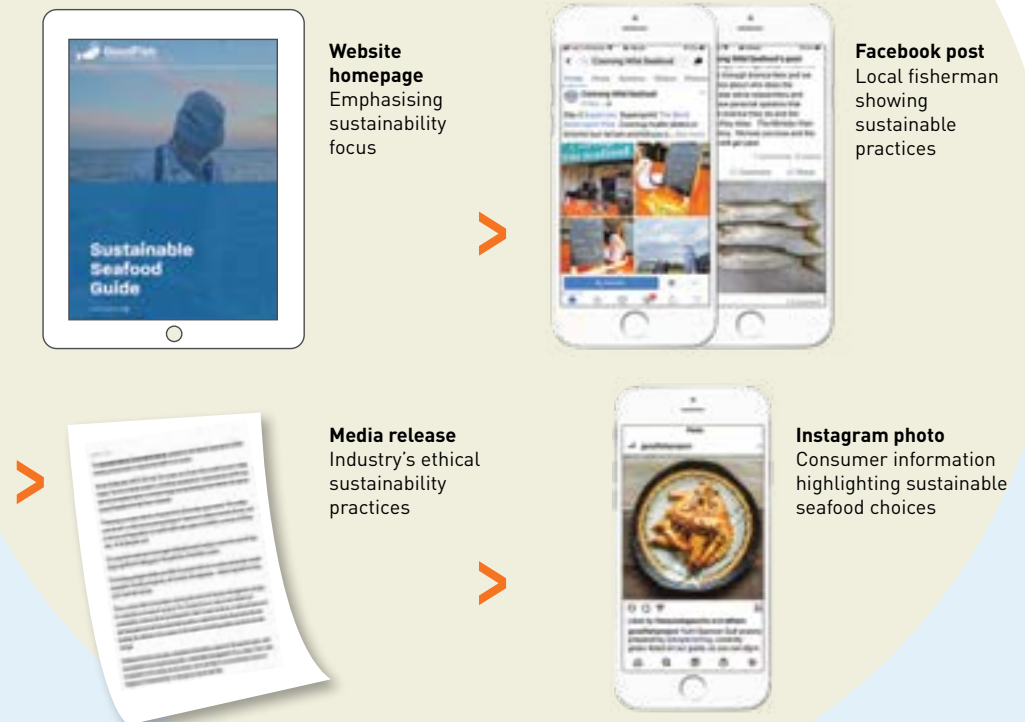
A single message can be communicated through multiple media in different ways. Your media messages should always be adapted for specific target audience/s, which should be clearly defined for their relevance to your overarching media communication objectives (see Figure 1).

### INFLUENCERS

When using influencers as part of your communication strategy, consider the following advice drawn from the FRDC-funded research:

- Most influencers used by the seafood industry are chefs, with some bloggers and nutritionists.
- Select influencers carefully to ensure appropriate alignment between their 'brand identity' and your organisation's key message.
- Some messages are communicated more effectively than others by influencers.
- Influencers and the message they communicate should be carefully targeted to niche audiences, as broad approaches often do not have the desired impact.
- Think outside the square to identify suitable influencers for your specific target audience: favour quality over quantity.

FIGURE 1: COMMUNICATING A SINGLE MESSAGE THROUGH MULTIPLE MEDIA



- Long-term relationships with appropriate influencers are more beneficial than one-off posts of endorsement.
- The terms of your agreement with an influencer should be as well defined as any other agreement with your organisation's stakeholders, clients or suppliers.
- Stipulate that the influencer should be tagging your social media account in any post discussing your organisation or your products.

### MAINSTREAM MEDIA

The key to success in this sphere is to present your information to mainstream media contacts in a way that makes it simple and effective for them to include your message in their content, whether that be a masthead news story, a TV show, magazine feature, radio program, podcast or local newspaper. This can be achieved by a media release or by communicating with journalists, producers and other content creators.

## 3 EVALUATION

### WHAT CONSTITUTES SUCCESS?

Assess the effectiveness of your communication at various intervals throughout the implementation of your plan. This might include:

- reviewing social media analytics;
- listening to your audience online and offline to see if your target audience is repeating your message;
- conducting formal research into your target audience to determine their level of awareness of your organisation and your key messages; and
- evaluating the impact of your communication on your organisational objectives.

Source: [Media engagement: a best practice guide for the Australian seafood industry](#)



# Narungga aspirations to bring benefits home

An agreement formalises the inclusion of traditional knowledge into the management of South Australia’s fisheries and the cultural fishing practices

Words and Photo **Catherine Norwood**



Source: DPIRD

The combination of a new Traditional Fishing Agreement – the first in the country – and emerging aquaculture opportunities are expected to lead a return to country for the Narungga people of Guuranda, now known as the Yorke Peninsula.

That is the aspiration Klynton Wanganeen has for his people. As CEO of the Narungga Nation Aboriginal Corporation (NNAC), he has been integral to negotiations that will now allow the Narungga people to fish their waters according to traditional and cultural practices.

The Traditional Fishing Agreement between the South Australian Government and the people of the Narungga nation was signed in February 2021. It is effectively a recognition of heritage and the Narungga’s many millennia of connection with their land and sea country.

This area takes in the coastal waters from Port Wakefield on the Gulf St Vincent around the Yorke Peninsula to the Spencer Gulf and north to Port Broughton.

“Fishing is integral to Narungga identity, and Narungga people’s relationship to the fresh, estuarine and saltwater components of our country are considered as interrelated, and

fundamental to the understanding of our country as a whole,” says Wanganeen.

“Fishing is not only important to the Narungga lifestyle, it also provides sustenance to Narungga people, and fish and other aquatic species are vital to our cultural and spiritual lives.

“This agreement formalises the rights of Narungga people to enjoy, exercise and maintain Aboriginal fishing practices in a sustainable way – as we’ve been doing as long as we’ve been living on these lands. It also puts in place a framework to support Narungga people to manage their traditional fishing activities, taking into consideration traditional lore and customs.”

## Moving forward

The agreement also includes the collection of data about traditional catch and effort to help improve scientific knowledge of traditional fishing and assist the Narungga nation to manage their traditional fishing into the future. It builds on the 2018 Buthera Agreement with the Narungga nation to provide capacity-building support for the Narungga Nation Aboriginal Corporation, to drive development, economic enterprises and collaborative engagement with government agencies on Yorke Peninsula.

It is through these provisions that the Narungga nation’s efforts to establish aquaculture activities such as the farming of *Asparagopsis* seaweed is being supported. The location of the Narungga’s first leases approved for seaweed aquaculture are at Port Victoria on the Spencer Gulf side of the Yorke Peninsula.

This area holds special cultural significance as part of Dreamtime stories, and includes the heritage-listed Wardang Island, White Rocks, Goose Island, Little Goose Island and Point Pearce.

Although he has lived in Adelaide for many years, Wanganeen grew up at Point Pearce and Port Victoria with an intimate knowledge of the local seafood abundance. He shares stories of learning to spear fish, of walking at low tide between islands, or swimming when the water was too deep. Stories of seals rocketing by beneath the water and of dodging sharks that come to feed on seals – Great Whites, Grey Nurse and Hammerheads among them.

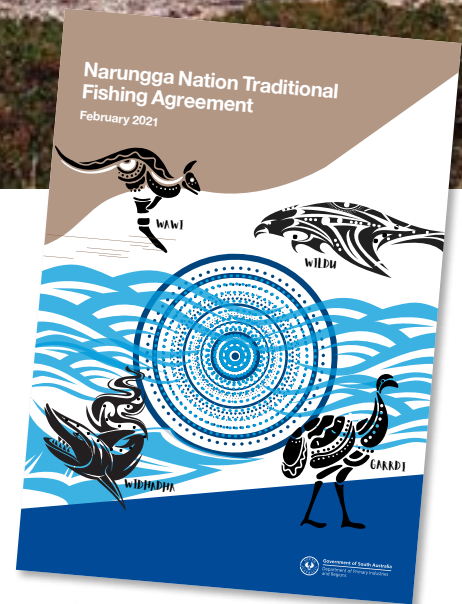
Port Victoria is one of only several locations involved in seaweed trials in partnership with CH4 Global and the FRDC (see story page 28). But for the Narungga people there is more at stake than the development of a new crop or product. Wanganeen sees these developments



#### R&D PLAN OUTCOME 4

Fair and secure access to aquatic resources

Fish traps such as this one at Port Victoria demonstrate the Narungga people's ongoing connection with country in the region.



Above Narungga Nation Traditional Fishing Agreement signed in 2021, recognises the heritage and the Narungga's many millennia of connection with their land and sea country.

as important steps towards new opportunities, jobs and skills for the Narungga community.

It is part of a larger picture the NNAC is working on to create commercial marine and fishing enterprises that will allow those who have left their country to return, and will also provide jobs for long-term unemployed people still on country.

He highlights the need for good governance of these initiatives to ensure the benefits accrued return to the community, given that marine leases and licences are held on behalf of the community as a whole, not for the benefit of individuals.

Among the NNAC's other initiatives is a three-year development licence, with a seven-tonne quota for the harvest of the large sea snail *Lunella undulata*, known locally as warriner. The quota is one step, says Wanganeen. Another is having divers with the skills to collect the warriner and then developing a market for the product.

Each step comes with its own challenges. For instance, having gained the three-year licence and quota, which expires this year, coronavirus restrictions suspended plans to work with a diver from Port Lincoln to teach young Narungga people the necessary skills, and these plans have yet to be reactivated.

The NNAC also has a five-hectare oyster lease at Stansbury, acquired from a local oyster grower. However, the infrastructure needs upgrading before it can be returned to production, potentially growing both Native Oysters (*Ostrea angasi*) and Pacific Oysters (*Crassostrea gigas*).

There are ambitions for commercial abalone fishing and farming, mussel farming and the wild harvest of finned fish and purple sea urchins, if the NNAC can gain the appropriate licences or quotas.

In wild fisheries where quota has already been fully allocated, it often remains controversial and difficult for Indigenous communities to regain access. Wanganeen is all too aware of the angst that comes from simply reallocating fishing rights.

From that perspective, an emerging industry such as seaweed provides an equalising entry point for new players; everyone in Australia is a new player. As Wanganeen contemplates the coast around Port Victoria for a suitable shore base for future aquaculture operations, he is optimistic that successful trials will lead to new facilities that will in turn build momentum to help revitalise the Narungga community.

Details of the Traditional Fishing Agreement are available at [pir.sa.gov.au/traditional-fishing](http://pir.sa.gov.au/traditional-fishing) F

#### MORE INFORMATION

Delahay Miller, manager, Aboriginal Traditional Fishing PIRSA Fisheries and Aquaculture, [delahay.miller@sa.gov.au](mailto:delahay.miller@sa.gov.au); Klynton Wanganeen, CEO Narungga Nation Aboriginal Corporation, [kwanganeen@nnac.asn.au](mailto:kwanganeen@nnac.asn.au)

#### INDIGENOUS HERITAGE

The agreements and activities discussed in this article relate to the land and sea country of the Narungga people of Guuranda, the Yorke Peninsula, South Australia.





Above CEO of the Narungga Nation Aboriginal Corporation Klynton Wanganeen with Adam Main from CH4 Global discussing locations for seaweed leases at Port Victoria.  
Photo: Catherine Norwood

## Seaweed research on a rising tide of optimism

Research to optimise propagation and growth of the red seaweed *Asparagopsis* gathers pace, throwing up exciting new opportunities and challenges

By Catherine Norwood

At Port Victoria on South Australia's Yorke Peninsula, sunshine, crystal clear water and calm conditions greet the partners of a new venture for the Narungga nation and CH4 Global as they inspect recently approved marine leases.

The leases are held by the Narungga Nation Aboriginal Corporation (NNAC) and are catering for one of several pilot trials underway to test the growing conditions needed for the red seaweed *Asparagopsis*. The Port Victoria trials are part of a larger project, jointly funded by the FRDC and CH4 Global. The South Australian Research and Development

Institute (SARDI) at the Department of Primary Industries and Regions (PIRSA) is leading the research project to optimise propagation and growing techniques in order to harvest this species from South Australian waters. The research is also investigating seaweed processing.

*Asparagopsis* is generating international headlines for its ability to reduce methane emissions by 90 per cent or more when fed as a dietary supplement to cattle. This could result in significant emissions reductions when you consider that livestock contribute 12 per cent of Australia's overall emissions.

But there's a catch. Thousands of hectares



## R&D PLAN OUTCOME 2

Best practices and production systems

of seaweed would be needed to provide enough supplement, even at minuscule levels, for all livestock in Australia. Globally, the potential demand would require hundreds of thousands of hectares of *Asparagopsis* production, which is still in its infancy.

The researchers involved in this discovery, from CSIRO, James Cook University and Meat & Livestock Australia, have jointly patented the science behind it and formed the company FutureFeed to manage the patent and licensing.

### South Australian sites

Leading the efforts to produce *Asparagopsis* in Australia is CH4 Global, which is actively partnering in local research to determine the best way to propagate and grow the species.

General manager, South Australia, for CH4 Adam Main says the Port Victoria trials are to be part of this work. The NNAC provides the site and CH4 provides the expertise and assistance to help set up the leases for production research. The research itself is being undertaken by SARDI, the research arm of PIRSA.

While SARDI investigates various cultivation techniques, PIRSA regulates where commercial aquaculture ventures can be established, issues marine leases and species-specific production licences. To facilitate aquaculture development across the state, the government has already pre-approved aquaculture zones, which Main says significantly simplifies the process of applying for leases followed by a species-specific licence.

In the past year CH4 has secured 880 hectares of its own leases and licences for seaweed aquaculture, with four sites along the Spencer Gulf side of Eyre Peninsula, at Tumby Bay, Louth Bay and Boston Bay.

This is in addition to two pilot trials that are part of the FRDC project: one of 20 hectares with the NNAC at Port Victoria and one on a two-hectare site in conjunction with Dinko Tuna at Port Lincoln on the Eyre Peninsula. Dinko and several other companies that ranch Southern Bluefin Tuna have received variations to their existing licences to include seaweed. Trials at Port Lincoln are now in their second year, while the Port Victoria trials officially kicked off with seeded ropes in the water in May 2021.

Main joined Klynton Wanganeen and Garry Goldsmith from the NNAC for a site inspection at Port Victoria in April. Depth readings showed one lease is almost five metres deep at high tide, the second is just shy of six metres deep, with an average 1.2 metre drop at low tide.

*Asparagopsis* grows naturally in the area. So, although red seaweed species are generally known to prefer deeper water, Wanganeen, Goldsmith and Main are optimistic about the local production potential once the infrastructure and seeded ropes are in the water. And if the current sites are not ideal, there are many others along the Yorke Peninsula to explore.

They see it as part of the learning process to identify what is optimal in terms of water depths and temperatures,

currents and climate, along with the infrastructure, boats and labour needed to successfully seed, grow and harvest the crop. While the Port Victoria sites are relatively shallow, the site at Port Lincoln is up to 25 metres deep.

There are two species of *Asparagopsis*: the tropical species *A. taxiformis* and a temperate species, *A. armata*. Both are found in Gulf St Vincent and the Spencer Gulf. South Australia is possibly one of the few places where both species occur. *A. taxiformis* grows in water temperatures of more than 16°C, from December to May in South Australia. *A. armata* grows in waters from 10 to 17°C from August to November or so. This counter-seasonality offers year-round production potential.

### Propagation challenges

The initial seaweed samples for culturing have been collected from the wild, principally from a reef about 10 metres deep and two kilometres offshore from SARDI's facilities at West Beach, Adelaide. Samples are also being collected from other locations where trials are being run to assess the genetic diversity, map bioactive compounds and the comparative reproductive and growth potential of seaweeds from different areas.

Sasi Nayar, head of SARDI's Algal Production Group, is leading the *Asparagopsis* research for the FRDC-CH4 project. His team has successfully completed the sexual reproductive lifecycle of both species in the hatchery, ➔



Above Sasi Nayar with *Asparagopsis* reproduced in tanks at the South Australian Research and Development Institute. Photo: Catherine Norwood

### NEW ALLIANCE TO SUPPORT EMERGING SECTOR

A new industry body, the Australian Sustainable Seaweed Alliance, has been established to help advance the emerging seaweed sector in Australia. Founding members include CH4 Global, FutureFeed, the Australian Seaweed Institute and the University of Tasmania.

Alliance director Jo Kelly is also CEO of the Australian Seaweed Institute. She is leading the implementation of recommendations in the *Australian Seaweed Industry Blueprint*, released by AgriFutures Australia in 2020. Recommendations include the formation of a peak body to help develop networks and share information and services to aid the growth of the sector. Kelly says ultimately the alliance hopes to target diverse stakeholders, from state and local governments to growers, investors and product developers, and to end users and consumers.

The seaweed sector has been identified as a priority for development by the United Nations High Level Panel for a

Sustainable Ocean Economy. Australia is a member of the panel and has committed to its *Transformations* action plan. This includes a commitment to: "Scale up environmentally responsible commercial farming of seaweed and algae to provide food and create alternatives for products such as fuels, aquaculture and agriculture feedstocks, biotech, and viable and sustainable plastic alternatives."

Kelly is also an Australian delegate to the international *Safe Seaweed Coalition*, which is pursuing similar goals on a global level. The focus of this coalition explicitly includes workplace, environmental and food or product safety as critical components in its development agenda. **F**

#### MORE INFORMATION

Jo Kelly  
[www.australianseaweedinstitute.com.au](http://www.australianseaweedinstitute.com.au),  
Australian Sustainable Seaweed Alliance  
[www.seaweedalliance.org.au](http://www.seaweedalliance.org.au);  
Safe Seaweed Coalition  
[www.safeseaweedcoalition.org](http://www.safeseaweedcoalition.org)



**Above** A diver collects *Asparagopsis* samples for propagation.  
Photo: Sasi Nayar, SARDI

**Above right** *Asparagopsis* samples collected from the wild for propagation in the lab.  
Photo: SARDI



which he says is a complex process involving gametophyte and two spore stages. *Asparagopsis* is a perennial that can regrow from its base each year, and can also reproduce asexually through division and fragmentation.

SARDI is also partnering with Peter Alderson from Flinders University to investigate vegetative propagation using fragments and tissue culture techniques. The aim is to identify which technique will be the most cost-effective and efficient for mass propagation.

One of the issues for South Australian at-sea cultivation is the comparatively low nutrient levels in the water. Seaweeds require nitrogen and phosphorus to grow. The Yorke Peninsula has no rivers delivering run-off to sea, a process that often contributes significant nutrients, particularly nitrogen. And across the southern Australian coast there is an ongoing battle beneath the waves for scarce nutrients and space, with 1500 known seaweed species all already seeking their share.

Main says the need for nitrogen is one reason why CH4 is also partnering with fish farmers in South Australia, including Dinko Tuna and CleanSeas.

Fish poo is a rich source of nitrogen. He sees the relationship with fish farmers as mutually beneficial, helping to maintain water quality around fish pens while producing secondary seaweed crops.

Main says CH4 also has its own tank trials underway to see if land-based operations could be used to produce more mature *Asparagopsis* plants for deployment at sea to improve survival rates and accelerate growth or extend the growing season.

In addition to the propagation research, SARDI will provide pilot processing of the *Asparagopsis* through to the end product as part of the project. SARDI is working with FutureFeed to determine the necessary production and quality standards.

Main says CH4 is also drawing together information about *Asparagopsis* from projects it has in other countries, including New Zealand, Canada and Fiji. Expertise provided by research partners in each country is contributing to a fuller understanding of the species and its attributes. This includes understanding the active components in the seaweed that help to reduce methane emissions. **F**

### HOBART HOSTS INTERNATIONAL SYMPOSIUM

In February 2022 Tasmania will host the International Seaweed Symposium, sharing the latest science and product development research from around the world. It is only the third time in the 75-year history of the host organisation, the International Seaweed Association, that its major conference, which is held every three years, has been held in the Southern Hemisphere, and it is the first time Australia will host the event. The 24th symposium will be held at the Grand Chancellor in Hobart, from 13 to 18 February 2022, with online registrations also available. The theme for the event is 'Seaweeds in a changing world'. It will focus on ongoing changes in seaweed aquaculture practices, industrial processing, future products and markets, local and global environmental change, and scientific discoveries that advance knowledge about what properties their chemical components might offer. **F**

**MORE INFORMATION** <https://www.iss2022.net>

### MORE INFORMATION

Sasi Nayar, SARDI, [sasi.nayar@sa.gov.au](mailto:sasi.nayar@sa.gov.au);  
Adam Main, CH4 Global, [adam@CH4Global.com](mailto:adam@CH4Global.com);  
Garry Goldsmith, Narungga Nation Aboriginal Corporation, [ggoldsmith@nnac.asn.au](mailto:ggoldsmith@nnac.asn.au)

### FRDC RESEARCH CODE

2019-144

### INDIGENOUS HERITAGE

South Australia's seaweed aquaculture research and trials is being undertaken on the land and waters of the Narungga people of the Yorke Peninsula, the Barngarla people of the Eyre Peninsula and the Kurna people of the Adelaide region.



# Seafood awards a sustainability barometer

Annual awards that recognise efforts to develop and promote sustainability are proving a successful point of engagement in the seafood value chain

By Brad Collis



The fifth annual Australian Sustainable Seafood Awards, announced on 8 March, reveal the extent to which the Australian sector – from producers to processors to retailers – is increasingly committing to the long-term sustainability and quality of marine food resources.

The award categories are fine-tuned each year by the Marine Stewardship Council (MSC) as part of a carefully planned strategy of awareness raising in industry and among consumers. In 2021 this was done in partnership with the Aquaculture Stewardship Council (ASC).

MSC program director for Oceania and Singapore Anne Gabriel explains that the MSC, a voluntary certification scheme, is overtly market-based. “To incentivise more and more fisheries to board the sustainability bandwagon, we must create demand for sustainable fisheries,” she says. “So there is a lot of focus on the consumer end of the supply chain.”

The blue MSC label or the green ASC label on seafood provide effective point-of-sale guides for consumers. However, Gabriel says the larger objective is to deepen the relationship between consumers and suppliers to drive a fundamental shift in sustainable production and increased consumption.

## SHARED VISION

The Marine Stewardship Council (MSC) and the Aquaculture Stewardship Council (ASC) share a common heritage and vision that global seafood supplies should be sustainable, responsibly managed and supported by secure supply chains.

The MSC is on a mission to end overfishing and protect the last major ‘wild’ food source.

The ASC’s mission is to elevate ‘fish farming’ in the

eyes of consumers through building confidence and trust in aquaculture and its processes.

Both organisations are working towards changing consumer shopping behaviour and preference when buying seafood.

The Sustainable Seafood Awards coincide with Sustainable Seafood Week, an MSC and ASC initiative to raise the profile of their

efforts to steer the world’s seafood markets towards environmental sustainability and social responsibility.

Seafood carrying the blue MSC label is wild caught by fisheries that have been awarded third party certification based on a range of sustainability criteria. Seafood carrying the green ASC label is farmed to strict standards governing product quality and animal health. **F**


## Consumer trust

Every two years the MSC commissions consumer research in more than 20 key markets around the world to gain insights into consumer trends and attitudes towards issues such as climate change, conservation and sustainable food production. It is the largest seafood consumer survey of its kind.

“In Australia we have been seeing both trust and understanding increasing, which is a much stronger barometer than just awareness,” Gabriel says.

“That’s why the supermarket awards category is so important. Most consumers buy from supermarkets. In addition, because of COVID-19, we have also seen the increase in online shopping and consequently some really strong movement by independent retailers and fishmongers in sourcing sustainable seafood.”

Gabriel says that while everyone in the sector has an interest in ensuring stocks continue to be healthy, the awards, begun in 2015, help to further stimulate “market movement” and product demand.

“It also takes vision and gumption by businesses because it needs to be a lifetime commitment, and the awards recognise the effort that this takes.” 



## LIFETIME ACHIEVEMENT

The MSC and ASC Lifetime Achievement Award was presented to Keith Sainsbury, a Tasmanian-based marine ecologist and mathematical modeller and former FRDC director.

Sainsbury was recognised for his significant contributions to advancing sustainable fisheries management through more than 20 years with the CSIRO and, more recently, with the Institute for Marine and Antarctic Studies (IMAS) at the University of Tasmania.



**Above** Award winners, from left, Simon Topatig, KB Food Company; Caitlyn Richards, Coles Supermarkets; Devon Long for Austral Fisheries; Bill Wall, Woolworths; Mark Boulter, Bidfood; Grant Logue, Harley and John's Seafood; and Brett Patience, Bidfood. Photo: MSC



This level of commitment is reflected in awards going to companies that have won previously but are continuing to increase their sustainability initiatives. It includes major fishing companies and supermarkets, along with smaller retailers that have signed up to the MSC program because of their belief in the community benefit.

The awards cover both wildcatch and aquaculture.

### Recognising effort

Among the major awards, the **Best Sustainable Seafood Product** was won for the second year running by Austral Fisheries' Glacier 51 Toothfish. The award was shared with the Fremantle Octopus product range.

The award to Glacier 51 Toothfish follows its recent recognition as the world's first carbon neutral seafood. The fishery is located around Heard Island, 4000 kilometres south-west of Perth. Fremantle Octopus produces a range of raw, cooked and marinated octopus from the Western Australia octopus fishery, which has been MSC certified since 2019.

KB Seafood Co's ASC-certified kingfish won the **Best Responsible Seafood Product**. The KB Food Company received this award for

Yellowtail Kingfish sourced from Clean Seas Seafood Limited in Spencer Gulf, South Australia.

Anne Gabriel says all the major supermarkets are today engaging with the MSC program; however, Coles Supermarkets, through its chain-of-custody certified fresh fish counters, has been the trailblazer.

This was recognised in this year's awards with the company receiving the top award for **Best Sustainable Seafood Supermarket**, and commendations in the **Sustainable Seafood Product** category for its WA rock lobster, and in the ASC **Responsible Seafood Importer** category.

The latter category was won by leading food distributor Bidfood for its commitment to sustainable sources of both domestic and imported seafood.

The **Community Champion Award** was won by Harley and John's Seafood in Wollongong, New South Wales, for its dedication to serving sustainably sourced seafood to the Illawarra district.

This year's awards were judged by a panel representing the sustainability and environment sectors, including Fairtrade Australia and New Zealand, OceanWatch Australia and the Ocean Future Fund. **F**

### AWARD WINNERS

#### Best Sustainable Seafood Product – MSC

- Glacier 51 Toothfish – Austral Fisheries
- Fremantle Octopus Range – Fremantle Octopus

#### Highly commended:

- Crumbed Australian Prawn Cutlets – Bidfood
- Just Caught Crumbed Fish Fillets Multiseed – KB Food Company
- Coles Western Australian Rock Lobsters – Coles
- OceanRise Pink Salmon 130g – ALDI

#### Best Responsible Seafood Product – ASC

- KB Seafood Co. Kingfish – KB Food Company

#### Highly commended:

- Woolworths Smoked Oysters – Woolworths

#### Responsible Seafood Importer – ASC

- Bidfood
- Highly commended:
  - KB Food Company
  - Coles Supermarkets

#### Best Sustainable Seafood Supermarket – MSC

- Coles Supermarkets

#### Community Champion Award

- Harley and John's Seafood, Wollongong

#### Lifetime Achievement – MSC and ASC

- Keith Sainsbury

### MORE INFORMATION

Anne Gabriel, Marine Stewardship Council, [anne.gabriel@msc.org](mailto:anne.gabriel@msc.org), [www.msc.org](http://www.msc.org)





# Marketing rethink as lobster crown slips

The Australian rock lobster sector has struck some troubled waters of late; however, operators are demonstrating agility in their responses and confidence in an eventual turnaround

Words **Catherine Norwood**

Southern Rock Lobsters  
Photo: Limestone Coast  
Co-operative

**A**ustralian rock lobster has come a long way from its days as a low-priced, bulk, frozen commodity headed for casinos in the USA at just \$10 to \$12 a kilogram.

Over the years, as fishers and exporters have pursued the best possible returns, they have improved production, handling, supply and marketing to cement the status of rock lobsters as a premium seafood product.

Analysis of the [FRDC's Seafood Production and Trade Databases](#) over the past two decades shows how the international markets for rock lobster have evolved (see snapshots, page 34).

In 2019, at their peak, live exports achieved average prices of \$72.67 per kilogram for Ornate Rock Lobster (*Panulirus ornatus*), \$101.60 per kilogram for Southern Rock Lobster (*Jasus edwardsii*) and \$93.13 per kilogram for Western Rock Lobster (*Panulirus cygnus*).

The premium status has also lifted the value of frozen product. Even as its share of the market diminished from almost half of exports to as little as three per cent, in 2019 prices averaged \$66.13 per kilogram for Ornate Rock Lobster, \$86.23 for Southern Rock Lobster and \$97.19 for Western Rock Lobster.

When the China–Australia Free Trade Agreement reduced Chinese import tariffs to zero in stages from 2015 to 2018, it allowed the Australian rock lobster sector to expand direct sales into the country. With buyers there willing to pay as much as

double the prices achieved elsewhere, exports to China have dominated sales in recent years.

The loss of this critical market following the suspension of Chinese rock lobster imports late in 2020 poses clear challenges for the sector. The disruptions have led both industry and government to call for a rethink of the sector's marketing strategy; specifically, there are calls to diversify both products and destinations, and pursue more stable, long-term prices and long-term market relationships.

For many in the rock lobster business, however, price fluctuations over the past two decades and the pursuit of higher-paying buyers are just part of doing business. There is a general belief that market forces and the appetite of Chinese consumers for Australian rock lobster will prevail, and high demand and prices will return.

However, there are others in the fishery and trade who say that each disruption jeopardises their continued participation; the impacts on their businesses, their personal welfare and the welfare of their families and local communities are too heavy.

## Relationships

The MG Kailis Group is Australia's largest exporter of Ornate Rock Lobster. Its Cairns operations generated about 90 per cent of its revenue from live exports to China until the recent disruptions. The company also exports lobster tails to the USA and whole frozen lobster to Hong Kong, and supplies frozen whole lobster and tails to the Australian domestic market.

Kailis' Cairns office general manager Brett Arlidge says he has been working with long-term customers – many of whom are Chinese companies that trade throughout Asia – to find alternative markets. Since early 2021 he has been shipping live product to Hong Kong, Malaysia, Taiwan, Thailand and Vietnam, albeit at reduced prices.

"We now have a multitude of customers taking smaller quantities, and the continued disruptions to commercial freight make the logistics of the live trade difficult. Every trade is that much harder to make."

The Australian product is filling gaps in the domestic supply in Malaysia, Thailand and Vietnam, which are now selling their own lobsters into China. Arlidge is optimistic that the current issues will be resolved over time, and the Chinese market will still want as much Australian rock lobster as it can get. He says there's also pent-up demand in other Asian countries that has been suppressed by the ability of Chinese buyers to outbid them for the available supply.

## Diversification

There has been varying levels of ability among industry players to adapt to the changing markets. Western Australia has maintained processing and freezing facilities, while similar capacity for Southern Rock Lobster in South Australia, Tasmania and Victoria is extremely limited.

Ferguson Australia, based in Adelaide, →

**MARKET EVOLUTION**

The Australian Seafood Production and Trade Databases hosted on the FRDC’s website ([www.frdc.gov.au](http://www.frdc.gov.au)) identify rock lobster exports under three categories: Ornate Rock Lobster (*Panulirus ornatus*), Southern Rock Lobster (*Jasus edwardsii*) and Western Rock Lobster (*Panulirus cygnus*).

While each species and fisheries jurisdiction has its own idiosyncrasies, the databases are interactive and allow comparison across years by state, product type and export destination. The species as a proportion of total exports, based on 2019 data, are: Ornate Rock Lobster 5.5 per cent; Southern Rock Lobster 24.5 per cent; Western Rock Lobster 70 per cent.

\* NB: Rounding has been applied to the following figures and minor amounts of preserved or unspecified processed product have been excluded from species-specific values.

**SNAPSHOT 2000**

**COMMENT:** In 2000, Australia’s rock lobster export market was relatively well distributed across four major markets. Exports were often redirected to China through Hong Kong, and the US was a key market.

**EXPORTS**

\$608 million, 15,819 tonnes to 25 countries

**MAJOR BUYERS**



By species	Total \$	Av. \$/kg
Ornate Rock Lobster	\$20 million	\$37.41/kg
Southern Rock Lobster	\$154 million	\$44.32/kg
Western Rock Lobster	\$434 million	\$39.64/kg

**PRODUCT BY WEIGHT**



**SNAPSHOT 2010**

**COMMENT:** Skip forward a decade and the sector had overcome the challenges of market declines related to the 2003-04 epidemic of severe acute respiratory syndrome (SARS) in South-East Asia. However, it was still to recover from the later impacts of the 2007-08 global financial crisis, with the volume and total value of exports falling to its lowest point in a decade.

**EXPORTS**

\$390 million, 7265 tonnes to 27 countries

**MAJOR BUYERS**



By species	Total \$	Av. \$/kg
Ornate Rock Lobster	\$26.5 million	\$46.26/kg
Southern Rock Lobster	\$150.3 million	\$71.88/kg
Western Rock Lobster	\$211.9 million	\$46.17/kg

**PRODUCT BY WEIGHT**



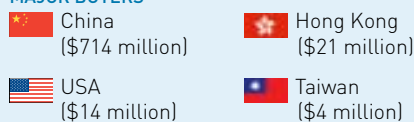
**SNAPSHOT 2019**

**COMMENT:** In 2010 Western Australia joined other rock lobster fisheries in applying a quota management system, with more selective fishing which lifted overall quality and prices. Large volumes sent to Hong Kong and Vietnam at different times were largely redirected to China until the removal of tariffs increased direct trade.

**EXPORTS**

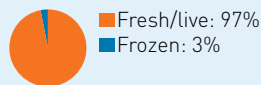
\$761 million, 8901 tonnes to 20 countries

**MAJOR BUYERS**



By species	Total \$	Av. \$/kg
Ornate Rock Lobster	\$38.1 million	\$72.67/kg
Southern Rock Lobster	\$230.9 million	\$101.60/kg
Western Rock Lobster	\$487.8 million	\$93.13/kg

**PRODUCT BY WEIGHT**



**SNAPSHOT 2020**

**COMMENT:** The COVID-19 pandemic and China market disruptions saw export volumes drop by 27 per cent, while average price per kilogram had substantially recovered from a decline earlier in the year.

**EXPORTS**

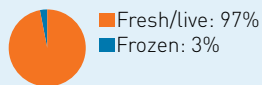
\$469 million, 6459 tonnes to 16 countries

**MAJOR BUYERS**



By species	Total \$	Av. \$/kg
Ornate Rock Lobster	\$25.9 million	\$60.06/kg
Southern Rock Lobster	\$158.9 million	\$87.89/kg
Western Rock Lobster	\$280.7 million	\$68.97/kg

**PRODUCT BY WEIGHT**



**SNAPSHOT Q1 2021**

**COMMENT:** In the first quarter of 2021 – the peak season for rock lobster sales, which coincides with Lunar New Year celebrations – the impacts of the disrupted trade to China are more clearly seen, with further price discounts.

**EXPORT**

\$87 million, 1896 tonnes to 15 countries

**MAJOR BUYERS**



By species	Total \$	Av. \$/kg
Ornate Rock Lobster	\$6.5 million	\$54.48/kg
Southern Rock Lobster	\$22.5 million	\$57.21/kg
Western Rock Lobster	\$58.0 million	\$46.39/kg

**PRODUCT BY WEIGHT**





South Australia, is both a fishing and processing company and has continued to innovate.

General manager Kate Birch says in the early 2000s the company developed new value-added products to make use of larger rock lobster that were being discounted in the live export trade. However, processing costs made these products comparatively unviable once beach prices for rock lobster reached \$50 per kilogram.

Birch says the company has maintained its export-accredited processing facilities and is working to refresh its offerings to meet the specific needs and formats of new markets.

When the live China trade dropped off last year, the company was able to redirect some of its Southern Rock Lobster in both raw and cooked form into its already established retail and food service brands for domestic and international buyers. This includes additional sales into independent Australian supermarket chains.

Ferguson Australia is continuing to evaluate the potential of valued-added export markets, particularly in Europe and the UK, with Australia now in discussions to establish a free trade agreement with the European Union.

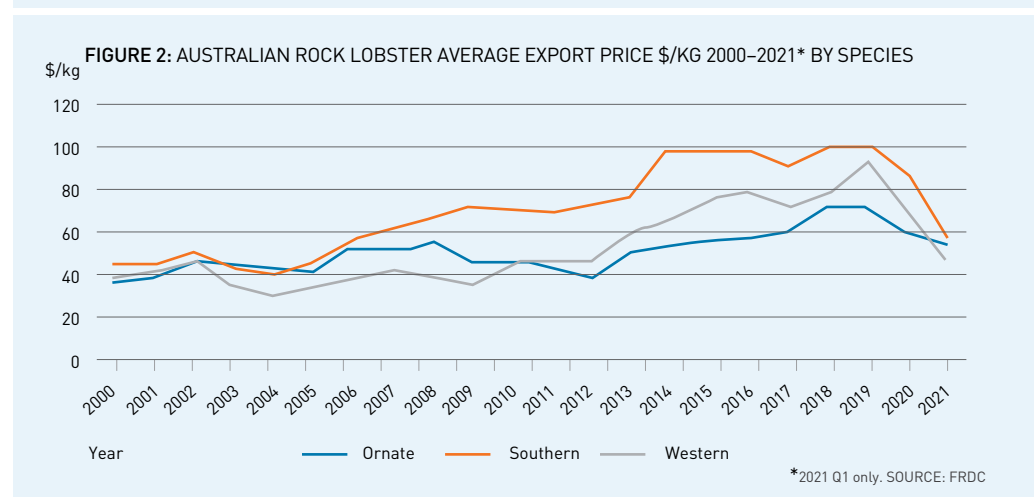
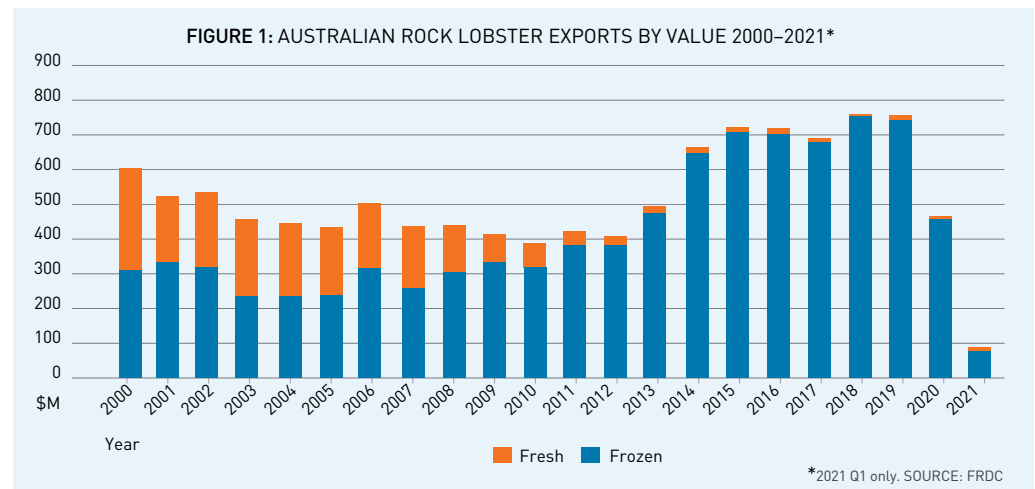
“We’d love to sell to new markets, particularly value-added product,” Birch says. “We’ve found with other products we still have going into China that they’ve turned marketing on its head at the moment, through fear of COVID-19 contagion. We used to have an advantage being ‘clean and green’, but now our products are seen as potential sources of infection. It’s a difficult position to compete with.”

### Community considerations

Justin Phillips from the new Limestone Coast Fishermen’s Co-operative, also in South Australia, sees the loss of China markets as accelerating the rationalisation of the sector and the consolidation of quota ownership and fishing enterprises.

Much of the quota in South Australia’s south-eastern rock lobster zone is still tightly held by fishing families, and the co-op was established in 2018 as a proactive local response to maintain local ownership. “Our focus is on our members, their families and communities, and making sure the benefits from the sector flow into these regional communities and are retained there,” Phillips says.

Initially geared for live exports, the co-op was able to change direction last year to increase domestic sales. It also opened a shopfront adjacent to its processing facilities in Beachport, targeting tourists and locals.



While it has managed to trade successfully through the current disruptions, Phillips says the co-op’s fishers have seen reductions of 50 per cent in return for their product – a genuine loss of economic activity and social benefit in these regional communities.

He says the co-op and its members will consider whether to put all of their eggs back in the China basket when that market reopens, which they believe it will.

“Should we consistently chase the highest returns or opt for a more stable business approach, playing more across the averages and putting a portion of product into other markets for lower returns, but which are ‘safer’ and more consistent?” Phillips says.

But long-term, lower-priced strategies are difficult for any individual organisation to implement, he says, given the highly competitive nature of the sector. Such a strategy relies more on broader industry behaviour, a collective approach that is yet to gain widespread traction.

Phillips also advocates for a collective approach to a national branding and promotional platform that fishers and exporters can use. When market disruptions occur, that branded platform could be picked up and implemented in other markets, he says.

“I think we’ve been a bit complacent about that because China was so good for so long. While there is clearly still strong demand for our product in China, addressing our level of exposure to that one market is a significant issue the sector faces.” **F**

#### MORE INFORMATION

FRDC Seafood Production and Trade Databases <https://www.frdc.com.au/services/seafood-production-and-trade-databases> <https://seafoodtradeadvisory.com/>

#### FRDC RESEARCH CODES

2018-128, 2018-205, 2019-028, 2018-176, 2018-004, 2017-224, 2016-257, 2016-235, 2015-212, 2013-749, 2013-714, 2012-714, 2012-741, 2012-705, 2017-138, 2017-137





## Support for women in leadership

The need for gender equity and to harness the power of women in solving pressing global problems was the focus of a recent event for Australia's women in seafood

By Jennifer Marshall

The aspirations of women in fisheries and fisheries science were highlighted during an International Women's Day event on 8 March 2021, hosted by Women in Seafood Australasia (WISA).

The combined in-person and online event included screening of the documentary *The Leadership* about the flagship voyage of Homeward Bound, a transformational leadership initiative for women in science, technology, engineering and mathematics (STEM) from around the world. It follows leader Fabian Dattner and her team as they dive into gritty issues with a cohort of 76 women in STEM during an intense 22-day oceanic journey into Antarctica.

The setting of the voyage itself carries deep meaning; Antarctica stands as a powerful symbol of the urgency for change and the high stakes involved in whether humans succeed or fail to engender balance in a complex and complicated world.

WISA president Karen Holder says there are many women who work in science among WISA members. "The film felt like a great opportunity to highlight key issues which are relevant to our members and create visibility for women in seafood."

The event was held at the Port Lincoln Hotel, with the live viewing of the documentary followed by

an online panel allowing the almost 40 participants to compare experiences and share ideas.

Kate Brooks, FRDC director and sociologist, was among the panellists who represented female seafood industry leaders from across Australia. She was joined by Claire Webber, director on the WISA Board, and Molly Christensen, a senior technical officer at the Institute for Marine and Antarctic Studies (IMAS).

"It's important to work with people who align with and support your goals," says Brooks. "Women as individuals should strive not to shy away from pushing in to do what they aspire to without constraint."

The panel discussion also highlighted a consensus that the changes needed will require work from all genders, and that no one gender can address these issues alone.

This means breaking down fears and stigma around differences in our needs and our ways of working and solving problems.

A critical gap identified as needing persistent attention and diligent effort is the gender disparity in leadership in STEM.

In Australia, the Department of Industry, Science, Energy and Resources found there is still a strong disparity in the representation of women in STEM and in their pay compared to men. As

of 2016, only 17 per cent of STEM workers were women, and in science they earned an average of 12.4 per cent less than their male counterparts.

Vulnerability was also a strong topic of discussion. Panellists and attendees alike emphasised the ongoing need to protect women from assault in every context, and the urgent need to prioritise physical and mental safety.

All attendees were challenged to consider what they would do to continue momentum for greater equity in both the seafood and STEM sectors.

Holder says one important step WISA is taking, with the support of the FRDC, is a project to benchmark who the women in seafood are and where they are, and then to find ways to support and promote effective participation in the sector.

The International Women's Day event was a positive reminder of the importance of taking action: our actions make all of us leaders, and when we learn together we lead together. **F**

**Above** Choosing the challenge of action, members of Women in Seafood Australasia attended a screening of the documentary *The Leadership*, which provided a focal point for discussion on International Women's Day.  
Photo: Andrea Broadfoot

### MORE INFORMATION

Karen Holder, WISA,  
[president@womeninseafood.org.au](mailto:president@womeninseafood.org.au);  
 WISA, [www.womeninseafood.org.au](http://www.womeninseafood.org.au)

**FRDC RESEARCH CODE**  
 2018-174





Prawn heads and shells are being dried as part of chitin extraction trials.

# Research to extract greater value from seafood

The twin goals of profit and sustainability are driving research into new products and value-adding processes for Australia's seafood businesses

Words **Catherine Norwood** Photos **Alexis Wing Huen Chung**

**A**ustralia's seafood and fisheries businesses are increasingly turning to product development and more sophisticated processing to increase returns from the 'sunk' costs of producing seafood. An added bonus is the potential reduction in waste that emerges from such innovations, and the attendant sustainability credentials.

For more than a decade the FRDC has specifically invested in enhancing seafood handling, processing and product development research to reduce waste and add value. With the additional support of the Fight Food Waste Cooperative Research Centre (FFWCRC), a new swathe of industry-focused research is now underway.

Post-harvest scientist Janet Howieson, based at Curtin University in Western Australia, is leading two projects funded jointly by the FFWCRC, industry partners and the FRDC through its industry partnership agreements.

## Preserving prawns

One project, with the Australian Council of Prawn Fisheries, is investigating ways to manage the discolouration of prawns – called melanosis – and subsequent waste that can occur when frozen prawns are thawed.

Part of the process includes testing alternatives to the preservative currently used to prevent melanosis – sodium metabisulfite – which can be an allergen for some people.

"Understanding the process of melanosis better will help to manage it," says Howieson. "There's very clear species differences with the progress of melanosis, and so we might be able to target preservative treatments more for specific prawn species." →

Right Fish jerky samples.

She is also examining other ways that prawn fishers might be able to reduce waste and improve their profit margins. This includes reconfiguring onboard processes to optimise handling, cold chain management and packaging the prawns into smaller boxes onboard vessels. Smaller boxes reduce the need for repacking and handling that could damage the product.

“We’re starting a more holistic view of onboard processing and packaging to reduce waste right from the point of harvest, drawing on international and local expertise. An important part of this work is just getting people to think about alternative processes and putting some new ideas out there.”

In another, newly approved, project, Howieson will be looking at the potential for abalone viscera for use as a supplement in human and pet food products. This FFWCRC project is funded in conjunction with the Abalone Council Australia, the FRDC and pet food company All Fish For Dogs as a commercial partner. She will identify the antioxidant and other therapeutic elements within the viscera and test processing techniques designed to preserve those benefits for use as a feed ingredient.



### Abalone heat treatments

Stephen Pahl, a researcher at the South Australian Research and Development Institute, a division of South Australia’s Department of Primary Industries and Regions, is working on another FFWCRC abalone project.

This combines funding from the Abalone Association of Australasia, Abalone Council Australia and the FRDC to explore whether the processes of heat-treating canned abalone could be tweaked to reduce shrinkage and improve product value.

As with all canned products, abalone is heat-treated to eliminate potentially harmful pathogens. But this results in a loss of moisture from the abalone that can reduce its drained weight by up to 30 per cent. Because



canned abalone is sold as drained weight, that is a significant loss for producers.

Pahl is hoping to identify areas of the abalone meat that are more at risk of pathogens, and which can be targeted more precisely with the heat treatment, while reducing the heat applied to other parts of the animal.

A small change like this would not require equipment changes – it is simply a matter of adjusting the treatment process, he says. The next step would be getting this new approach validated by regulators both in Australia and abroad.

There is a lot to be gained. “Abalone being a quite a valuable product, a small percent increase or improvement will have significant financial benefit,”

## THE SUM OF SEAFOOD WASTE

While the Fight Food Waste Cooperative Research Centre (FFWCRC) is already funding specific projects to address identified food waste issues, it is also working to better assess the size of food waste across the entire Australian economy. Its initial national waste benchmark study, released in 2019, will be updated and re-released this year.

Internationally, the United Nations’ Food and Agriculture Organization says waste in the seafood industry is a particular concern, with an estimated 35 per cent of all fish and seafood being wasted globally.

Measuring seafood waste in Australia is a challenging issue, due in part to the disparate nature of seafood processing across the country and, in some instances, at sea, which complicates waste volume calculations. The filleting of fish, for instance, might occur onboard a vessel, at a centralised processing plant, or at

one of many hundreds of fishmongers or food service businesses anywhere in Australia. For many finned fish species, only 30 to 40 per cent of the fish is recovered for sale after filleting; the rest becomes waste.

FRDC-funded research published in 2016 calculated seafood waste volumes from Australian processing of wild and farmed seafood at more than 55,000 tonnes per year. This data provided the basis for figures in the FFWCRC benchmark report; however, it does not include bycatch – seafood caught at sea but discarded.

Bycatch is a controversial form of waste. Not all bycatch dies, and survival rates can be improved using specific handling techniques. The catch that does die is lost to reproductive fish populations, but it will enter the marine food chain in some way, which is not the case for waste that ends up disposed of and compacted in landfills.

Furthermore, bycatch always represents a potentially avoidable cost to fishers in harvesting a catch that is then partly discarded for a variety of reasons that range from fishing regulations and quotas to market preferences. In hand-harvested fisheries, such as abalone, there is no bycatch. In others, such as some ocean trawl fisheries, bycatch might exceed the retained catch. And commercial fishing requirements to keep records of bycatch also vary across fisheries and fishing jurisdictions.

Commenting on the challenges of calculating seafood waste, the FFWCRC CEO Steven Lapidge says when it is difficult to gather the data, it is difficult to identify the size of the problem.

“And if you don’t know the size of the problem, generally you don’t do anything about it. However, if we’re going to claim we’re clean and green, this is something we really need to be looking at and addressing,” Lapidge says. **F**

**Right** New products being developed target the recovery of more meat from fish frames.

Pahl says. With around \$70 million of canned abalone sold each year, the change could generate millions of dollars of additional revenue to industry.

Modifying heat treatment to reduce weight loss is something that abalone processors in Australia have been considering for some time, he says. They just needed something to help it along, which proved to be the support of the Fight Food Waste CRC.

### Shell developments

At Curtin University's School of Molecular and Life Sciences, Howieson has other product developments underway as part of a relatively broad and ongoing stream of research for the FRDC.

One project is using drying technologies to help extract chitin from prawn peelings. Chitin, converted to chitosan, has diverse uses that range from pure-grade medical ingredients to bioplastics and fertiliser input. Chitin extraction is not a new technology, Howieson says; it is an established process internationally. What is new is the volume of prawn peelings now being generated from increased processing in Australia.

The drivers for onshore processing include travel restrictions that limit seafood freight to countries that have traditionally undertaken processing, as a result of the global COVID-19 pandemic. Another driver, says Dylan Skinns from Austral Fisheries, is the marketing advantage that comes from 'caught and processed in Australia'. "This is now a trending theme for supermarkets, restaurants and consumers. It also allows producers and sellers to claim the 100 per cent Australian made on packaging, which is seen as another marketing edge."

Austral is one of Australia's largest wild prawn producers and was already moving towards increased onshore processing prior to the pandemic; it has since increased this from 70 per cent to 90 per cent of its prawn harvest. Skinns expects this will increase to almost 100 per cent by the end of the year.

"We are processing about 300 tonnes of prawns a year into meat and cutlets, which results in 32 tonnes of prawn shells that could be used for other products."

One such product Austral has already invested in is prawn oil, produced by Seaweedery, a new business Austral sponsored through the Seafood for Good campaign it ran in 2020 in conjunction with the social enterprise start-up support organisation StartSomeGood.

With other prawn producers also moving to process their catch locally, Howieson calculates that the increased onshore processing could provide the economies of scale needed for a commercially viable chitin extraction process and products.

She is also trialling the drying and extraction of chitin from a range of sources, including rock lobster and crabs processed in Australia and from black soldier fly larvae fed on fish waste.

"We're first trying to understand the recoveries from the different raw materials, such as green or cooked peels or heads, and the quality of the chitin and chitosan, which will determine possible end uses."

### Protein reclamation

Another project underway is reclaiming shreds of meat from the frames of filleted Barramundi (*Lates calcarifer*), Atlantic Salmon (*Salmo salar*) and Patagonian Toothfish (*Dissostichus eleginoides*). The latest version of this protein reclamation research is developing a fish jerky. A previous iteration successfully created a seafood snack product and, less successfully, trialled



"We're first trying to understand the recoveries from the different raw materials, such as green or cooked peels or heads, and the quality of the chitin and chitosan, which will determine possible end uses."

Janet Howieson

extrusion processes commonly used in other food processing sectors for products such as pet foods, pasta, breakfast cereals and snacks.

Howieson reports a rising interest in adding value to byproducts from seafood businesses in recent years. "There has definitely been a cultural shift in recent years. My focus is on the development and proof of concept for value-adding processes or products, and there has been an increasing number of enquiries from businesses looking to do more with what they have, including 100 per cent utilisation. The most successful projects, in terms of adoption, are those with strong industry buy-in," she says.

Recent examples include new handling practices to support the commercialisation of scampi roe and pearl oyster meat as premium seafood products. Another is the development of an enzyme-based process to replace acid hydrolysis of seafood offal for fish processor SAMPI in South Australia. Hydrolysis breaks down the waste into its chemical components. The resulting hydrolysate is used as an ingredient in products such as pet foods, aquafeed and fertiliser. The new process has reduced processing time, increased yield and increased the quality of the hydrolysate, effectively increasing its value.

The FRDC's general manager for strategy and innovation, Matt Barwick, says stakeholders highlighted the importance of new product development and adding value to existing resources that would otherwise be wasted during the development of the FRDC's 2020–2025 Research and Development Plan. This issue is also integrated into the broader stakeholder 'Fish Forever 2030' vision that emerged from the planning process.

It is an approach that can broaden markets with new products and even initiate new businesses, effectively "growing the pie" Barwick says, to feed greater prosperity for the seafood sector and diversify benefits across the community. **F**

#### MORE INFORMATION

[www.fightfoodwastecrc.com.au](http://www.fightfoodwastecrc.com.au);  
Janet Howieson, [j.howieson@curtin.edu.au](mailto:j.howieson@curtin.edu.au)

#### FRDC RESEARCH CODES

2013-711.40, 2014-704, 2016-223, 2016-22





# Real-life adventure in seafood science

Queensland's Sue Poole has been in the vanguard of post-harvest seafood scientists who have lifted the quality, value and consumer appreciation of seafood

By Brad Collis

**A**s a pioneering seafood researcher, particularly in the area of post-harvest management, Sue Poole has been a key player in elevating the quality and value of Australian seafood.

Surviving a cyclone in the Timor Sea and working from a trawler that had to evade pirates “who didn’t take prisoners” add to the many colourful footnotes of a career that bridged the daily risks and difficulties fishers face with her research work in labs and offices.

Over three decades, Poole’s career has taken her from food safety and seafood microbiology to become the principal food scientist with the Queensland Department of Agriculture and Fisheries and a professor with the University of Queensland. In these roles, she has been responsible for much of the science behind the improved delivery of prawns, crabs, lobsters, reef fish, Barramundi, scallops, jellyfish exports and more.

As she retires this year and reflects on the achievements of her career, it is the memory of an episode that occurred shortly after she joined the Queensland department in 1983 that remains indelible.

“There was no seafood section, so I was placed in the Dairy Research Institute ... and they were not happy,” she recalls. Undaunted, Poole threw herself into her new role and one day was using a 1950s era blender to homogenise a large quantity of mullet that was already a few days old and ‘ripe’.

“Well, I didn’t secure the lid properly and as the blender reached maximum revs the lid flew off and I sprayed the pristine dairy-white laboratory, and everyone in it, with liquified fish offal. The shock and sheer disbelief on the faces of the dairy men has stayed with me ever since,” she says with her trademark grin.

“One of the biggest joys of my working life has been the interaction with fishers and industry people because they know so much. I learned very early on that if I wanted to know something, I just had to ask a fisher. Talking to people became so important to the science.”

## Ear to the ground

She recalls working with mud crab fishers in the Northern Territory. “I remember one chap telling me the crabs hate breeze disturbance.” She says the detail proved crucial, and only came to light because the fisher really knew his fish,

and she was keen to learn from his experience.

The mud crab research was one of numerous times when field work took Poole into real-life adventures – in that instance, daily implementing the adaptability required to avoid encounters with crocodiles. “It was wild, beautiful and remote country up near the NT–Queensland border on the Gulf of Carpentaria. It was a big project, following the whole supply chain from remote riverbanks to markets thousands of kilometres away.

“The fishers keep the crabs wet and protected from flies by wrapping them in hessian cloth, regularly dousing them with water until the weekly truck pick-up for transport to Borroloola, then to Darwin, then to Sydney and Melbourne. That’s 15 days they have to be kept alive and healthy. When a mud crab dies it reeks of ammonia and that seems to trigger more deaths.”

The cause of death was assumed to be stress, she says, but finding the actual trigger proved a long journey. She says they eventually found that stress in that early post-capture phase was the killer.

“This was elevated by loud noise. Even someone getting a bit noisy after returning to camp at the end of the working day caused the crabs’ temperature to rise, as did exposure to a breeze.”



**Left**  
Applying science to bring safe and healthy seafood to consumers from remote locations, such as the NT mud crab fishing camps, has been an important part of Sue Poole's work. Photo: Sue Poole



**Below**  
Sue Poole prepares fish samples for a taste test – post-harvest quality control has been a research priority in response to consumer food-quality expectations. Photo: Brad Collis

**Below**  
Seafood scientist Sue Poole was an interloper in the dairy research lab when she first began investigating post-harvest quality management. Photo: Supplied by Sue Poole



“One of the biggest joys of my working life has been the interaction with fishers and industry people because they know so much. I learned very early on that if I wanted to know something, I just had to ask a fisher. Talking to people became so important to the science.”

The finding showed how a potentially highly complex issue can have a simple remedy; in this case, keeping the mud crabs cool, damp and in peace in the days following their capture.

**Widening horizons**

Over the past three decades Poole has been on the frontline of numerous other advances in Australia's fisheries and seafood developments.

“Initially it was all first-step stuff ... what's the storage life for this or that species in ice, and if it's not done properly, what is the rate of spoilage? It was research aimed at creating opportunities for wider distribution. Retail in the 1980s and into the 1990s was very much based on local catch. You didn't catch fish to send somewhere ... in Brisbane, for example, we pretty much ate out of Moreton Bay.”

One of the first groundbreaking projects Poole worked on, in collaboration with NT researchers, was to see if shelf life would be increased by gutting fish on the boats and putting the whole fish in ice, instead of the established practice of filleting and freezing in 10-kilogram blocks while still at sea. Aside from variable refrigeration, the large frozen blocks limited customer options.

Researchers discovered that tropical reef fish have a very long shelf life if put straight into an ice slurry because their bacteria are adapted to water temperatures of 28°C to 30°C. Chilling knocks out the bacteria. The long lag time before the microbes start to revive provides a much-extended storage life for the chilled product.

“This caught on very quickly and reef fish prices rocketed ... from \$2 per kilogram to \$6 per kilogram because consumers quickly recognised the quality of the product.

“Discovering the spoilage patterns and showing that chilling well and fast could extend storage life by days, if not weeks, was a big step forward. Today it is basic knowledge. It's easy to forget that not so long ago this wasn't known. Most of the research behind this big change has been through the FRDC.”

**Generational change**

Poole says that in the early stages of her career there was also an attitude among many fishers that once they landed the catch it was no longer their responsibility: “That has changed completely. Fishers now see themselves as

part of the supply chain; they feel a connection to consumers because they recognise they are critical to the quality of their product.

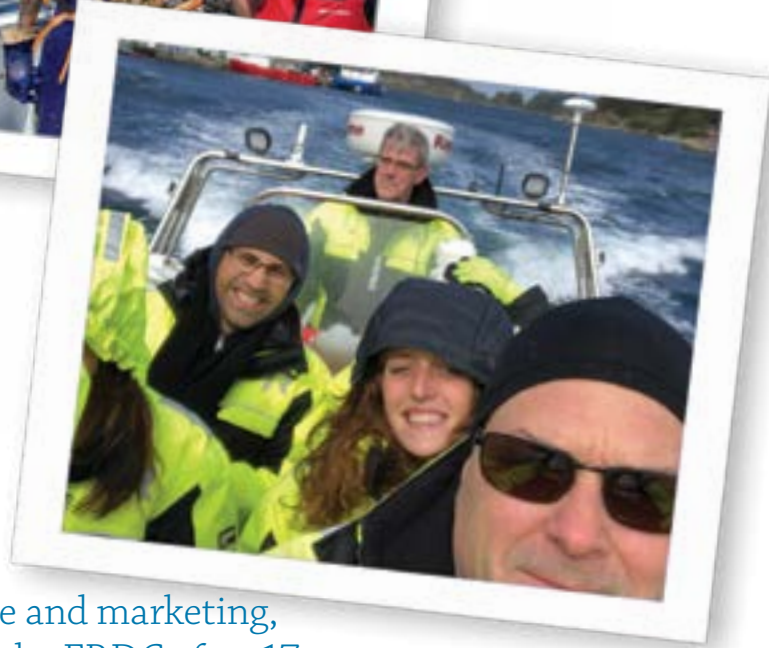
“The science behind shelf life, freshness and quality has made seafood a sophisticated sector and I think this is bringing young people back into the industry. When I first started working with fishers they were mostly older men whose children had no interest in the business. Today I frequently see father-son, father-daughter operations.”

It's been a rewarding journey of discovery and community support for Poole since she responded to the advertisement for a seafoods microbiologist, albeit in a dairy research unit, and departed New Zealand where she was working in a food safety laboratory.

She has seen firsthand the impact that research has on people's livelihoods and industry advancement: “I've met some wonderful people, fishers and research colleagues, and I learned as a scientist that the best way to help people is to get out and talk face-to-face – not at a workshop or seminar but in a conversation. You learn and they learn and that's how you make the biggest difference.” **F**



Diverse communication and engagement activities feature among Peter Horvat's career highlights. Photos: FRDC



# Time for change

Peter Horvat, general manager communications, trade and marketing, shares some parting thoughts and thanks on leaving the FRDC after 17 years

By Peter Horvat

Last year was a year like no other. It asked much of everyone, and for many it gave them time to consider who they are, where they are and, more importantly, where they want to go. I am one of those who has thought long and hard about this. This is my way of saying that, after 17 years, I am leaving the FRDC.

Looking back over these 17 years, I think some of my more significant contributions have been how the FRDC communicates and engages, as well as driving research to better understand the community's perception of fishing and aquaculture. The role has provided me so many challenges, experiences and friendships.

## FRDC highlights

Before exiting stage left, I would like to share some of the highlights of my journey, including:

- working with nine ministers and their staff (Duniam, Colbeck, Littleproud, Ruston, Burke, Ley, Ludwig, Abetz and Macdonald);
- writing 17 annual reports and annual operating plans and working on three R&D plans;
- editing and producing 69 editions of *FISH* magazine. Building it up from the R&D News (in memory Mal Maloney and Duckie) to a highly respected magazine with

readership that covers the breadth of fishing and aquaculture stakeholders (the goal is for every licence holder to get a copy);

- being involved in the production of one documentary (*Life on the Line: the story of the Southern Bluefin Tuna*), two television series (*Escape Fishing with ET* and *Seafood Escape with ET*), and the media created for industry by Matt Blyth at Millstream;
- developing a longitudinal community perceptions dataset (thanks, Michael Sparks);
- working on the Status of Australian Fish Stocks Reports;
- developing the Australian Fish and Chips Awards;
- running conferences and trade tours (here and overseas);
- undertaking hundreds of media requests and interviews; and
- working with many FRDC-funded researchers on almost 2000 projects.

I thank the many people who have been part of that journey.

When starting in a new role anywhere, having technical expertise is good. However, when you work for an organisation such as the FRDC, you also need topic knowledge – something I apparently did not have enough of ... just ask

Roger Edwards, who told me “yeah, we didn’t think you knew much, but a couple of years later I am glad to say you do know things ...”.

## Value in relationships

Knowing the details largely comes from time spent listening to stakeholders across the country. Industry members and associations continue to show a level of resilience and friendship that is hard to find anywhere. There are a few whom I would be remiss not to note. These are Stuart Richey, Annie Jarrett, Tim Hess (as well Peter and Una), Brian Jeffriess, David Carter, Andrew Puglisi, Sam Gordon, Ben Hale, Andrew and Renae Tobin (the researchers who saw the fish and chip sign and haven’t looked back) and Kath and Tom Long (who are true innovators). Lastly, there are two who I want to specially thank: John Susman and James Fogarty. Both are incredibly knowledgeable and generous with their time and wisdom.

On the other side of industry are the state and territory fisheries agencies and staff. Again, a remarkable group who have the tough task of trying to keep everything in the green. In particular, thanks go to Ian Curnow, Sean Sloan, Gavin Begg, Nick Rayns and those who have come before them. →

In addition, a number of people spread across the globe have helped me on my journey. These include the members of the International Coalition of Fisheries Associations (ICFA), in particular John Connelly, and Gavin Gibbons and Lynsee Fowler at the US National Fisheries Institute, Marcus and Hazel at UK Seafish, Alastair Macfarlane, Kathryn Stark, Karen Galloway and Tom Rossiter (thanks for the craic).

Outside fishing and aquaculture, there are 15 Rural Research and Development Corporations that have been constant companions. While on occasion I have sat at the big table with the chairs and CEOs (and Tim Lester), most of my time has been spent working with the many communicators and marketers. Individuals like Kylie Dunstan (Grains Research and Development Corporation and now Isentia), Ruth Redfern (Cotton RDC), Kate Harvey (Wine Australia), Lachlan Bowtell (formerly Meat & Livestock Australia) and Emily Mackintosh (previously at Pork Australia).

For a big part of the last decade, I have also had the privilege of working with many talented people in food service, primarily as a result of the Appetite for Excellence awards program. Key to this were founders Luke Mangan and Lucy Allon. Many others have also been part of the program, in particular Richard Ousby, Colin Barker, Jake Nicolson, Josh Niland and, of course, Nick Hill. Many other chefs and foodies have also been part of my journey – Pete Manifis and Don Hancey, Pete Hilcke, Brigid Treloar and many more.

Helping deliver all the content have been the creatives. A group that takes my rambling and disparate thoughts (creative insight) and turn them into things of beauty (and, in some

cases, works of art). A great big thanks go out to Lindsay Davidson at Whitefox and Allison Mortlock at Angellink, Matt Blyth, Andrew Ettingshausen, Will and Hanna Meppen and the team at Coretext, in particular Catherine Norwood, Brad Collis, Adrienne Dolphin, Tim Claeys, Fiona James and the many, many writers who have graced the pages of *FISH* magazine.

Lastly, a mention goes to all the FRDC staff and directors past and present. Working at the FRDC is a unique experience for most. They get to do more, see more and become more than almost anywhere else I have worked. Many I have known for a long time – Peter Dundas-Smith and John Wilson (those responsible for employing me) and Annette Lyons, Crispian Ashby and Patrick Hone who were there from day one.

To my team – Annabel Boyer, Ilaria Catizone, Angela Tsang and the comms/ICT team of Kyaw Kyaw Soe Hlaing, Dennis Payne and Lee Armson, thank you. You put up with my plans (crazy and otherwise) to create, communicate and deliver day in and day out. Last year during COVID was a testament to this with the team producing five editions of *FISH*, starting a new e-newsletter and being happy to call industry across the country to touch base. You guys are awesome!

Peter Horvat (left), leads industry delegates to the Seafood Expo Global in Brussels. Photo: FRDC



A younger Peter Horvat (second from left) with Tom Clancy from NSW Department of Primary Industries (left) and WA chef Don Hancey (right). Photo: FRDC

So farewell for now, travel safe, enjoy the ride and thanks for all the fish!

### Fishy futures

As I leave the FRDC I cast my mind to *FISH* magazine and all stakeholders across Australia who enjoy reading it. The overarching objective for all the communication activities and, in particular, for *FISH* magazine is to improve how they operate, improve adoption of the R&D and build a strong fishing and aquaculture community. Over the years the team has driven change, and incorporated changes based on feedback from readers. Some, like the previous *FISH* writer Mal Maloney, have sent some solid suggestions for the magazine – such as stories focusing on the people as much as possible.

I am sure the FRDC's communications team will continue to develop it into an even better publication, reaching even more stakeholders. In the age of COVID-19 and the digital renewal, *FISH* magazine will expand what can be delivered online, but when a large number of your audience spends most of its time at sea or in remote areas with limited connectivity, there remains a need for the old-fashioned ink on paper to engage their minds.

I look forward to seeing where the team will take the magazine in the future.

### New day, new role

Post-FRDC, I will be taking on the role as manager of the AusIndustry engagement team. AusIndustry's role is to support Australian businesses to grow and transform for the benefit of all Australians. Programs include the R&D Tax Incentive and Entrepreneurs program, which a few fish folk have participated in.

The role will see me doing something I am passionate about, supporting businesses, helping them build connections and networks and tell their stories, albeit across a much wider range of industries.

Looking forward to keeping in touch – and look me up if you want to conquer the world! **F**

# New projects

The FRDC board has recently approved the following research projects to go ahead

Project number	Project	Applicant	R&D Plan outcome
2021-022	Establishing influence of environmental factors on trace element profiles database and sampling frequency	Curtin University	1
2021-020	Stable isotopes: a rapid method to determine lobster diet and trace lobster origin?	Institute for Marine and Antarctic Studies, University of Tasmania	1
2021-018	SafeFish 2021-2025	Institute for Marine and Antarctic Studies, University of Tasmania	1
2021-010	Investigating video survey techniques to determine commercial scallop abundance in inshore and offshore waters, closed areas and juvenile beds	Institute for Marine and Antarctic Studies, University of Tasmania	1
2021-008	Utilisation of boat ramp cameras to estimate recreational fishing catch and effort in key Victorian fisheries	Victorian Fisheries Authority	1
2021-001	The emerging billfish fishing grounds of northern Australia: fisheries description, movements, and hot-spots	Charles Darwin University	1
2020-118	Pre-feasibility for a zero-emission fishing fleet – prawn fishing case study	Austral Fisheries Pty Ltd	2
2020-116	Accelerating Greenlip Abalone stock recovery in South Australia using release of hatchery-reared juveniles: Phase 1 – genetics risk assessment and preliminary cost-benefit analysis	University of Adelaide	1
2020-110	Fish and Chips Awards 2021	Seafood Industry Australia (SIA)	5
2020-109	Future proofing the Southern Bluefin Tuna ( <i>Thunnus maccoyii</i> ) (SBT) Industry through Kin in South Australia by developing new and alternative distribution markets and distributions channels	Kin Premium Australian Seafood Pty Ltd	1
2020-107	Seafood Directions Conference 2022, 2024, 2026	Seafood Industry Australia	3
2020-106	Pioneering Tropical Rock Lobster raft grow-out for Northern Australia	CRC for Developing Northern Australia	1
2020-105	Ray Report Card	University of Tasmania	5
2020-104	Evaluating the role of direct fish-to-fish contact on horizontal transmission of Koi herpesvirus	NSW Department of Primary Industries	1
2020-098	Consumer and market data to inform Love Australian Prawns 2021-22	Australian Council of Prawn Fisheries Ltd	1
2020-097	Investigating sources of variability in the Heard Island and McDonald Islands Patagonian Toothfish fishery	University of Tasmania	1
2020-095	Science to support Australia's Southern Ocean fisheries 2021-2023	Institute for Marine and Antarctic Studies, University of Tasmania	1
2020-094	Improving the availability of safe and effective veterinary medicines for Australia's seafood industry	University of Adelaide	1
2020-073	The value of artificial reefs and fish-aggregating devices (FADs) in creating new recreational fishing opportunities and the important role in fish recruitment that are unique to Tasmania	Institute for Marine and Antarctic Studies, University of Tasmania	1
2020-062	Minimising plastic in the Western Rock Lobster industry (Phase 1 – scope and identify)	Western Rock Lobster Council Inc.	2

**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

## Improving crab survival

**2017-018**

Scientists from Queensland Department of Agriculture and Fisheries worked with the New South Wales crab and lobster industries to determine ways to reduce stress imposed on the animals from capture to market. Through temperature monitoring along the supply chain, two key areas were identified as having high impact on the crustaceans. Handling by individual fishers from point of capture was found to be critical to keep animals cool, damp, out of light and with minimal disturbance. Low temperatures during transport of crabs and lobsters often imposed severe stress, arising from truck refrigeration temperatures being set below the tolerance of live animals and the influence of cold truck floor-beds reducing live animal temperatures. The importance of careful handling after capture was emphasised at every landing location visit. Simple modifications for protecting live animals from cold temperatures during transport were developed to reduce stress. The benefit gained from adapted practices was successfully demonstrated within commercial operations.

**More information:** Sue Poole, [sue.poole@qld.gov.au](mailto:sue.poole@qld.gov.au)

## Climate factors impact crab harvests

**2017-047**

This project investigated relationships between environmental factors and crab harvests in the Gulf of Carpentaria (GoC). Desktop correlative analyses indicated that fluctuations in the catches of Giant Mud Crabs (*Scylla serrata*) in the GoC are likely to be driven by environmental factors including river flow, rainfall, temperature, evaporation, and sea level changes. Declines in catches of Giant Mud Crabs between 2009 and 2016 in the Northern Territory and 2013 and 2016 in Queensland coincided with a sequence of years with low rainfall, high temperatures and below average mean sea levels. The GoC is an area where Giant Mud Crabs and their associated fisheries may be highly vulnerable to climate events.

**More information:** Julie B. Robins, [julie.robins@daf.qld.gov.au](mailto:julie.robins@daf.qld.gov.au)

## Nutritional composition of seafood

**2017-145**

Understanding the nutritional composition of seafood products is both a regulatory requirement and a consumer demand. Although a considerable body of data exists that covers key fish species, most commercially important species within the wildcatch sector still lack a basic nutritional profile. This knowledge gap impacts heavily on industry by providing hurdles for the industry to meet their regulatory responsibilities and leaving consumers somewhat in the dark when it comes to understanding the seafood products they consume. To address this, extensive work was undertaken to develop nutrition panels for a minimum of 25 commercially important wildcatch seafood species where none currently exist.

Overall, the project successfully delivered nutritional profiles for 25 finfish and three crustacean species. The data compiled consists of proximate, vitamin and mineral components for the 28 profiled species. Published results within this report have also been made available electronically to help preserve integrity during data handling. The impact to industry of this valuable resource is broad and goes beyond simple nutrition information panels for the profiled species. Using the data generated through this project, stakeholders are better equipped to promote the health benefits of seafood consumption, overcome technical market challenges and regulatory requirements, counter any negative public perceptions or media claims, and expand product innovation and further species utilisation.

**More information:** Andrew Forrest, [andrew.forrest@daf.qld.gov.au](mailto:andrew.forrest@daf.qld.gov.au)

## New harvest strategy for SESSF

**2018-077**

Since the 2006 structural adjustment program, which saw a large reduction in the number of fishing boats in the Southern and Eastern Scalefish and Shark Fishery (SESSF), the fishery has been undergoing a period of substantial change. These changes have included an increased focus on ecosystem-based fisheries management, fewer quota species being targeted by

fishers, total allowable catches (TACs) for many quota species being significantly under caught and some stocks continuing to decline, or not recovering, despite reduced fishing effort.

These changes prompted research to improve fishery outcomes for the benefit of fishers and the Australian community. This project, incorporating a workshop involving representatives from all SESSF stakeholder groups, has been an important step in identifying, understanding, rationalising and prioritising the outcomes of this recently completed research to best respond to the changes and maximise the benefits of the fishery. The output of this project is the implementation plan that provides a comprehensive, prioritised list of actions for the SESSF as it transitions to a new harvest strategy framework.

**More information:** Ian Knuckey, [ian@fishwell.com.au](mailto:ian@fishwell.com.au)

## Recovery strategy for western abalone

**2018-212**

A two-day workshop was held to progress a formal industry-driven recovery strategy to complement current Department of Primary Industries and Regional Development recovery work in Western Australia. The aim of the workshop was for industry participants to gain an understanding of how the Western Abalone Divers Association had implemented new technologies to monitor fishing effort and catch more accurately.

Workshop participants were particularly interested in understanding the use of data loggers, dive loggers, measuring boards and GoPros, and how data generated by these could be used to produce heat maps for fishing effort, catch rates and dive times.

**More information:** Don Nicholls, M 0457 735 638

## Prawn import disease testing

**2017-088**

This project tested a range of imported uncooked prawn commodities for the presence of Yellowhead virus (YHV-1) and Taura syndrome virus (TSV). The knowledge gained was used to inform the response of the Australian Prawn Farmers Association (APFA) into the review of the crustacean →

Import Risk Assessment in 2018. All samples tested negative for YHV-1. But inconclusive results in 15 of 105 uncooked prawn commodities for TSV is a concern for the potential entry of a viable exotic prawn pathogen into Australia. The diversion of imported uncooked prawns for use as bait or berley by recreational anglers has been demonstrated as a risk pathway for release of pathogens should they be present within uncooked imported product. The use of cooking as a sanitary measure for reduction of risk in imported prawn commodities could demonstrably reduce risk of viable pathogen entry into Australia via this commodity trade.

**More information:** Matt Landos, [matty.landos@gmail.com](mailto:matty.landos@gmail.com)

### Chemical use data for prawn farms 2018-099

This project assisted in providing Australian prawn farms improved access to priority chemical products that can assist farm biosecurity. Detailed review of available knowledge and public domain literature to complete data packages and fill information gaps has assisted the completion of minor-use permit (MUP) applications to the Australian Pesticides and Veterinary Medicines Authority for trichlorfon, hydrogen peroxide and calcium and sodium hypochlorite, while identifying additional data requirements needed to complete MUP applications for benzalkonium chloride and copper sulfate. This process ensures safe use and efficacy of chemical products on Australian prawn farms.

**More information:** Matt Landos, [matty.landos@gmail.com](mailto:matty.landos@gmail.com)

### Reinvigorating Queensland oyster industry 2018-118

This study has revealed the intertidal oyster species that are present in Queensland and their distributions. This information is of critical importance to oyster farmers who are considering diversification, as native oyster species are unlikely to perform well outside their natural latitudinal range. The information is also essential for the legislative bodies who govern oyster

aquaculture in Queensland. The results will also be used by industry, government and university personnel to direct future research efforts towards species that are most likely to be commercially viable. The project has also developed a suite of molecular tools to support the development of the Blacklip Oyster [*Saccostrea echinata*] as a major aquaculture species. This data is publicly available and will be utilised by researchers to improve production.

**More information:** Carmel McDougall, [c.mcdougall@griffith.edu.au](mailto:c.mcdougall@griffith.edu.au)

### Fast track tests for oyster farms 2018-127

To make rapid decisions in responding to disease outbreaks such as Pacific Oyster mortality syndrome (POMS), results are required as fast as possible. Following a review of potential rapid and portable testing options, researchers from SARDI Aquatic Sciences selected and investigated the sensitivity and specificity of the Biomeme Franklin platform for rapid detection of ostreid herpesvirus 1 (OsHV-1) in Pacific Oyster [*Crassostrea gigas*] samples. OsHV-1 is the virus responsible for POMS. This project investigated and delivered a test that can deliver results in hours rather than days, at low cost, with ease of use and field applicability.

**More information:** Sarah Catalano, [sarah.catalano@sa.gov.au](mailto:sarah.catalano@sa.gov.au)

### Guidelines for farm biosecurity plan 2019-088

This project developed guidelines to provide the Australian sea-cage finfish (non-salmonid) industry with the tools and templates to create an auditable farm biosecurity plan. Consideration was given to the current farming of Yellowtail Kingfish

[*Seriola lalandi*], Southern Bluefin Tuna [*Thunnus maccoyii*] and Cobia [*Rachycentron canadum*]. There were two components to this project. First, an industry-government workshop was held to discuss disease risks for sea-cage finfish farms, existing biosecurity guidelines, policy, risk assessments, and the appropriate content of a sea-cage finfish (non-salmonid) biosecurity plan. Based on these discussions, attendees workshopped best practice and practical biosecurity management for sea-cage finfish (non-salmonid) farms.

The second component of the project was to develop biosecurity plan guidelines and templates for the sea-cage finfish (non-salmonid) industry of Australia. These guidelines are based on information from the industry workshop and related reference material. They highlight the potential routes for disease transmission, including disease spread onto, within and off the farm, to facilitate associated risk assessments for disease transmission.

**More information:** Shane Roberts, [shane.roberts@sa.gov.au](mailto:shane.roberts@sa.gov.au)

### Northern aquaculture opportunities 2019-096

This report provides a summary of the 'Aquaculture opportunities in northern Australia: solutions and strategies workshop' held in Rockhampton, 5-6 February 2020. This FRDC project supported James Cook University, the Australian Barramundi Farmers Association, Australian Prawn Farmers Association and Rockhampton Regional Council to organise and host the workshop. The Cooperative Research Centre for Developing Northern Australia (CRCNA) commissioned an aquaculture situational analysis to understand the current situation and future challenges and opportunities for aquaculture in northern Australia. This facilitated stakeholder workshop brought together 85 key stakeholders and enablers from across northern Australia to test, refine and gain buy-in for the 'Vision 2030 for aquaculture in northern Australia' and prioritise recommendations to enable industry expansion.

**More information:** Jennifer Cobcroft, [jennifer.cobcroft@jcu.edu.au](mailto:jennifer.cobcroft@jcu.edu.au)



# Calendar of events

DATE	EVENT	MORE INFORMATION
<b>2021</b>		
8 June 2021	World Oceans Day	<a href="https://unworldoceansday.org/">https://unworldoceansday.org/</a>
14–17 June 2021	The Australian Petroleum Production & Exploration Association (APPEA) Conference and Exhibition, Perth	<a href="https://www.appeaconference.com.au/">https://www.appeaconference.com.au/</a>
16–17 June 2021	FRDC Board stakeholder engagement tour, Perth	FRDC 02 6122 2100
23 June 2021	FRDC Board Meeting, virtual meeting	FRDC 02 6122 2100
27 June – 2 July 2021	Australian Marine Sciences Association Annual Conference, Sydney	<a href="https://www.amsa.asn.au/amsa-annual-conferences">https://www.amsa.asn.au/amsa-annual-conferences</a>
8–10 July 2021	Australian Fishing Trade Association Trade Show, Gold Coast	<a href="https://afta.net.au/trade-show-2/">https://afta.net.au/trade-show-2/</a>
18 August 2021	FRDC Board Meeting, virtual meeting	FRDC 02 6122 2100
6–9 September 2021	Fine Food Australia, Sydney	<a href="https://finefoodaustralia.com.au/">https://finefoodaustralia.com.au/</a>
16–17 September 2021	Fish Waste for Profit, Reykjavik, Iceland	<a href="https://www.icefishconference.com/">https://www.icefishconference.com/</a>
20–24 September 2021	World Fisheries Congress, Adelaide	<a href="https://wfc2021.com.au/">https://wfc2021.com.au/</a>
21 November 2021	World Fisheries Day	<a href="https://nationaltoday.com/world-fisheries-day/">https://nationaltoday.com/world-fisheries-day/</a>

## Movers and ...



**Don Nicholls** has resigned as executive officer of the Southern Seafood Producers (WA) Association but is continuing as a director of the Western Australian Fishing Industry Council (WAFIC) board in 2021.

**Roberta Muir** has left the Sydney Seafood School.

**Brad Milic** has left the Australian Maritime Safety Authority to join Australian Longline as General Manager.

**Jeremy Lyle** retired from the Institute for Marine and Antarctic Studies at the University of Tasmania in May.

CSIRO appointed

**Dan Metcalfe** as director of Oceans and Atmosphere in March. He was previously deputy director with CSIRO Land and Water.

**Tom McCue** has left his position as senior manager of emerging industries at AgriFutures to join Hort Innovation in Sydney as business development manager Hort Frontiers.

**Mannie Shea**, executive officer resource access – oil and gas with WAFIC, has moved to Austrade to focus on export in the agribusiness, food and seafood sectors.

**Carli Telfer** has stepped into the

position of WAFIC industry development manager.

**Tim Lester** has finished his role as executive officer of the Council of Rural Research and Development Corporations. **Anwen Lovett** will provide secretariat support to the Council.

**Kathy Grigg** and **Anne O'Donnell** have been appointed to the inaugural board of Agricultural Innovation Australia along with **Bernie Brookes**, **Anne Astin** and **Heather Stacy**.

The new board is in the process of appointing a chief executive officer.

Executive officer

of VRFish **Michael Burgess** has left this position, returning to Western Australia with his family.

The Cooperative Research Centre for Developing Northern Australia has appointed **Anne Stünzner** as its new CEO, based in their head office in Townsville, replacing **Jed Matz**.

**Emily Mantilla** is leaving Honey and Fox to pursue her interests in the community services sector.

**Alan Snow** has retired from his role leading the FRDC's Fish Names Committee.

The FRDC has

### MOVERS WE'VE MISSED?

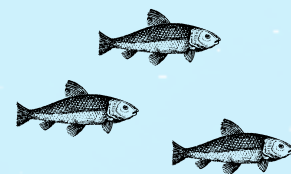
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02 6122 2128 [ilaria.catizone@frdc.com.au](mailto:ilaria.catizone@frdc.com.au)

farewelled **Peter Horvat**, its general manager of communications, marketing and trade. He takes up a position as manager of the AusIndustry Engagement team. The role of FRDC's communications manager is currently being filled by **Annabel Boyer**.

**Andy Myers** has left OceanWatch Australia where he was the oyster industry extension officer to take up a position with Blue Harvest.



**Michael O'Shea** has left Sugar Research Australia after 23 years to take up a position as innovation broker at the Global Change Institute, University of Queensland.



### FEEDBACK

FRDC WELCOMES YOUR COMMENTS  
[frdc@frdc.com.au](mailto:frdc@frdc.com.au)

*FISH* magazine is printed on FSC-certified paper stock using vegetable-based inks by a printer with ISO14001 Environmental Management System Certification.