

# FISH

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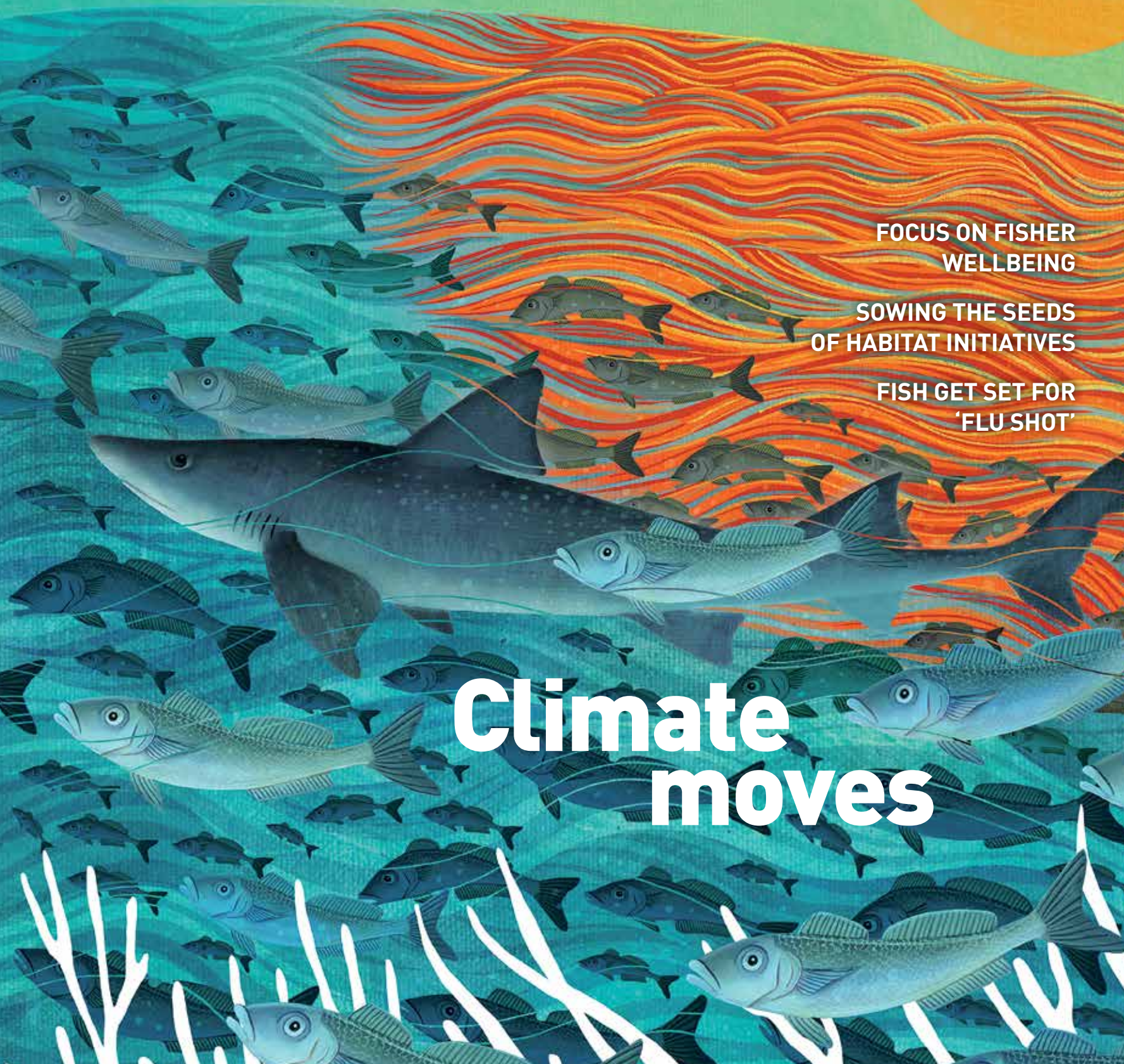
DECEMBER 2018

**FOCUS ON FISHER  
WELLBEING**

**SOWING THE SEEDS  
OF HABITAT INITIATIVES**

**FISH GET SET FOR  
'FLU SHOT'**

## Climate moves





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**SEAFOOD  
DIRECTIONS  
2019**



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DECEMBER 2018

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A photograph of two men sitting on a concrete pier. The man on the left is wearing a pink shirt and dark pants, and the man on the right is wearing a light blue shirt and dark pants. They are both smiling. A large orange lifebuoy is positioned between them. The pier is made of concrete and has wooden posts. In the background, there are boats and fishing equipment. The water is calm and reflects the pier and the sky.

# Fisher wellbeing in focus

By Annabel Boyer

Journalist Ray Martin, left, and Tasmanian Seafood Industry Council chief executive Julian Harrington attended the Stay Afloat event, a fundraiser for mental health in the seafood industry. Photo: Mathew Farrell





## Initiatives around the country are kick-starting conversations around mental health in Australia's seafood sector

**“If a boat’s going down, even if it’s your worst enemy, you are going to save them,”** says Julian Harrington, CEO of the Tasmanian Seafood Industry Council (TSIC). “It should be the same if a mate is going under, in terms of their mental health; we need to help each other.”

To better position the seafood sector to do this, TSIC is leading an industry initiative to address mental health issues, launching its ‘Stay Afloat’ campaign in October 2018, which is Mental Health Month.

The launch event – a fundraising cocktail party – was held in Hobart on Saturday 13 October, with 170 people attending. MC for the launch event was television personality Ray Martin, who has agreed to act as official ambassador for mental health in Tasmania’s seafood industry.

Funds raised on the night, with sponsorship, have provided \$50,000 to kick off the Stay Afloat campaign. Planned activities include a peer initiative to encourage those in the Tasmanian seafood sector to look after one another.

One of the main aims of the campaign will be to #drownthestigma around mental health issues, to ensure that people in the seafood sector feel able to seek help when they need it. Julian Harrington says TSIC is keen to see people use the #drownthestigma hashtag to spread the word on social media, and to emblazon it on vehicle bumper bars and the wheelhouses of their vessels.

TSIC is running the Stay Afloat campaign in partnership with Rural Alive and Well Tasmania, a non-profit organisation that helps individuals, families and the community to manage mental health issues, with a focus on suicide prevention.

Julian Harrington says the partnership means TSIC is able to tap into the Rural Alive and Well network of outreach officers in regional areas.

### Identified need

He says the need for an initiative such as Stay Afloat became apparent on several fronts, among these the results of the first national survey on the health, safety and wellbeing of Australia’s commercial fishing industry, conducted in 2017. Preliminary results indicate an alarming rate of psychological distress within Australia’s fishing industry. The survey was funded by the FRDC as part of a broader, three-year Sustainable Fishing

Families project to provide better evidence of the extent of mental health issues in the sector.

Mental wellbeing has long been a hidden and neglected issue in the sector. Almost a decade ago in 2009 a report released jointly by the Australian Department of Agriculture Fisheries and Forestry and the country’s research development corporations, including the FRDC, identified fisher mental health as in need of attention.

Since then several programs have addressed mental health wellbeing in farming communities, but fishing communities continued to miss out.

With TSIC’s Stay Afloat campaign and a new mental health initiative called Project Regard launched by Women in Seafood Australasia (see story on page 28 to 29), the issue seems to be finally gaining momentum.

### Workshop

In September 2018, the FRDC’s Human Dimensions research subprogram hosted a workshop in Adelaide, in preparation for the development of a mental health strategy for the seafood sector.

Attendees heard from speakers representing other industries and mental health organisations, who described how they approached this issue. Seafood sector representatives also attended to give their perspectives.

At the workshop, Beyond Blue’s Catherine Doherty noted that the cost to Australian businesses of not addressing mental health issues was about \$11 billion a year. She commended the fisheries sector for considering an industry approach and encouraged people and businesses to take action regarding workplace mental health by using the free, evidence-based resources available at the Heads Up website ([www.headsup.org.au](http://www.headsup.org.au)).

“It is good to consider an integrated approach to workplace mental health, which

includes promoting positive mental health, taking preventative measures to manage workplace risks and of course supporting people who are managing a mental health condition, regardless of the cause,” she said.

Gail Jamieson, from the Drought Wellbeing Service run by the Royal Flying Doctor Service (RFDS) in Queensland, spoke about providing services for rural communities and the importance of making contact with those potentially in need of services.

“There is no difference in the prevalence of mental health issues between metropolitan and rural areas; there is a difference in access to services,” she said.

Dealing with remote and often isolated populations has required the program to be creative in order to connect with people, by attending a wide variety of community events.

The Drought Wellbeing Service also trains all frontline staff to recognise and deal with signs of mental illness. “We use a ‘mental health as part of total health’ model, which introduces the topic of mental health in a non-intrusive way,” Gail Jamieson said.

Leader of the FRDC’s Human Dimensions subprogram Emily Ogier says that in order to progress, the fishing and aquaculture sector will need to adopt what others have done well and make improvements where approaches are lacking, particularly to take into account the unique aspects of the fishing and aquaculture industry.

“The next actions are to actively support industry mental health champions with recognition and training so we can give support to those in the industry who need it. We need to build more partnerships to make sure support services are available to people in fisheries and aquaculture, and that these services can ‘talk fish,’” she says. **F**

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“It is good to consider an integrated approach to workplace mental health, which includes promoting positive mental health, taking preventative measures to manage workplace risks and of course supporting people who are managing a mental health condition, regardless of the cause.”

Catherine Doherty, Beyond Blue

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# Insights fuel fisher wellbeing program

By Brad Roberts

Fishing operators and their families experience some unique challenges and high levels of psychological distress.

These are the findings in the preliminary analysis of the first national survey of the health, safety and wellbeing of the Australian commercial fishing industry, led by Deakin University researcher Tanya King.

Anonymous responses to the survey identified traditional stressors such as fluctuating markets, severe weather and the physical dangers of fishing, as well as 'modern uncertainties' including red tape, livelihood insecurity and regulatory change.

While fishers are good at dealing with traditional risks, they are less able to deal with modern uncertainties because they can not control or anticipate these decisions.

The survey identified common symptoms of mental distress, which include difficulty sleeping, stress, trouble concentrating and remembering. These are symptoms with the potential to increase the existing risks of fishing, reduce productivity, and affect family relationships.

The survey is part of the FRDC's Sustainable Fishing Families project, hosted by Deakin University in partnership with the National Centre for Farmer Health in Hamilton, which also aims to provide practical ways to deal with the stress caused by these factors.

As part of the same project, a pilot program of health literacy workshops for fishing families has been developed based on the model of the successful Sustainable Farming Families program, which has been running for 10 years in Australia and adopted in other countries.

The aim is to build resilience and positive wellbeing so that fishing operators and their families can better 'ride the bumps' of a challenging profession while enjoying happy and fulfilling lives.

The program consists of three workshops (one two-day workshop and two one-day workshops), which have been delivered in Victoria's Bellarine Peninsula region over 12 months. Families learned from health professionals about issues, dangers and risks specific to the fishing industry and what individuals can do to maximise their productivity and improve their quality of life.

With the help of health professionals, participants tracked their own health and developed pathways to improve their health and wellbeing.

A key feature of the program has been the personalised action plans identifying personal goals and strategies that the participant can track over time. The workshops covered a range of important topics relating to health and wellbeing — from men and women's health, to discussion about depression and suicide. Individual health testing, one-on-one health checks and specialist referrals were also included in the program.

Tanya King says the workshops have had extremely positive results and the Victorian Government had funded more.

"I'll never forget one participant saying: 'If it wasn't for this program, I'd have been dead on the side of the road by now, for sure. But here I am, working harder than I have in years ... and feeling fantastic!' That's a gratifying process to be a part of," she says.

"Seeing the health and productivity of participants improve in ways even they didn't think was possible has been amazing. I'd love to see this program rolled out to as many fishing communities as possible across the country." **F**

*(Updated from an article originally published in Australian Maritime Safety Association's Working Boats magazine.)*



Above Mates Dave Withers and Bruce Davey.  
Photo: Bruce Davey

## CHECK ON YOUR MATES

By Sarah Cameron

Fisher and business owner Bruce Davey says it is important to proactively manage your employees' wellbeing at sea.

"In an operation like ours, which runs seven days a week, 30 days a month, 180 days a year, we need to be perceptive to the moods of those on board," Bruce Davey says.

"If there's any hint of depression or other mental health issues with staff, I need to make sure they have the opportunity to talk to someone.

"Many family operations like ours are literally working 14 and 15-hour days, then doing their own accounting, log books and their steering watches.

"The first thing that happens with fatigue is that people get angry. In the past there was no compassion for that, it was about hardening up but that's changed today.

"We make sure they're not working 31 hours straight, and pretty much just look after them and work as a team.

"We also have a highly articulated job description of what's expected, so young kids coming into the job know what they're getting themselves into. They're encouraged to develop self-confidence, to come to the captain with any issues, to take part in meetings about everything that's happening and to log everything. This is a part of our safety management system.

"There are other pressures on a local, state and national level that can cause additional stress. But I concentrate on things I can do something about to improve the quality of life for myself and my crew." **F**

*(Originally published in Australian Marine Safety Association's Working Boats magazine.)*



## Fish 2.0 – Regional hub of seafood entrepreneurs and investors

Australia's first FISH 2.0 workshop held in Melbourne in October was attended by 16 groups of seafood entrepreneurs, with an additional 40 investors and seafood experts attending the associated investor pitch session.

Sponsored by the FRDC, the event is part of a long-term plan to build an innovation investment network for the seafood sector, which also includes the FRDC's business incubator program Fish-X.

The FISH 2.0 event provided expert advice to entrepreneurs on how to present their venture to potential investors or partners and launched partnerships among several participants. It was run by Fish 2.0, a US organisation that works to connect sustainable seafood ventures with investors through regional workshops and a global online competition for seafood entrepreneurs.

A second, larger Australia–Asia-Pacific regional event is scheduled for Brisbane in March 2019. It will include opportunities for Australian ventures that have competed online in FISH 2.0 to pitch to a broad group of investors from Australia, the Pacific Islands and South-East Asia.

Sign up for the online competition or to receive news about the Brisbane event at the FISH 2.0 website ([www.fish20.org/ventures/2018tracks/australia](http://www.fish20.org/ventures/2018tracks/australia)).

All ventures that qualify through the online competition will be invited to join the FISH 2.0 global online connection platform to connect with business partners and investors. Top-scoring finalists will also be invited to pitch at the FISH 2.0 Global Innovation Forum in Silicon Valley in late 2019.

There is no cost to participate in the online competition. **F**

**More information:** [cole@fish20.org](mailto:cole@fish20.org)



**Above** FRDC's new board, during their induction in Canberra (Left to Right): Saranne Cooke, Patrick Hone, Katie Hodson-Thomas, Colin Buxton, Kate Brooks, Ron Boswell, Mark King, Lesley MacLeod, John Lloyd.

### New FRDC directors

FRDC chair Ron Boswell has welcomed five new directors appointed to the FRDC Board by the Minister for Agriculture and Water Resources, David Littleproud, in October 2018, which has expanded the board from eight to nine members.

The new directors are Kate Brooks, Saranne Cooke, Mark King, John Lloyd, and Katina (Katie) Hodson-Thomas. Two members of the previous board, Lesley MacLeod and Colin Buxton, have been reappointed. Patrick Hone remains as managing director and Ron Boswell will stay on as chair.

The outgoing directors are Renata Brooks, John Harrison, Daryl McPhee and John Susman. Ron Boswell thanked all those on the outgoing board for their hard work and service in overseeing the first three years of the FRDC's Research, Development and Extension Plan for 2015–20, which marked a new approach to research investment and performance for the organisation. **F**

**More information:** [www.frdc.com.au/About-us/FRDC-Directors](http://www.frdc.com.au/About-us/FRDC-Directors)

### NSILP APPLICATIONS OPEN

Applications for the 2019 National Seafood Industry Leadership Program (NSILP) are now open and will close on 17 January 2019.

The program runs over six months and involves three, three-day residential sessions as well as ongoing work on team projects. Two

programs will run in 2019, the first beginning on 5 March and the second beginning on 7 May. The NSILP is funded by the FRDC, Sydney Fish Market and Austral Fisheries. For a rundown on the 2018 program see page 36. **F**

#### For more information and to apply:

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### JOIN THE WFC2020 PROGRAM

Australia will host the World Fisheries Congress 2020 (WFC2020) in Adelaide from 11 to 15 October 2020. The International Program Committee is calling for expressions of interest to lead sessions, symposia, and education and training workshops.

Commercial, recreational and Indigenous sector-led sessions, as well as student-led sessions, are encouraged.

The WFC2020 program aims to test current thinking and practices, identify opportunities to enhance global fisheries, and address the challenges of fishing sustainably and maintaining prosperous fishing communities.

Applicants are encouraged to think beyond traditional approaches and consider alternatives to the normal conference formats (such as interactive 'Ask me anything' sessions, light-speed presentations, fishbowl panel discussions, debates, workshops). **F**

Email the committee with ideas or suggestions at [conference@aomevents.com](mailto:conference@aomevents.com) by 31 January 2019. More information: [www.wfc2020.com.au](http://www.wfc2020.com.au).





Photo: Shutterstock

## TECHNOLOGY

**Albatross surveillance**

Albatrosses fitted with tiny radio transceivers are the latest recruits in global efforts to identify illegal fishing. Scientists from France and New Zealand have developed a tiny transceiver beacon, weighing less than 60 grams, which will be fitted to about 250 albatrosses.

The device can pick up low-level radar signals from a trawler within an eight-kilometre radius and will transmit these to the French navy. Vessels require radar to safely navigate the ocean, even if automatic identification systems (AIS) have been turned off to avoid being tracked by satellite, which illegal fishers often do.

Scientists will also use the transceiver beacons to track the birds and analyse their feeding habits. **F**

Source: *The Telegraph*, London

## WORDS

**TRACEABILITY AND AUTHENTICITY**

'Traceability' and 'authenticity' are often used interchangeably, but the two are quite different and require different techniques to assess.

Traceability refers to the ability to track a product from one process or location to the next. The ultimate aim is to track a product from the beginning of its life through every step to the end of its life or, in the case of seafood, from its source to the consumer.

Authenticity relates to the inherent characteristics of a product that allow it to be identified as genuine – the real thing – whatever those characteristics might be. Traceability may help verify some specific attributes, such as the original source, but will not identify a characteristic such as species. **F**

## ECOLOGY

**SAWFISH DISCOVERED**

CSIRO researchers have discovered a new and healthy population of the critically endangered sawfish (*Pristis microdon* and *Pristis clavata*) in the Northern Territory's Victoria River this year.

The survey that found the sawfish was part of a bigger project to establish a monitoring program in the 560-kilometre-long Victoria River, in collaboration with the Northern Land Council and the Timber Creek Rangers.

Sawfish are among the most endangered species on the planet and Australia has a few viable populations in some remote regions.

Numbers have declined dramatically as a result of bycatch in commercial fisheries, Indigenous and recreational capture, and habitat modification and destruction.

Sawfish return to breed in the same area they were born in, which has resulted in distinct genetic groups that stay in one place and do not interbreed. Because their numbers are so low, little is known about the basic biology of sawfish, including how long they live, what size they can grow to or how often they breed.

The survey team, led by Richard Pillans, also discovered two other species of shark never before recorded in the area during their trip – the critically endangered Speartooth Shark and Northern River Shark.

The project is designed to estimate the population of sawfish and Speartooth Sharks in the river as well as understanding the cultural significance of sawfish to the traditional owners.

The tissue samples taken during the survey will be used to determine if the sawfish and Speartooth Sharks in the Victoria River are genetically distinct to populations in other rivers in Australia and will also be used to estimate population size as part of a long-term study on the population status within the Victoria River. **F**

Source: CSIROscope



Photo: David Wachenfeld

RESOURCES/  
COMMUNICATION**SMARTPHONE  
APP FOR FISH  
STOCKS**

The *Status of Australian Fish Stocks (SAFS)* reports will soon have their own smartphone app, making it easier for customers to check on the sustainability status of different species as they are buying seafood.

The app is in development and will be launched with the next update of the reports, early in 2019.

The app will aim to make the information on the status of Australia's commercial fish species more accessible, distilling information from the SAFS reports into clear language appropriate to a lay audience.

The SAFS reports are the most scientifically robust, up-to-date information on the sustainability of Australia's fish stocks. **F**

More information: The SAFS reports can be found at: [www.fish.gov.au](http://www.fish.gov.au)





**MORE INFORMATION**

David Stone, david.stone@sa.gov.au  
FRDC RESEARCH CODE: 2016-200.40

**Below** Researchers conduct post-mortems on Yellowtail Kingfish following trials to assess the success of different dietary formulae.

Photo: Andrew Oxley



# Research reveals fishmeal alternatives

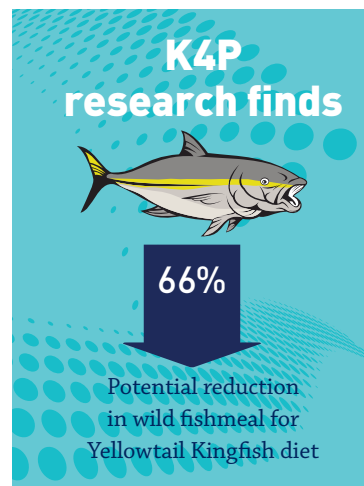
The search for more sustainable proteins in fishmeal has found some options for Yellowtail Kingfish feeds

By **Catherine Norwood**



SARDI researcher  
Matthew Bansemmer

*“Finding cheaper and more sustainable alternative proteins to replace fishmeal will help reduce production costs and improve the sustainability of aquaculture.”*



**Research into the composition of feeds for farmed Yellowtail Kingfish** (*Seriola lalandi*) has found it is possible to reduce the wild-sourced fishmeal component of diets by two-thirds without any significant impact on fish health or growth rates.

Project principal scientist David Stone, from the South Australian Research and Development Institute (SARDI), says the feed trials were part of the larger three-year ‘Kingfish for Profit’ (K4P) project, funded through the Australian Government Rural Research and Development for Profit programme, which ends early in 2019.

A dietary source of lipids and protein, fishmeal is an essential component of aquaculture diets for carnivorous fish and typically makes up about a third of Yellowtail Kingfish feeds. However, wild-sourced fishmeal has several downsides. It is increasingly expensive due to growing demand, at more than \$2300 per tonne in 2018. And although it is a renewable resource, fisheries managers limit the quantities of fish taken out of the ocean.

SARDI researcher Matthew Bansemmer says finding cheaper and more sustainable alternative proteins to replace fishmeal will help reduce production costs and improve the sustainability of aquaculture.

Alternative ingredients in the trials included fishmeal derived from the by-products of fish processing, poultry meal and soybean protein concentrate.

Six diets formulated to contain these ingredients were compared in a nine-month tank trial conducted at the South Australian Aquatic Sciences Centre from late summer to early spring.

The diets included:

- a control with 30 per cent wild-sourced fishmeal;
- 20 per cent wild-sourced fishmeal and 10 per cent fishmeal derived from fish waste by-products;
- 10 per cent wild-sourced fishmeal and 20 per cent fishmeal derived from fish waste by-products;
- 20 per cent wild-sourced fishmeal and 10 per cent poultry meal;
- 10 per cent wild-sourced fishmeal and 20 per cent combined fishmeal from waste by-products and poultry meal; and
- 20 per cent wild-sourced fishmeal and 10 per cent soy protein concentrate.

Over the course of the trial the growth, feed and nutrient use for fish given fishmeal combined with alternative ingredients was similar to that of the control group, which was fed a diet containing 30 per cent wild-sourced fishmeal.

Fish grew from 2.5 to 4.3 kilograms and there was little difference in growth or feed conversion rates between the ingredients tested.

All diets for the trials were prepared by Skretting Australia, which is a partner in the K4P project, along with FRDC, Ridley, Clean Seas Seafood, Huon Aquaculture, SARDI and the NSW Department of Primary Industries.

Information about the performance of a wider range of more sustainable proteins will provide manufacturers and producers with the flexibility to take advantage of fluctuations in the availability and prices of ingredients.

David Stone says while water temperatures in tanks represented conditions in SA, the findings will also have application for feed formulations used in Port Stephens, NSW, and Geraldton, WA. He says pilot-scale ocean-based commercial trials should be undertaken before the findings are implemented more broadly for commercial use. **F**



# Hooked on fish 'n' chips



Our national judge lifts the lid on what it's like to eat fish and chips for every meal, as well as what gave Western Australia's Hooked on Middleton a winning edge

By John Dory

It sounds like a dream job: national fish 'n' chip judge. In many ways, perhaps it is – especially if you're fond of a battered deep-blue diet. But as any food critic will tell you, sometimes you have to eat a bag full of bad to find the gloriously golden winners.

The competition was fierce as the FRDC sent nine judges into the fryer to sample the seafood swagger of some 35 national finalists from Queensland, New South Wales, Victoria, Tasmania, South Australia, Western Australia and the Northern Territory, and to whittle the list down to state winners, and of course the national numero uno.

Eating fish 'n' chips is often a fast affair. Five minutes in the fryer, a quick dash to a perch, then the furious face stuffing begins, before the chips get cold.

Our mission was to sample one grilled, one battered and one crumbed fish – whatever

species best suited each application, according to staff at any given venue. We investigated their connection to local seafood suppliers and fishers, and their local community too, the information they supply about species and sustainability and considered cleanliness, freshness and how well it was seasoned, cooked and packaged.

Last year was an eye-opener in regards to some world-class fish 'n' chippers down under. In 2018 we discovered a whole new kettle of keenly competitive fish 'n' chippers: enthusiastic, passionate and eager to inform guests of every minor detail if they asked.

## Seafood champions

What is evident is that fish 'n' chippers have it tough. Long hours, a high-priced, fragile product and a low average spend means they're always run by owner-operators with few staff. And yet the best operators were really in their

element doing Australian seafood proud.

We have realised that you do not need a seafood display of the catch of the day to prepare and cook the most delicious fish 'n' chips. You do not need fancy packaging and you do not need to be strictly just a fish 'n' chipper either. Sometimes there is a need to be a mixed business to survive financially, and in some instances the fish 'n' chips were sensational, but in others our grilled fish tasted like a hamburger.

What surprised us the most were the undiscovered gems – the shops and the passionate staff, including some fabulous young people with such a good attitude and customer service. You just wanted them to win because of their commitment and belief in the product.

It was also exciting to realise how varied good fish 'n' chips can be, from a hole-in-the-wall with a small menu to a diner-style sit-down affair. Many operators were looking at the bigger





## 2018 WINNERS

### NATIONAL WINNER

Western Australia Hooked on Middleton, Albany

### STATE AND TERRITORY AWARDS, JUDGED WINNERS

#### New South Wales

Beach Street Seafoods, Forster

#### Northern Territory

Frying Nemo, Stuart Park

#### Queensland

Fish & Chips Co, Wynnum West

#### South Australia

Stunned Mullet, Henley Beach

#### Tasmania

Tasmanian Gourmet Seafoods, Cambridge

#### Victoria

Blu by Australian Seafood, Coburg North

#### Western Australia

Hooked on Middleton, Albany

### STATE AND TERRITORY PEOPLE'S CHOICE AWARD WINNERS

#### New South Wales

Pelican Rocks Seafood Restaurant and Café, Greenwell Point

#### Northern Territory

Frying Nemo, Stuart Park

#### Queensland

Fresh Coral Seafoods, Mudgeeraba

#### South Australia

Sotos Fish Shop, Semaphore

#### Tasmania

Fraggles Fish and Chips, Invermay

#### Victoria

Seafood on Evans from Victoria, Sunbury

#### Western Australia

Ocean and Paddock, Albany

picture too: not only great fish 'n' chips and great local seafood, but supporting local fishers and educating customers about sustainability and the environment, including packaging, using local suppliers, QR codes and doing their own filleting.

We also got to appreciate how well supported some were by the locals. Often without prompting, passers-by or customers would voluntarily offer comments: "This place has the best fish 'n' chips"; "You've chosen the best place to eat", or "You know they do the best fish 'n' chips in the state."

And for quite a few they were right. The state winners were exceptional, and some very good fish 'n' chippers missed out on a gong too.

### National winner

But there can only be one national winner. Western Australia's Hooked on Middleton trains its staff to share knowledge of all fish on the menu. It is clean, switched on and blurs the lines between seafood restaurant and fish 'n' chipper without hurting the hip pocket.

The menu changes daily and each day it has



Above The Vale family, from left, Kelly, Janine, Hayley and Shane, from Hooked on Middleton, collected the award for the nation's best fish and chips. Photo: FRDC

new fact sheets to complement it. The battered flathead was crisp on the outside with moist fish inside. Crumbed whiting was butterflied with the tail still attached – so crisp the tail could be eaten too. Bright Redfish was spot on grilled with a subtle lemon pepper and the chips crisp and made from local spuds. It is dining moments like this that confirm national fish 'n' chip judge as one of the best jobs on the planet. **F**

### CALLING ON FISH 'N' CHIPPERS FOR FEEDBACK

The 2018 National Fish and Chips Awards are over for another year. The FRDC is inviting your feedback on how they went. Perfecting how the FRDC runs the

awards is an ongoing process. The 2018 awards were run with three key changes from the inaugural awards of 2017, based on feedback from fish 'n' chip shops. These included implementing a consistent timetable

across different states and territories to avoid confusion, a process of email verification to ensure all votes were genuine and the inclusion of a nomination option for shops in places with smaller populations.

The judging criteria was also changed to merge the information and labelling criterion and introduce points for presentation. **To have your say on the awards go to: [www.fishandchipsawards.com.au/](http://www.fishandchipsawards.com.au/)**

## FISH AND CHIPS AWARDS 2018

By Peter Horvat

The FRDC started developing the Fish and Chips Awards as part of a longer-term plan to raise awareness around key issues related to seafood (sustainability, labelling, management and use).

Central to the program is engagement with consumers and fish and chip shops across Australia – to have a conversation about these issues. It also aimed to increase traffic to FRDC-curated sources of information – [www.Fishfiles.com.au](http://www.Fishfiles.com.au) (a central hub for seafood consumers) and [www.fish.gov.au](http://www.fish.gov.au) (the *Status of Australian Fish Stocks* reports).

The Fish and Chips Awards have gained a profile via media and word of mouth. The awards website ([www.fishandchipsawards.com.au](http://www.fishandchipsawards.com.au)) and social media channels have been used to deliver information to consumers, allow for voting and increase traffic to the FRDC's other sites.

The fish and chips shops are significant partners in the awards because they encourage people to vote, while also being valuable conduits for information. The shops showcase and provide consumers with information directly – either by having clear information present in the store or by directing consumers to sources of information. Throughout the awards the FRDC has supplied information on how shops can improve, which includes improving the information they supply.

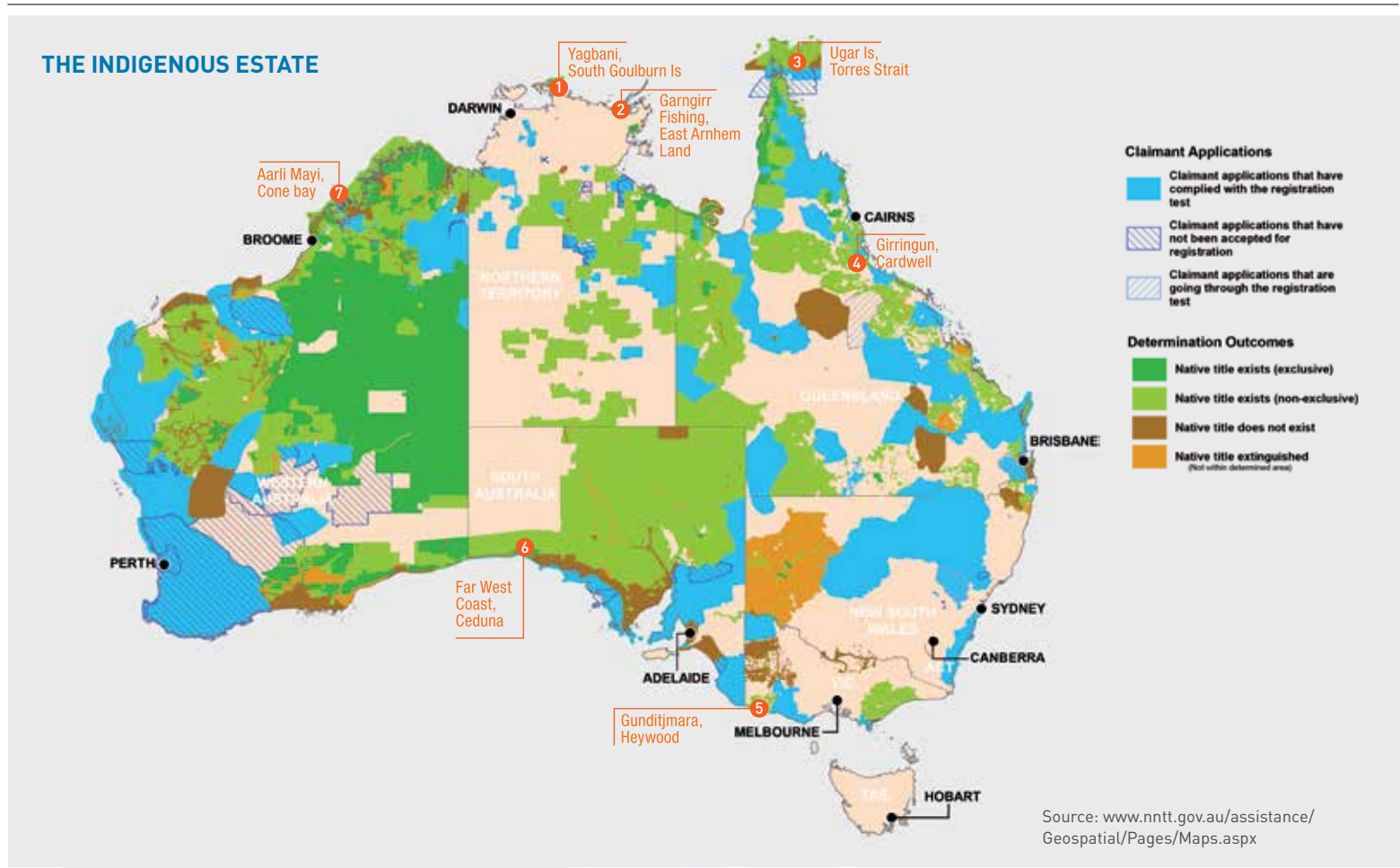
During the year the FRDC has worked to grow and build the list of fish and chips stores that registered and participated. In 2018 there was about a 15 per cent increase in the number of shops getting votes.

### Voting engagement and tracking

The Fish and Chips Awards voting process and website were redeveloped in 2018 to increase security and allow for the inclusion of more information and links to content. This information was based on the voting assessment criteria – taste, service, choice (do they sell Australian?), information (labelling) and presentation.

Two additional levels of engagement were trialled in this year's awards – when a vote was cast the confirmation and thank you emails contained randomised links to information on five areas – sustainability, cooking, industry, management and research. The goal was to get more people to find out about these issues and to assess interest levels in different kinds of information. While large numbers of consumers did not follow up the links directly back to the website, about five per cent did. The breakdown of engagement on different content types shows that information on sustainability is still of interest to fish and chip buyers. **F**





## Aligned aspirations

By Catherine Norwood

A new report maps the successful characteristics of Indigenous initiatives to develop fisheries



Ewan Colquhoun  
Principal investigator

For Indigenous communities wanting to develop their fisheries resources, a new step-by-step approach has emerged from a five-year research project, providing guidance for communities, government fisheries managers and potential business partners.

The FRDC’s Indigenous Reference Group (IRG) initiated the project ‘Building the capacity and performance of Indigenous Fisheries’, released in June 2018, which analysed seven initiatives across six fisheries jurisdictions.

The principal investigator for the project, Ewan Colquhoun from Ridge Partners, says around Australia fishery assets contribute only a small amount, directly or indirectly, to the total economic wellbeing of Indigenous communities.

“Of those communities seeking economic development, many are unaware of the true latent economic value of their fishery assets,” he says. “Looking beyond customary uses, most communities have only limited engagement in fishery economic activity, and therefore underutilise their fishery resources.”

Indigenous Australians own or have legislated rights under various exclusive and non-exclusive Native Title and rights to 40 per cent of the Australian land mass. Where adjacent to marine coastlines and river catchments, these rights extend to certain fishery resources as well (see map above). But Ewan Colquhoun says these rights are not leading to beneficial outcomes for Indigenous communities.

As part of the IRG project, seven case studies were developed from face-to-face discussions with community participants about actual or proposed fishery initiatives to identify processes that have worked and potential barriers to be overcome.

The Indigenous fishery community is the core stakeholder in the quest to boost the capacity and performance of Indigenous fisheries.

Ewan Colquhoun says communities vary greatly in their understanding of their fishery assets and in their engagement with, access to and use of marine or freshwater fishery resources. “This diversity compounds the economic complexity that community leaders, investors and research managers face in seeking to boost fishery capacity and performance.”

The report has come at an ideal time for Shane Holland, who has stepped into the role of traditional fisheries manager fisheries and aquaculture created at Primary Industries and Regions SA last year. He is also a member of the Indigenous Reference Group.

“It’s really useful for us as managers to understand what works and why,” Shane Holland says. “In South Australia we have Indigenous communities that

want to develop business opportunities from fishery resources. This report will help us to provide advice to those communities to enhance the success of their initiatives.”

Ewan Colquhoun says each community must decide for itself whether it wants to pursue the economic development of its fishery resources. For some communities, the potential to provide jobs, skills and meaningful activity, particularly for young people, may be the primary motivator, rather than financial returns.

### Steps to success

From the case studies, the project has identified six attributes for an Indigenous fisheries venture that provide a sound foundation for success.

1. Ensure there is formal community cultural governance in place, which establishes a leadership platform and helps to clarify the fishery assets available for potential development. This should include registration with the Office of the Registrar of Indigenous Corporations.

2. Separate the corporate governance of a business initiative from the community's cultural governance structures. Corporate governance provides independent financial and risk management for a commercial enterprise, but the aspirations of the enterprise should also align with the aspirations of local community governance.

3. Provide access to new Indigenous and non-Indigenous knowledge. Case studies indicate that this may be provided through mentoring, action learning, formal courses on and off-site, joint ventures, collaborations and supply chain relationships.

4. Incorporate microbusinesses within the business venture. This provides a way to empower families, clans and individuals, allowing each to make their own decision to specialise, invest, learn and contribute their own labour and resources into ventures that create economic returns for the community, their respective family or clan, and themselves.

5. Develop a formal business plan for the first three to five years, which is reviewed regularly thereafter. The planning process and the document are vital to defining and securing commitment from community leaders and third parties (chain partners, buyers, governments) and outcomes.

6. Establish a professional management team to lead the venture, with authority from its own board and from the community to implement an agreed business plan and strategy. The management team should report progress to owners and community stakeholders. **F**

### CASE STUDIES

The case studies examined for the 'Building the capacity and performance of Indigenous Fisheries' project include both operational and proposed fisheries economic initiatives.

- 1 In the Goulburn Islands in the Northern Territory, the five clans of the Warruwi Community established the Yagbani Aboriginal Corporation in 2011 as a not-for-profit organisation run by a joint committee of clan representatives. Fisheries activities are part of the corporation's broader

community initiatives and include ranching, harvesting and providing first-stage processing for Sandfish (Sea Cucumber), establishing an agreement in 2015 to supply Tasmanian Seafoods Pty Ltd. There have been two successful harvests and further development is underway. The corporation is also involved in research trials for Blacklip tropical oysters (*Striostrea mytiloides*) and fluted giant clam (*Tridacna squamosa*) aquaculture, in conjunction with the Northern Territory Fisheries aquaculture unit.

- 2 Also in the Northern Territory, the Yolngu people of the East Arnhem Communities established the Garngirr Fishing Aboriginal Corporation in 2013 as a commercial cooperative to harvest and distribute finfish and crustaceans. This venture has moved from a pilot project to a stand-alone business, with ongoing support from Northern Territory Fisheries. Its strategic plan includes a proposal to purchase commercial seafood licences to expand production.

- 3 In the Torres Strait, members of the Ugar Island Community own and operate the Kos & Abob Fisheries (KAF) Torres Strait Islander Corporation with volunteer management and staff. The business harvests, processes and sells Sea Cucumber and finfish to markets in Cairns. A new business plan outlines a path to establish a professional management team and progressively increase harvests of under utilised available commercial species, working with other eastern zone island communities and the Australian Fisheries Management Authority.

- 4 Based between Cairns and Townsville in Queensland, nine tribal groups are represented in the Giringun Region Indigenous Protected Area (GRIPA) governed by the Giringun Aboriginal Corporation. Established for 20 years as a not-for-profit, the corporation has stable and successful governance in place to advance participation of traditional owners in resource management and community health and wellbeing. Its current management plan incorporates the development of marine and fishery assets, with three licence options being considered. This would build on its successful sea ranger program, provide employment opportunities and create a branded Giringun sea country product.

- 5 In south-west Victoria, the Gunditj Mirring Traditional Owners Aboriginal Corporation provides the overarching governance for the affairs of the Gunditjmara people. It has two separate fishery ventures based on native eel and pipi fisheries

in development. One proposal is part of the larger regional Budj Bim Master Plan to re-establish customary eel fishing at Lake Condah, where engineered stone weirs provide a record of eel farming from more than 6600 years ago. This system has been nominated for World Heritage status. Indigenous eel fishing would enhance the developing Budj Bim Indigenous tourism experience. Investigations are also underway into a customary or commercial pipi fishery at Discovery Bay in south-west Victoria.

- 6 South Australia's Far West Coast Aboriginal Corporation was officially established in 2013, representing six clans. However, pre-existing Indigenous organisations had already established professionally run commercial enterprises for the local clans, including mining agreements and the leasing of mine equipment. Three new ventures are being planned to generate income that will support the aims of the corporation and provide for its members' cultural, social and economic needs. These new ventures in development include recreational fishing tours, a seafood tourism trail, and investment in employment opportunities in commercial fishing and downstream seafood processing.

- 7 The Kimberley Saltwater Country people in Western Australia's northern region have come together to establish a large-scale commercial aquaculture venture that aims to produce high-quality seafood for world markets. Partners in the joint venture are the Dambimangari, Bardi Jawi and Malaya Aboriginal Corporations, representing the region's three clans, and the Maxima Opportunity Group, owned by the Hutton family. Each partner has a 25 per cent share in the Aarli Mayi Aquaculture Project Joint Venture. In 2016 the venture was awarded a new aquaculture licence and lease in the Kimberley Aquaculture Development Zone to produce up to 5000 tonnes of finfish a year, and the business proposal has undergone a full feasibility study. The first harvest is expected in 2020. **F**





# Majestic game species inspires a champion's mentality

Game fishers with a real passion for Southern Bluefin Tuna are being invited to become Tuna Champions – experts able to seamlessly interweave sport, innovation and a duty to care for this iconic species



By Gio Braidotti

**S**outhern Bluefin Tuna (SBT) populations are rebuilding after falling to as low as five per cent of their original global spawning biomass (those fish capable of reproducing), which is bringing the species back into the orbit of the recreational fishing community.

SBT is a large, migratory pelagic species that has one single global population. It suffered heavily over several decades, up to the 1990s, as a result of high international fishing pressure and a lack of coordinated management.

Since then, Australia's commercial sector and others around the world have accepted steps to improve SBT management, which has included substantial cuts in catches to allow for a recovery of the stock.

The decline in stocks and contracting migration patterns had meant that SBT were beyond the reach of most recreational fishers.

Even passionate fishing enthusiasts such as Al McGlashan – who produces and presents much-loved fishing shows, such as *Fish'n with Mates* – says he grew up never encountering SBT.

But in recent years this has begun to change, with SBT appearing in greater numbers in southern Australian inshore waters. Sport fishers are not only encountering them in greater numbers but are also encountering larger fish.

All those seeking to catch SBT, either commercially or recreationally, must continue to do so in a responsible way that ensures the upward trajectory for this species.

## Positive trajectory

At the Australian Fisheries Management Authority (AFMA), Matt Daniels confirms that the species is showing positive signs of recovery internationally, with estimates placing the species at about 13 per cent of

virgin spawning biomass and on a trajectory to reach 20 per cent by the mid to late 2020s.

The SBT's recovery has been warmly welcomed by sport fishers, many of whom are getting their first taste of fishing this superbly athletic species that can reach top speeds of 64 kilometres per hour and dive to 500 metres. The opportunity to encounter these fish, and the potential to catch a fish of 100 kilograms or more, has resulted in a rush to regional coastal towns during the annual SBT migration along Australia's southern coast, bringing economic benefits to local communities.

Al McGlashan says that the SBT's return has inspired a sense of wonder so profound that it has affected how he fishes, culminating in an urge to look after these amazing animals.

"I quickly went from catching SBT for sport, to learning how to process the meat for eating to the highest quality, to now just wanting to jump

**Below** Al Mc Glashan with his son Cooper.  
Photos: Al McGlashan and Sean Tracey



### HARVEST ESTIMATE

Being highly migratory, Southern Bluefin Tuna (SBT) require international stock management protocols, which are undertaken by the Commission for the Conservation of Southern Bluefin Tuna.

As a signatory to conservation agreements, Australia was recently required to account and report on all sources of SBT mortality. For the first time, this will involve a national harvest estimate for the recreational sector, which the Australian Government is funding.

Sean Tracey is in charge of acquiring the required data. He is applying several survey methods across different states to a sample of SBT recreational fishers, in order to extrapolate the national total.

"We are well aware that people gain social and possibly health benefits from being out on the water fishing and there are proven economic benefits to regional communities from recreational fishing," Sean Tracey says.

"This survey provides an opportunity to estimate the recreational harvest of SBT, and to better understand the nature and scale of this important recreational fishery."

Recreational fishers who already do or have an interest in catching SBT are being invited to become Tuna Champions members, subscribe to the champions newsletter, download videos or exchange views, ideas and experiences on social media. As of October 2018, more than 1000 people were already following the Facebook page. **F**

### TUNA CHAMPIONS ONLINE

Reach out to Tuna Champions online:  
[www.tunachampions.com.au](http://www.tunachampions.com.au)

**f** @tunachampions

**t** bluefin38

New educational materials have been designed to flag best-practice catch, handling and processing methods for catch-to-eat and catch-and-release, as well as some specific material on tagging to assist conservation efforts.

"A key focus is to reduce wastage and unnecessary mortality of this amazing species by considering all aspects of the fishing experience from hook to plate," Sean Tracey says.

Included are tips to improve capture techniques to reduce stress and post-release mortality if the angler chooses to release the fish, through to fish processing methods to ensure the quality of the meat is at its best and as much of each fish as possible is used if the fish is kept for eating.

"We will be sharing tips not only from recreational fishers, but also from the commercial industry and chefs that specialise in making the most of the fine food products they showcase through their cooking and restaurants," Sean Tracey says. Also central to Tuna Champions is a spirit of community, a willingness to innovate and a desire to blaze a trail for an ethos that seamlessly interlinks sporting enthusiasm with responsible fishing practices – from accomplished experts and influencers through to beginners.

"Tuna Champions is all about getting everyone working together," Al McGlashan says. "We are not about assigning blame for what happened before people knew about stock management. Times have changed. Now everybody can be part of the solution."

That is a key message that inspired his latest filming project *Southern Bluefin*, sponsored by the FRDC, which recounts SBT's story and encourages recreational fishers to act as stewards of the fishery.

"This film has a powerful message," Al McGlashan says. "SBT were almost completely smacked. But look at what we have done! We turned it around."

The film is set for release in early 2019 with possible outlets including commercial Australian television channels, Netflix, the Discovery Channel and National Geographic. **F**



in to swim with them and film them," he says. "I feel privileged to have gotten to know this fish."

A new initiative called Tuna Champions is seeking to capture this spirit of awe and empower recreational fishers to be stewards and leaders in helping to continue the recovery of SBT. Tuna Champions has received the unstinting support of experienced anglers and recreational fishing peak bodies, including the Australian Recreational Fishing Foundation (ARFF).

Tuna Champions works by providing a virtual community to share experiences, access expert advice, watch videos on handling and processing, and basically champion practices that allow fishers to get the most value and enjoyment from this fish – with the least wastage.

Tuna Champions is co-funded by the FRDC and Australian Department of Agriculture and Water Resources (DAWR).

### Responsible stewards

The science behind the Tuna Champions educational resources is supplied by lead investigator Sean Tracey of the Institute for Marine and Antarctic Studies at the University of Tasmania.

Sean Tracey previously led one of the world's largest SBT post-release survival studies using satellite-tags; the results of that study, funded by the FRDC, underpin some of the newly acquired knowledge available to Tuna Champions. A prime example is an understanding of the relationship between fight time and the physiological stress that affects SBT's ability to survive being caught.





Illustration  
 Sonia Kretschmar



## Our fisheries in 2050

By Bianca Nogrady

Models are providing researchers with predictive capability into the effect of climate change on Australia's fisheries with implications for fisheries management



Beth Fulton  
 Group leader at CSIRO Oceans and Atmosphere

*"It's the first time globally where so many different models have been used to piece together a continental-scale consideration of the effects of climate on the fishing industry."*

### The fishing industry is no stranger to seasonality. Fish migrate,

invertebrates spawn or moult at varying times of year, and larger meteorological forces such as the El Niño-Southern Oscillation change how, where and in what numbers fish and seafood can be harvested. But the changes now being seen in many of Australia's most significant fisheries are something different. Some stocks are declining despite strict harvest limits, and species are turning up in places that used to be well beyond their comfort zones.

"After more than a decade of having last considered climate change effects on our fisheries we decided it was time to revisit its importance," says Nick Rayns, executive manager of fisheries management at the Australian Fisheries Management Authority (AFMA).

"And it was only then that we realised climate may be playing a more significant role in our fisheries; it wasn't just about how much fish the fishing industry was taking out of the water," he says.

CSIRO, with funding from the FRDC, has delivered a comprehensive, evidence-based projection of the changes likely to occur in Australian fish stocks between now and 2050. The report, *Decadal scale projection of changes in Australian fisheries stocks under climate change*, was a massive undertaking, says lead author Beth Fulton, group leader at CSIRO Oceans and Atmosphere.

The greater availability of data has allowed this most recent project to make detailed predictions about a wide range of commercial fisheries species, based on extensive modelling. It builds on a legacy of FRDC research into the effects of climate change on Australia's fishing and aquaculture ongoing since 2009. (For more information on FRDC's climate adaptation program of research, led by Colin Creighton, go to the FRDC website [www.frdc.com.au/Industry-and-Environment/Climate-change/Climate-Adaptation-Program](http://www.frdc.com.au/Industry-and-Environment/Climate-change/Climate-Adaptation-Program)).

### 2050 projection

"It's the first time, globally, where so many different models have been used to piece together a continental-scale consideration of the effects of climate on the fishing industry," Beth Fulton says.

Researchers concluded that 70 per cent of more than 100 key Australian fish species important to commercial, recreational and Indigenous fisheries are sensitive to climate change, along with several protected species.

The abundance, movements, distribution or behaviour of these species could be affected – positively or negatively – by changes in water temperature and the flow-on ecosystem effects of those changes. But predicting these changes is far more complex than a simple 'physics to fish' modelling approach, which only takes into account the direct effect of temperature on fish, says CSIRO scientist Alistair Hobday, a co-author of the report.

"Fish don't eat temperature, they don't eat chlorophyll, they don't eat salinity," Alistair Hobday says. "That tells us that our modelling has to take much greater account of the prey that the fish might eat, because the prey could go up and down, or the prey could move somewhere else."

The 13 models were all 'forced' by temperature, meaning that temperature is the main variable altered. But some models also took into account pH, rainfall and nutrient changes – either directly or via those being forced by changes in productivity predicted by global-scale climate models.

By incorporating several different modelling approaches, researchers were able to see where the different models agreed – giving them greater confidence in the predictions – and where they did not.

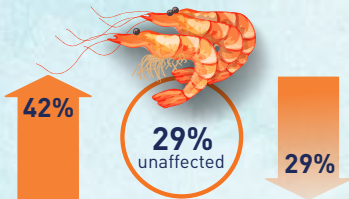
In most fisheries, the agreement of models provided a moderate level of certainty in the predicted outcomes. Australia's tropical fisheries were the exception, with only a low level of certainty (see infographic right).



## COMMONWEALTH FISHERIES 2020-25 MODELLED CLIMATE CHANGE SCENARIOS

### NORTHERN PRAWN FISHERY

All species potentially sensitive, but may benefit in the long term

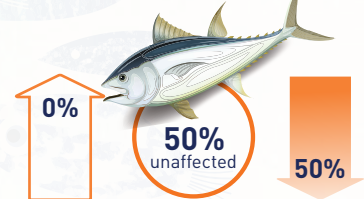


Likelihood of fish stocks declining

Moderate level of certainty

### TROPICAL FISHERIES

All species potentially sensitive, 'apparently few winners'



Likelihood of fish stocks declining

Low level of certainty

### EASTERN TUNA AND BILLFISH FISHERY

All species potentially sensitive, but many will likely still cope



Likelihood of fish stocks declining

Moderate level of certainty

### FISHERIES EXPERTS ESTIMATE

# 70%

OF KEY COMMERCIAL SPECIES ARE LIKELY TO BE AFFECTED BY CLIMATE CHANGE

### KEY

- ↑ % Increase in stock level
- % of stock unaffected
- ↓ % Decrease in stock level

Computer models were also used to explore potential futures for the main fished species and the effects on the gross value of fisheries

Source: CSIRO

### SMALL PELAGIC FISHERY

All potentially sensitive, but many will likely still cope



Likelihood of fish stocks declining

Moderate level of certainty

### SOUTHERN AND EASTERN SCALEFISH AND SHARK FISHERY

Some species are already being affected.



Likelihood of fish stocks declining

Moderate level of certainty



## Exposed

Even with these uncertainties, Beth Fulton says she was surprised by the sheer magnitude of the exposure of Australian fisheries to the effects of climate change.

“There’s already more than a hundred species that have shifted distributions and moved further southward,” she says. “There’s been an increasing number of extreme events, particularly affecting the waters around Australia and the marine habitats that our fish species rely on.”

But not all species are negatively affected. For example, in the Northern Prawn Fishery, the report found that all species were potentially sensitive to changing climatic effects, but some could benefit in the short term. Similarly, the Eastern Tuna and Billfish Fishery modelling showed about one-fifth of species was likely to benefit from increasing temperatures, and one-third would suffer from them.

Alistair Hobday says the overall trend points to short-term winners but long-term losers.

“Particularly in southern Australia, warming waters might enhance the growth rate of fish, so they’ll grow more quickly, they might have more offspring, but in the long term that temperature increase will have a negative effect,” he says. This is because species have a ‘thermal preference’ – a temperature distribution that best suits them – which is hump-shaped.

“For fish living at temperatures on the uphill side of the hump, as it gets warmer their performance will increase,” he says. “But once you get over the hump and down the other side, as temperatures increase still further, their performance declines.”

For more stationary coastal species, such as scallop, rock lobster and abalone, that temperature increase is more problematic. These species could find it more difficult to relocate the required distances to cooler water.

Pelagic fish species have it a little easier, because they can move southwards or further out to sea to escape the increasing temperatures.

But this raises a major issue for fisheries management: what happens when a species moves beyond the legal boundaries of a fishery?

## Fishing boundaries

AFMA recently convened a cross-jurisdictional steering committee, made up of representatives from environmental organisations, the commercial and recreational fishing industries, managers and the research community, to address this question. The committee’s aim, over the next year or so, is to explore how adaptable Australian fisheries are, and what can be done to improve their resilience against a changing ocean climate. Nick Rayns says the committee will explore three key issues.

The first issue is fishing boundaries – do they need to be moved to enable industry to remain sustainable and profitable?

The second issue is fishing methods – is more freedom needed in choosing a method to give fishers greater flexibility as fish stocks change in abundance or location?

The third issue is fishing rights. The quota fishery system in place allows fishers to take a certain amount of a certain fish stock – but what happens to that quota if that fish stock changes its abundance or range as a result of climate change?

“Similarly, if new fish stocks arise because they’ve become more abundant in a future climate, who gets access to those?” Nick Rayns asks. “How do we actually give future access to what might be a new resource that can be harvested?”



“There’s already more than a hundred species that have shifted distributions and moved further southward. There’s been an increasing number of extreme events, particularly affecting the waters around Australia and the marine habitats that our fish species rely on.”

Beth Fulton

## Management rethink

Clayton Nelson, project manager at Austral Fisheries, believes the fishing rights system is likely to need a major rethink to respond to the challenge of climate change. The focus has to be on flexibility in fishing arrangements.

“It’s not just about climate change, it’s about climate change affecting marine parks and marine park boundaries, and migratory fishes – it’s a very complex discussion,” he says.

While effects are already being seen in northern and western abalone stocks, and anecdotal evidence suggests early effects in rock lobsters, there is particular interest in how the Southern Bluefin Tuna Fishery will be affected and how it will adapt.

“They’re a migratory species, but they can move according to water temperatures,” Clayton Nelson says. “How it moves, and if it moves beyond Australian waters, what happens then?”

AFMA convened a workshop in November 2018 bringing together stakeholders to better understand the risks and how those risks may be assessed. Attendees included participants from the US, Canada and New Zealand who face similar climate challenges in their own fisheries. The development of a formal risk-assessment framework is expected to identify key issues that will need to be addressed in the management of Commonwealth, and possibly other, Australian fisheries.

It is one thing for the fishing industry to adapt, but consumers are just as much of a challenge when it comes to changes in seafood availability.

“I think the industry will do a pretty good job of adaptation, but the consumer has to be brought along with it, which is going to be one of the tougher bits,” Nick Rayns says. “We’re big fans of Snapper, Atlantic Salmon and Barramundi, but if you put seafood someone hasn’t seen before in front of them they tend to be a little cautious.”

Despite the many unknowns, Beth Fulton is optimistic that Australia can still achieve a sustainable fishing industry, even with large-scale ecosystem change.

She says the commercial sector is being proactive in its response to potential climate effects. “They want to do it in an inclusive way that does consult with industry and the public to make sure that everybody understands why change is needed,” she says. **F**

**MORE INFORMATION**Lachlan McKinnon,  
www.southerneelsaustralia.com.au**FRDC RESEARCH CODES:**

2000-264, 2008-017, 2009-064

Lachlan McKinnon

Photo: Impress  
Photography

## Eels alive

One Victorian business is working to rebuild international markets as the inland eel fishery recovers from drought

By **Jeanette Severs**

It is a 40-hour trip from Sale, in Victoria's Gippsland region, to market destinations in Japan, China and South Korea. For exporter Southern Eels Australia, it is an ongoing challenge to ensure that its product arrives alive.

Lachlan McKinnon is a fisheries scientist-turned-fisher who established Southern Eels Australia with business partner Leo Chau two years ago to export Short-finned and Long-finned Eels (*Anguilla australis* and *A. reinhardtii*) to Asia. These are the same species found throughout much of Asia. While South Korea and Japan prefer locally farmed eels, wild-harvested eels attract a premium in China.

Establishing Southern Eels Australia has allowed Lachlan McKinnon to transform his expertise in eel biology into something much more hands-on – a move he has discovered is much more to his liking than his former career in fisheries research for the Victorian Government.

He spent more than a decade in research, including projects related to Victoria's eel fishery. During that time he had seen the eel fishery decline as a result of the Millennium Drought from 2001–09. With less water in the landscape, he says there was simply less habitat for the eels,

which spend most of their lives in fresh and estuarine waterways, including irrigation systems, although they migrate to the Coral Sea off north-east Australia to breed at the end of their lives.

Eight years ago Lachlan McKinnon made the leap from research to fishing, leasing three eel licences in Gippsland. With the fishery – and potential markets – now slowly rebuilding, he took the next step last year, buying the eel licences he had been leasing and an accompanying processing facility at Sale.

Southern Eels Australia now employs three fishers, who harvest eels from waterways and inland irrigation sources, and also buys Short-finned Eels from commercial fishers in south-west Victoria and harvests from farm dams. The business has focused on the lucrative, but somewhat challenging live-export market, trading directly with restaurants and caterers in to China, Japan and South Korea through in-country partnerships.

### Live-export challenges

At Sale, eels are classified by size and then chilled to 5°C, which puts them into a sleeping state, allowing them to be packed into oxygenated bags, which are then boxed and transported

by road to Melbourne Airport. During transit, temperatures must be held between 5°C and 10°C.

"The biggest risk is at the airport," Lachlan McKinnon says, "particularly if it's not a direct flight. We have a good relationship with the freight forwarder at this end and our buyers at the other end to ensure the highest-quality product arrives."

The business averages 40 tonnes of eel exports a year with potential to increase trade once new processing facilities are completed. This is likely to include frozen eels to Europe, where buyers prefer to smoke their own product and which was a well-established market before the Millennium Drought. It could also include locally smoked eel sold into the domestic market.

The facility purchased in Sale included smoking and freezing equipment badly in need of an upgrade, which is now in the works thanks to a recent \$123,000 grant through the Australian Government Regional Jobs and Investment Packages.

### Managing the fishery

In 2017, the Victorian Government revised its Eel Fishery Management Plan for the sustainable commercial harvest of eels. This recognises the potential to increase the harvest up to 300 tonnes a year, and also recognises the importance of eels to Indigenous cultural practices.

Across Victoria there are 18 eel fishery access licences. Each licence has specific waterways allocated to it and allows 50 nets for the fishing of both Short-finned and Long-finned Eels. Specific waters are closed to commercial eel fishing in order to protect the spawning adult population and maintain recruitment to the fishery. **F**





## Pictures of abundance

Camera technology lights the way towards improved stock assessments as researcher Tony Courtney discovers in his search for ways to better understand Queensland's Scallop fishery



Tony Courtney  
 Researcher

*"The trip was one of the most useful and stimulating experiences I have had. Since my return I have been trialling different towed cameras, an automated underwater vehicle and remotely operated vehicles to see how suitable these may be at photographing scallops."*

Above Sea scallops in buckets.  
 Photo: NOAA Fisheries

**As the adage goes, counting fish is like counting trees,** except that they are invisible and they keep on moving. While fisheries scientists have a variety of tools at their disposal to help solve the problem, the space is always ripe for change.

Earlier this year, researcher Tony Courtney visited the US to take part in data collection activities on board the research vessel the RV *Hugh R Sharp*. He is working on FRDC-funded research to understand Ballot's Saucer Scallop mortality rates in Queensland's East Coast Otter Trawl Fishery (FRDC project 2017-048).

The purpose of the voyage was to survey Atlantic Sea Scallops (*Placopecten magellanicus*) off the coast of Maine and Massachusetts. The Atlantic Sea Scallop fishery extends across several US north-east states and into Canadian waters and is one of the two most valuable commercial fisheries in the US, valued at about US\$480 million (A\$678 million) annually.

For Tony Courtney the trip was an opportunity to observe and learn about the survey methods used on board the RV *Hugh R Sharp*, in particular HabCam, a habitat-mapping camera system that photographs the sea floor, capturing the various species living on it. The technology is used by the US National Oceanic and Atmospheric Administration (NOAA) for their scallop stock assessment and may also be applicable in some Australian scallop fisheries.

Tony joined the RV *Hugh R Sharp* for the last six days of its 32-day survey when it came to port at Woods Hole to refuel. It is a 44.5-metre state-of-the-art research that operates as part of the University-National Oceanographic Laboratory System (a network of research bodies formed to make best use of research vessels and resources across the US), and is based at the University of Delaware.



1 Releasing the dredge sampling  
2 The HabCam equipment

3 Staff monitoring HabCam images  
4 An Atlantic Sea Scallop



During the survey voyage, the vessel was staffed by a crew of eight and an additional team of 12 scientists, researchers and volunteers focusing on data collection.

The vessel costs about US\$16,000 (A\$22,593) a day to charter or US\$512,000 (A\$722,887) for the whole survey; data is collected continuously, 24 hours a day, with crew and research teams working 12-hour shifts.

“The survey is very well organised and the data derived from it are being directly used to assess the stock and make management decisions,” Tony Courtney says.

### HabCam technology

NOAA has been conducting scallop dredge surveys for decades, but since 2011 has incorporated the camera-based system called HabCam into its survey design (<https://habcam.whoi.edu/projects>). HabCam takes photographs of the sea floor that are then used to count the number of scallops for stock assessment.

HabCam takes six photographs of the sea floor per second while the vessel travels at about six knots. This equates to two photographs per metre. HabCam is deployed for about 21 of the 32 days and during this time generates about 10 million images of the sea floor.

The voyage included 11 days of dredge sampling. Each dredge sample was deployed on the bottom for 20 minutes, and once brought to the surface, the catch was processed. The number and size of all scallops was recorded, as well as the number and weight of any other species.

### Data at sea

While NOAA has developed software to automatically process the images to detect and measure scallops, it is not as accurate as a trained human eye. As a result, NOAA still relies on manual annotation of images for the scallop assessment, but only about two per cent (approximately 200,000 images) can be processed by trained scientists, researchers and volunteers to derive the annual abundance estimates.

While this is labour-intensive, trained annotators can process about 1000 images per day. About half the images are processed at sea, with the remainder processed in the laboratory after the survey.

“I was impressed with the skill, knowledge and speed at which NOAA researchers who have participated in previous surveys annotate the images,” Tony Courtney says.

The HabCam Survey produces very large datasets, which has proved to be a significant unanticipated challenge. The system generates two to three terabytes of data daily, about 70 terabytes during the course of an annual survey. For this reason, the system requires a full-time data specialist to track, store, copy and access the images and other data, including sonar, temperature, conductivity, turbidity and oxygen data collected by sensors on the HabCam.

### Australian applications

Tony Courtney thinks the Queensland Saucer Scallop fishery may be suitable for a similar towed camera-based survey. That data could be used to derive an index of abundance, which is more accurate than the current trawl survey estimate.

“The methodology also has less impact on the sea floor than the current trawl survey, which is conducted in Queensland,” he says.

The Queensland Saucer Scallop lives on the sea floor and has limited

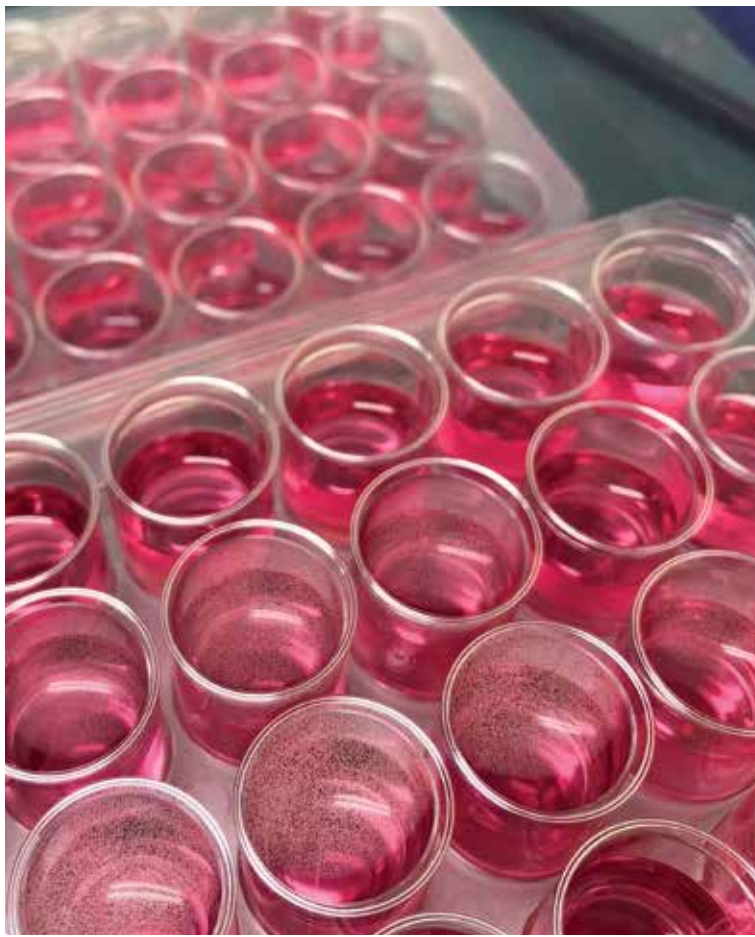
swimming ability; it is similar to the Atlantic Sea Scallop, although the North American species is slower-growing and lives longer.

As much of the Queensland fishery occurs in waters of the Great Barrier Reef Marine Park, Tony Courtney says a camera-based approach may have potential as an additional method for monitoring the benthic ecosystems in the marine park. It may also have application in other fisheries, such as the WA Saucer Scallop fishery, which is the same species as that fished in Queensland.

Although implementation in Australia would require significant funding, Tony Courtney believes that the range of potential applications means that this could be supported by a broad user base.

“The trip was one of the most useful and stimulating experiences I have had,” he says. “Since my return I have been trialling different towed cameras, an automated underwater vehicle and remotely operated vehicles to see how suitable these may be at photographing scallops.” **F**





Left Vaccines at the Centre for Aquatic Animal Health and Vaccines, Launceston, Tasmania

## Salmon get ready for their 'flu shots'

Story and photos Catherine Norwood

A new vaccine holds hope in controlling an endemic virus that is challenging Atlantic Salmon production



Jeremy Carson  
Principal research microbiologist

*The creation of the Certovac vaccine will be one of the final projects completed under the direction of principal research microbiologist Jeremy Carson*

**A three-year, \$5-million vaccine development program is underway** to improve fish health and protect Tasmania's Atlantic Salmon industry from the increasingly deadly Pilchard Orthomyxovirus (POMV).

Huon Aquaculture's general manager of fish performance Steve Percival likens POMV to a fish-specific version of influenza. Not all infected fish die, and younger fish are more susceptible. He says low levels of infection in aquaculture pens can suddenly spike, causing a high number of mortalities within a few days. The infection can also build more slowly, leading to a peak in fish mortalities almost a month after the virus is first detected. One fish pen might suffer major losses of up to 70 per cent, while other pens on the same ocean lease remain relatively unaffected.

POMV has become a persistent issue for Atlantic Salmon (*Salmo salar*) over the past six years but, so far, it appears that Rainbow Trout (*Oncorhynchus mykiss*) are not affected. The virus was first identified as an 'incidental infection' in South Australian pilchards in 1998 where a different, herpes-type infection had caused a major wild fish kill. In the summer of 2006-07, POMV was found in a small number of Atlantic Salmon in Tasmania's Tamar River, also as an incidental infection.

But in May 2012, an outbreak of the virus in the Huon River in south-east Tasmania resulted in significant Atlantic Salmon mortalities. Since then POMV has been found in all Atlantic Salmon production areas.

Steve Percival says the intensity of infection has varied from year to year, but the summer of 2017-18 saw the largest losses to date, affecting all production companies farming in the Macquarie Harbour and south-east regions. Macquarie Harbour was worst affected, with fish mortalities estimated at 1.3 million.

While the industry's other major disease issue, amoebic gill disease (AGD), can be treated by bathing fish in fresh water, there is no treatment for POMV. Animal husbandry practices, such as ensuring appropriate stocking rates in pens and the best nutrition is provided, to help to reduce stress on fish and, therefore, their susceptibility to infection. In some growing regions, pens with infected fish can be moved to an isolation site.

### Fast-track vaccine

Even before the most recent outbreak, the Atlantic Salmon industry was working with the Centre for Aquatic Animal Health and Vaccines to develop a POMV vaccine. The centre is part of the Tasmanian Department of Primary Industries, Parks, Water and Environment's facilities in Launceston. The Tasmanian Salmonid Growers Association (TSGA) and the FRDC have jointly funded this research through an ongoing Industry Partnership Agreement.

Principal research microbiologist Jeremy Carson heads the Vaccine Centre and has been coordinating a series of related projects including a one-year fast-track POMV project that has developed the vaccine Certovac, which is now being manufactured.

Certovac was developed by applying the virus models and vaccines for similar diseases, including infectious salmon anaemia virus, which is exotic to Australia but has decimated Atlantic Salmon aquaculture overseas. Certovac has been tested in tank trials, although Jeremy Carson says it is difficult to challenge the fish sufficiently in tanks to test the true effects of the vaccine. The real evidence of success will come once vaccinated smolt are put to sea in autumn.

He is "cautiously optimistic" about its success, and industry members have committed \$2 million, licensing Tréidlia Biovet in Sydney to produce enough vaccine to inoculate the entire 2019 Atlantic Salmon year-class. However, each

**Below** Researcher Carla Giles examines cells for the growth of a virus needed to produce vaccines.

**Right** Upgraded biosecure facilities allow research to be conducted more quickly.

of the three producers – Huon Aquaculture, Petuna and Tassal – will decide for itself on the extent of vaccination next year based on the latest information regarding efficacy and safety.

In addition to the fast-track vaccine, a three-year POMV project will refine the vaccine's effectiveness and its production processes. In concurrent projects, Jeremy Carson's team is also developing vaccines for several less-severe infections that potentially make fish susceptible to more serious infections, including POMV. These include:

- Tasmanian Atlantic Salmon reovirus, which makes fish unwell although it does not necessarily kill them;
- *Tenacibaculum maritimum*, a bacterium that causes skin and gill lesions on a wide range of fish and is a problem in aquaculture internationally; and
- Tasmanian aquabirnavirus, found only at Macquarie Harbour.

### National capacity

The concurrent projects are possible as a result of a \$2.5 million expansion to facilities at the Centre for Aquatic Animal Health and Vaccines, completed in 2016, which increased fish-holding capacity from one tank room to five. It includes certified quarantine containment facilities (to Class 5.2) with a wastewater disinfection system. The expansion was jointly funded by the Atlantic Salmon industry, the Tasmanian Government and the FRDC to increase the national capacity for vaccine R&D.

Jeremy Carson says it allows the centre's research team to accelerate research, building on the success of other vaccines it has already developed for Atlantic Salmon.

### Intellectual property

The Tasmanian Government has established the TSGA as the owner of the vaccine-related intellectual property IP, including the newly developed POMV vaccine Certovac.

This agreement includes the following vaccines already developed: Yersinivac®, a bivalent vaccine for *Yersinia ruckeri*; Tegovac®, a multivalent vaccine for *Vibrio anguillarum*, atypical *Aeromonas salmonicida* and *Yersinia ruckeri*; and Corrovac® for the Tasmanian Rickettsia-like organism. Diseases such as Vibriosis or Marine Aeromonas Diseases are no longer significant issues for the industry, as a result of effective and successful vaccination programs.

Jeremy Carson believes industry ownership of the IP provides an excellent model for the aquaculture sector. "It means producers are not beholden to a particular manufacturer, who might decide to increase the cost of a vaccine or even to discontinue production," he says. "The TSGA owns the IP and controls its own contracts with manufacturers." **F**



### VACCINE CHALLENGES

When it comes to making vaccines, there are two standard techniques: inactivated or recombinant protein.

Inactivated vaccines require the virus or bacterium to be cultivated and then killed. The fish recognise the virus as a threat even though it has been 'inactivated', and develops antibodies in response. Should a live virus strike, these antibodies are on hand to fight the infection.

There are two challenges with this approach: growing fish cells in which to cultivate the virus and then growing enough virus to produce a vaccine. The process requires an 'immortal' fish cell line, which continues to reproduce, providing a host for the virus. And not just any immortal fish cell will do.

In the case of Pilchard Orthomyxovirus (POMV), researchers are using a cell line imported from the US to help speed development, and Certovac will be Australia's first vaccine approved using an imported fish cell line.

The Tasmanian vaccine centre is also working to create its own line of immortal cells. "But it can be a bit of a lottery," microbiologist Jeremy Carson says. "You can work on creating a cell line for a year, but even if you can create the 'immortal' cell, it may not have the characteristics you need, such as susceptibility to a virus."

Inactivated vaccines are seen as the most likely to be effective, but they are labour-intensive and take longer to produce. It takes two weeks to produce the fish cells

and another two weeks to produce the virus in those cells before incorporating them into a vaccine. Generating enough virus in the fish cells within this time frame can be difficult.

The recombinant protein process allows a vaccine to be produced more quickly and uses only the proteins created by the virus, rather than the virus itself. The challenge is identifying which part of the virus DNA and related proteins are needed to trigger an antibody response in the fish.

The relevant proteins are often on the surface of the virus particles, like spikes, helping the virus attach itself to a host. Once the proteins are isolated, a fast-growing organism such as *E. coli* can be used to produce large quantities of the virus proteins, which are then incorporated into a vaccine.

All of the vaccines being developed in the Tasmanian Salmonid Growers Association projects are first developed as an inactivated vaccine. A follow-up recombinant protein vaccine is part of a longer-term approach, to reduce the time and cost of manufacture.

It is likely these vaccines will be incorporated into a multi-product injectable vaccine given to smolt at about 70 grams, before they are deployed to sea. Some vaccines, such as the one for *Yersinia ruckeri*, are also delivered as a freshwater bath to smaller fish, when they are just one, two and five grams. **F**





# Protecting Australia's safe seafood brand

By Catherine Norwood

Finding a fit-for-purpose technology to address food fraud depends on what you are trying to prove or protect against



Stephen Pahl  
Research Scientist

*"The minimum standard in Australia is being able to track a product at least one step forward and one step back"*

Although it is difficult to estimate the extent of food fraud related to Australian seafood, globally food fraud is estimated to cost the food industry more than \$50 billion a year, and seafood is one of the top four sectors involved.

In 2016, a review of priorities by SafeFish (a body funded by the FRDC to provide technical advice to support Australia's seafood trade and market access) found that fisheries stakeholders were highly concerned about gaps in seafood traceability and authenticity systems.

As a result, SafeFish commissioned the South Australian Research and Development Institute (SARDI) research scientist Stephen Pahl to investigate the technologies available to help seafood businesses prevent substitution and mislabelling.

While traceability and authenticity are separate issues, Stephen Pahl says problems with either have the potential to jeopardise the reputation of individual businesses, seafood species and brands, and the Australian seafood industry as a whole.

This includes undermining the trust of Australian consumers in seafood, as well as undermining access of Australian products to international markets.

He says mislabelling may be a simple and inadvertent quality-control issue, and relies on having agreed names for species consistently applied across all fisheries jurisdictions. This underlying framework is provided by the Australian Fish Names Database managed by the FRDC.

However, food fraud or counterfeiting is a more deliberate attempt to gain a financial advantage, usually by substituting a less-expensive product for one with a higher value, and there are diverse activities under this umbrella (see Food Fraud diagram).

One of the food safety issues associated with fraud and substitutions is the sale of seafood species susceptible to natural toxins or heavy-metal accumulation, such as shark, as a species that has a lower heavy-metal risk. Other issues include products treated with illegal chemicals to give the appearance of freshness, or repackaging of expired product that may contain harmful bacteria.

Stephen Pahl says traceability follows a product along the supply chain, and the minimum standard in Australia is being able to track a product at least one step forward and one step back. More comprehensive systems can track



a product from a fishing vessel or aquaculture lease through to the consumer (see FISH vol. 23 no. 3 for an in-depth discussion of these systems).

Gaps in traceability make products more vulnerable to substitution and also make it difficult to address food safety issues, in particular to recall a product if an issue is discovered.

Meanwhile, authenticity processes determine whether a product is what it purports to be, based on its inherent characteristics: is it the specific species it is supposed to be, wild or farmed, from a specific location, fresh or thawed?

Determining that a product has been legally harvested, however, or proving that it was illegally harvested, may require a combination of both traceability and authentication technologies.

Stephen Pahl says the ability to detect fraud can act as a deterrent to help prevent these illegal practices and protect the reputation of Australian seafood. In the European Union, more stringent, full-chain traceability requirements are being put in place, which may affect the ability of Australian exporters to access these markets.

Stephen Pahl says businesses will need to evaluate which techniques best meet their specific needs and budgets. The first step is to conduct and document a food fraud vulnerability assessment – what are the risks and where are the potential substitution or weak points in the supply chain? **F**

See the report *Authenticity for the Australian Seafood Sector: A Review of Available Tools to Identify Substitution and Mislabelling*, at [www.safefish.com.au](http://www.safefish.com.au) for more details.



## TRACEABILITY TECHNOLOGIES

**Barcodes and labels** as part of paper-based systems remain the primary traceability systems in operation, tracking products through the supply chain to point of sale. In 2014, GS1 DataBar barcodes were established as the global standard for traceability, facilitating information exchange across international borders and different systems to track harvest and other information. These are not intended for point-of-sale scanning.

**Quick Response (QR) codes** are two-dimensional computer-generated images printed and added to packaging and are a consumer-focused extension of traditional barcodes. These allow consumers to

use smartphones to scan the codes and learn more about a product.

**Serialisation** is a whole-of-business and supply-chain approach and has been widely adopted in the pharmaceutical industry. It provides unique identifiers for every product and has been used to aid both traceability and authentication. It can be used on packaging and labelling, including on gill tags attached to fish.

**Radio-frequency identification tags (RFID)** are tiny electronic chips that store data and can be tracked without the need for physical contact or a line of sight (which barcodes need). This system is used as part of the Australian National Livestock Identification System for cattle, sheep and goats and is also being tested on Australian prawn trawlers as part of an FRDC project (2012-702 and 2015-711). The Hong Kong-based Fukui Shell Nucleus Factory is reported to be embedding RFID tags as pearl nuclei in molluscs to enable each pearl to be uniquely identified, track-and-traced and authenticated.

**Microbranding** is being used to etch unique identification codes or symbols onto microdots, which are then physically applied to a product. Microdot particles are so small that they are generally invisible to the naked eye, providing covert protection. They are frequently used in combination with overt warning systems to provide greater deterrence against fraudulent activity.

**NanoTags™** are being used by the Australian Wild Abalone Program to protect product from counterfeiting. The tags, integrated into packaging or attached to abalone shells, include a certification mark and an individual export code. This initiative was developed with assistance from FRDC project 2009-723. In 2007, Australian oyster growers trialed a

similar DataDot™ product, but at the time it was found to be too expensive for everyday use. Research is also underway to develop encodable nanomaterials, known as nanobarcodes, which could be added to packed products to aid traceability. These are expected to be highly durable, machine readable and very difficult to counterfeit.

**Distributed ledgers** such as blockchain provide a back-end technology that securely records information from a primary source in databases hosted on multiple synchronised computers in decentralised locations around the world. This allows information regarding a product, such as origin, transport and processing details, to be securely recorded by each participant in the supply chain as it moves through, with all participants connected to and adding new 'blocks' of information using the same electronic ledger system. Whole-of-chain reporting has the potential to track a specific product in minutes, rather than days or weeks. Several seafood-specific trials are already underway, including a World Wildlife Fund project to track tuna. The international blockchain start-up Fishcoin also launched recently.

## AUTHENTICITY TECHNOLOGIES

**Visual assessments** are the most traditional and low-cost method of assessing authenticity, although it is a process that is highly dependent on the skill of the assessor. It is also much more difficult to do once fish have been processed into flesh and identifying features such as heads, skin, fins and tails have been removed.

**DNA techniques** are considered the gold standard in authenticating a species. Although costs are coming down as technology improves, the processes involved can be expensive.

They also require validated DNA reference materials for comparison. It can take several days for laboratories to deliver DNA results, and while these may authenticate a species they generally will not be able to verify point of origin or other harvest details. DNA can be damaged during canning or cooking; however, CSIRO is developing a technique that will allow it to extract DNA from seafood processed this way.

**Protein extraction and proteomic techniques** can be used to establish a 'protein fingerprint' for species, although there are some difficulties distinguishing closely related species and fish proteins begin to deteriorate once the animal dies. The techniques can be used to differentiate species, origin and fresh or thawed product.

**Mineral element analysis** of bones, scales or shells can be used to produce an elemental fingerprint that identifies the geographic region of origin. This process is underway as part of a research project for the Australian prawn industry (FRDC project 2016-261), which is establishing a reference library of trace-element fingerprints to authenticate provenance of both farmed and wild-harvested prawns.

## Spectroscopic methods

use reflected light and other electromagnetic imaging techniques to identify the inherent characteristics of a product, using everything from near infra-red imaging to nuclear magnetic resonance. These methods are particularly useful in identifying contamination, substitution and adulteration issues. They have also successfully identified fish from different geographic regions, fish that has been thawed, differences in wild and farmed fish, and fish grown in fresh and brackish environments. **F**



# Seafood's smoke experts

The taste sensation that is smoked seafood has inspired a smokehouse revival in Australia and new opportunities for fishers to add value to their catches. We take a look at a few of those re-embracing this ancient food preservation technique

By **Gio Braidotti**

It is about the taste. There is fresh seafood and then there is the unique sensory experience created by smoke experts. There is an artisanal skill of infusing the fats in fish meat with aromas derived from smouldering wood. The best of the experts achieve an inspired match between the unique fragrance of different timbers and the taste profile of salt-cured fish.

One of the more innovative pairings comes from the use of Australian native timbers. As demonstrated by Greg Rassmussen, formerly of Noosa River Smokehouse, paperbark proved an especially flavoursome choice when it came to cold smoking Atlantic Salmon, producing a deeper colour and a distinctive smoked taste.

Digging into the nuances of smoking

techniques, there are two overarching methods: cold smoking, which cures but does not cook the flesh, and hot smoking, which both cures and cooks (see table). Both preserve the meat while tenderising it and doing something almost magical to the flavour.

At the Queensland Department of Agriculture and Food (DAF), Andrew Forrest, one of Australia's leading food scientists specialising in smoking, says that the good news for would-be smokers is that the majority of Australian native timbers are hardwoods and, therefore, suitable for use in smoking food (as opposed to softwoods, which are not suitable).

Taking advantage of this fact is BJ Plummer of Woodbridge Smokehouse located in



Woodbridge, Tasmania. The smokehouse has been in operation for 15 years, but was bought by Pure Foods three years ago to retail hot and cold-smoked Atlantic Salmon and ocean trout.

In that short time, this boutique smokehouse has built an expanding export market that includes weekly deliveries to Hong Kong and Singapore. Tasmanian native hardwoods are an integral part of that success.

"The taste profile is obtained by the choice of wood used during smoking," BJ Plummer says. "We are located in an apple orchard and we use a judicious amount of wood from the apple trees combined with local native hardwoods, such as Tasmanian oak."

By taking this distinctive approach, Woodbridge Smokehouse reports growth across all facets of its business, from tourists visiting the smokehouse, through to online sales and shipments to domestic and international retailers.

Another key aspect to achieving great results in a smokehouse is the freshness of the fish. BJ Plummer sources only A-grade quality fish from Tasmanian suppliers, Tassal, Petuna and Huon Acquaculture. This often

## THE SMOKING PROCESS



Smoking seafood entails a three-step process:

- 1 Curing with salt, either by immersing in brine or smothering meat with dry salt.
- 2 Rinsing the salt-cured meat and drying first with towels and then refrigerating on a rack, skin side

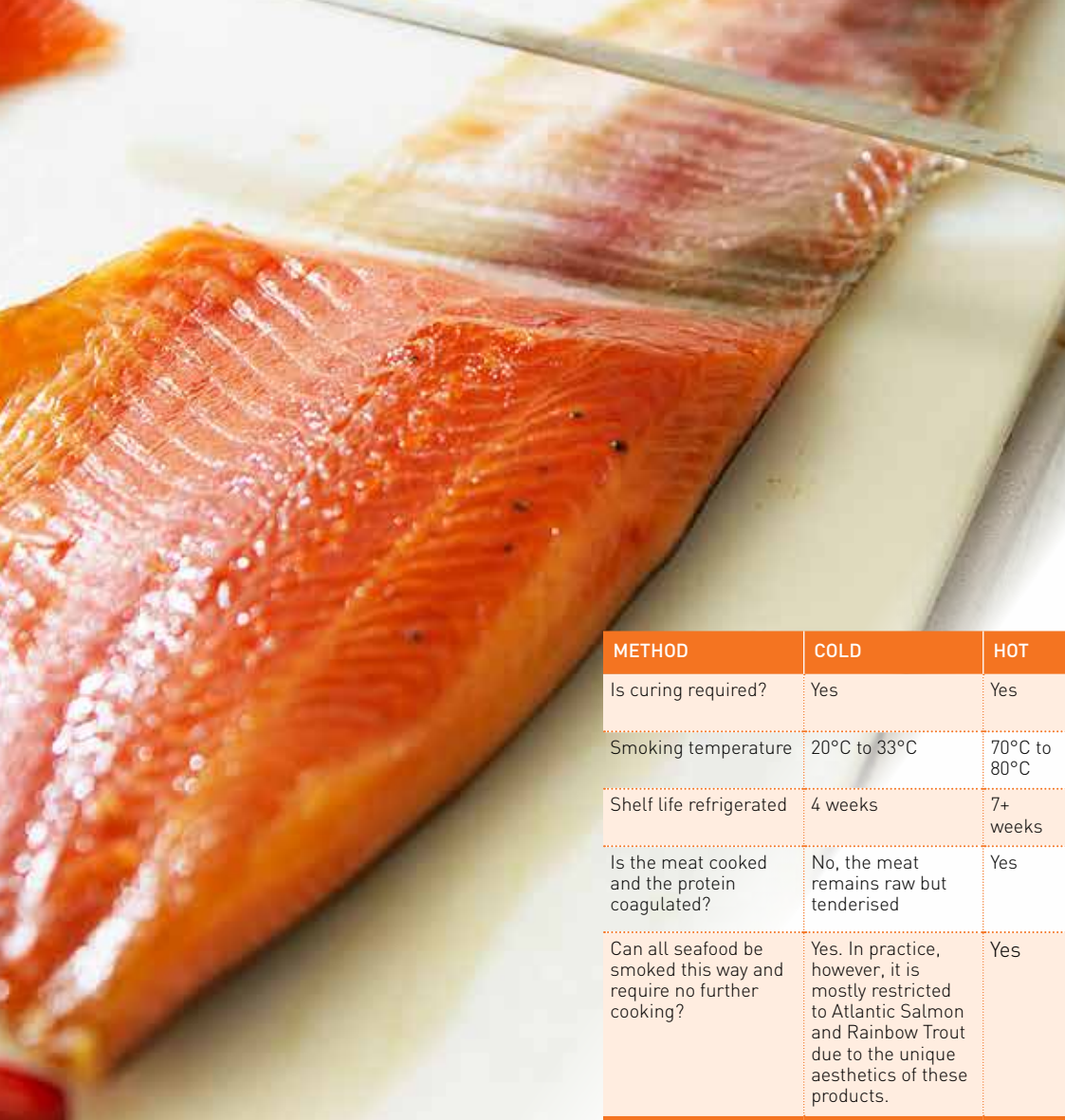


- 3 Smoking to infuse the oily component with flavours distinctive for different hardwood types, including Australian native hardwoods such as paperbark.



Only hardwood timber – typically beech or mesquite – is safe to use in a smokehouse. Softwoods are not suitable due to toxins that survive combustion. If in doubt, consult a local barbecue supplier that stocks wood for smoking.

Note: Both salt curing and smoking have antibacterial properties.



**Above** Smoked Murray Cod from Aquana Aquaculture. **Left** Hand processing of cold smoked salmon from Woodbridge Smokehouse. Photos: Woodbridge Smokehouse and Aquana Aquaculture

METHOD	COLD	HOT
Is curing required?	Yes	Yes
Smoking temperature	20°C to 33°C	70°C to 80°C
Shelf life refrigerated	4 weeks	7+ weeks
Is the meat cooked and the protein coagulated?	No, the meat remains raw but tenderised	Yes
Can all seafood be smoked this way and require no further cooking?	Yes. In practice, however, it is mostly restricted to Atlantic Salmon and Rainbow Trout due to the unique aesthetics of these products.	Yes

means the seafood can be processed within just hours of being harvested. “Fresh is best and so is quality,” Andrew Forrest confirms. “That’s why smoking is a real opportunity for fishers looking to value-add with boutique products.”

Interest in creating smoked products is increasing, with the potential to increase shelf life of seafood to more than seven weeks. At the Queensland DAF Coopers Plains food research facility, Andrew Forrest has conducted hot-smoked trials with Cobia and mullet. He thinks both have great potential, especially when smoked with native wood.

Over in South Australia, fishers Glen and Tracy Hill of Coorong Wild Seafood in Meningie are successfully marketing small volumes of hot-smoked versions of their award-winning Coorong Yelloweye Mullet fillets at farmers’ markets and wineries.

The fillets are smoked using red gum sawdust, with the fillets prepared in their natural state or coated with chilli flakes or lemon pepper.

In Griffith, NSW, Aquana Aquaculture farms the native freshwater fish Murray Cod, and is preparing to launch a hot-smoked product in the

next few months to complement its fresh fish.

The smoked product has been developed by Eden Smokehouse, where smoke master Stan Soroka uses oak chips – the same ones the wine industry uses to accelerate the oaking of young wines. Murray Cod has generous layers of fat in the flesh and smoking produces a mild, creamy flavour.

Aquana managing director Mat Ryan says trial product was taken to the Sydney and Melbourne Good Food & Wine Shows earlier this year where it was well-received and this has given them the confidence to pursue development.

Further south, at St Leonards in Victoria, the Bellarine Smoked Fish Company uses locally sourced tea tree to hot smoke Australian farmed Barramundi, Atlantic Salmon, Rainbow Trout and New Zealand Ora King Salmon.

Owner and chief smoking officer Jason Smith also smokes wild-caught Gemfish as another white fish option and for those who prefer wild to farmed fish, although the availability of the wild fish does fluctuate.

For fishers Karen Miller and partner Mark Gray, “wild-caught” is a feature of their business, Malanda Seafood, which has fishing

vessels operating out of Cairns and Karumba, Queensland, and a retail shop in Malanda on the Queensland Atherton Tablelands.

They have begun trials with their Barramundi and Spanish Mackerel as a way to diversify their offerings for the local community and promote Queensland’s wild fisheries.

The Tarzali Lakes Smokehouse Cafe has provided samples using a mix of oak and Queensland maple for the smoking and Karen Miller says they sold everything on the night of their first tasting event. While their new seafood products are still a work in progress, she is excited about the potential to enhance their range for customers.

Harris Smokehouse, in Hahndorf, South Australia, is the oldest seafood smokehouse in Australia and offers the largest, most traditional range of fish products.

Smoke mastery at Harris Smokehouse goes back four generations to Richard Pinney, an oyster farmer on the UK coastline. He designed his own oak log smoking process to smoke Atlantic Salmon, creating a thriving business, Pinneys of Orford, which still operates. His technique arrived in Australia in 1990, brought over by his grandson, Richard Harris, and continuing with Richard’s son Adam Harris.

The range of smoked seafood includes Atlantic Salmon, Yellowtail Kingfish, kipper fillets, mackerel fillets, Cod, English Haddock, Rainbow Trout, Barramundi, prawns, salmon fins, kingfish wings, eel fillets and oysters. Visitors can also see the smoking in process at the smokehouse cellar door.

Business here is thriving, suggesting that the future for locally sourced, locally smoked seafood is in its ascendancy. Andrew Forrest says he is keen to talk with fishers to discuss new opportunities or pilot-scale trials for smoked seafood products. **F**





# A new generation takes on the challenge of change

Building on the work of the founders, Australia's women in seafood are undertaking new initiatives, championing their contributions and helping to transform the seafood sector itself

By Catherine Norwood

**C**elebrating its 20th anniversary this year, the Women's Industry Network Seafood Community (WINSO) has inducted 20 leading contributors to its inaugural roll of honour during a gala dinner in Adelaide in October 2018.

More than 140 guests attended the dinner and unveiling of the honour roll, which recognises some of the industry's most effective 'quiet achievers' who have worked tirelessly to support fishing businesses, their communities and the broader seafood industry.

The rebranding of WINSO as Women In Seafood Australasia (WISA) was also announced during the dinner, following a review of the organisation funded by the FRDC.

Newly elected WISA president Karen Holder says the organisation has focused in particular on raising the profile of women in the industry and recognising their achievements. This has included broadening the recognition and focus from fishers and their families to the wider supply chain, resource management and research.

WISA will also pursue opportunities to build the personal and professional capacity of women to contribute to their industry, reaching out to a new generation of young women. The FRDC provided bursaries that allowed nine young women to attend the workshop from around Australia, bringing valuable new perspectives and skills to the organisation.

Karen Holder says in its new form, WISA will work to expand its activities and to lead some new initiatives. Chief among these is the mental health initiative Project Regard.



**Above** Delegates from the Irish Women in Seafood Fisheries Network, from left, Monica Buckley, Siobhan Faulkner, Catherine Barrett and Trudy McIntyre. Photo: Catherine Norwood

## Regard for wellbeing

WISA director Tanya King has played a pivotal role in this initiative as a social scientist and principal investigator of an FRDC-funded Sustainable Fishing Families project, which included a national survey of fisher health and wellbeing. The survey has identified high rates of psychological distress in the fishing community (see pages 4 and 5).

WISA has responded to this finding with Project Regard, and has developed a video featuring mental health ambassadors around the country – fishers and family members – have bravely shared stories of their own mental health challenges (<https://www.youtube.com/watch?v=e-QQqx3qGck>).

"The video is a tool to start a discussion about mental health in the industry," Karen Holder says. "It will help to begin recognising and then addressing the issue, encouraging

relevant organisations to secure funding for the support services needed."

Project Regard was launched during a Stronger Seafood Communities workshop in Adelaide in the lead-up to the WINSO 20th anniversary dinner. The FRDC-supported workshop had two key themes: the wellbeing of the fishing community and its members, and managing the environmental impact of human activities on oceans.

## Clean-up efforts

During the workshop participants heard from representatives of the Irish Women in Seafood Fisheries Network, who spoke about their efforts to reduce marine pollution and provide support for their communities in the wake of tragedies at sea.

Siobhan Faulkner outlined the Irish 'Fishing for Litter' campaign where trawl fishers retain any litter caught up in the nets and bring it



in to shore for disposal. It also encourages fishers to ensure no litter is added to the marine environment during the process of fishing. The campaign includes the collection and recycling of nets to reduce the impact of the industry on the environment.

South Australia's Claire Webber spoke about the Australian Southern Bluefin Tuna Industry Association's program to coordinate the efforts of its member businesses in the aquaculture sector around Port Lincoln to clean up 155 kilometres of local coastline.

Trudy McIntyre, also from the Irish Women in Seafood Fisheries Network, provided an overview of the Lost at Sea Tragedies (LAST) initiative. This raises funds to provide financial and emotional support for fishing families when a family member dies at sea.

In a first step towards establishing a similar initiative in Australia, WISA held a raffle during its 20th anniversary dinner, which raised \$6000. Karen Holder says considerable discussion is still needed about who would coordinate such a foundation, what support would look like and whether it would only cater for the commercial seafood sector, as the Irish project does.

In addition to initiatives to support the health and wellbeing of the seafood community, Karen Holder says access to a new training initiative for members will be pursued. "We'd like to provide access to a webinar-based leadership program for members. This is something they could do in their own homes, in their own time to help build confidence and leadership skills."

She says this is the kind of first-step program that could be a precursor to something like the National Seafood Industry Leadership Program sponsored by the FRDC.

WISA will continue to provide a voice through representation on the National Rural Women's Council; immediate past WINSC president Leonie Noble is president of this national body. **F**

**Above** Inductees into the Women's Industry Network Seafood Community honour roll  
Photo: Dianah Walter



## WOMEN IN SEAFOOD HONOUR ROLL

The inaugural inductees into the honour roll are:

**New South Wales**  
Tricia Beatty  
Mary Howard

**Northern Territory**  
Carmel McCaskill - Ball  
Julii Tyson

**Queensland**  
Elaine Lewthwaite  
Karen Miller  
Margaret Stevenson  
Anne Whalley

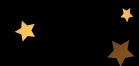
**South Australia**  
Mona Barnes  
June Gill  
Tracy Hill  
Gloria Jones

**Franca Romeo**  
Catherine Sayer  
Charmain Wait

**Tasmania**  
Frances Bender  
Dawn Jordan

**Victoria**  
Mary Mitchelson

**Western Australia**  
Toni Jurinovich  
Jennifer Shaw



## JOIN THE NETWORK

Add your voice to Women in Seafood Australasia and join the network. You're eligible to become a member if you are 'actively engaged in or associated with the Australian seafood industry.' Membership forms are available at the Women's Industry Network Seafood Community website ([www.winsc.org.au](http://www.winsc.org.au)) under the 'About' menu. Financial membership is \$66, or join the community on Facebook (@womeninseafoodAU) to stay up-to-date with what's happening and new opportunities.



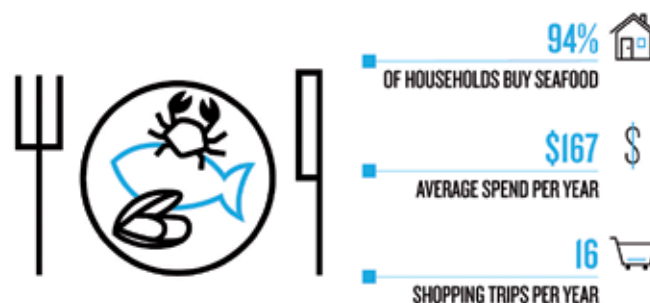


# Seafood sales value rises, volumes hold steady

Australian households spend an average of \$14 a month on seafood to cook at home; there is room for improvement

## AUSSIES HOOKED ON SEAFOOD

Almost all Australian households purchase seafood at least once per year



Source: Nielsen Homescan

By **Melanie Norris**

Senior manager, Fresh Analytics team, Nielsen

**T**he FRDC has teamed up with international data analytics company Nielsen to provide seafood producers with better understanding of how Australian consumers buy their seafood.

From supermarkets to fishmongers, Nielsen Homescan data captures the grocery purchases of Australians by using a continuous panel of 10,000 households that is geographically and demographically balanced. This information can give seafood producers a better understanding of changes in consumption patterns, while also highlighting future opportunities.

Nielsen Homescan data shows that Australian shoppers are hooked on fish. In the 52 weeks ending 8 September 2018, more than nine in 10 (94 per cent) of Australian households



Sydney Fish Market  
Photo: Shutterstock

have purchased some type of fish or seafood.

These households spent an average of \$167 split across 16 shopping occasions in the past 12 months. Total annual dollar sales for the fish and seafood category grew by 3.6 per cent, largely driven by an increase in the average price per kilogram. In terms of volume, the amount of fresh seafood purchased by consumers in the past year has held steady.

The fish and seafood category has a strong foundation for growth and is well positioned to be a premium protein offer for consumers. The market is split into three distinct segments – fresh, frozen and ambient (tinned or shelf-stable) – and sales performance varies by type. In terms of dollar sales, fresh fish accounted for half of the category in the past year, while frozen and ambient each made up a quarter.

The picture differs in volume terms, with each segment roughly represented by a third of sales. This highlights how important fresh seafood is when it comes to driving up the value of the category overall, although most shoppers buy across all three segments.

Traditionally, fishmongers and markets have been perceived as the stronghold of fresh seafood sales. However, this dynamic is changing. Major supermarkets are driving the growth of fresh fish and seafood, while specialty shops and markets as a retail group are declining. In 2018, 79 per cent

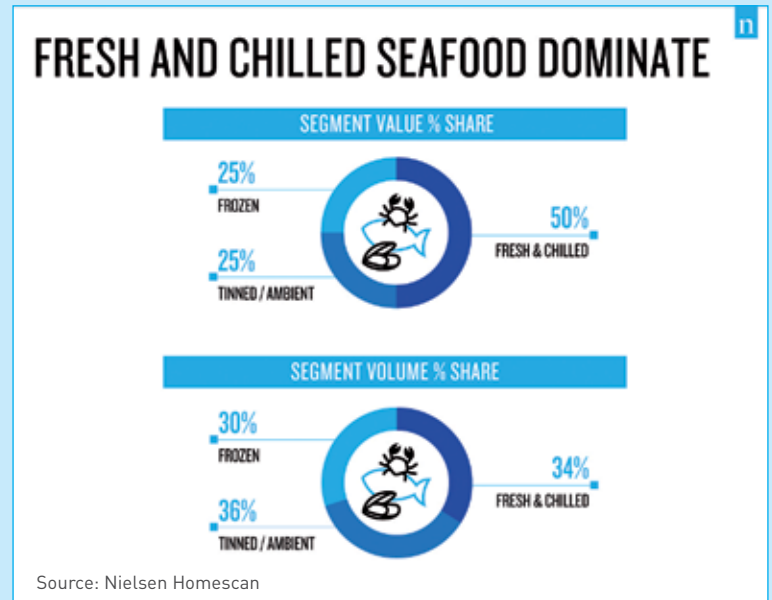
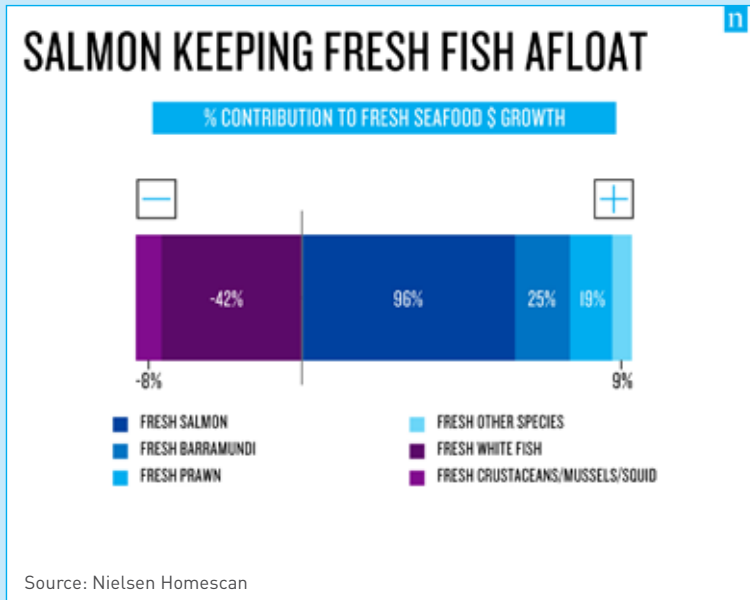
of Australian shoppers purchased their fresh fish from the supermarket, compared with 21 per cent who purchased from specialty shops and markets.

### Freezer leads growth

Contrary to other proteins such as meat and poultry, frozen fish and seafood is growing faster than both the fresh and ambient segments. Last year, frozen fish grew by 5.3 per cent in dollar sales and 3.3 per cent in volume sales, with some of this increase in volume attributed to shoppers switching from fresh to frozen.

Frozen fish and seafood have a wide range of prepared options and a lower price point that appeals to busy families and also those in a lower-income bracket. Over the past year, the frozen segment was, on average, \$10 cheaper per kilogram than fresh fish and seafood. The frozen segment has also had a significant number of new products launched over the past year (particularly in the area of frozen white fish and prawns), contributing more than \$10 million to the category.

Atlantic Salmon, Barramundi and prawns were the biggest contributors to value growth within fresh fish and seafood. All these species have experienced significant growth with modified atmosphere packaging (MAP) too. This type of packaging is a highly effective method for extending the shelf life of produce and offering



fish and seafood shoppers an easy-to-compare, viable option to other proteins. MAP fish and seafood delivered just under half of the fresh fish and seafood dollar growth, with MAP salmon recording a significant amount of success in 2018.

Ambient category fish – tinned or other shelf-stable varieties – is a consistent performer, featuring in the lunches and dinners of many Australians on a regular basis. Unsurprisingly, most ambient fish is sold through supermarkets, with 90 per cent of the value going through this channel. Salmon, tuna and sardines are the key contributors to growth in this segment. Ambient has the cheapest price per kilo of the segments, which is perhaps one of the reasons why these products have a strong skew towards young, single Australians.

#### Product positioning

Having the right supply is critical during key seasonal times for seafood producers. While some species, such as Atlantic Salmon, are sold consistently throughout the year, prawns have a seasonal skew with sales peaking at Christmas and Easter.

For many Australians, prawns are viewed as a summer treat and this coincides with a steady increase in sales from September right through to the end of summer. Once the festive season is over and consumers rein in their eating and

drinking, the category typically sees a surge in the cheaper ambient and frozen seafood options.

Australia is experiencing a change in the demographic make-up of the population, with an increase in ethnic diversity.

This group represents an important opportunity for seafood. Many of this group, defined as non-English speaking households, spend more on fresh fish and seafood than shoppers from English-speaking households.

Those with an international heritage are not as fond of Atlantic Salmon as shoppers of Australian heritage, but they do show a marked preference for Barramundi. Fresh fish is also skewed towards couples over 35 who fall into a higher income bracket.

Australians are also showing a much higher engagement with health and wellness trends; fish and seafood are ideally poised to take advantage of these trends. Millennials and high-income households, in particular, have a greater willingness to pay a premium for products that have perceived health benefits or offer superior quality, such as fish and seafood.

Current flat volume trends indicate that fish and seafood sale volumes have not kept up with the Australian Bureau of Statistics' population growth (1.6 per cent). However, with more than three per cent value growth – driven by the slightly higher cost of fish – Australians

are certainly not pulling back on buying fish.

There is room for future growth, particularly if seafood producers are willing to:

- explore further expansion of MAP options within the fresh segment;
- drive greater competition and comparison to traditional protein options;
- appeal to the shoppers born overseas; and
- continue to invest in producing convenient options for busy shoppers. **F**

#### BY GEORGE TAKES RAW PRAWN BY THE TAIL WITH NEW PRODUCT SUCCESS

Capitalising on the growth of frozen fish and seafood, the popularity of prawns, convenience and seasonality, By George Raw Prawn Tail Off (500 grams) has been a stand-out new product launch.

The launch in November 2017 was perfectly timed to take advantage of the Christmas peak. The product contributed 17 per cent of the value growth in frozen fish and seafood over the 52 weeks leading to 8 September 2018. This product also ranks in the top five frozen fish and seafood stock items sold in Coles in the past year.





Saildrones are solar and wind powered and can be at sea for up to 12 months without returning to dock.  
Photo: Andreas Marouchos



# New wave of roving ocean observers

New technologies and an international partnership are advancing automated and unstaffed ocean data-collection tools, offering new avenues for understanding our marine environment

By Catherine Norwood

**B**obbing on the waters of Bass Strait, between mainland Australia and Tasmania, a bright orange Saildrone attracts the attention of passing vessels, although they are warned to steer well clear rather than draw closer.

This is something far more sophisticated than a navigation buoy. At seven metres long and five metres high, the neon sailboat is what is known as an unmanned surface vessel (USV) – essentially an automated mini laboratory capable of continuously gathering complex ocean and

atmospheric data, and even recording vision.

The Saildrone is just one model in an emerging armada of USVs worldwide that are setting out to counter our ignorance of marine environments, initially at least, in the name of science. This particular model comes from ocean technology start-up Saildrone Inc., in San Francisco.

CSIRO has entered a five-year partnership with the company, bringing three of its USVs to Australia earlier this year for use in ongoing research and development. Funding from the CO2 Cooperative Research Centre and the

Australian Government Education Investment Fund Support for Clean Energy Research Infrastructure is supporting the initiative.

Overseeing the USV deployment is Andreas Marouchos, CSIRO principal engineer of the engineering and technology program and a research group leader at the Oceans and Atmosphere Division.

“Australia has a huge marine domain to monitor and USVs can address our three greatest challenges: the need to cover large marine areas, the need for persistence in

observations and the need for greater scale.

“Autonomy is the future of ocean operations for both science and industry,” Andreas Marouchos says.

“It allows us to go where we need to go, to stay as long as we need to stay and to do it cost-effectively, at scale. While we can do some of these with traditional means, it’s really difficult to hit all three.”

### Mobile data

Each USV is equipped with powerful sensors to measure ocean chemistry, meteorological data and marine acoustic signals. This data can be supplied to researchers in real time via satellite links or stored on board for retrieval later.

The Saildrones are made of carbon fibre, impervious to salt, and are solar and wind powered. They can remain at sea for up to 12 months without returning to dock, travelling at speeds between three and eight knots, and can be programmed to stay at the same location in a variety of wind and wave conditions. At least one drone has reportedly withstood waves of up to 12 metres in the Bering Sea.

Carbon measurements on board the Saildrone use technology developed by the National Oceanic and Atmospheric Administration’s Pacific Marine Environmental Laboratory in the US. This is a miniaturised version of the equipment used on high seas on research vessels to measure atmospheric and ocean carbon, which is critical for understanding carbon fluxes and carbon uptake in the oceans.

Another customised installation is the scientific echo sounder – a commercial product from Kongsberg Maritime modified and configured specifically for use on USVs by the CSIRO research team.

“We’ve spent a lot of time and effort to understand the noise environment at the surface of the vehicle which might interfere with

**“Autonomy is the future of ocean operations for both science and industry. It allows us to go where we need to go, to stay as long as we need to stay and to do it cost-effectively, at scale.”**

Andreas Marouchos

readings,” Andreas Marouchos says. “There has been extensive acoustic calibrations in San Francisco and in Hobart to ensure we are getting the most accurate scientific data from the acoustic and other systems.”

The echo sounder transmits at the dual frequencies of 200 kilohertz and 38 kilohertz, which helps to monitor the ecosystem and identify the presence of fish to depths of about 700 metres for the 38 kilohertz frequency.

This is an extension of the acoustic systems that CSIRO’s research team led by Rudy Kloser has developed with early support from the FRDC, for use in fish stock assessments for Orange Roughy and Blue Grenadier.

That research led to the development of multi-frequency acoustic optical systems deployed on the headline of trawl nets during trawls, helping to correlate acoustic signals with images of the catch.

The acoustic component of this system is being deployed on Saildrone. Rudy Kloser says it will allow researchers to better characterise the ecosystem and will be able to recognise key species groups such as krill at ranges up to 200 metres.

### Ocean exploration

CSIRO is already using the USVs as part of a carbon-capture project and for general research in the relatively remote and unexplored Southern Ocean.

“For ocean operations, a USV is a really important tool for environmental assessments,” Andreas Marouchos says. “It won’t give us the full capabilities of a research vessel – it doesn’t have as much power or equipment – but can still do a lot of the work and we can go where we need to when we need to.

“For fisheries assessments, in the past this involved going to sea with nets and catching things and counting them and using well-informed science and statistics to form estimates about biomass.

“But now we can leverage more sophisticated tools to augment those efforts and to gather more information, and year-round, not just once or twice a year – ongoing monitoring.”

He sees potential applications in several areas, for instance following schools of fish, measuring the extent of marine heatwaves, tracking blooms of algae in remote areas, and being part of a system to monitor carbon capture and storage sites. **F**

**Below** CSIRO researcher Rudy Kloser checks the ocean exploration equipment he has helped to develop to explore ocean depths to 1000 metres. Photo: Catherine Norwood



### INTO THE TWILIGHT ZONE

The ocean zone between 200 and 1000 metres, or mesopelagic zone, is sometimes referred to as the ‘twilight zone’ by researchers. It is potentially home to large marine biomass, but little is known about the creatures that live there and their role in the ecosystem.

The challenge to learn more about Australia’s mesopelagic depths has led CSIRO’s researcher Rudy Kloser to develop new automated instruments as part of the profiling lagrangian acoustic optical system (PLAOS).

CSIRO’s PLAOS provides a unique combination of acoustic and optical sensors. When used together the multi or broadband-frequency acoustic signals from different species can be matched with their images, helping to develop new acoustic signatures for future reference and research.

Gradually, as data is accumulated, researchers will be able to build a picture of what lives in this mysterious ocean zone.

Rudy Kloser says researchers are keen to know more about this ocean zone, which is where large predators such as sharks feed.

“Globally it’s estimated that there might be between one to 20 gigatonnes of fish and other creatures in this range – that’s a lot of protein, if we look at it from a food security perspective.

“But we don’t actually know what and how many organisms live in this space, what role these creatures play in the ecosystem and how they might be influenced by fishing or climate change. Internationally some countries are already fishing in this zone and more countries are beginning to look at these mesopelagic species with remote vehicles.” **F**





# Hands-on habitat

A project empowering recreational fishers to restore habitat is having a tangible impact on both inland and coastal environments

By **Melissa Marino**

**H**arry Davey fell in love with freshwater fishing when he moved to Tenterfield in northern NSW for a treechange. But he soon became concerned about the local environment.

Riverbanks had been cleared for farming and degraded over many decades by hoofed animals, robbing fish of much-needed riparian zone habitat that provides shade, a food source and in-river structures while also protecting water quality.

Inspired to make a difference, he attended an Inland Summit organised by OzFish Unlimited in 2016 as part of the FRDC-funded project 'Empowering recreational fishers as champions of healthy fish habitat'.

There, he says he was "blown away" by being in a roomful of like-minded people "who had habitat, fish passage and the future of fishing as their main agenda," and by their insights into how to make a change.

The summit included information from scientists on river health issues, fisheries managers on navigating the grants system and other fishers on fundraising. "It spurred me to think 'maybe we can make a difference,'" he says. "I'm no scientist. I'm just a rec fisher but I branched out, and here we are today."

Harry Davey leads the Tenterfield OzFish chapter, which he established with a group of fishing mates after the summit. Their first project planted 140 river gums and acacias along 300 metres of the Mole River, returning native habitat to stabilise the riverbank and re-create the natural ecosystem. And Harry Davey says benefits are already evident.

"Fish can get up to 40 per cent of their food from trees, and we are seeing a return of insects; come summer we will have cicadas and all sorts of things dropping into the river," he says. "And we all really hope we can last another 60 years to see how the trees will grow."

## Empowering fishers

The 'Empowering recreational fishers' project was coordinated by OzFish Unlimited for the Fish Habitat Network between 2016 and 2018.

The FRDC and several state recreational fishing bodies, environmental groups and government agencies co-funded the initiative, which has been responsible for raising knowledge about the importance of habitat and providing recreational fishers with the resources they need to improve it.

"We wanted this project to build capacity to make a difference," OzFish Unlimited CEO Craig Copeland says. "Rather than just transfer information we wanted to help create a legacy for the future."

There are now 20 of these recreational fishing chapters across Australia. This has enabled a grassroots movement of recreational fishers to take the lead to support and restore fisheries through organising hands-on habitat activities in their local areas, he says.

The national outdoor retailer BCF has provided funding for multiple habitat initiatives being undertaken by newly empowered recreational fishers, including the restoration of shellfish reefs at Pumicestone Passage near Moreton Bay, Queensland.

BCF is also supporting OzFish as an organisation, helping to spread the word about habitat restoration to its 1.3 million recreational fishing customers.

OzFish is run by fishers and supports the chapters by helping with insurance, administration, project design and grant

applications, allowing members to get on with the habitat work they are so keen to do.

"Without these groups, there's a whole bunch of projects you wouldn't see. It's that simple," Craig Copeland says. "Recreational fishers have created enthusiasm in all these locations for fish habitat projects and the whole idea is for us to make it easier for them to do it."

## Action aplenty

While not funding any specific restoration programs itself, the 'Empowering recreational fishers' project has helped to build knowledge among fishers and provide a framework from which restoration efforts have spawned.

These efforts are wide ranging and include planting trees for habitat, shade and insects, re-snagging rivers, building shellfish habitat and reefs and even undertaking research projects.

Other initiatives include forums and events, education programs, the creation of information hubs, fishing groups and OzFish chapters, and the promotion of issues through the media. "We needed to have fishers telling stories, and those stories needed to be about habitat," Craig Copeland says.

Communicating the habitat message really began when the Fish Habitat Network was created in 2009 by the NSW Department of Primary Industries Fisheries Division. The network brought together state-based recreational fishing groups and government agencies and provided the groundwork that made the 'Empowering recreational fishers' project possible, Craig Copeland

"Fish can get up to 40 per cent of their food from trees, and we are seeing a return of insects; come summer we will have cicadas and all sorts of things dropping into the river."

Harry Davey



Left Harry Davey is leading restoration projects to improve habitat for local fish such as this Golden Perch caught in Tenterfield, NSW.

Photo: Simon Fitzpatrick, Northern Rivers Sportfishing

## NATIONAL FISH HABITAT STRATEGY

One of the major outcomes of the 'Empowering recreational fishers as champions of healthy fish habitat' project is the new National Fish Habitat Strategy.

The strategy was first mooted in 2012 to coordinate and communicate the fish habitat restoration efforts of agencies across Australia. It provides a framework to monitor and manage fish habitat, engaging with fishers to protect, restore and enhance recreational fisheries. It has four objectives.

- To increase fish populations by restoring and conserving habitat through local, regional, state and nationwide fish habitat projects.
- To get more fishers involved through workshops, seminars and communication.
- To 'get smart' by carrying out research and development to support fish habitat action, including a National Fish Habitat Assessment, and developing citizen science initiatives for recreational fishers.
- To get the story out by communicating fish habitat outcomes and issues to the general community.

OzFish Unlimited CEO Craig Copeland says the strategy, supported by his organisation, is not prescriptive. Rather, it provides a guide to encourage and enable action on habitat.

"There's probably not a recreational fisher I know who doesn't want to leave a legacy of a better place than they have found," he says. "So we are trying to give them the capacity to make that contribution." **F**



Photo: 123rf

says. In turn, this recent project has also now led more fishers to engage in the creation of the National Fish Habitat Strategy.

Connecting a network of recreational fishers and harnessing their willingness and desire to help could well have been the empowerment project's greatest achievement, Craig Copeland says. "They've got information that habitat is important, that they can make a difference and they've got the structure to allow them to make a contribution." It is a sentiment Harry Davey wholeheartedly agrees with.

He has forged connections with groups in his area including Landcare, the birdwatching society and the local Aboriginal Land Council, leading to more projects on a "long list" including further rehabilitation works and improving access to fishing for people with disabilities.

"We are trying to get that inter-agency thing happening, and these relationships are now starting to bear fruit," he says. "As Craig once told me, 'if you build relationships, the trees will come.'" **F**





# Seafood leaders pushed to excel

An expanded leadership program continues to provide participants with opportunities for growth

By **Annabel Boyer**

**T**he longstanding National Seafood Industry Leadership Program (NSILP), now in its 18th year, displays the diversity of Australia's seafood sector. At the program's culmination for 2018, there were people grouped into teams who would probably never rub shoulders in their regular working lives.

Sharing a table at the graduation dinner for the 2018 NSILP were a fisheries biologist, an analytical chemist, a policy officer from the Australian Department of Foreign Affairs and Trade, and a quality assurance manager from the tuna industry. One diner had recently arrived in the seafood sector from the Tasmania's beer industry; another had many years in the global seafood industry but was a newcomer to Australia.

Creating this kind of diverse team is, in fact, a central tenant of the program. Bringing together people from different parts of the seafood sector helps to destroy the myth that only certain kinds of people work in seafood and that they all do the same kind of work.

As NSILP participant Portia Kyros said in her presentation to a group of industry leaders: "The wider community doesn't realise the fantastic opportunities that exist in the seafood industry."

The program's focus is to give its participants the right tools and knowledge to positively influence their own future, the future of their own businesses and the future of the



**Above** The second NSILP cohort of 2018 in Parliament House's Marble Hall. Back row, left to right: Mike Steer, Brad Callcott, Shane Holland, Debbie Lever, Umar Nguyen, Chad Lunow, Adrienne Laird, Joshua Cook, Evan Rees. Front row, left to right: Michael Hobson, Matt Pember, Toby Jeavons, Morgan Hand, Prue Davey, Mick Gamble, Rebeka Glanvill. Photos: Affectus

Australian seafood sector as a whole.

Demand for the program is so great that it expanded in 2018 from one 16-member cohort to two. Initially jointly funded by the FRDC as part of its people development program and the Sydney Fish Market, the program now has Austral Fisheries on board as a sponsor.

## Developing leaders

Jill Briggs, managing director of Affectus, which runs the program, says NSILP has come a long way since its inception in 2001, although the fundamental drivers – "develop knowledge and skills, experience leadership through an activity and build networks" – have remained the same.

"Affectus's focus is to provide participants with a supported experience that ensures they understand more fully the complexities of the Australian seafood industry and can work effectively and collaboratively with a team to change the future of the industry," she says.

After six months working together, which includes three residential sessions involved in the program, participants present their work to a room full of industry leaders. The projects are intended to have real-world applications and continue beyond the life of the six-month program.

This year the 'plastics free' team, presenting as part of the second NSILP cohort, announced that the biennial industry conference Seafood Directions would go plastic-free in 2019 as a result of their efforts to encourage leadership from the industry on this issue.

"We are always amazed at the efforts of the participants to deliver a mission which will positively change the direction of the industry," Jill Briggs says.

The program provides a range of experiences and opportunities for participants, depending on the projects they choose to pursue, but its bedrock is a belief in the value that core leadership skills are vital for individual leadership

ability and the future of the seafood sector.

Confidence, public speaking, critical thinking and the ability to negotiate are skills that are of value wherever you are and whatever your actual day-to-day job may be. The program pushes participants to realise their own potential for leadership within their own workplaces and industries. Requiring them to complete a team project that fills a need for the seafood sector encourages them to learn new skills and stretch their abilities.

For some this has meant learning audio recording and editing, doing web design, social media and marketing to launch a pilot podcast that tells the human stories of the seafood sector. Other groups filmed and photographed material for YouTube channels and Instagram accounts.

“I was amazed to discover that I can compete with others much younger than myself when it comes to using social media and other web-based technologies,” says 2018 participant Richard Hamilton, chair of the Gold Coast Fishermen’s Co-op and a Spanner Crab fisher.

For others, their project provided the opportunity to learn about the complexity of the seafood sector. One team used the opportunity to identify gaps along the seafood supply chains, another to investigate an alternative fundraising model for the sector. ‘Team Seafood Connect’ chose to tackle the complex issue of tracking seafood through the supply chain using a system of labelling and barcode tracking.

“The program has helped to cement the feeling that I am part of the seafood sector and that I have the power to effect positive change,” says Stephen Masters, an environmental chemist who works for Sydney Fish Market. “I think moving forward from this there will be the momentum from having discovered a new passion.”

“I now recognise the value of actively coaching and listening to my team,” says Cameron Shield, slicing manager with Tassal, who is



**Above** The first NSILP cohort of 2018 with Minister for Agriculture and Water Resources the Hon David Littleproud MP. Standing left to right: Richard Hamilton, Ryan Rossi, Andrew Bollinger, Angela Williams, Toni Clark, Tom Moyle, Ashley Lukin, Stephen Masters, Lachlan Bassett, Cameron Shield, Portia Kyros, Kim Hooper, Michael Passi. Seated left to right: Sarah Ugalde, Hon David Littleproud MP, Santha Nakandage.

The program’s focus is to give its participants the right tools and knowledge to positively influence their own future, the future of their own businesses and the future of the Australian seafood industry as a whole.

relatively new to the seafood sector. “It’s not just about seafood; leadership is transferable and you can bring your experiences with you.”

### New networks

During the 18 years of the program, NSILP has built a valuable network of alumni both inside and out of the seafood sector, in government, private industry and not-for-profit sectors. These connections are one of the most enduring legacies for participants. Past NSILP participant and now executive officer of OceanWatch Lowri Pryce urged participants to make the most of their new-found connections.

“Don’t forget this network of your peers. When you go back to your daily lives, please evolve your ideas, don’t forget about them, and use this network you’ve established.”

For participant Mike Passi, who has his own seafood business in the Torres Strait diving for sea cucumber and rock lobsters, the program was an invaluable way to build relationships with others in the sector and learn how things are done elsewhere in the country.

“As someone from a remote community, it was great to make connections with so many others from around the community and to think about where they are coming from.” **F**





# Reef rescue a business and science pact

Survival skills take diverse forms for Victorian fisher John Minehan, from joining research projects and creating new seafood industries to consolidating workplace safety

Story and photos **Brad Collis**

One of John Minehan's earliest memories is of sitting astride his dad's shoulders in the surf off Mallacoota, Victoria; father and son at one with the sea – its power, beauty and bounty. It was inevitable that he would follow in the footsteps of his father, Mike Minehan, to become a diver and fisher, so powerful was his childhood bond with this world.

His boyhood reads like a Tim Winton novel: youthful rights of passage honed by the challenges and knowledge that comes to people who learn, often hazardingly, the ways of the sea and the life within it.

"It was a beach life. I grew up surfing, fishing, diving and aside from a brief side-step into university (studying IT), that's the way it has continued," he says, reflecting on the influences that have made maintaining the health of his marine backyard a professional passion.

John Minehan's father was a pioneer of the Mallacoota abalone industry in the 1960s, establishing it as the economic mainstay of the Victorian township that lies just south of the border with NSW; tourism weighed in later.

## Joining the fray

John Minehan has continued his father's legacy of community leadership. For his father this included helping to found AFCOL, previously known as the Abalone Fishermen's Co-operative, to process and export wild abalone.

But as the fisheries sector has evolved, for John Minehan this has meant dealing with the more modern issue of securing continued access to the abalone resource against both environmental and regulatory challenges.

For more than a decade he has been on

the committee of the Victorian Eastern Zone Abalone Industry Association and in recent years he has been heavily involved with FRDC-backed research into the loss of abalone habitat caused by an explosion in sea urchin numbers.

The 'why' of the urchin explosion is still being researched, but the consequence has been a denuding of underwater reefs and the kelp forests that abalone and other species need to survive.

The main problem species is *Centrostephanus rodgersii*, the Long-spined Sea Urchin.

"Just being in the water, as I have been, over the past 20 years I've witnessed the steady loss of our kelp forests – we estimate we've lost 50 per cent in Victorian waters over this period," John Minehan says.

The urchin invasion has caused abalone habitat to shrink, and the abalone fishery along with it. Cuts to the total allowable commercial catch (TACC) for abalone in the Eastern Zone are a stark measure of the impact.

## Protecting reefs

The good news is that reef ecosystems can recover if the urchins are removed or controlled. John Minehan has been one of the team of 22 divers involved in a Fisheries Victoria project – the Marine Reef Restoration Project – to test reef recovery. He says they have removed more than 1.5 million urchins to date, which has restored a tremendous area of marine habitat back to a healthy state.

"We are part of this environment so a lot of what we are doing comes very much from a strong sense of stewardship and responsibility," he says.

"We witnessed firsthand the destruction that occurred, and it was distressing. It's beautiful working 10, 15, 20 metres down in

a kelp forest. You become very familiar with it, and the knowledge you build over years of working in this environment makes you very comfortable in a place that would be hazardous for many other people. It becomes very special."

The Marine Reef Restoration Project has been a successful confluence of science and business. The urchins have their own potential in seafood markets, where their roe is considered a delicacy. This has led sea urchin harvesting to progress from developmental fisheries permits to a licensed, quota-managed fishery in its own right.

"Where sea urchins being removed are of a viable quality – in other words, where they haven't started to starve because they have eaten an area out – we harvest for market," he says.

With the decline in the abalone TACC, urchins have become an important part of John Minehan's business, accounting for more than six months of work. He splits his time between Mallacoota and Melbourne, where he dives in Port Phillip Bay to harvest a different sea urchin species, *Heliocidaris erythrogramma*, sometimes called the Purple Sea Urchin.

## Diver safety

John Minehan has also been a leader in efforts to establish a new safety management plan for abalone diving.

When the Australian Maritime Safety Authority (AMSA) was formed in 1990, new national laws and regulations governing marine operations were introduced. This pushed fishing vessels and dive-based fisheries, such as abalone, to address the safety risks inherent in these activities.

"We had to process a whole lot of new paperwork to obtain a safe operator's ticket to keep operating, but there was a lack of relevant

John Minehan at the start of another day working on the seabed.



support documentation,” he says. His requests to the Victorian Abalone Industry Committee for a formal plan led the committee to suggest that he might take on the job – to come up with a document that was suitable for the industry and that would meet AMSA compliance requirements.

“There was a draft document, but it was not user-friendly and didn’t fully meet AMSA’s requirements. We needed something simpler and more tailored to our industry. So it started out, really, as self-interest because I was simply looking for useable documentation for myself and then discovered everyone was looking for the same thing.”

John Minehan says in the process he

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“From my father’s day to the present there have been enormous improvements in safety and they have mostly been driven by the industry itself.”

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realised that the knowledge required around issues such as risk assessment and safety was already well enshrined in professional practice.

“From my father’s day to the present there have been enormous improvements in safety and they have mostly been driven by the industry itself. So putting together the safety management plan for

AMSA was really just about compiling existing best practice, already tried and proven by the industry.”

The plan earned him the Seafood Industry Victoria’s Safety Award in 2017. But John Minehan sees it mainly as a validation of proven industry standards for practices and equipment and to show how this supported AMSA’s requirements.

He retains a pragmatic view of regulations. “In our industry safety always comes back to individual operators and their professionalism. But we are a small community, so it doesn’t take much for people to keep each other in mind and to contribute to improve standards. It’s ongoing because, like the management of our fisheries, it’s all about self-preservation.” **F**





# Sea greens name challenge

To help Australian producers join international markets for marine plants, the FRDC is developing an Australian standard for aquatic plant names

By Alayna Hansen

**S**ea asparagus, swamp grass, glasswort, pickleweed and sea beans – these are all common names for an aquatic form of the succulent family known more formally as samphire (*Amaranthaceae* sp.).

Often found inland on salty flats as well as in coastal areas, samphires are a form of 'sea green' gaining popularity among boutique chefs around the globe.

But there are many different species of samphire, including several native to Australia, some of which are endangered. Confusion over naming and identification is rife.

The proposed Australian Aquatic Plant Names Standard will address this confusion, distinguishing different species by matching scientific names with a single agreed-upon common name, much as the Australian Fish Names Standard has done for marine animals.

Edible algae, microalgae and samphire will be among the first entries. At a workshop in Hobart in October 2018 experts defined what was an aquatic plant and established candidate names for an initial list of 50 plants.

About 250 species proposed were rejected as not being aquatic plants and several new nominations are being considered.

Alan Snow is project manager for the proposed standard, which he says will enhance relationships between buyers and sellers in Australian markets by establishing common ground.



**Above** 'Beaded glasswort' is one of several common names applied to samphire, which is expected to be included in the proposed Australian Aquatic Plant Names Standards. Photo: Chris Rockley

Defining features of plants are likely to help determine names, for example, Mermaid's Necklace has been proposed for the green seaweed species *Chaetomorpha coliformis*; Red Sea Lettuce has been suggested for *Grateloupia turuturu*, the largest red seaweed in the world.

"There is so much variation in the names used for aquatic plants across Australian states. We're trying to remove the confusion between industries about what to call a certain commercial species, or ones that have the potential of being commercialised in the future," Alan Snow says.

"Stakeholders are sending in lists of species and the names that they use for them; we are asking the industry for suggestions.

"Where there's a unanimous agreement, the decision will be non-contentious and will most likely pass," he says.

"But some species can have four to five names in the marketplace and individual companies may have to give their consent to the proposed changes."

Alan Snow says worldwide access to

knowledge about edible aquatic plants and their common names will be vital in developing and maintaining Australian and international markets into the future.

Establishing a single name for a species will increase the efficiency of trade procedures, including final health certification by quarantine authorities and provide consistency with international naming protocols.

"Once the standard is developed, it will be available on the FRDC website, so it will be open access. Anyone in the world will be able to search it and have knowledge of the Australian Standard and it will assist with communication in the domestic marketplace too."

The project has received three years of initial funding from the FRDC to develop and maintain the standard in its first phases.

Additions or changes may be subject to an annual review process, giving stakeholders an opportunity to contribute as the market evolves.

The standard is proposed to be finalised by June 2019. **F**

# Final reports

## Overcoming variability in prawn larvae 2016-407

Current prawn farming practice in Australia involves breeding and rearing larvae in a hatchery, then transferring to grow-out ponds. This technique leads to variable survival rates and restrictions on the growing period due to low temperatures. An intermediary nursery phase allows for the animals to be held to a larger size in a smaller temperature-controlled system before moving them to the grow-out ponds. This enables the animals to be grown to full market size for the Christmas harvest, where early-season low temperatures normally restrict final harvest weight.

The Nuffield Scholarship provided Glenn Wormald with the opportunity to study nursery systems already in operation in other countries to help Australian prawn farmers avoid known pitfalls and harness best-practice management. He visited prawn producers in Ecuador, Honduras, Nicaragua, the US, Canada, Vietnam and Thailand.

**More information:** Glenn Wormald, [glenn.wormald@hotmail.com](mailto:glenn.wormald@hotmail.com)

## Building seafood industry engagement capacity 2017-133

This project aimed to improve understanding of how and to what extent certain barriers keep the seafood industry from making substantive progress towards building greater stakeholder and community trust.

The project was undertaken in three parts: a literature review; followed by a set of 10 interviews with a sample of seafood industry leaders identified by the FRDC Human Dimension Research Subprogram; and a telephone workshop with those participants to review findings and relevance of pilot support materials. Project participants came from across all Australian states and territories.

One of the major barriers has been a lack of motivation to change industry engagement practices. Engagement was typically undertaken without a clear articulation of the aims of engagement. Consequently ad hoc methods have often been used and rarely evaluated. Another significant finding was that despite a range of support tools being available to assist the seafood industry to build its capacity to engage (internally, externally), there has been very little uptake of those resources.

**More information:** Nicki Mazur, [nickimazur@grapevine.net.au](mailto:nickimazur@grapevine.net.au)

## Monitoring puerulus settlement in Tasmania 2014-025

A review of the Tasmanian puerulus program undertaken in 2008 involving government, industry and an external review identified that the puerulus collectors were all on the east coast (with the exception of King Island), despite the southern and western regions supporting the largest catches in the fishery. The review identified as a priority to “investigate options for collection on the west coast using boat-based collection and using the commercial fleet to reduce cost of collection”.

This project has provided a means by which industry can monitor puerulus settlement in the western and southern areas. It has generated a collector design that collects puerulus as effectively as traditional diver-serviced inshore collector systems, collects puerulus effectively from deep water (greater than 25 metres), and can be easily and safely deployed, retrieved and serviced by vessels from the Tasmanian commercial rock lobster fleet during routine fishing operations.

**More information:** Stewart Frusher, [stewart.frusher@utas.edu.au](mailto:stewart.frusher@utas.edu.au)

## Queensland Seafood Marketing Symposium 2016-262

The initial proposal to hold a marketing symposium in Queensland was based on the need to bring industry together with particular reference to the post-harvest sector to provide, exchange and discuss information in an open forum regarding trends and/or needs in the existing value-chain process. This will lead to product reaching its market in its highest post-harvest condition and value. Concepts of market brands, brand orientation, consumer trends, market segmentation, packaging and distribution were all key elements of the symposium subject matter.

One of the key messages that resonated strongly throughout the symposium was that the seafood industry does not communicate with consumers or the community in general about how sustainable Queensland seafood is or its value in terms of nutrition and wholesomeness. Similarly, the sustainability message of how the seafood industry operates is also absent in its marketing.

There was a strong consensus among the delegates that these areas should be addressed, and that a possible central theme of the next symposium should



Photo: Shutterstock

be what effective strategies and methods the seafood industry should consider in engaging and creating awareness within the community as to our high level of sustainable practice and social responsibility.

**More information:** Marshall Betzel, [nqtrawlers@bigpond.com](mailto:nqtrawlers@bigpond.com)

## Mapping Australia's trawl footprint 2016-039

The first national overview of Australia's demersal trawl footprint brought together data on different habitat types on the sea floor, records of trawling and areas closed to trawling. The report provides valuable insight into the impact of trawling for fisheries managers.

The majority of the different habitats defined and mapped had little or no exposure to trawling by the state and Commonwealth trawl fisheries included in the assessment. Across all fisheries, there were relatively few assemblages that had both high exposure to trawling and low protection by closed areas.

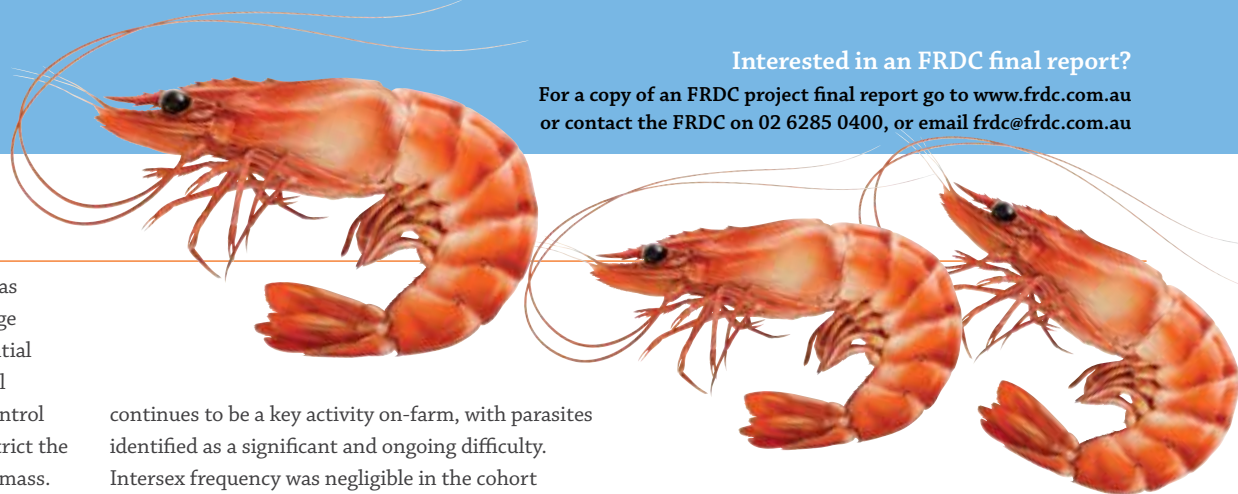
However, it was highlighted that some data gaps existed and this should be a priority to further demonstrate sustainability.

**More information:** Roland Pitcher, [roland.pitcher@csiro.au](mailto:roland.pitcher@csiro.au)

## Maximising net economic returns 2015-202

Identifying maximum economic yield (MEY) is just one part of the challenge facing fisheries managers. How to achieve MEY in multi-species fisheries was a major part of this project. Using a model based on the Southern and Eastern Scalefish and Shark Fishery, the study examined the effectiveness of different harvest strategies in achieving fishery-wide MEY, and also how different approaches to estimating MEY affected the outcomes. →





Implementing MEY, once identified, also has several challenges. The study considered a range of harvest control rules, as well as other potential management options. The results of the model analysis suggest that 'hockey-stick' harvest control rules in multi-species fisheries may overly restrict the catch of species that are above their target biomass. Given the higher abundance, catch of these species is likely to result in increased discarding and lower economic returns than might otherwise be achieved. An alternative harvest control rule that allowed higher than 'optimal' fishing mortality rates for species that were above their target biomass resulted in less discarding and higher economic returns.

**More information:** Sean Pascoe, [sean.pascoe@csiro.au](mailto:sean.pascoe@csiro.au)

### Building Indigenous fisheries capacity 2013-218

Around Australia, fishery assets contribute only a small amount, directly or indirectly, to the total economic wellbeing of Indigenous communities.

For Indigenous communities wanting to develop their fisheries resources, a new step-by-step approach has emerged from this five-year research project, providing guidance for communities, government fisheries managers and potential business partners.

As part of the project, seven case studies were developed from face-to-face discussions with community participants about actual or proposed fishery initiatives to identify processes that have worked and potential barriers to be overcome.

**More information:** Ewan Colquhoun, [ewan@ridgepartners.com.au](mailto:ewan@ridgepartners.com.au)

### Commercialising Cobia production 2014-242

This project was undertaken to consolidate the aquaculture in Australia of Cobia, a species offering considerable potential as a diversification option for pond-based aquaculture activities in Queensland. The project addressed key elements of the production cycle in order to move industry towards a more commercial footing and advance both the scientific knowledge and human capabilities of the sector.

From 2014 to 2017 the research examined: health issues affecting Cobia in aquaculture both in the hatchery and on-farm; the emerging issue of intersex in Cobia and potential for this to further impact production; capability development of staff in preparation of the establishment of a commercial Cobia hatchery; and the involvement of some new entrants to Cobia aquaculture utilising tank-based production systems.

The project found that health management

continues to be a key activity on-farm, with parasites identified as a significant and ongoing difficulty. Intersex frequency was negligible in the cohort examined, and these individuals demonstrated significantly different growth and reproductive development to intersex animals.

The study has continued to demonstrate the viability of Cobia as a diversification option for prawn farms, particularly in north Queensland.

**More information:** Peter Lee, [peter.lee@daf.qld.gov.au](mailto:peter.lee@daf.qld.gov.au)

### Improving access for Indigenous Australians 2014-233

Phase 1 of the project audited many fisheries-related documents (legislation, policy, management strategies and plans) to develop a picture of how Indigenous fisheries are addressed within these documents.

Information from the audit has been provided to several governmental reviews and inquiries over the past three years. For Indigenous end users, findings from this section of the project will be communicated through several future FRDC projects. The research team recommends the development of a more comprehensive set of national Indigenous fishing principles to further guide the development, implementation and monitoring of Indigenous fisheries policy across all jurisdictions.

Phase 2 of this project ran a series of case-study workshops for Indigenous fishing communities to test a methodology for making risk assessments of fisheries. This methodology was used to assess the potential risks posed by non-Indigenous fisheries on Indigenous cultural fisheries. Four case-study workshops were conducted, one national and three regional. The workshops employed a two-way exchange of knowledge with researchers collecting data and, at the same time, providing information on risk-assessment methodology and other fisheries management issues to workshop participants.

The project focused on trialling a methodology where the impacts on end users are limited to the three communities and the facilitators engaged in the workshops. The project team recommends that at least three more regional workshops be conducted in other regions of Australia using the methodology employed in this project.

**More information:** Stephan Schnierer, [stephan.schnierer@me.com](mailto:stephan.schnierer@me.com)

### Seafood CRC: Quality assurance for prawns 2011-747

The project set out to ensure that Australian prawn market-development strategy is underpinned by supply of a consistent, high-quality product and to establish, trial and evaluate the impact of a national, whole-of-chain, prawn-quality program for grading, shelf life, appearance and provenance of Australian prawns.

The project has resulted in the development of a set of agreed parameters and assessment methods for 'quality' Australian prawns. Best-practice techniques for all stages of the supply chain have been summarised and documented, and in the case of fishers, retailers, food service and consumers, developed into training/information resources. Despite the use of industry committees and champions, in some cases uptake and adoption of the resources is not complete. For this reason, the Australian Council of Prawn Fisheries Board has been requested to undertake a process to advise on priorities and drive continued uptake and adoption of the resources beyond the scope of the project.

The outputs of this project can be used to support all promotion and marketing work of the prawn industry, and in particular be linked with the 'Love Australian Prawns' national marketing campaign.

**More information:** Janet Howieson, [j.howieson@curtin.edu.au](mailto:j.howieson@curtin.edu.au)

### Evaluation of 'Love Australian Prawns' campaign 2016-272

The 'Love Australian Prawns' (LAP) campaign was instigated at a time when Australian prawn prices were struggling and there was little differentiation between the Australian prawn category and imported prawns. The project aimed to evaluate the program, using consumer research, sales data and a market strategy review and to make recommendations for the future of LAP.

The project found that the LAP project delivered on its objectives in differentiating Australian prawns, and that the LAP brand should focus on positioning LAP prawns as being of high quality and increase its presence in major supermarkets.

**More information:** Rachel King, [acpf.eo@gmail.com](mailto:acpf.eo@gmail.com)



## Movers and ...






**Ian Dutton** has been appointed as director of marine resources at the Department of Primary Industries, Parks, Water and Environment in Tasmania.

**Nick Rayns** has retired as executive manager of the Australian Fisheries Management Authority (AFMA). His replacement is yet to be announced.

**James Findlay** has left AFMA, where he was CEO to take up a position as Director of Parks Australia.

**Ian Thompson** has moved from first assistant secretary to chief environmental biosecurity officer.

**Cassandra Kennedy** has been appointed as first assistant secretary in the DAWR AgVet Chemicals, Fisheries and Forestry (AFF) Division.

**Kate Hutson** has left James Cook University to go to the Cawthron Institute in New Zealand.

**Scott Spencer** has retired as director of

fisheries at the Queensland Department of Agriculture and Fisheries (QDAF).

**Richard Saunders**, Queensland DAF senior fisheries scientist, has moved to New Zealand.

**Warwick Nash** has retired as head of fish and aqua research at QDAF, to be replaced by **Paul Palmer**.

**Karen Holder** is the new chair of Women in Seafood Australasia (WISA) (formerly WINSO) and **Heidi Mumme** is the new deputy chair.

**Tim Moltmann** will step down as chair of the National Marine Science Committee, to be replaced by CSIRO's **Tony Worby**.

**John Moloney** and **Mark Porter** have both recently joined Tassal to work on prawns.

**Ian Poiner**, marine ecologist, has been appointed to head the Great Barrier Reef Marine Park Authority, succeeding

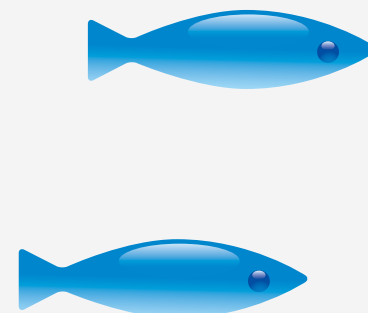
**Russell Reichelt**.

**Russell Reichelt** has been appointed by the Prime Minister to be Australia's 'Sherpa' in activities related to the United Nation's Decade of Ocean Science for Sustainable Development (2021 to 2030).

**Renee Vajtauer** has left the role of executive officer of the Commonwealth Fisheries Association to work in her business, the Fish Shoppe, and has been appointed to the Fish Names Committee.

**Pheroze Jungalwalla** has retired from the Aquatic Animal Health Biosecurity Subprogram.

The Tasmania Fish Health Unit's principal research microbiologist **Jeremy Carson** will retire in December after 34 years. From January 2019 **Richard Morrison** will lead the vaccine projects. He has been heavily involved in this vaccine centre research for the past 10 years.



**FEEDBACK**  
FRDC WELCOMES YOUR COMMENTS  
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Annabel Boyer, 02 6285 0415,  
annabel.boyer@frdc.com.au

## Calendar of events

DATE	EVENT	MORE INFORMATION
<b>2018–2019</b>		
11-12 December	FRDC Board meeting	02 6285 0400
17 January	Applications for the 2019 National Seafood Industry Leadership Program (NSILP) close	<a href="https://affectusaus.com.au/program/nsilp/">https://affectusaus.com.au/program/nsilp/</a>
22 January	FRDC Board meeting	02 6285 0400
2 February	World Wetlands Day	<a href="http://www.ramsar.org/activity/world-wetlands-day">www.ramsar.org/activity/world-wetlands-day</a>
19-20 February	Evoke AG, Melbourne	<a href="https://evokeag.com">https://evokeag.com</a>
26-27 February	FRDC Board meeting	02 6285 0400
2-10 March	Seaweek – New Zealand Association for Environmental Education, New Zealand	<a href="http://seaweek.org.nz">http://seaweek.org.nz</a>
5-6 March	ABARES Outlook Conference, Canberra	
8 March	International Women's Day	<a href="https://www.internationalwomensday.com">https://www.internationalwomensday.com</a>



Having people who understand international markets is good for everyone in the Australian seafood industry.



# LOOKING TO EXPORT TO NEW MARKETS? LOOKING TO EXPAND YOUR HORIZONS?

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The **FRDC is inviting applications** for travel bursaries in 2019.

Each awardee will have the opportunity to visit one of the world's great seafood events (the next trip will visit Seafood Expo North America, March 17-19, 2019 - [www.seafoodexpo.com/north-america](http://www.seafoodexpo.com/north-america)), as part of a study tour which will help participants to gain insight into the global seafood marketplace. Participants will also have the opportunity to visit seafood markets, and meet significant regional seafood players.



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**FOR MORE INFORMATION** e: [Peter.horvat@frdc.com.au](mailto:Peter.horvat@frdc.com.au)