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VOLUME 23 NUMBER 3  
SEPTEMBER 2015

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Excellence  
in culinary  
connection



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Seafood CRC  
farewell

## COVER

Damien Bell in  
Mandurah, Western  
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Photo: Ian & Erick

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Crop rotations  
in the zone

# Growers sign on to premium oyster service

## MARKETING

**Creating direct access from farms to restaurants is providing growers with greater returns and the opportunity to showcase their best oysters**

By Catherine Norwood

It takes extra time to produce a premium oyster: a little longer in the water, extra gradings and additional time to sort and to box the very best of the crop. But an increasing number of Australia's oyster producers from all major growing regions

are signing up to do just that. More than 40 have already committed to supply Signature Oysters with their best product, which is then sold directly into restaurants and to retailers who are equally committed to providing customers with the best possible eating experience.

Signature Oysters is owned by a collaboration of farmers and promoters in order to access markets that will recognise and reward quality, most notably the high-end restaurant trade. The aim is to provide a year-round supply of the highest-quality fresh oysters – Pacific Oysters, Sydney Rock Oysters or Native Oysters, according to seasonal availability.

Following a small-scale trial in Melbourne, Signature Oysters officially launched in May 2015 with more than 20 leading restaurants, including Pei Modern and Rockpool, as customers.

Company director Ewan McAsh has been one of the main drivers of Signature Oysters. As an oyster grower on the Clyde River at Batemans Bay, New South Wales, he says he started to grade out his best oysters and sell them direct to restaurants to get a better price about four years ago.

The wholesale chain was simply not delivering the returns his business needed to survive. Looking at options to increase returns, he also established an oyster and wine bar at Ulladulla,

PHOTO: ELISHA ROSS



Directors of Signature Oysters Mick Daw (left) and Ewan McAsh aim to put more fresh premium oysters into restaurants around Australia.

NSW, which he ran successfully for more than four years before selling it in 2014 to focus on oyster production and on Signature Oysters.

“The culinary culture in Australia has changed and many chefs now like to receive their oysters live, to open them fresh for customers. And they want to know about the origins of the oysters – their provenance and distinctive characteristics,” he says.

This information is usually lost when oysters are sold into the wholesale or processing chains, according to Mick Daw, who runs the wholesale business Oyster Source, acting for several oyster growers across Australia.

He also joined Signature Oysters as a director, frustrated by the lack of returns for growers, who have often been pitted against each other – squeezed by their own rising costs and by wholesalers and processors intent on driving their own costs down.

He says the existing supply-chain arrangements are effectively jeopardising

the future of the industry. Creating access to a premium market is the only real way to increase the profitability of the industry and to raise the quality and profile of Australian oysters – even if that market is only a small percentage of the total market.

A certain lack of respect for a product he is clearly passionate about has also been a driver in his support of Signature Oysters. “For many years we have been seriously underwhelming consumers,” he says. “The industry is very good at producing ‘average’ oysters. I know our growers can all produce great oysters, but there has been no reward for doing so.”

### A quality proposition

Through Signature Oysters, growers receive 20 to 30 per cent more for their premium product, which Mick Daw says reflects the extra time taken to grow them and care in handling. Gone are the huge sacks of dripping oysters. This product is packed in airfreight-approved polystyrene boxes

that hold 10-dozen oysters, with hessian liners to absorb moisture. The boxes are then sealed, along with information about the provenance, taste and details of the business supplying the oysters.

“Growers put their own name on the oysters, so there’s an incentive to make sure they are providing the best product they can. It is not a generic product. Their information goes all the way to the chef, and possibly the consumer. If the chefs like what they are getting, it’s a chance for the growers to promote their own businesses,” he says.

Mick Daw’s experience in the wholesale trade has proven invaluable in identifying the best cold-chain processes for the oysters. He says he noticed that product delivered to Oyster Source by one particular transport company were in better condition than other products.

When this changed he contacted the growers involved, only to discover that the transport company had changed its delivery arrangements. Oysters previously sent with the fresh fruit and

PHOTOS: ELISHA ROSS



A premium paid for a high-quality product will help oyster farmers secure the future of the industry. Boxed oysters travel as a live premium product in the fresh-produce supply chain.

## INNOVATION OPENS NEW MENU OPTIONS

Oyster shucking may be simple once you get the hang of it, but even in the professional kitchen oysters have been responsible for many an injury from the sharp edges of the shells or the slip of a knife.

Opening large quantities of oysters quickly, cleanly and without accident requires a considerable amount of training and practice. But an innovation developed by New South Wales fisher Steve Siminis is making the business of oyster shucking safe and easier, and finding favour in an increasing number of restaurants, caterers and oyster retailers.

The benchtop system holds the oysters in place, making it safe and easy to open the shells from the hinge, which provides better presentation. Director of Signature Oysters Mick Daw says the system is a great innovation that helps to overcome one of the barriers restaurants may face in adding fresh oysters to their menus – the lack of staff skilled in opening oysters.

“Staff can learn to use this system really quickly, and you don’t have to be particularly strong – you just

need good technique,” he says. It means more businesses can lift the quality of their offerings, moving from processed, pre-opened oysters, to fresh, live oysters shucked only moments before being offered to diners.

Signature Oysters is working with Steve Siminis to develop a demonstration video for the oyster opening system as part of the support it provides to customers.



NSW fisher Steve Siminis has developed a new oyster shucking system that will make it easier to put fresh, premium oysters on the menu in more restaurants. The opening system provides a secure grip on the oysters, making them safer and easier to open.



PHOTOS: ELISHA ROSS

vegetables were now being delivered with the chilled seafood and meats. It was the change in temperature that made the difference.

While Pacific Oysters can handle short periods in temperatures used for the meat cold chain, 0°C to 4°C, Sydney Rock Oysters in particular do not cope well. When transported with fruit and vegetables, at 6°C to 10°C, all animals arrive in better condition; 8°C is ideal.

### Supply-chain partner

While there is clearly a market for a premium product, accessing that market and managing a fresh, on-demand supply chain have been barriers for the many small businesses that make up the oyster industry.

Ewan McAsh says the only way he could grow his premium sales was to increase the number of restaurants he supplied. But as his clientele grew he found it increasingly difficult to deal with the administration and deliveries.

Finding the right partner to handle these aspects of the business, including transport, has been a critical part of the Signature Oysters venture.

To this end the business has initially partnered with Yarra Valley Farms. This business specialises in the transport and ordering systems for fresh fruit and vegetables, delivered directly from farmers to quality-focused cafes, caterers and restaurants – keeping oysters within the fresh-produce cool chain.

Founder of Yarra Valley Farms Bill Kollatos admits to being cautious when he was first approached by Signature Oysters. He has tried to expand the Yarra Valley Farms product range several times without any lasting success.

“Our sales people and our franchise operators have really embraced the idea. They see oysters as a specialty product that creates value for our customers. There has been exceptional uptake in a relatively short time; our customers are very, very interested in the high-quality, consistent oyster lines.”

For Ewan McAsh, the software that now handles the Signature Oysters ordering and accounts – including full product traceability – considerably eases the administrative burden of selling direct to restaurants.

The low-key start of Signature Oysters in Melbourne has allowed both businesses to work out any kinks in the system and to test the market. Limited deliveries are also being made under the Signature Oyster brand in existing supply chains of grower members, including McAsh Oysters. Signature Oysters expects to expand to Adelaide, Brisbane and Sydney within the next few months, and possibly to Perth.

The May launch also coincided with the launch of the Signature Oysters’ website, which profiles all of its growers, the different regions where the oysters are produced and the restaurants that are serving Signature Oysters on their menu. Ewan McAsh says the early feedback has been

positive. “Chefs love the regional diversity, and being able to offer a platter of different flavours and shapes of oysters that might come from Bruny Island in Tasmania, Coffin Bay in South Australia or the Clyde River in NSW. When you get them side by side you can compare the characteristics of the different provinces. It makes the oyster bar concept much easier to do.”

### Quality criteria

Mick Daw has been a judge for the Royal Agricultural Society of NSW (RAS) Sydney Royal Fine Food Show for the past three years, and says the same judging principles have been used as a basis for Signature Oysters’ selection criteria.

“We have simplified the RAS criteria, which goes into a great deal of detail. It comes down to the condition of the meat, the cleanliness of the shell and the health of the oyster,” he says.

The meat should fill the shell and be a deep creamy colour, rather than opaque, and rich and thick. Size is a factor, but meeting specific shape or dimensions is not as important as providing “a good mouthful” of oyster.

The shell should be clean and free of debris. And the oyster should be healthy, which he says is generally indicated by a good lustre on the nacre – the mother-of-pearl – on the shell’s inner surface.

“In the past the premium product has not been getting onto the consumer’s table. What we want to do is get more people eating great-quality oysters more often,” he says. **F**

## Wanted: women with leadership potential

Applications are now open for the 2016 Rural Industries Research and Development Corporation's (RIRDC) Rural Women's Award, which has recognised state winners from the fisheries sector in previous years. These include Francis Bender, Huon Aquaculture, Tasmania 2001; Amanda Way, Clearwater Fisheries, Tasmania, 2005; Carmel Ball, Northern Territory, 2010; Fiona Ewing, Tasmania, 2012; and Barbara Koennecke, Northern Territory, 2012. The RIRDC award is open to all women involved in primary industries who are committed to making a real difference to their industry and community.

State and territory winners receive \$10,000 to implement their award idea and participate in leadership development opportunities, including the company directors' course run by the Australian Institute of Company Directors. The national winner and runner-up will be selected from state winners with a further \$10,000 awarded to the winner and \$5000 to the runner-up to support their professional development and contribution to primary industries.

**More information:** [www.rirdc.gov.au/rural-women's-award](http://www.rirdc.gov.au/rural-women's-award)

PHOTO: ROBB SHAW-VELZEN



Fiona Ewing

## Business leadership

Tasmanian Atlantic Salmon producer Tassal Group has won the 2015 Australian Business Award for Sustainability. The award is benchmarked against international performance standards and recognises leadership and commitment to sustainable business practices.

Tassal is the first salmon company in the world to achieve Aquaculture Stewardship Council certification on all of its farms and is committed to continuous improvement and transparency. The company has a partnership with WWF Australia and is a signatory to the WWF Global Seafood Charter to safeguard valuable marine ecosystems, ensuring the long-term viability of seafood supplies.

## Seafood Directions 2015

The latest research and leading issues for the Australian seafood industry will be discussed and debated at the industry's biennial conference, Seafood Directions, in Perth in October. The three-day conference will be held at Crown Perth from Sunday 25 October to Tuesday 27 October 2015. The industry's best performers and ambassadors will also be recognised at the National Seafood Industry Awards presented during the gala dinner that will conclude the event.

International guest speakers include Tom Pickerell, technical director of Seafish in the UK, which works to support policy and promotion that underpins sustainable fishing and increased fish consumption. He will provide the keynote address, speaking on the conference theme of 'Selling Our Story'.

CEO of the Scottish Fishermen's Federation Bertie Armstrong will speak about establishing good relations between the fishing industry and the gas and oil industry, a subject that will feature in several conference presentations (see page 17).

Joshua Stoll, co-founder of the Walking Fish Cooperative, a community-based fishery in North Carolina, will discuss 'Local seafood marketing: an opportunity for marketing'.

The program manager at Global Seafood Sustainability Initiative (GSSI), Herman Wisse, will speak on the progress of GSSI and the CEO of the Marine Stewardship Council (MSC), Rupert Howes, will discuss the role and value of the MSC certification in shaping markets.

**More information:** [www.seafooddirections.net.au](http://www.seafooddirections.net.au)

## FRDC BOARD APPOINTMENTS

The Agriculture Minister, Barnaby Joyce and Parliamentary Secretary to the Minister for Agriculture, Senator Richard Colbeck, have announced the appointment of six directors to the FRDC Board. Commencing on 1 September 2015, the directors will be responsible for delivering the objectives of the FRDC including innovation in fishing and aquaculture RD&E, investment in marketing, and effective and efficient administration. The Hon. Harry Woods, FRDC chair, welcomed the announcement noting the high calibre of people who apply to be FRDC directors.

The appointments were based on the selection short list provided by the government-appointed independent selection committee chaired by Glenn Hurry. The directors appointed until 31 August 2018 are:

- Dr Renata Brooks – chair of the Queensland Government's Biosecurity Capabilities Review;
- Professor Colin Buxton – adjunct professor, University of Tasmania, co-chair Bioregional Advisory Panels, Department of the Environment;
- Mr John Harrison – CEO of the Western Australian Fishing Industry Association;
- Dr Lesley MacLeod – CEO of Dairy Innovation Australia, board member for Murray Dairy;
- Dr Daryl McPhee – associate dean, Bond University; and
- Mr John Susman – managing director and owner of Fishheads Seafood Strategy.

The FRDC management express thanks to the outgoing directors – Ms Heather Brayford, Mr Brett McCallum, Dr Bruce Mapstone, Dr Peter O'Brien and the late Mr David Thomason for their significant effort in delivering tangible outcomes for the Australian fishing and aquaculture sectors.

## PEAK BODY PROJECT LAUNCHES

A three-year project has kicked off to identify the best options for a new national seafood industry peak body. With Australian Government funding, the National Seafood Industry Alliance has commissioned Canberra firm Inovact Consulting to undertake the 'United Seafood Industries' project.

The project provides a unique opportunity for seafood businesses to develop a strong national peak body tailored to their needs, and with the capacity to

engage the government and community with influence and authority. A dedicated website ([www.unitedseafoodindustries.com.au](http://www.unitedseafoodindustries.com.au)) has been launched and consultations are planned for each state to connect with seafood businesses, individuals and industry associations. Brian Ramsay, managing director of Inovact Consulting and former CEO of Australian Pork Ltd, is leading the project and will speak at Seafood Directions 2015 in Perth (25 to 27 October).

# A decade of excellence in culinary connections

## ENGAGEMENT AND EDUCATION

**There is nothing like seeing fish caught firsthand to understand the effort that goes into producing the best-quality product with the lowest impact**

For consumers and chefs, connecting with primary producers is a growing trend, powered by media and TV shows such as *MasterChef*. But the FRDC has already been involved in taking chefs and hospitality staff to visit fishers and farmers for more than a decade, through the Appetite for Excellence program.

The program was created by chef Luke Mangan and his business partner Lucy Allon to encourage chefs and hospitality staff to stay in the industry. The FRDC was one of the founding product sponsors in the first year and took the bold step to have finalists visit fishers in a nominated region.

The concept was simple: take some of the best young chefs and show them how seafood was caught or grown and explain how science and best practice underpins Australia's seafood and primary industries.

"When we asked on behalf of the chefs, we didn't really expect the regional tour program to go very far," says the FRDC's manager of communications, trade and marketing, Peter Horvat. "But after discussions with other rural R&D corporations, the FRDC had three partners for the first tour in Tasmania – Horticulture Innovation Australia, Meat and Livestock Australia and Wine Australia."

Now an annual event, over the course of a week-long tour, finalists in the Appetite for Excellence program visit four or five primary sectors to learn about where the produce comes from, firsthand. Other partners have included Dairy Australia and Australian Pork.

In the past decade, the regional tour program has visited many seafood companies

including crab and fin fishers in Carnarvon (Western Australia), tuna, kingfish, mussel and oyster producers and processors in Port Lincoln and Adelaide (South Australia). There were abalone farms, fishers and processors in Geelong (Victoria), and commercial co-operatives and long liners in Bermagui (New South Wales). A Batemans Bay (New South Wales) tour visited oyster farmers; there were crab fishers in Noosa and processors in Brisbane (Queensland) Atlantic Salmon and oyster farms in Hobart, scallop fishers in Devonport and more oyster farms in Smithton (Tasmania).

This year the finalists toured Victoria starting in the Ballarat gold fields and moving south to Geelong where seafood visits focused on fishing in Port Phillip Bay with the Jenkins family and the Jade Tiger Abalone farm.

Seafood Industry Victoria CEO Johnathon Davey hosted the seafood leg of the tour, joining fishers from the Jenkins family and



After visiting the Jade Tiger Abalone farm in Portarlington, Victoria, to learn about the production process and to taste test the abalone, the Appetite for Excellence finalists were keen to learn where they could get hold of more product to use in their restaurants.



PHOTOS: DON ARNOLD



PHOTOS: DON ARNOLD

The tour participants were able to closely observe shallow water haul seine fishing, a low-impact harvesting technique used in Port Phillip Bay to catch many popular species such as King George Whiting. They were also able to compare their own fish filleting technique against that of the professional filleters, who process the catch for Jenkins and Son.

Victorian fishery scientist Matt Koopman. Their expertise provided participants with a good overview of Victoria's commercial fishing operations, from harvesting methods to techniques used to assess fish stocks.

### On the water

After a 7am start at Queenscliff marina, the group spent three hours on Port Phillip Bay with the crew from Jenkins and Son, who demonstrated how shallow water haul seining works. This is a low-impact method of harvesting that allows the catch to be sorted in the net before it is brought out of the water. The Jenkins family has been operating in Port Phillip Bay for five generations. The key species they target include King George Whiting, Snapper, Flathead, Red Mullet and squid.

Tour participants were able to observe the fishing from only metres away – on board the Geelong-based Eco Tours boat. Fishing on the day produced a good haul of about 200 kilograms of King George Whiting. The FRDC's Josh Fielding says the group members were able to see that the fish not targeted were released in a healthy condition.

Johnathon Davey agrees it was a great opportunity to show some of the hospitality industry's best young people how sustainable the practice of haul seining is. "They were all able to see how the seafood they use does come from

an environmentally friendly commercial fishing industry. It's an industry where the operators are custodians of the environment," he says.

Donna, Peter and Ben Jenkins opened their shop in Portarlington, allowing the group to witness how seafood was processed, highlighting the deft skills of professional fish filleting. Several of the young chefs tried their hand to improve their skills.

Peter Jenkins and Johnathon Davey gave an outline of the issues the Port Phillip Bay fishery is facing in relation to the Victorian Government's election commitment to close the bay to commercial fishing.

Members of the tour were keen to understand the issue and to learn how they could help in this case or with similar issues around Australia.

"It would great to have the opportunity to provide a similar experience to future groups of not only chefs but also other young leaders," Jonathon Davey says. "It could be a good case study to inform the National Seafood Industry Leadership Program, and the experience it provided and how it could be incorporated into other programs."

### Abalone aquaculture

Continuing the tour, the finalists spent the afternoon visiting the Craig Mostyn Group's

### 2015 ELECTROLUX AUSTRALIAN APPETITE FOR EXCELLENCE AWARD WINNERS

#### Australian Young Chef

**Winner:** Jake Kellie from Estelle Bistro, Victoria

**Runner-up:** Aaron Starling from Bistro Guillaume, Victoria

#### Young Restaurateur 2015

**Dual winners:** Bianca Welsh from Stillwater Restaurant and Black Cow Bistro, Tasmania  
Chris Thornton from Restaurant Mason, New South Wales

#### Young Waiter 2015

**Winner:** Brooke Adey from Bentley Restaurant & Bar, New South Wales

**Runner-up:** Louise Naimo from Estelle Bistro, Victoria

Jade Tiger Abalone farm, also at Portarlington. Managing director Anton Krsinich was the host for the afternoon and gave an overview of the operation from spawning and spat production right along the supply chain to processing, canning, packaging and exporting.

This land-based facility is the largest abalone farm in Australia and produces a selectively bred abalone with a distinctive jade colour.

At the end of the tour the group was treated to a tasting of abalone in a few different forms – canned and fresh. For many in the group this was the first time they had tried abalone and they were not disappointed.

As with the tour provided by Jenkins and Son in the morning, participants were keen to know where they could secure supplies from Jade Tiger Abalone.

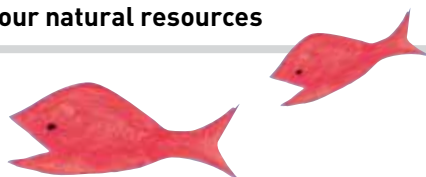
"It was clear that participants loved being able to hear the stories of the fisheries, and to understand the background of the seafood they work with," Josh Fielding says.

After 10 years of involvement in Appetite for Excellence the FRDC has helped to educate almost 200 leading hospitality professionals, and has built long-lasting partnerships and a network of good people who continue to use the FRDC as a resource for information on the seafood industry. **F**

# Delivering to the public on key challenges

## POLICY AND PLANNING

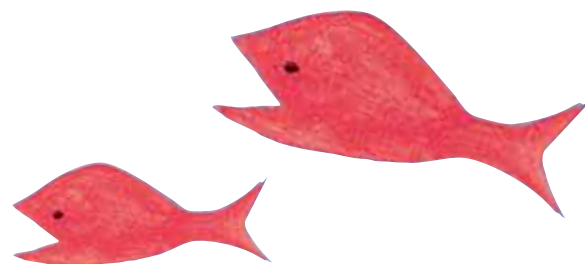
**Research, development and extension priorities for the next five years aim to ensure Australian fishing and aquaculture measure up to rising expectations for sustainable and ethical behaviour, while optimising the use of our natural resources**



**T**he FRDC's new Research, Development and Extension Plan will be officially launched in September 2015 and will herald a significant change to the direction and approach for the corporation.

Senator Richard Colbeck, Parliamentary Secretary to the Minister for Agriculture, will officially launch the 2015–2020 RD&E Plan at Parliament House in Canberra on 16 September.

One of the priority areas for the plan and for the FRDC will be improving the confidence of consumers in the products of Australian



fishing and aquaculture. There will also be improved opportunities for recreational fishers and Indigenous people to benefit from fish and aquaculture. Both will be able to play a greater role in the stewardship of natural resources.

Addressing the public's perception of Australian fishing and aquaculture has been arguably one

## National Marine Science Plan 2015–2025

**A** 10-year plan for investment and research has been developed to help grow Australia's blue economy and its fisheries.

By 2025, Australia's marine industries will contribute around \$100 billion each year to our economy and have the potential to supply a significant proportion of the seafood we eat.

The National Marine Science Plan, released by the Minister for Industry and Science, Ian Macfarlane, focuses on seven key challenges associated with our oceans. It provides a template for striking a balance between reaping the Australian ocean's economic potential and the need to safeguard its longer-term health.

A key challenge is food security, and marine and fisheries science will play a significant role in helping Australia respond to and meet this challenge.

According to John Gunn, chair of the National Marine Science Committee that coordinated the National Marine Science Plan, Australia's marine sector is already a significant contributor to the nation's economy. He says it

has the potential to provide even greater economic wealth through growth in offshore oil and gas production, renewable energy resources, biotechnology, marine and coastal tourism, fishing and aquaculture.

The plan outlines the science needed to provide the knowledge, technology and innovation that will build a sustainable blue economy and how fisheries and aquaculture are a key part of the future.

The Marine Science Plan is a consensus document with input from more than 23 marine research organisations, universities and government departments, and more than 500 scientists. It provides recommendations for science that will be at the heart of dealing with these challenges. The plan's recommendations are as follows.

- 1** Create an explicit focus on the blue economy throughout the marine science system.
- 2** Establish and support a national marine baseline and long-term monitoring program to develop a comprehensive assessment of our estate, and to help manage

Commonwealth and state marine reserves.

- 3** Facilitate coordinated national studies on marine system processes and resilience to enable understanding of development and the impact of climate change on Australia's marine estate.
- 4** Create a national oceanographic modelling system to supply the accurate, detailed knowledge and predictions of ocean state that Defence, industry and government need.
- 5** Develop a dedicated and coordinated science program to support decision-making by policymakers and the marine industry.
- 6** Sustain and expand the Integrated Marine Observing System to support critical climate change and coastal systems research, including coverage of key estuarine systems.
- 7** Develop marine science research training that is more quantitative, cross-disciplinary and congruent with the needs of industry and government.
- 8** Fund national research vessels for full use.

of the single greatest emerging issues in the past five years – a trend also seen internationally.

### Public perceptions

“It is clear that community perceptions can and do have a strong influence on government decision-making and management approaches – whether they are based on scientific evidence or not,” says the FRDC’s manager of communications, trade and marketing, Peter Horvat.

“The rise of social and digital media mean that concerned community members have increased the ability of the public to assert pressure for change and no longer have to resort to chaining themselves to machinery.

“This means that Australia’s fishing and aquaculture sectors must not only be sustainable, humane and consistent in line

with wider community expectations, they will have to continue to show it; and be open to scrutiny of their practices to continue to have community endorsement.”

The RD&E Plan includes a performance target to increase the positive perceptions of commercial fishing in Australia from 28 per cent of survey participants in 2014 to 40 per cent by 2020.

To do this, the FRDC will be working with its stakeholders – government and industry – to implement a multi-tiered approach. The Australian Government, for example, is taking a leading role in understanding community views and in developing communication strategies and materials to help industry tell its story – see breakout ‘Who cares about the seafood industry?’

The FRDC will continue to fund good R&D projects to underpin fisheries management and industry practice. It will shine a spotlight on the way fisheries operate and how they are meeting world’s best practice through programs such as Appetite for Excellence (see

page 8), and demonstrate the performance and sustainability of Australian fisheries.

The *Status of Key Australian Fish Stocks Reports* will be an important part of transparent reporting to the public on the sustainability of Australian fisheries.

In the next five years the number of commercial species assessed in the reports is expected to increase from 68 in 2014 to 200 by 2020. The FRDC will also establish standards for the management of Australian fisheries to provide the public with greater confidence that management practices take into account community values.

“We need to expand our capacity to connect with seafood consumers in markets and overseas and to tell the story of sustainable production to our customers,” Peter Horvat says. “We can do this by better understanding the values of the wider community and how we can align the fishing and aquaculture sectors with these more broadly held values.” **F**



The FRDC played an integral role in developing the fisheries productivity and food security aspects of the National Marine Science Plan, aligned with the objectives and directions set out in the FRDC’s 2015–2020 RD&E Plan. **F**

## WHO CARES ABOUT THE SEAFOOD INDUSTRY?

Not the public, according to recent market research commissioned by the Department of Agriculture. The Australian community has little front-of-mind or spontaneous feeling for the seafood industry, particularly in comparison with other primary industries, according to a survey on community attitudes towards the management of fisheries and the seafood industry.

However, the research shows that there is potential for Australians to feel pride in and support for the seafood industry – they just need some encouragement. It also found that the public values sustainability and protection of the environment, and want to know that the industry is protecting it.

It is clear from the research that developing a compelling communications strategy is not only about factual education of the public, but also about what actions are being undertaken to ensure sustainable management of the fisheries resource. To deliver increased confidence and pride in Australian fisheries, this project focusses on attitude change. It is about challenging the status quo – ensuring that people reframe their perceptions and reconsider their beliefs.

The findings of the market research are the first step in a project by the Department of Agriculture to improve public attitudes and understanding of the seafood industry and fisheries management.

Consumers generally have little consideration for the seafood industry when compared with other primary food source industries in Australia. The seafood industry lacks profile and status in their minds, and there is a need to get the industry onto the agenda of Australians.

The seafood industry has consistently agreed that it needs greater industry-wide unity and pride, supported by a consistent and positive image, to encourage Australians to understand and value this important primary industry.

The department is now taking the research findings, discussing with industry and working with communication experts to develop a concept and campaign that can be used to promote fisheries management and the seafood industry. The process includes developing strong, positive key messages, and testing them with further market research.

From September, the department will start discussions with key industry stakeholders and associations in the lead up to the Seafood Directions conference in Perth this October, where the results of this work will be presented.

The department welcomes industry and community input. Please send feedback to: [fisheries.communication@agriculture.gov.au](mailto:fisheries.communication@agriculture.gov.au)

# Student awards for aquafeed impacts and SBT spawning

## PROFESSIONAL DEVELOPMENT

**The Australian Marine Science Association provides a valuable forum for student researchers to present their work alongside that of experienced researchers**

**A** presentation of research into the impact of aquafeed nutritional changes on the environment has won the FRDC student award for the University of Melbourne's Camille White at the annual Australian Marine Sciences Association (AMSA) Conference. A second FRDC student award was presented to Shona Jennings from Murdoch University for her presentation on Southern Bluefin Tuna spawning grounds.

The four-day AMSA conference highlighted the diverse range of research being undertaken in marine environments, including fisheries-related research. The 2015 event, held in Geelong, Victoria, featured presentations from more than 300 scientists on their current and topical Australian marine research.

Camille White's award-winning presentation was titled 'Does increased use of high omega-6 feeds in aquaculture impact on ecology of marine food webs?' She said the expanding aquaculture

industry released extra nutrients into coastal and estuarine ecosystems worldwide through waste feed, faecal material and nitrogenous wastes.

During the past decade there has been a switch away from feeds high in omega-3 fatty acids based on fish oil, to feeds high in omega-6 fatty acids comprising mainly terrestrial plant oils and animal fats. This has led to a shift in the composition and quality of the waste released into the sea.

As part of her work, Camille White demonstrated that nutrients from the wastes released by aquaculture were widely consumed by organisms in both benthic and planktonic systems. She subsequently investigated the health and reproductive consequences of consumption of this waste on several key groups of organisms.

Single and multi-generational experiments were conducted on common, rapid production fouling organisms, such as Caprellidae and Corophiidae amphipods, a shrimp-like form of crustacean.

Camille White and her team also investigated health and reproductive outcomes on several sea urchin species, which have the potential to be ecosystem drivers in many coastal and estuarine systems worldwide.

They found that urchins consuming aquafeed had enhanced gonad indices compared with those consuming a natural diet. However, this did not necessarily translate into larval success,

with larvae of adults consuming the natural diet surviving at significantly higher rates.

## Spawning conditions

Shona Jennings's presentation at AMSA was 'Oceanographic synopsis of the Southern Bluefin Tuna spawning ground in the eastern Indian Ocean'. Her work highlighted how the physical and biological conditions of the eastern Indian Ocean varied spatially and temporally, across seasons and also annually.

She said as this area was the only known spawning ground of the highly valuable Southern Bluefin Tuna, it was important to understand how changes in conditions affected spawning.

To do this, Shona Jennings and her team compiled five years of data about ocean conditions at depths of 50 metres and 500 metres from a variety of national databases to identify trends, anomalies and seasonal variations of sea surface temperature, sea level height, ocean body temperature, salinity, nitrate, phosphate and oxygen.

The data identified the physical and biological changes that occurred in the spawning grounds, one to two months before spawning began, that promoted favourable conditions for larval survival.

As larval survival is dependent on the strength, timing and duration of these oceanographic changes, modelling these processes will allow the fishing industry to predict Southern Bluefin Tuna population growth.

This research will provide background information to the emerging East Indian Ocean Upwelling Research Initiative, which forms a part of the coming Indian Ocean Expedition. **F**



Shona Jennings



Camille White receiving her AMSA award.

PHOTO: CARLIE DEVINE



# Wine month revellers get a taste for oysters

## MARKETING

**Aussie Wine Month provided the opportunity for a range of local oysters to shine, showcasing distinct regional flavours**

It is the first week of May and Australia Square in Sydney's CBD is bustling with activity; glasses clinking as they are unpacked, wines are unboxed and hessian bags brimming with fresh oysters hauled in, ready for the two-day launch of Aussie Wine Month on 6 and 7 May.

The oysters are a mixture of Native Oysters, Sydney Rock Oysters and Pacific Oysters, from a select number of growers on the New South Wales coast. Severe storms and flooding in the lead-up to the event reduced the number of growers represented at the event, but more than 280 dozen oysters were still sourced to showcase a variety of species and regional variations.

The FRDC's manager of communications, trade and marketing, Peter Horvat, says the pop-up cellar door event run by Wine Australia was a great opportunity for the seafood industry to benefit from the media attention and awareness generated by Wine Australia's Aussie Wine Month.

In the same way that winemakers were able to explain the regional and varietal differences of their offerings directly to customers, the oyster bar was able to tell the story of the regional and species differences of its oysters.

The 2015 event was the second time the FRDC has coordinated the promotion of seafood at the Sydney launch of Aussie Wine Month. In 2014 prawns and Atlantic Salmon were the feature seafoods.

Last year a dozen TAFE students spent many



PHOTO: WINE AUSTRALIA

Customers enjoying freshly shucked, unrinsed oysters.



"It's so good when an event is put on properly! The guys at @wineaustralia have this amazing complimentary oyster bar as part of #citycellardoor for #AussieWineMonth"



"@wineaustralia the wine was good, oysters amazing #citycellardoor for #AussieWineMonth"

hours peeling the 100 kilograms of prawns provided in preparation for the event. This year Joe Zappia and Les Maisi from Sydney City Oysters were on hand to help coordinate the delivery of live oysters direct from the growers and to shuck them on the spot – more than 3300 in all – for customers. Botany Bay oyster producer and processor Dave Barker also attended to help tell the story of oyster growing.

Joe Zappia says shucking the oysters fresh and serving them unrinsed, with the full flavour of the oyster's juices, was a point of difference for consumers, many of whom had only experienced oysters pre-opened and rinsed. They were also able to compare the different regional and species flavours, from the creamy Merimbula Sydney Rock Oysters, to the full-flavoured native flat oysters from the Clyde River (which were only opened for serious oyster lovers).

At the same time, customers were asked questions about their interest in opening their own oysters so that they could experience ultimate oyster tasting for themselves – freshly shucked and unrinsed in the shell.

About 1500 people attended the two-day Aussie Wine Month launch, most of whom were aged 25 to 45 years and who worked in and around Australia Square. Peter Horvat says the significant media coverage of the event was a positive outcome, reaching more than four million readers through print media and another 140,000 people via Facebook and Twitter.

Oysters Australia used the event to add to its consumer research in the 25 to 45-year-old city worker demographic. Oysters Australia executive officer Rachel King says the industry wants to increase the number of people who can open their own oysters to enjoy a premium eating experience.

Customers eating oysters surveyed at the Wine Month launch were asked if they ate oysters at home and if they could open the oysters themselves. The survey found that:

- five out of 10 were 'no hassles please' eaters, who did not want to know how to open an oyster – they went to trusted sources, such as restaurants and Sydney Fish Market for their oysters;
- three out of 10 were open to learning how to open an oyster – most already ate oysters at home and would buy more if they could buy them closer to the source; and
- two out of 10 were already oyster 'gurus' – they would buy more oysters to open themselves, if they could get them direct from the farm. F

## THE WINEMAKERS

Carlo Pizzini – Pizzini Wines (Victoria)  
Corrina Wright – Yarnbomb and Oliver's Taranga (SA)  
Jeremy Dineen – Josef Chromy Wines (Tasmania)  
Jim Chatto – McWilliam's Wines (NSW)  
Keith Hentschke – Hentley Farm Wines (SA)  
Luke Skeer – Wynns Coonawarra Estate (SA)  
Neil Larson – Tahbilk Winery (Victoria)  
Richard Burch – Howard Park Wines (WA)



## THE OYSTER PRODUCERS

Dominic Boyton – Merimbula Gourmet Oysters, Merimbula (Sydney Rock Oysters)  
Tony Troup – Camden Haven Oyster Supply, Camden Haven River (Sydney Rock Oysters)  
Paul Wilson – Port Oyster Co, Hastings River (Sydney Rock Oysters)  
Ewan McAsh – McAsh Oysters, Clyde River (Sydney Rock Oysters and Native Oysters)  
Ben Ralston – Ralston Bros Oysters, Clyde River (Pacific Oysters)  
Brandon and Jason Armstrong – Armstrong Oysters, Camden Haven River (Sydney Rock Oysters)

PHOTO: WINE AUSTRALIA

# Fishing and management

## A SHARED JOURNEY

### INDIGENOUS FISHERIES

**Merging indigenous fisheries management and contemporary management frameworks provides an opportunity to get the 'best of both worlds'**

By Rose Yeoman

**M**ost people think of fishing as falling into one of two categories – either commercial or recreational. But this fails to take into account customary fishing practices.

Robert 'Bo' Carne, manager for Indigenous strategic development at the Northern Territory Department of Primary Industry and Fisheries, and Terry Yumbulul, chair of the Garngirr Fishing Aboriginal Corporation (GFAC), have a wider perspective to offer.

Terry Yumbulul blurs the boundaries between story and poem, as he tells their story. "We, the saltwater people of East Arnhem Land, are listening to the sea and will take back our place as customary fishers in the holistic sense ...

"I am Manbuynga, we are Garngirr, we are the people of the sea, I am that sea, I am the custodian, I am a part of the sea, I belong to the sea and the sea belongs to me and my people.

"We do not wish to stop anyone from fishing our waters, we want to be a part of the management and fishing industry in this country and particularly in our area of East Arnhem Land. That is our longstanding right, responsibility and desire.

"We want to share our knowledge and methods and learn your knowledge and methods, we see this as a two-way journey fishing our waters but also protecting our waters and the fish stocks for future generations," he says.

Bo Carne explains that from his experience with first nation groups in Australia, fishing is regarded in a holistic way: "the social, cultural, spiritual, management and economic aspects are all linked as they have been for the past 40,000 years".



Terry Yumbulul (left), chair of the Garngirr Fishing Aboriginal Corporation, with Robert 'Bo' Carne, manager for Indigenous strategic development at NT Department of Primary Industry and Fisheries.

"It is not customary fishing without also being commercial fishing, recreational fishing, religious observance, fisheries management, fisheries compliance and fisheries and habitat conservation.

"But to me, customary fishing is not well interpreted in any Act in a way that is inclusive of all these. For example the *Native Title Act 1993* says it's for subsistence only and even this aspect of the Act has inconsistent interpretations across Australia's jurisdictional fisheries Acts," he says.

### Garngirr Corporation

To help and empower Indigenous people to be 'complete' fishers again, the GFAC was established in 2013. A board of 12 directors was selected from the area to undertake contemporary governance and small business training and develop a business plan outlining their vision.

Inaugural chair Terry Yumbulul is an elder of the Warramiri and a well-known artist who has travelled in Europe and the US lecturing

about art, culture and the importance of the ocean. It was through his role working with the Miwatj Health Aboriginal Corporation that he realised the importance of good nutrition to improve the health of his people.

Terry Yumbulul describes the link between Indigenous health and Garngirr as "perfect" and a good opportunity to get people eating fresh seafood. "This is not about knocking down non-Indigenous food but it's about retaining eating our healthy food, provided to us from the wild, our seas. GFAC will improve health by providing healthier food choices, especially for the children and old people. This food, provided daily, will also help our own fishing enterprises."

With the support of Bo Carne and the NT Department of Primary Industry and Fisheries, GFAC was developed to help people earn a healthy living using the sea's resources. Terry Yumbulul explains that they were asked to fulfil the dreams and vision of the old people:

PHOTO: DEPARTMENT OF FISHERIES, NT

“To catch fish, employ our people, utilise our resources and share it with everyone”.

Terry Yumbulul sees his role as ensuring that his people look at the bigger picture and notes that fisheries must be managed in a sustainable way.

“We not only go fishing but we also have to maintain our resources, through our sea ranger groups. This helps to keep that holistic approach to customary fishing, being able to catch and sell fish as well as working with our sea rangers to ensure we do it in compliance with both our management and non-Indigenous management rules.

“Garngirr (the sea) gives us our life.”

### Challenges and new learning

Bo Carne cites examples of how Indigenous fishers think and behave differently to commercial fishers. Under customary law, fish may not be taken from the sea country of another group unless a person from that group is present or the appropriate permission has been granted.

Also, customary fishers do not think about how much money they can make as individuals but how much can be provided back to the community. This relates mostly to people being employed and providing affordable fresh seafood.

Fish may be caught to trade for other food or bush tucker medicine and fishing may be practised in order to teach the young. Most importantly, fish is always shared.

The challenge now is to acknowledge fisheries management requirements around licensing, catch size and stock protection, and to see how Indigenous management frameworks can be incorporated into contemporary management. This presents an opportunity to get the ‘best of both worlds’ in search of best-practice management.

Terry Yumbulul describes how, for thousands of years, his people have bartered by trading one kind of fish for another, for example, fish for shellfish or crustaceans. This was their form of commercial fishing, but it was not recognised by governments.

“If we want to do commercial fishing today, we need licences, no more freedom of choice. Now all has to be recorded. This is new to us too, we need to learn and we are willing to do that.

“Many of our old people would remember when we were actively engaged in commercial fishing back in the 1950s and 1960s. We had our fishing co-operatives operating and now we want to bring them back.”

### Models for cooperation

One aim of the GFAC is to develop a co-operative that provides a workable model allowing different levels of commercial enterprise. It could be two men in a tinny, inshore fishing with nets or a commercial vessel with a crew. Bo Carne says the co-operative model is likely to work best as it allows Indigenous people in East Arnhem Land to fish their traditional sea country and at the same time ‘pool’ their product.

“It’s important to diversify and target some of the higher-value species, but there can be a lot of restrictions when you start stepping up,” Bo Carne explains.

“You need a surveyed vessel and a coxswain.

Many Indigenous people speak five or six languages so it’s challenging when English is their sixth or even seventh language and they need to be proficient in that to pass the coxswain’s exam.

“But the value of a coxswain’s certificate is that it broadens employability and allows movement into different jobs, including that of sea ranger or fishing tour operator.”

He says individuals or the co-operative could hold licences and the funding would come from a proportion of the catch, which would allow purchase and maintenance costs associated with boats as well as costs associated with coordinating, processing and marketing the catch.

At present Indigenous people are fishing with permits but the next step will be to formalise their business by obtaining licences and assets and learning from commercial fishers. The NT Department of Primary Industry and Fisheries has employed two Indigenous fishing mentors who work in remote communities to help teach commercial fishing skills.

Bo Carne says there is always plenty of interest, but without a more formal commercial business enterprise, this initiative will not be taken seriously: “We need more community-based fishing mentors, at least in the short term so we can create momentum.” **F**

Robert ‘Bo’ Carne and Terry Yumbulul will be among the presenters at the Seafood Directions 2015 conference in Perth from 25 to 27 October. Their presentation titled “Garngirr Dhapuluwan: ‘The sea has spoken’” will describe the ways in which Indigenous people regard fishing and how that contrasts with that of non-Indigenous Australians and how the differing approaches might be merged to create a coherent whole.

PHOTO: DEPARTMENT OF FISHERIES, NT



Fishing mentor Klaus Jeffery at the Goulburn Islands in the Arafura Sea, off the coast of Arnhem Land.



Fresh fish sold by Crocodile Island rangers to a local community store.



Rangers at the Crocodile Islands (located in the Arafura Sea, off the coast of Arnhem Land) collecting research data as part of their fishing permit that also allows the sale of the fish into their community stores.

# NEW WAVE OF SEISMIC ENGAGEMENT

## MARINE RESOURCES

**The heightened profile of seismic activity in Australian waters is generating new science about potential effects, answering some questions and dispelling some misconceptions**

By Catherine Norwood

There has been a recent deluge of requests seeking comment from fishers about proposed seismic surveys in Australia's petroleum hot spots. While this suggests that offshore activity is on the rise and has generated increased concern about the potential effects on fisheries, the reverse is in fact true.

Matt Smith, from the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), says the number of surveys has decreased in the past three years.

What has increased is the level of consultation now required between the petroleum industry and other marine stakeholders, including fishers.

This follows changes to legislation in February 2014 that also made NOPSEMA the sole environmental regulator of offshore oil and gas operations in Commonwealth waters.

The changes introduced new obligations on petroleum titleholders preparing environmental plans for proposed activities to consult with stakeholders, such as fishers, who may be affected by any proposed activities including seismic surveys.

Matt Smith says while the new consultation requirements involve more effort for all those involved, they also provide more protection for fisheries against the potential effects of petroleum-related activities.

## High-pressure impact

There are considerable concerns about the impact of surveys that involve the use of air guns, which discharge high-pressure air into the water every few seconds while criss-crossing the oceanic survey area.

The process then uses the pressure waves reflected back from the seafloor to create an image of the rock layers below the seabed and to reveal any potential oil or gas reserves.

In recent years exploration has expanded to include potential sites for carbon sequestration, particularly in the Gippsland basin off Victoria's south-eastern coast.

Canadian research has documented evidence of physical damage to fish directly in the path of the high-pressure air gun blasts, but there has been little research on the longer-term impact on fish or on the effects of the survey process on invertebrate species.

## Industry input

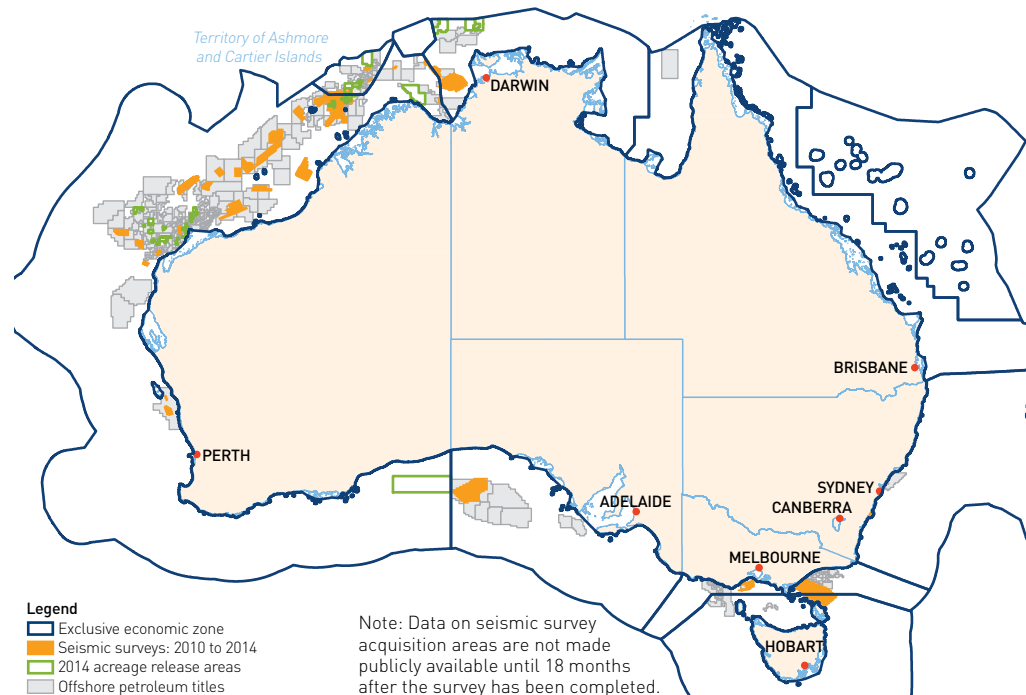
Prior to environmental streamlining in February 2014, Matt Smith says fishers may only have been consulted on some seismic surveys.

Prior to environmental streamlining both the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* applied. But the focus of the EPBC Act on threatened, endangered and protected species did not necessarily extend the same level of consultation or protection to commercial fisheries, he says.

As an example of the increased protection provided by the new arrangements regulated by NOPSEMA, Matt Smith points to applications for seismic surveys off Eighty Mile Beach in Western Australia.

Four different applications were received for 'speculative' surveys off Eighty Mile Beach south of Broome, from the 30-metre seabed contour to the 200-metre contour. The area of the proposed surveys extended from about 40 kilometres offshore to almost 200 kilometres.

**FIGURE 1 AREA OF COMPLETED SEISMIC SURVEYS IN AUSTRALIAN COMMONWEALTH WATERS FROM JANUARY 2010 TO JANUARY 2014.**



SOURCE: NATIONAL OFFSHORE PETROLEUM TITLES ADMINISTRATOR

The adjacent inshore area is home to the only commercial wild pearl oyster fishery of its kind in the world, and it underpins Australia's high-value pearl industry.

The Pearl Producers Association (PPA) was concerned about the pearl oyster broodstock spawned in areas out to the 100-metre contour and possibly beyond. Any potential damage to the broodstock and the spawning process would jeopardise the future of the industry.

Matt Smith says that under the pre-February 2014 public consultation arrangements, it is possible that the PPA may have only received notification of the survey going ahead rather than being consulted on the proposed seismic activity, which is now part of the mandated consultation process.

While the PPA had strong anecdotal evidence from reputable scientists that spawning was occurring beyond the areas of the pearl beds, there was no published science to support their case. At the same time, there was also no definitive evidence to support the applicants' position that the oysters would not be affected.

### Science to fill gaps

With a substantial modification to the proposed surveys to address the PPA concerns, the survey applications were accepted by NOPSEMA.

The PPA remains concerned about the potential effects of seismic surveys on the pearl oyster population and has called for research to provide definitive scientific information on its ecological effects.

The pearl oyster case highlights two of the seismic-related issues that FRDC-funded projects underway are already working to address. One is managing the consultation processes, the paperwork and closer relationships between the petroleum industry and fisheries. The other is the gap in the science about the effects of seismic surveys.

Jayson Semmens at the Institute for Marine and Antarctic Studies is leading the project to investigate the effects of seismic surveys on Southern Rock Lobsters and scallops.

The project was initiated by the Scallop Fishermen's Association of Tasmania following concerns about a decline in scallop beds in the Gippsland Basin and Bass Strait.

Partners in the project include Curtin University, Origin Energy and the Victorian Department of Environment, Land, Water and Planning, which operates the national

CarbonNet (carbon sequestration) project for the Australian Government.

Jayson Semmens says the three-year project is analysing both the immediate effects of air gun blasts on scallops and rock lobster and longer-term physiological effects, using both laboratory and field tests.

In the case of rock lobsters, this includes the effects on offspring, as berried female lobsters are included in the experiments. Both rock lobsters and scallops are placed, in containment, on the seafloor and are subjected to air gun blasts. Blood tests are part of the work to measure physiological responses, while video is used to document behavioural responses.

### Optimise engagement

Meanwhile, working with Seafood Industry Victoria, researcher Ian Knuckey has been investigating ways to optimise the communication and operational processes of seismic surveys for the fishing industry and the oil and gas industry.

The paperwork is one issue that can seem overwhelming, he says.

Fishers can come home from extended time at sea to find a mass of notifications from several different players, who may all seem to be proposing something similar.

"Simply keeping track of all the different stages of multiple operations is a challenge for fishers," he says. "On the other side of the equation, oil and gas companies are just as flummoxed by the extent of the engagement they now have to undertake and the number of players they need to notify."

He says interviews with stakeholders have also shown that the different sectors do not really understand the operational requirements and constraints of the other. This includes the potential impact on an individual business, fishing in a specific area, and on an industry sector basis.

There is also little consideration of the cumulative effects of multiple seismic operations. "Fishers may be able to contend with the impacts of a single seismic operation by modifying their activities, but there may be limited ability to do this in response to multiple operations conducted in a relatively small area in a short period of time," he says.

Proposals to improve the engagement process include an annual regional stakeholder meeting and website to centralise and share relevant information between the industries, roundtable discussions on overarching policy and processes, as well as one-on-one industry discussions.

### SEISMIC SURVEY UPDATES

The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) provides a notification service for applications related to seismic survey at its website ([www.nopsema.gov.au](http://www.nopsema.gov.au)). Customised notification services for new submissions or changes to status in existing submissions can be made through NOPSEMA's search tool.

This service is designed to ensure that anyone potentially affected by survey activity has the opportunity to comment, even if they may have been missed from the official notification list.

NOPSEMA search tool: [www.nopsema.gov.au/environmental-management/ep-submissions-and-summaries/search](http://www.nopsema.gov.au/environmental-management/ep-submissions-and-summaries/search)


### SEAFOOD DIRECTIONS ON TOPIC

Several presentations at this year's industry conference Seafood Directions in Perth from 25 to 27 October will feature the relationship between the fishing and the petroleum industries.

- Bertie Armstrong, the CEO of the Scottish Fishermen's Federation Services Limited, will present 'How we made oil and water mix – a 50-year journey linking fishing and energy'.
- A joint presentation from the Australian Petroleum Production and Exploration Association and the Commonwealth Fisheries Association will discuss the development of a memorandum of understanding between the sectors, and the initiation of a roundtable forum.
- John Hughes, Alan Hopping and Paul Young from the International Association of Geophysical Contractors will present 'How could the fishing and seismic industries achieve a closer working relationship?'
- Ian Knuckey and Chris Calogeras will speak about reducing industry transaction costs due to seismic activity.
- Michelle Andrews, from the Western Australian Department of Mines and Petroleum, will discuss community engagement with the resource sector.

Ian Knuckey says several new protocols have been developed to help guide improved relations between the fishing and the petroleum industries, although these are yet to be tested.

Both of these FRDC-funded projects are expected to be completed this year. **F**



A family prawning on the Swan River,  
Western Australia.

# NOSTALGIA UNDERPINS RESTOCKING EFFORTS

PHOTO: STEWART ALLEN

## RECREATIONAL FISHING

**A new wave of support for recreational fishing, combined with technological advances, is allowing more native species to be cultured as part of stock-enhancement initiatives**

By Natasha Prokop

**T**he Western School Prawn (*Metapenaeus dalli*) is an iconic species for the people of Perth, many of whom share memories of huge catches and big feasts of barbecued prawns with families and friends on the banks of the Swan River and the Peel Inlet.

"People still either remember prawning as adults or as children, and now they want their kids to be able to experience prawning too," says James Tweedley, a marine scientist at Murdoch University in Western Australia.

However, a recent decline of the species has prompted new research with James Tweedley and

colleague Neil Loneragan investigating the decline as part of a three-year project funded by the FRDC. In conjunction with their work is a separate but related project undertaken by the Challenger Institute of Technology in Fremantle, WA, to restock local waterways with school prawns.

## New technology

Western School Prawns have previously been considered commercially unviable as a species for aquaculture production. Without the new-found support of the recreational fishing industry, they were an unlikely species for culturing.

The Recreational Fishing Initiatives Fund has allowed the Australian Centre for Applied Aquaculture Research at the Challenger Institute of Technology to close the life cycle on the species, successfully culturing 600,000 juvenile prawns for release in 2014 and two million for release this year.

"The response to the stock enhancement has been overwhelmingly positive," James Tweedley

says. "This is a project that has captured the imagination of the people of Perth. And once you develop the technology for a difficult species such as school prawns, there's no reason you can't apply the lessons learnt to other species."

He says the cost of about 0.3 cents per prawn is seen as a good investment, given the community benefits that come from improved fishing.

In the case of school prawns, the enhancement is also providing a mechanism to overcome recruitment bottlenecks and to investigate why the species had declined. James Tweedley says it provides a baseline for stock numbers, as well as helping to track the factors that influence the survival of both natural and restocked populations.

## Changing landscape

Head of Environmental and Conservation Sciences at Murdoch University Neil Loneragan has observed the changing landscape of marine

stock enhancement over many decades. He says the two key drivers behind recent initiatives are new technologies, which have allowed a wide range of native species to be cultured, and the growing significance and appreciation of the importance of recreational fisheries.

Enhancing recreational fisheries is about far more than just putting fish in the water, he says. "It's about enhancing the experience: having more fish caught and more people enjoying the experience."

While culturing technologies have helped to rebuild self-sustaining populations of threatened or endangered natives, they have also significantly benefited recreational fisheries, providing social and economic benefits to the wider community. New recreational fishing licences in many states, including general fishing licences in New South Wales and WA, have also expanded the potential sources of funding for recreational fishing initiatives such as stock enhancement.

Enhancement programs have been trialled or continue for a diverse range of species from large finfish such as Mulloway (*Argyrosomus japonicus*) to invertebrates such as Eastern King Prawns (*Melicertus plebejus*).

## Stewardship

In Queensland, fishing in impoundments is incredibly popular. More than 8.5 million native fish of species such as Murray Cod (*Maccullochella peelii*), Golden Perch (*Macquaria ambigua*) and Barramundi (*Lates calcarifer*) have been stocked between 2009 and 2013 alone.

Often these species will not breed in impoundments and the stocked populations are not self-sustaining. Barramundi, for example, will not spawn in fresh water. Maintaining these impoundment fisheries is a significant undertaking.

In 1986, Queensland initiated the recreational fishing enhancement program to promote community involvement in stock enhancement throughout Queensland. Today there are more than 70 community stocking groups that take responsibility for their own little piece of water.

Jennifer Mondora was among the first to establish community stocking groups in 1987 with what is now the Cairns Area Fish Stocking Group Inc. and, in 1990, with the Tableland Fish Stocking Society at Lake Tinaroo, Queensland.

"We like to get people to take ownership of the fish we are putting in," she says. "We want to do everything we can for each and every fish. It's about more than just putting fish in;

it's about getting people involved, the whole community," she says. "We get people from all over the shire coming to help with releases."

About 20 per cent of Queensland impoundments receive funds from the Stocked Impoundment Permit (SIP) scheme: fishers purchase a permit to fish in an impoundment and 75 per cent of the fee is then used for stock enhancement.

In the remaining impoundments and open rivers and estuaries, enhancement programs are funded almost entirely by the community groups, although Jennifer Mondora says it has become harder to raise enough funds, outside the SIP scheme, to maintain stocking efforts in many of these systems.

## Community benefits

The benefits of stock enhancement go beyond recreational enjoyment. A 1991 cost-benefit analysis of the Barramundi stocking program at Lake Tinaroo found that each dollar spent on fish stocking returned a potential \$31 to the Queensland economy. Similar research from 2001 estimated total expenditure on trout fishing and related activities in the Snowy Mountains region in New South Wales alone at up to \$70 million a year.

Salmonoids such as trout are not native and their populations are not always self-sustaining in Australian environments. However, their popularity among recreational fishers ensures they continue to be stocked on a scale that dwarves native fish enhancement efforts.

In 2014, NSW and Victoria stocked more than three million and 660,000 salmonoids respectively. Tasmania and WA stock lower numbers, about 30,000 a year.

Criticisms of trout and salmon stocking highlight the potential impact of these fish on native fish populations. Cameron Westaway, senior inland fisheries manager at the NSW Department of Primary Industries, says NSW undertakes a formal risk-assessment process under the Fisheries Management Strategy for stocking projects.

"We assess the risks of all stocking and set guidelines to address those risks, including impact on threatened species, disease, genetics, and the suitability of stocking sites." This includes assessing whether trout pose a risk to, or could prevent the rehabilitation of, a threatened species.

The feeding habits of trout are a major concern; they have diverse diets and will eat whatever food source is available. They are



PHOTO: ALISTAIR MCBURNIE

Fin-clipped trout are used to assess the success of stocking in Australia. However, some fisheries, particularly in the US, are moving to eliminate trout restocking in preference to native species.

known to reduce the abundance of small native species including the Mountain Galaxias (*Galaxias olidus*) and the threatened Barred Galaxias (*Galaxias fuscus*).

However, the potential impact of trout pales in comparison to other introduced species such as Redfin (*Perca fluviatilis*), also introduced more than 100 years ago for angling. Redfin are an aggressive and highly piscivorous species known to affect native fish populations through predation. Fisheries managers now try to contain established populations rather than support any spread of the species.

Cameron Westaway says the substantial social and economic benefits of trout fisheries in particular make it worth the effort to manage the potential risks involved.

"Trout provide significant benefits and we manage the potential impacts," he says. "At the same time we are working hard to restore and rehabilitate the major native recreational species as well as our small-bodied threatened species." **F**



PHOTO: LEN STEPHENS

# GAS OPTIONS TO HELP PRAWNS KEEP THEIR COOL

## INNOVATION AND TECHNOLOGY

**An award-winning refrigeration redesign is paving the way for new technology and a generational change in the Northern Prawn Fishery**

By Catherine Norwood

**W**hen the *Gulf Bounty* headed out into the Gulf of Carpentaria in April for the start of the 2015 Banana Prawn season, the refurbished trawler provided a test case for what seems destined to be a new era in the fishery.

The new refrigeration technology on board has increased processing speeds, increased freezer capacity, and keeps prawns in the best possible condition from the moment of harvest.

It is a custom design and a demonstration of what is possible as the industry faces the challenge of finding new, environmentally acceptable refrigerants to keep freezers working safely and efficiently in difficult conditions.

For more than 40 years hydrochlorofluorocarbon-22 (HCFC-22), or R-22 as it is widely known, has been the refrigerant responsible for keeping the catch in prime condition. But as a major ozone-depleting gas, R-22 has, for the most part, been phased out of refrigeration systems around the world in accordance with the 1987 Montreal Protocol to reduce the use of ozone-depleting gases.

### A tough task

Finding a replacement gas for the Northern Prawn Fishery has not been easy. Refrigeration expert Peter Brodribb, from the Expert Group,

says the vessels of the Northern Prawn Fishery have one of the most demanding tasks for refrigeration equipment in the world.

"They operate in the constrained space of a relatively small vessel, under heavy load, in high ambient temperatures," he says. "The refrigeration is uniquely designed to snap freeze up to six tonnes of product at 28°C, down to -18°C in eight to 12 hours, with an on board holding capacity of 30 to 40 tonnes of prawns."

"This is all done on a moving vessel, subject to heavy vibration and exposed to corrosive salt spray and water," he says.

Other complications in the Northern Prawn Fishery include long distances between fishing grounds and ports, and the limited ability of vessel engineers to maintain complex refrigeration systems in the event of breakdown.



The refitted plant room on board the *Gulf Bounty* uses R-404A as its refrigerant, replacing R-22.

Few gases come anywhere close to the performance of R-22 in these conditions. The most obvious choices are either toxic (ammonia) or explosive (propane); neither are a good fit on fishing vessels where refrigeration units share space with the main engine and generators, and the vessel is at sea for weeks at a time and a long way from help.

CEO of Austral Fisheries David Carter says the industry has been “stuck” for several years with no clear way forward on the refrigeration issue. R-22, while it is an ozone-depleting gas, has a mid-range global-warming potential.

The most likely alternative gases are not ozone depleting, but have high global-warming potential. The introduction of a carbon tax under the previous Australian Government made these gases extremely expensive, based on their

potential carbon dioxide (CO<sub>2</sub>) emissions. A change in government policy has removed the carbon tax and put several alternatives back on the table, including R-404A and R-507A.

While their CO<sub>2</sub> potential makes them a priority for phase out, possibly within the next decade, Peter Brodribb says the phase-out process will still take some time. These gases should continue to be available for the operational life span of a refrigeration system – 10 to 15 years – and provide scope for emerging alternatives to be explored and tested in existing R-404A systems. The refrigeration and safety performance of these gases most closely compare to R-22.

Refrigeration systems are expensive, \$500,000 or more, and represent a major capital investment. Given that the systems on most vessels in the Northern Prawn Fishery fleet

## AWARD-WINNING RESEARCH

The industry-led project to design a standard-setting refrigeration system for the Northern Prawn Fishery using the new generation of refrigerants has won the 2015 Queensland Seafood Industry Award for research, development and extension.

Northern Prawn Fishery Industry CEO Annie Jarrett says it is great recognition for the benefits of research within the broader industry. The project is now a contender for the National Seafood Industry Awards to be announced at the biennial industry conference Seafood Directions in Perth in October.

She says the project generated groundbreaking technology, with a prototype design that meets the specific needs of the Northern Prawn Fishery, although this can be easily adapted to other tropical fishing vessels.

“The project aimed to develop a new technical standard and evaporator design, which will be owned by the industry and made available to other vessel operators and refrigeration contractors.”

Project partners including the FRDC and the Northern Prawn Fishery will make reports and manuals of the R-404A refrigeration prototype available to the broader industry over the next couple of months.



PHOTOS: LEN STEPHENS

(Centre) Peter Brodribb from the Expert Group and Mike O'Brien on the *Gulf Bounty*, with prawns snap frozen in the new freezer system that uses R-404A. (Bottom) The *Gulf Bounty*'s new snap freezer.

are at, or beyond, their design life, the move to new fitted vessels and new refrigeration systems will be a major generational change for the industry, David Carter says.

But it is a change they cannot afford to get wrong.

This is why Peter Brodribb and many others in the prawn industry are watching closely the performance results of the *Gulf Bounty* as the test case for a new refrigeration system, developed as a result of industry-led research into potential options.

The project was led by the Australian Seafood Cooperative Research Centre (Seafood CRC), following an FRDC-funded assessment of options to replace R-22.

Both the assessment of options and the design of the new refrigerant prototype fitted in the *Gulf Bounty* were undertaken by the Expert Group, along with operational benchmarks and design specifications for the new system.

The FRDC, Australian Council of Prawn Fisheries and the Western Australian Fishing Industry Council have also supported the project.

The *Gulf Bounty* was selected for refurbishment

as the demonstration model through a competitive process. Its refrigeration systems were completely replaced, with two new freezers and a water-cooling system now using the refrigerant R-404A.

### Cool performance

The *Gulf Bounty* is one of four vessels that Cairns-based company Tropic Ocean Prawns operates in the Northern Prawn Fishery, Torres Strait and Eastern Coast Trawl Fisheries.

Managing director Mike O'Brien is enthusiastic about the new technologies incorporated within the refrigeration systems, as well as the performance of R-404A.

It has almost doubled the processing capacity of the *Gulf Bounty*, from four tonnes a day to more than seven tonnes. In the first few weeks of the season the *Gulf Bounty* was able to harvest and process 30 tonnes of Banana Prawns.

To accommodate the new gas, the refrigeration system had to be reconfigured to ensure the compressors, pumps and evaporators all worked efficiently under the harsh marine conditions. This has reduced the amount of refrigerant the system actually needs. It also includes the latest in automatic controls, computer monitoring, leak detection and remote fault diagnosis for vessels at sea.

A stand-alone chilled water system helps to reduce the ambient temperature of the prawns from 28°C to 30°C down to 2°C while they wait in hoppers to be processed. Using a separate compressor for the chilled water system means it does not draw power from the freezers, and cooling the prawns first improves the efficiency of the freezers.

There is a new hydraulic plate snap freezer in the processing room that can freeze about 90 cartons of prawns in about six hours. In the hold the fixed plate snap freezer can freeze about 360 cartons in eight to 10 hours.

Mike O'Brien says the increased automation is also a great advantage, particularly given difficulties finding staff with the relevant engineering and refrigeration skills. "The automation makes it easier to operate, and the remote observation systems allow land-based contractors to ring into the boat's system if there's a problem, to help diagnose and fix it," he says.

Tropic Ocean Prawns put more than \$200,000 of its own money into the refurbishment of the *Gulf Bounty*. Along with funds provided through the Seafood CRC the total project cost was \$675,000.

"Our local contractors, particularly Casco Refrigeration, also put in a lot of extra time to make sure it was all running smoothly," Mike O'Brien says.

He plans to bring the rest of the company's vessels up to the standard of the *Gulf Bounty* as quickly as possible, but recognises that some in the Northern Prawn Fishery fleet will want to stay with R-22, at least for the time being.

R-22 will become increasingly difficult to obtain in the coming years as no further imports into Australia are permitted. There is an estimated 9000 tonnes in the country in existing air conditioning and refrigeration systems that can be reclaimed and recycled as those systems are retired. But at a cost of up to \$160 per kilogram, re-gassing a boat could cost as much as \$40,000. Preventing leaks will be crucial for those trying to extend the life of their existing systems.

### Alternative approach

Meanwhile, A Raptis & Sons Pty Ltd, based in Brisbane, is investigating the potential of a different gas as an R-22 replacement – R-438A. CEO Arthur Raptis says the trawler *Arnhem Pearl* will trial the new gas for the 2015 Tiger Prawn season.

He says while R-438A is more expensive per kilogram than R-404A, it is not as expensive to convert the existing refrigeration to accommodate the new gas. Concerns about longevity of R-404A have also led the company to investigate other options.

"The installation of the new gas has been relatively simple with some minor seal changes, and we expect R-438A will get cheaper as more people begin using it. It also has a better environmental footprint than R-404A." He says trials on the *Arnhem Pearl* will test its performance during the next prawning season, with a particular focus on the snap freezers. **F**



PHOTO: 123RF.COM

# Greening of WA's seafood

## SUSTAINABILITY

**Independent assessment of Western Australia's fisheries confirms the green credentials of the state's wild-caught seafood and pearls**

By Gio Braidotti

**W**estern Australia is on track in its world-first bid to seek independent assessment of the sustainability of all its wild-catch seafood, pearl fisheries and ornamental fisheries.

As part of a \$14.5 million state-government-funded project, independent fishery bodies have already used the Marine Stewardship Council (MSC) environmental standard to pre-assess most of WA's fisheries.

MSC is the world's most respected scientific standard for sustainability, with the state's rock lobster fishery the first fishery in the world to be MSC certified.

The project will also fund the next steps – the full MSC assessment process as well as the first audit following certification. In addition to rock lobster as an existing certified fishery, six of the state's 46 fisheries have already commenced or are ready to take those steps:

- the Exmouth Gulf Prawn Fishery;
- the Shark Bay Prawn Fishery;
- the Peel-Harvey Crab Fishery;
- the Peel-Harvey Sea Mullet Fishery;
- the Deep Sea Crab Fishery; and
- the Pearl Fishery.

The Peel-Harvey Crab Fishery is the first in the world to seek MSC certification for both commercial and recreational fishing.

The certification specifies a fishery by species, fishing method and area. Certification for the above six fisheries covers nine different categories of assessment, known as 'units of certification'.

Kim Walshe from the WA Department of Fisheries says that six fisheries a year is probably the optimal level for the project's certification phase. That means the project is long-term and will take several years to complete if all fisheries participate.

"While we are working with every fishery during the pre-assessment process, the transition

to certification requires the consent of each individual fishery. There can be valid reasons to be cautious or to delay certification, given industry must pay the ongoing costs after the first annual surveillance audit," Kim Walshe explains.

He cites the example of fishers that are yet to receive a market signal of demand for MSC-branded seafood or a price premium. "There needs to be positive incentives in place and these are now being seen more clearly, as market trends are moving in favour of sustainably sourced seafood," he says.

"For example, we are seeing supermarket chains preparing to promote certified sustainable fish products and that, I think, will rapidly help shift public perceptions."

Where the pre-assessments have identified any shortfalls in a fishery's ability to meet the MSC standard the project can provide funds for fisheries improvement programs.

"Money is limited and we encourage fisheries to develop relationships with other funding providers, for example, the supermarkets," Kim Walshe says.

The program is expected to provide a range of benefits to WA including enhanced community confidence in the sustainability of the state's fisheries and greater certainty among fish consumers that their seafood purchases are sustainably fished.

The benefits are expected to grow substantially as more WA fisheries are certified and a critical mass is reached. Guy Leyland is the project leader for MSC certification with the WA Fishing Industry Council (WAFIC) in Perth. His role is to manage industry aspects of the government's MSC initiative.

He says the certification process is progressing well and the opportunity of government

**"While we are working with every fishery during the pre-assessment process, the transition to certification requires the consent of each individual fishery. There can be valid reasons to be cautious or to delay certification, given industry must pay the ongoing costs after the first annual surveillance audit."**

– KIM WALSH

assistance to pursue MSC certification is "percolating through" the different fisheries. Those trading into export markets and that have close connections with buyers have been leading the way, but it will be a long-term process to engage all fisheries in the certification scheme.

WA's MSC track record is already impressive. In 2000, its rock lobster fishery became the first in the world to achieve the certification. That fishery was re-certified to the MSC standard for the third time in 2012, when WA also launched its statewide initiative.

The project is a partnership between the WA Department of Fisheries, WAFIC (the peak commercial fishing industry body), Recfishwest (the peak recreational fishing body) and the MSC.

The FRDC is also providing funding to WAFIC to assist in industry communication and engagement. **F**

Kim Walshe will present 'Western Australian fisheries – The MSC journey to the future' at Seafood Directions 2015 industry conference in Perth on 25 to 27 October.



Blue Swimmer Crab

# Seafood CRC farewell

The Australian Seafood Cooperative Research Centre (Seafood CRC) officially opened for business on 6 August 2007 and the agreement with the Australian Government ended on the 30 June 2015. The FRDC was the largest partner investor in the Seafood CRC contributing about \$31 million over the past eight years of operation. This means that for most of the projects completed the FRDC contributed about 71 cents in every dollar. The FRDC has worked closely with the Seafood CRC to transition activities and incomplete projects for ongoing management and to ensure the legacy of its investments endures and continues to deliver benefits to its participants and end users. By the numbers, here are some of the achievements of the Seafood CRC.

## 1 Seafood CRC

The Seafood CRC mission was to contribute to the economic growth and the industrial and commercial success of the Australian seafood industry by assisting end users to profitably deliver safe, high-quality, nutritious Australian seafood products to premium markets, domestically and overseas. The headquarters of the CRC was based at Flinders University in Adelaide and research projects were conducted throughout Australia and even in China.



**4** research programs: Production Innovation, Program and Market Development, Communication and Education, Commercialisation and Utilisation

**8** years of operation, from 2007 to 2015

**10** supply chains improved

**100+** usable project outputs or products developed. These have had direct and practical application to aquaculture, ocean fisheries, domestic and export markets

**176** milestones achieved  
This is all but one of the milestones outlined in its Commonwealth Agreement

**300** research publications

**500** data loggers tracking temperature during oyster transport

**540** projects undertaken

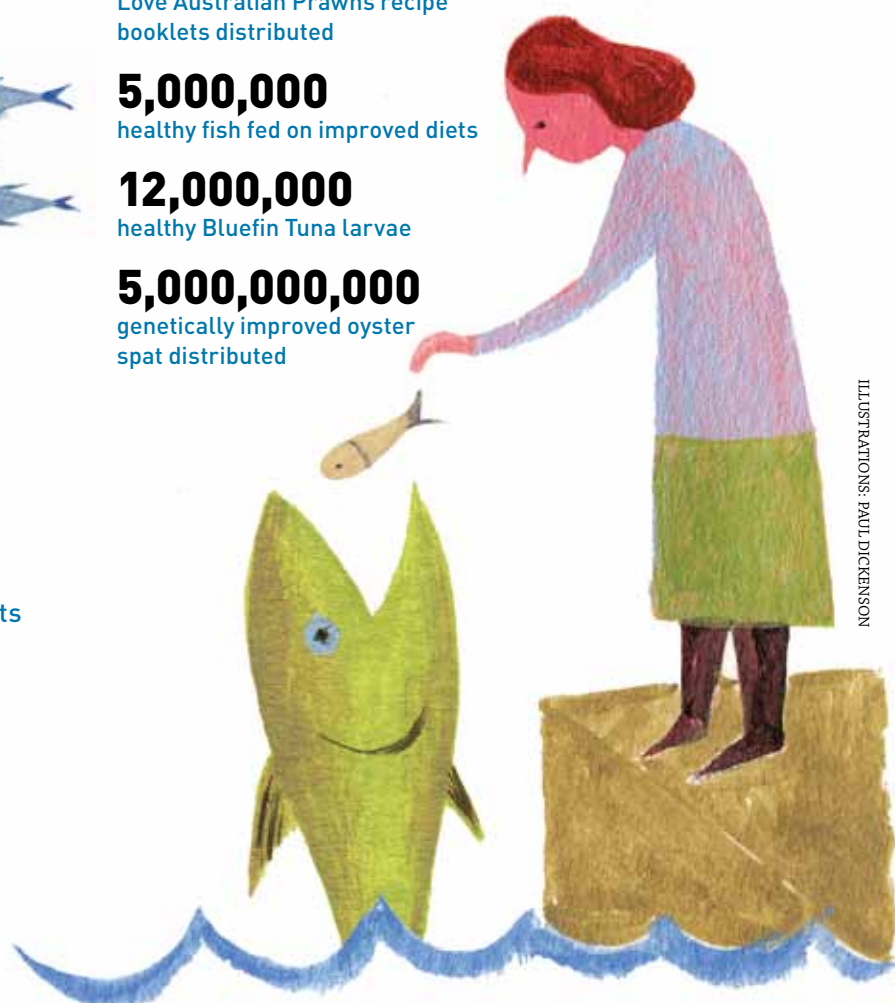
**30,000** Cobia sent to market

**2,300,000**  
Love Australian Prawns recipe booklets distributed

**5,000,000**  
healthy fish fed on improved diets

**12,000,000**  
healthy Bluefin Tuna larvae

**5,000,000,000**  
genetically improved oyster spat distributed



ILLUSTRATIONS: PAUL DICKENSON

## The money

**\$31,000,000**

invested by the FRDC as one of the main Seafood CRC participants

**\$35,500,000**

funding contributed by the Australian Government

**\$68,000,000**

the value of in-kind contributions provided by the Seafood CRC's participants

**\$83,000,000**

received from government, the FRDC and other participants to the Seafood CRC and spent by the Seafood CRC during its life



## The people

**10** staff

**14** board members

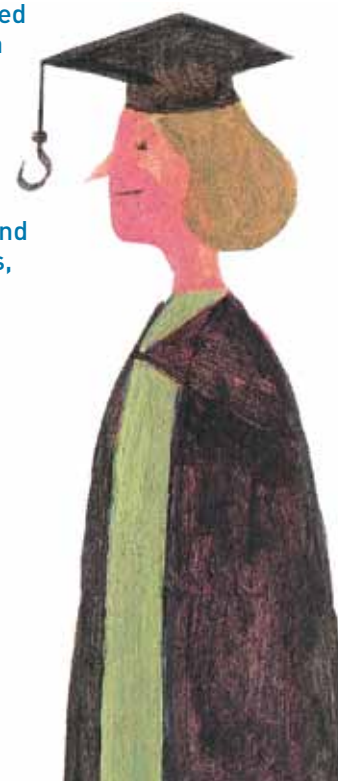
**34** participants

**67** graduate students who completed their higher degrees with the support of the Seafood CRC

**97** travel bursaries supported by the Seafood CRC to attend a variety of educational and professional development activities in Australia and overseas

**2000** Australian seafood end users in aquaculture, fisheries, domestic and export markets to benefit from Seafood CRC research

**4000** of China's best chefs seeking Australian abalone thanks to the Australian Wild Abalone™ marketing campaign



## 4 programs

The Seafood CRC had four planned outcomes to help link researchers with industry and government, with a focus on research application. These outcomes were presented as programs.

**PROGRAM ONE:** Production Innovation aimed to substantially increase the production and profitability of selected wild-catch and aquaculture species.

**PROGRAM TWO:** Program and Market Development was given responsibility for increasing demand and access to premium markets for Australian seafood while fulfilling consumer

demands for safe, high-quality, nutritious seafood products and increasing profitability throughout the value chain.

**PROGRAM THREE:** Communication and Education delivered additional outcomes in the form of skilled scientists, industry-ready graduate students, informed industry personnel and increased social capital among all participants.

**PROGRAM FOUR:** Commercialisation and Utilisation was directed to the delivery of the outputs from the other three programs.

# Fish health benefits undersold

## WORLD AQUACULTURE

**From international policymaking to point-of-sale, fisheries need to engage in selling the benefits of their product**

By Catherine Norwood

**F**ish have been promoted as an important source of protein for decades, but the World Aquaculture Society (WAS) has been told that more could be done to promote the additional nutritional benefits of fish and seafood. This was the message from Shakuntala Thilsted, senior nutrition adviser with WorldFish, who was the plenary speaker at the WAS annual conference in May.

The event, held on Jeju Island in South Korea, brought together almost 2500 delegates from 66 countries for four days of presentations and discussions aimed at improving the profitability and sustainability of aquaculture, with the ultimate aim of improving human health.

Shakuntala Thilsted said, with a population of seven billion today, projected

to reach eight billion by 2024, there was considerable discussion about how much food would be needed to feed these billions.

"We need to move beyond the quantities of food, to the nutritional value of food, and fish in particular," she said. "Although there are few dietary guidelines with specific recommendations for fish, we know that fish is important in the diets of humans."

She said fish is a rich source of multiple nutrients, and essential fats are linked to brain development in children, for cognition particularly during the first 1000 days (gestation to age 24 months).

Along with protein and omega-3 fatty acids, fish and other aquatic animals play an important role in meeting dietary requirements for vitamin A, vitamin B12, riboflavin, vitamin D, vitamin E, and highly bioavailable forms of iron, zinc, calcium and phosphorus.

Her presentation focused particularly on the nutritional needs of children in the first 1000 days of life and of pregnant and breastfeeding women in poor countries, where as little as 50 grams of

fish a day could make a significant difference to the health and wellbeing of mother and child.

## Cultural consumption

To increase fish consumption, particularly in poorer countries, year-round local production is needed, although this can include a diverse range of species. Fish products need to be in a form that is culturally acceptable and affordable. In poorer countries they also need to be of a high nutritional value, or nutrient dense, and safe to eat – given potential food-storage issues.

While westernised countries focus on large species such as Atlantic Salmon and Barramundi, in developing communities smaller fish species are more affordable and can be purchased in small quantities and mixed into a dish for sharing – such as a curry dish in Asia, or incorporated into a relish eaten with meats in Africa.

## Nutritional information

Speaking at a 'Seafood and Health' session held later in the conference, Shakuntala Thilsted highlighted the lack of recommended daily intakes

A floating platform equipped with nets on a reservoir in Israel harvests fish trained to come to the sound of a buzzer.

PHOTO: BOAZ ZION

## HOW TO TRAIN YOUR FISH

**WORLD AQUACULTURE**  
Fish ranching with sound was among the diverse range of future possibilities presented at the WAS 2015 conference

**P**eople and dogs are not the only creatures to respond to the sound of a dinner bell; fish can also be trained to come to a sound associated with food. Israeli researcher Boaz Zion has taken classic conditioning techniques and applied them to fish, training them to come when called – right into a waiting net.

With the right reinforcement, he says, the fish can remember their training for six months, and possibly longer – long enough to grow to a marketable size. And trained fish are also quick to share what they have learned. In the laboratory and in field trials, they have taught their 'naive' companions to follow the sound of the dinner bell, or in this case a dinner buzzer.

Boaz Zion has been working on acoustic training techniques for fish for the past six years as an agricultural engineer with the Volcani Center, part of Israel's Agricultural Research Organization. His aim is to determine whether acoustic training can be used as a kind of cageless ranching technique. This might allow trained fish to be released into open water to

PHOTO: CATHERINE NORWOOD



The Western Australian Department of Fisheries provided one of the few Australian stands at the trade show, promoting an automated microdiet feeding system developed by senior researcher Sagiv Kolkovski for use in hatcheries. WA researchers Adva Mori (left) and Nicole Watts (pictured with the dispenser) helped to staff the stand and also presented the results of their octopus culturing and ranching projects, which featured in the March 2015 issue of *FISH* magazine.

PHOTO: CATHERINE NORWOOD



As president of the World Aquaculture Society, Australian Graham Mair (third from left) is among the dignitaries and sponsors lined up to officially open the trade show as part of the society's 2015 annual conference in South Korea.

for fish, compared with dairy food or eggs. She said perhaps this reflected the cohesive engagement of the dairy and egg sector with health and nutrition issues, and also the investment in these sectors.

Her own research showed that fish could challenge current advice in some areas. This included higher concentrations of calcium in small fish that was more readily used by the body than that provided by the world's "gold standard" for calcium – milk. She said nutritional analysis for seafood is expensive and more difficult than for

terrestrial animals. The bioavailability of nutrients also requires analysis as well as identifying the levels of nutrients. Among those countries with the best analysis are Denmark, Japan and Australia.

Session chair and member of the Global Initiative for Life and Leadership through Seafood, Roy Palmer said internationally, the lack of nutritional analysis presented a huge gap for aquaculture and fisheries – one he hoped could be addressed by establishing a community of practice, through the World Aquaculture

Society, focused on nutritional and health issues. A loosely based community of practice would allow members from diverse interest groups to work together to share relevant information and respond to issues without the need for formal working groups or committees, he said

### Health and sustainability

Also speaking at the WAS health and wellbeing session was Jillian Fry, director of the US-based Public Health and Sustainable Aquaculture Project at the Johns Hopkins University Center for a Livable Future. She said while it is possible to produce healthy food, if it is not produced in a sustainable manner then global food security will never happen. "We need to think more about sustainability and expansion at all costs."

The western diet needs seafood for different reasons than low and middle-income countries. The US diet is high in meat, dairy and eggs – way beyond nutritional needs of these foods.

From a health perspective, seafood provided its own range of nutritional benefits, while also offsetting consumption of other meats, potentially reducing the health risks associated with consuming too much red meat, including cardiovascular disease.

"Seafood has a high role to play in shifting diets to better health and sustainability," Jillian Fry said. **F**

feed and grow, before being harvested when they respond to a previously learned signal.

A critical factor is the duration of a fish's memory. In presenting his findings to the World Aquaculture Society conference in South Korea in May, he said 28 days was the optimal initial period identified in laboratory trials to train Tilapia (*Sarotherodon galilaeus*) to come to the sound of the buzzer, initially through the provision of food.

When the learned behaviour was tested at various intervals, there was some residual memory after three months, but none after six months. However, with regular retraining of six sessions every 17 days, the learned behaviour was maintained – potentially indefinitely. Other species successfully trained included European Carp (*Cyprinus carpio*), African Catfish (*Clarias gariepinus*) and Grass Carp (*Ctenopharyngodon idella*).

Boaz Zion said for producers ranching fish in cages, it would be simple and relatively cheap to provide ongoing training with a simple sound system to generate the buzzer in conjunction with feeding. This might prove an effective

way to recapture escapees from caged systems, addressing concerns about the contamination of wild gene pools with farmed species, as well as reclaiming potentially lost income.

He also found that when trained fish were released into the Eshkol Reservoir in the Galilee region, it was possible to continue retraining using the same buzzer signal and food supplies from a floating platform that was also fitted with a net. During the field trial the fish became familiar with the platform system and when the time came to deploy the nets, they effectively harvested themselves.

But even when the buzzer was used from a small boat across many different locations on the reservoir, the fish would come to where ever the boat was, Boaz Zion said: "It was like whistling for fish."

He also found that the trained fish brought many other fish with them. "We recaptured 65 per cent of the carp and 13 per cent of the tilapia we put into the reservoir. But in total, we harvested 260 per cent of the original biomass because of

the other fish that came with our trained fish."

Laboratory modelling indicated that under ideal conditions, fish could respond to acoustic signals from as far as 10 kilometres, which equates to an area of 30,000 hectares.

"Of course real-life conditions are not ideal. But even if we only recaptured 20 per cent of the fish we introduced, that would be a break-even point. Every fish captured after that would be profit."

The research has also found that fish can distinguish between signals with as little as two hertz difference, and can distinguish a signal with a positive association (food) from other, indifferent, background noises.

He said he was confident the technique had potential for the aquaculture industry, although significant work was still needed to investigate a range of factors including responsive fish species and stocking rates, issues associated with shared water resources such as reservoirs, and the technological requirements of acoustic training and harvesting equipment. – CATHERINE NORWOOD

# FLATFISH SPEARHEAD SOUTH KOREA'S AQUACULTURE EXPORTS

## WORLD AQUACULTURE

**As host of the World Aquaculture Society's 2015 annual conference, South Korea profiled the successes and challenges of its industry**

By Catherine Norwood

**W**ith a firm, white flesh and a delicate flavour Olive Flounder (*Paralichthys olivaceus*) is commonly eaten raw and features on many Korean and Japanese menus. Marketing focuses on its nutritional analysis, highlighting the "collagen rich" texture of the flesh, which is "high-protein, high-lysine and low in fat".

Olive Flounder is the flagship species of South Korea's aquaculture industry. It is the world's largest producer and exporter of the species, with production in 2013 of 37,000 tonnes, worth about US\$430 million – or 58 per cent of the South Korea's total aquaculture value. About 10 per cent of South Korea's production is exported, most of which goes to Japan, with buyers in several other Asian countries as well as in the US, Canada and Russia.

The species also exemplifies many of the challenges facing the industry in South Korea as it moves to modernise and expand production of this and other fish including several groupers and bream.

Olive Flounder production in South Korea dates back to the 1980s when the native species was first identified for culture. Industrial-scale production began in 1989. Flatfish such as flounder are popular around the world and this has placed pressure on many wild fisheries. The strong demand makes these and similar species strong candidates for culturing.

## Jeju production

A national Olive Flounder breeding program is underway and is now in its fourth generation,

with an increased focus on disease resistance and preserving genetic diversity while still improving growth rates by 30 per cent. Olive Flounder are grown in land-based systems, developed after ocean-cage production proved inefficient.

More than half of the national production comes from Jeju Island, where the industry has a natural geographic advantage that allows year-round production. Fish grown here reach market size – 0.9 to 1.1 kilograms – 1.7 times faster than in other production centres.

Most aquaculture farms in Jeju are able to use high-quality underground seawater as either their sole water source or in combination with the island's unpolluted seawater. The underground water remains at a steady 16°C to 18°C year round, reducing energy costs involved in heating the water to achieve optimal fish growth, which occurs at 21°C to 24°C.

While disease outbreaks, exacerbated by high stocking densities, reduced national production from a peak of 54,574 tonnes in 2009 to

36,921 tonnes in 2014, production from Jeju Island was less affected, declining from 26,047 tonnes in 2009 to 23,000 tonnes in 2013.

## Feed challenge

In providing a general overview of South Korean industry at the World Aquaculture Society conference the head of the Fisheries Policy Department Ministry of Oceans and Fisheries, Yeong-Hoon Jeong, said food safety for consumers was the first priority.

The widespread use of moist pellets made of fresh and frozen fish bycatch and byproducts presented a significant challenge for both the Olive Flounder industry and aquaculture in general in South Korea. He said it was difficult to manage food safety when farmed fish were fed on raw fish.

Promoting the use of high-efficiency, extruded pellet technology for industry is a priority for the South Korean Government, with a ban on moist pellets expected to come into force in 2016. The aim is to promote fish health, increase production,

## BREEDING FOR NEW MARKETS

Efforts to add value to the product include initiatives such as Jeju Garlic Flounder – a marketing initiative of the Jeju Flounder Co. to promote the local provenance from Jeju Island in the country's south as a global brand. Value-adding for this brand includes the addition of lactobacillus from fermented garlic into the feed, to enhance the nutritional benefits of the raw fish flesh.

A genetically focused initiative, Golden Olive Flounder, is also underway. In the wild a rare mutation results in flounder of a vivid golden colour. Researchers working with the Korean Fish Breeding Research Institute have a program to stabilise the colour genetics; the product is already attracting strong interest from Asian markets.



PHOTO: CATHERINE NORWOOD

Olive Flounder production systems typically involve shallow pools, which are also used for turbot production. Delegates to the World Aquaculture Society conference toured several fish farms, including the Beebong Aquaculture Farm on Jeju Island, which produces 300 tonnes of flatfish a year, using a combination of seawater and marine groundwater.

traceability and food safety, and to improve the fish-in fish-out feed ratio. The 3:1 ratio using moist pellets has improved to a reduced rate of 1.2:1 through a combination of improved extruded pellet feeds and fish genetics.

Consumers were also increasingly demanding that producers should properly manage the health of their fish. He said this would require supporting improved production practices to prevent and reduce disease, including better feeds, as well as the development of improved vaccines and medicines.

Yeong-Hoon Jeong said other challenges for aquaculture overall included developing a more environmentally sensitive industry. Highly concentrated, high-intensity farming in some coastal areas had resulted in environmental degradation.

He said high-intensity farming and a focus on selection of stock for growth had also led to a loss of genetic diversity, more widespread occurrence of deformities, and more frequent and severe disease outbreaks.

The adoption of multi-trophic farming and greater use of biofloc and recirculation systems were expected to help address this but he acknowledged that a shift in perspective towards a greater ecological awareness across the industry was needed.

### New species

Initiatives to address this include breeding programs at the Future Aquaculture Research Center in Jeju. The centre has a mandate for the preservation of indigenous species and the development of culturing techniques and genetic improvement for aquaculture.

At the centre, the Olive Flounder improvement program is now in its fourth generation of genetically improved broodstock. However, the other 31 species raised at the centre – some still being evaluated for commercial potential, or species preservation – continue to be bred from wild-harvested broodstock. This includes turbot, which is often produced commercially in conjunction with Olive Flounder.

The South Korean Government has selected flatfish (flounder, turbot and halibut), serranidae (groupers and bream) and abalone among its national export-focused agricultural investment priorities.

PHOTO: 123COM



Often served raw, Olive Flounder is the iconic species of the South Korean aquaculture industry, and was a feature of the menus during the international aquaculture conference.

While South Korea already commercially cultivates 29 species on an industrial scale, it will continue to “put energy into value-added and high-value species in global markets, such as bluefin tuna and groupers”, Yeong-Hoon Jeong said. And, of course, Olive Flounder. **F**



PHOTO: WWW.JEJUFLOUNDER.COM

## Chinese view on fish farming

**A**lso providing a keynote address at the World Aquaculture Society 2015 conference was Kangsen Mai, a professor at the Ocean University of China specialising in fish nutrition. He took the opportunity to defend China's reputation as the world's largest producer of farmed fish.

He responded to the “anti-aquaculture noise” that had accompanied the publication of an article in Science magazine (January 2015) raising concerns about the potential of China to deplete wild fish stocks to feed its expanding aquaculture industry.

Kangsen Mai said China farms more than 160 different species of fish and seafood, and more than half were not dependent on fish-based aquafeeds. About 50 per cent of Chinese production comprised filter feeding or herbivorous species. Omnivorous species account for 42 per cent of production and carnivorous species account for eight per cent of production.

He said while aquaculture production in China has continued to increase steadily, consumption of wild fishmeal has remained relatively steady at about 1.6 million tonnes since 2000. Only 55 per cent of this is used in aquaculture.

Total fish and fishmeal used in aquaculture totals seven million tonnes to produce 28 million

tonnes of seafood for human consumption (excluding mollusc production), with an overall fish-in fish-out ratio of 1:4. Removing filter feeders from the production total still results in a ratio of 1:3.2 – and a feed-conversion ratio that is two to seven times more efficient than that of land-based animal farming, he said.

In terms of improving human health and nutrition, aquaculture has allowed China to lift its per capita consumption of fish protein from 9.5 kilograms per person in the 1960s to 36.6 kilograms in 2013. China's seafood exports also add about four million tonnes to the seafood available in other countries.

Aquaculture accounts for 70 per cent of national fisheries production in China, which is responsible for two-thirds of the world's total aquaculture production.

While fish remain as the last wild food on the dinner table, Kangsen Mai said he believed the domestication of fish was inevitable: “Fish will follow the same fate as sheep, goats, cattle, pigs and poultry.”

And while farming of land animals had not been successful in preserving related wild species, he said that given the vastness of the oceans, maybe this could be achieved for fish species, by gradually replacing wild stock with farmed fish.

BROADLEAF SEAGRASS

**HABITAT**

**Farmers and fishers have created new connections in a campaign to preserve the seagrasses that are an essential part of the aquatic ecosystem at Gippsland's Corner Inlet**

By Ilaria Catizone

**T**wo very different types of grass – pastures and seagrasses – are both crucial to important commercial food production businesses in the most south-easterly part of Victoria's Gippsland region. While the management of one grass has the potential to affect the health of the other, the two groups of primary producers who share this connected ecosystem rarely cross paths.

But in May this year, farmers and fishers of Corner Inlet met for the first time to discuss shared management of the local environment and to learn more about changes in the region's seagrass habitat.

Corner Inlet is a 600-square-kilometre bay, 200 kilometres south-east of Melbourne in South Gippsland, surrounded by fertile farmland and Wilsons Promontory National Park. The inlet is listed as a wetland of international significance under the Ramsar Convention.

It includes shallow intertidal mudflats that support extensive areas of mangroves, saltmarsh and seagrasses, and the third largest commercial bay and inlet fishery in Victoria. The surrounding area is prime dairy land, with Gippsland producing 22 per cent of Australia's milk. It is also home to many beef producers.

More than 40 farmers, researchers and fishers attended the May gathering, which was funded by the FRDC via a research collaboration between the University of Melbourne, the West Gippsland Catchment Management Authority and local commercial fishers. Also integral to the day were South Gippsland Landcare, Dairy Australia and Corner Inlet Connections, a group committed to improving the health of the catchment.

John Ford, a researcher from the University of Melbourne, was the driving force behind the meeting as part of his investigations into the decline of seagrasses at Corner Inlet.

He said while there was no clear evidence of what was causing the decline, it was likely that excessive nutrient and sediment in the water over many decades had affected the health of seagrasses.

PHOTOS: JOHN FORD

FINELEAF SEAGRASS

# Save the seagrass

PHOTO: WARREN REED



Dairy farmer Dan Knee and his family protect the Franklin River as it passes through their property to prevent contamination with sediment and nutrients, which would otherwise then flow into the Corner Inlet estuary and bay.

PHOTO: ROBERT KENYON, DRIFT MEDIA FOR WEST GIPPSLAND CATCHMENT MANAGEMENT AUTHORITY



John Ford uses a series of tanks to show participants the effects of high-nutrient water on seagrass.

At the meeting he used a series of water tanks to demonstrate how the addition of nutrient and sediment-rich water to a tank containing seagrass could increase the water turbidity. When turbidity became so severe that seagrasses were deprived of light, they would no longer be able to survive, he said. This seemed to be what was happening in Corner Inlet.

To better understand the issue, John Ford has been talking to the fishers about the loss of seagrass. "Fishers have been here for a long time. Their stories tell me that the decline started in the 1960s and 1970s. My role is to listen to them and to document the changes to try and work out the causes and how to address them."

Seagrass is not an algae; it is a flowering plant that lives underwater. There are two species of seagrass found in the inlet: the broadleaf seagrass (*Posidonia australis*) and the fineleaf seagrass (*Zostera nigracaulis*). The first one has a large root system and annual growth cycle. It grows in spring and summer and dies back in the cooler months. It is hardy, but slow to reproduce.

The fineleaf species is like a runner grass and it is quick to grow and colonise new areas. Fishers have seen the distribution of this species change over time, but steep declines in the past five to six years have resulted in the lowest fineleaf cover in living memory.

Seagrass is used as both habitat and a food source for many aquatic animal species at Corner Inlet, supporting commercial and recreational fisheries for whiting, flathead, garfish and calamari.

"Seagrass is an important ecosystem in our area, it is very productive and diverse. Seagrass keeps the water clean, supports biodiversity and stores carbon," John Ford said. "There's still a lot of wonderful seagrass out here. We have an opportunity to arrest the decline as we have not yet reached the tipping point where the seagrass is so low that it would take decades to bring it back."

During the past 30 years, fishers have watched as the seagrass cover on the inlet decreased. They have observed how different fish species react differently to these environmental changes.

"This is a good year for King George Whiting, but the Rock Flathead are in trouble," says Brett Cripps, who has been fishing at Corner Inlet with his family since the 1970s. The difference may lie in the lifecycle of these species: Rock Flathead breed in the seagrass, while the King George Whiting do not.

The fishery supplies small volumes of high-quality fresh fish for Melbourne, Sydney and the Gippsland region. "We want to keep our fishery sustainable, as it has always been," says Brett Cripps. "We have self-imposed rules for the fishery, such as limiting our effort to no more than two seine net shots in a 24-hour period," he says.

Finding out about these voluntary restrictions was an eye-opener for Dan Knee, the dairy farmer who hosted the second part of the meeting at his property adjoining the Franklin River. He said it was good to learn that fishers were careful to prevent overfishing.

"It is also important for the fishers to

realise that we have been working at improving water ways for more than 20 years," he says. Dan Knee's parents, Rae and Bruce Knee, were among the first to start planting trees and fencing off the large Franklin River frontage of their land. Now their herd is excluded from all but a minute portion of the banks.

These actions help to prevent soil, fertiliser or animal manure from farm-based activities from moving into surrounding waters. Dan Knee said soil was a precious resource, fertiliser was expensive and animal manure could be recycled to improve pasture.

Farmers went to great lengths to ensure their animal effluent stayed on their land, for their interests, and to meet legal requirements. Legislation dictated that dairy operations must keep all effluent on-farm. Dan Knee said 80 per cent of dung and urine was excreted directly onto paddocks. "For the rest, we have ponds where we accumulate the effluent and we spread it back onto the pasture," he said.

Fishers attending the meeting were pleased to see how farmers were working to prevent run-off and said the creation of new connections between farmers and fishers was an important outcome of the day.

This connection would be essential to the care of Corner Inlet, John Ford said following the meeting. "I can be the facilitator and work with them. But ultimately they are the ones who can identify and carry out the solutions to save the seagrass in Corner Inlet." **F**

PHOTOS: KARL MONAGHAN APP AAIPP

ARTIST: Manny Mcaullay  
TITLE: Southern Comfort

# FLOTSAM AND JETSAM INSPIRE ART

## COMMUNITY ENGAGEMENT

**The oceans, art and community all come together in Western Australia to showcase creativity and care for the local environment**

By Ilaria Catizone

Combining her passion for the remote Abrolhos Islands, 40 nautical miles off the Western Australian coast, with a love for art, Pia Boschetti has created the annual Flotsam and Jetsam exhibition in Geraldton, WA, where rubbish collected on beaches is recycled into art.

Pia Boschetti grew up in a rock lobster-fishing family and spent much of her childhood on the Abrolhos Islands. She loved walking on the beach to see what had washed up from the sea. The thrill of the discovery was her favourite part and thinking of how she could turn those items into something beautiful made it even more interesting.

Today Pia Boschetti runs a successful pearling business on the islands, with galleries in WA and Queensland. "I wanted to give something back to the Islands," she says. "So I decided to take part in the Clean Up Australia Day initiative."

In the first clean up in 2011, Pia Boschetti and a team of volunteers filled a 16-metre boat with rubbish. Some of it was domestic rubbish and some was from overseas, everything from squash balls to rock lobster floats and balloon ribbons.

Local artists then worked to convert the items collected into works of art displayed every year in the Flotsam and Jetsam exhibition, held at Pia Boschetti's Latitude Gallery in Geraldton.

In maritime law, flotsam is a wreckage, debris or refuse from a ship, found floating in the water, whereas jetsam is cargo or equipment that either sinks or is washed ashore after being thrown overboard to lighten the load of a ship in distress. But thanks to Pia's initiative, those items are now being turned into art that can hang proudly on a wall.

The response to the collection was so





ARTIST: **Tim Carrier**  
TITLE: **Angler fish**

2015 overall winner



ARTIST: **Michelle Symonds**  
TITLE: **Melancholy Mermaid**

positive that Pia Boschetti has made this an annual event. Interest in the initiative has been growing each year, although thankfully the rubbish collected has also been decreasing.

In an ABC interview for Open Mid West WA, 2015 participant Jayne Rolinson said

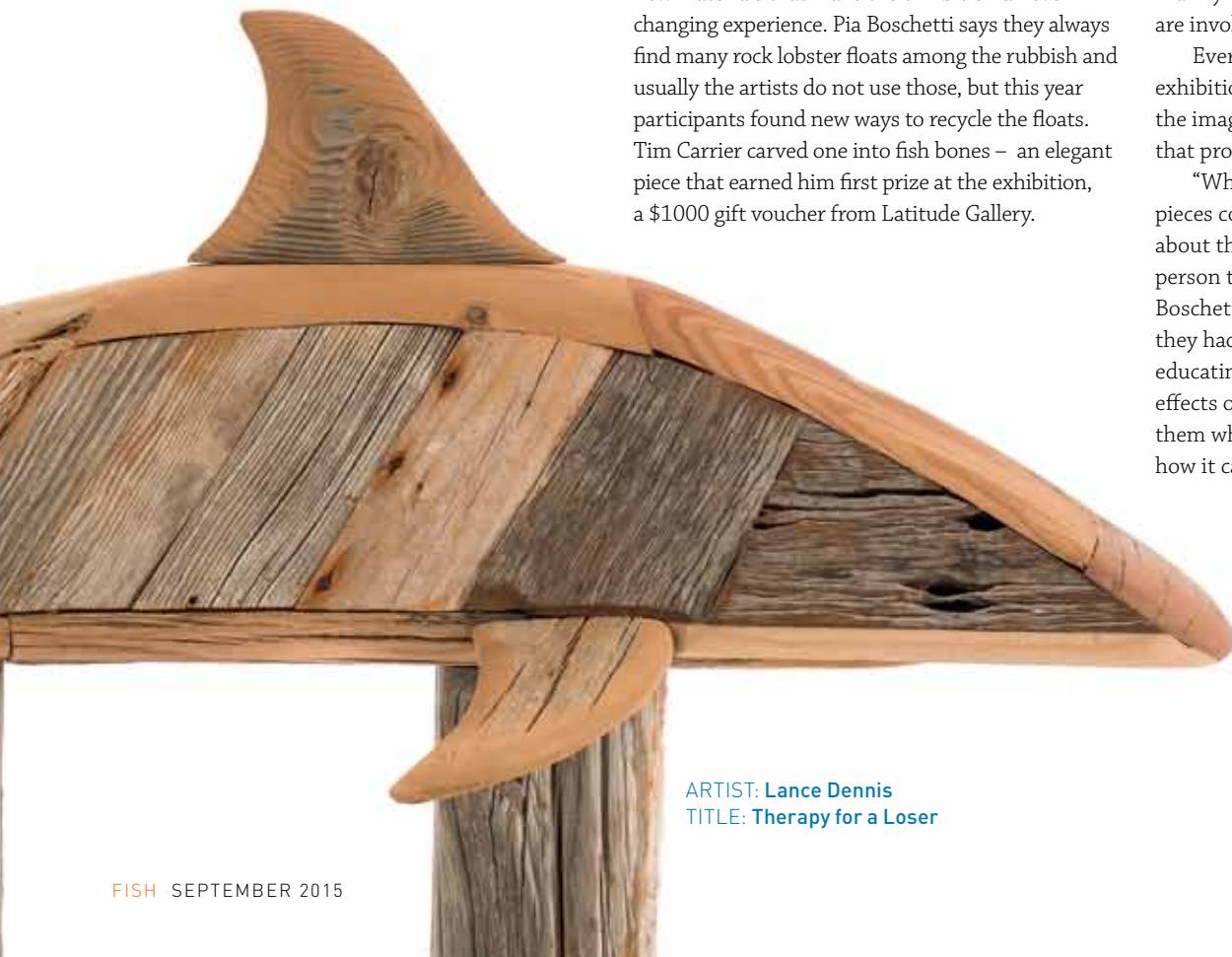
it was a great community concept for people to be involved in. "It is something that we all love," she said. "Pia is an amazing role model for our society for doing this and getting behind it with such energy and passion."

Every year the collection brings in different and new materials that make the exhibition an ever-changing experience. Pia Boschetti says they always find many rock lobster floats among the rubbish and usually the artists do not use those, but this year participants found new ways to recycle the floats. Tim Carrier carved one into fish bones – an elegant piece that earned him first prize at the exhibition, a \$1000 gift voucher from Latitude Gallery.

All the artwork produced goes on display in the exhibition, from the work of the accomplished artists to the efforts of children, who can enter in the under-16 category. Many of the artists are also fishers, with strong emotional ties to the Abrolhos Islands. Among them are Lance Dennis, Manny Mcaullay and the winner Tim Carrier; all are involved in the local Rock Lobster Fishery.

Every piece is professionally photographed by exhibition judge and sponsor Karl Monaghan and the images are published in a coffee table book that provides a lasting memory of the event.

"When I look around I think some of the pieces could certainly be sold, but it is not about the money, it is about the journey each person took in creating their artwork," Pia Boschetti says. "It makes me happy to know they had a good time. And it is a great way of educating the younger generation about the effects of throwing rubbish out, by showing them what it does to the environment and how it can be recycled," she says. **F**



ARTIST: **Lance Dennis**  
TITLE: **Therapy for a Loser**



PHOTO: WESTERN ROCK LOBSTER COUNCIL

A haul of Western Rock Lobster.

# Making the most of rock lobster resources

## CONFERENCE REPORT

**Strategies to optimise use of fishery resources and adapt to changing industry conditions were a key focus of the biennial Trans-Tasman Rock Lobster Industry Conference**

By Natasha Prokop

**T**he Chinese market for Australian rock lobster is booming, underpinning good returns in all state rock lobster fisheries. With Chinese tariffs on rock lobster imports being phased out over the next four years, the outlook is buoyant.

However, economist Paul McLeod told the recent Trans-Tasman Rock Lobster Industry Conference that fishers should beware

their over-reliance on a single market, with estimates that more than 85 per cent of total Australian rock lobster exports go to China.

Any hiccup in that dominant market – be it a decline in Chinese consumer demand or a contamination issue – could see prices plunge and fishers having to find alternative buyers and markets.

This was reflected in the theme for the joint 3rd Trans-Tasman Rock Lobster Industry Conference and 9th Rock Lobster Congress held in April in Fremantle, Western Australia, 'Adapt to thrive', which highlighted the need to make the industry more resilient in an increasingly complex environment.

Conference organiser and chief executive officer of the Western Rock Lobster Council John McMath said there was an ever-increasing range of stakeholders with an interest in the Australian rock lobster industry.

The diversity of delegates was a testament to this. A sell-out audience of more than 200 delegates included representatives ranging from investors and economists to environmentalists, researchers and fishers.

These stakeholders all hope to capitalise on the strengths of the industry: the high demand in China, which is driving high beach prices, and the continued sustainability of quota-managed harvests.

## Fishing to demand

Australian rock lobster is an almost entirely export-based industry, servicing major markets in Asia (such as China, Japan and Taiwan), with an increasing emphasis on live exports to China.

Paul McLeod, director of Economic Research Associates, spoke of the growing need to understand the drivers of demand for rock lobster in China.

He said increases in Chinese consumer expenditure, primarily due to the expanding middle class, had driven demand and high beach prices in Australia. But he warned this was no assurance that demand would continue to grow at the same rate as it had been.

He said predictors of future demand needed to be developed to inform the catch (supply) fishers should take in order to maintain high demand and therefore prices.

The conference heard this was where bio-economic models could become useful. They allowed biological catch data to be considered in the context of the costs of production and harvest returns.

PHOTO: WESTERN ROCK LOBSTER COUNCIL



(From left) Western Rock Lobster Council (WRLC) chief executive John McMath, Member for Bateman Matt Taylor, Member for Fremantle Simone McGurk, WRLC chair Linda Williams and FRDC executive director Patrick Hone at the conference.

Bio-economic models could help to set management targets such as maximum economic yield (MEY) that optimise profits and sustainable use of the resources.

Wayne Hosking, CEO of Geraldton Fishermen's Co-operative, called for MEY – which has typically been an informal target – to be made a formal management target for the industry.

Wayne Hosking said that for a high-value product based on its status as a scarce and privileged commodity, fishing to maximise profit by maintaining supply below demand made sense.

"We need to deny ourselves now to build something really great for the future," he said. "You can make more money, work less days and have more rock lobster left in the water to catch again."

## Meeting the market

If Australia was to truly capitalise on the favourable Chinese market, An Yan, Marine Stewardship Council (MSC) country director for China, said Australia should develop business strategies to better meet the Chinese market on its terms.

She suggested stronger links could be established between consumers and Australian producers by promoting Australian rock lobster in Chinese stores and marketing directly to consumers through the booming e-commerce industry.

An Yan suggested the targeted 'fresh and safe' marketing strategies adopted for Alaskan and Canadian seafood were examples Australia should seek to emulate.

Patrick Hone, executive director of the FRDC, encouraged the industry to use the FRDC's R&D capacity to assist with developing such branding and marketing strategies.

"It's important that the research we do underpins your brand, but also help industry understand and know their customers" Patrick Hone said.

"So when we market Western Rock Lobster or Southern Rock Lobster to the consumer in China, or the consumer in the community in Fremantle, or anywhere in the world, we are using the right research to allow you to put the right products and brand on the table. The conversation you need to have is: who is your customer, what do they want and what is your brand?"

## Potential and pitfalls

The June 2015 signing of the China–Australia Free Trade Agreement (FTA) has thrown the spotlight onto high-value products such as rock lobster, which is likely to benefit from a four-year reduction in tariffs from the current 15 per cent on live rock lobster to zero by 2018.

Mike Burnett, director of Lyford and Burkhart Exports, addressed the conference on the

challenges New Zealand faced breaking ground with its FTA, which came into effect in October 2008.

He said trading with China under the FTA had not been a straightforward process. Differences in interpretations and unforeseen challenges had caused delays with product entry in the early days. He warned delegates that an FTA provides a mechanism for security of entry, but should not be seen as a panacea.

"Issues take time to resolve, meanwhile there is live lobster sitting on the tarmac," he said. Australia should ensure there were provisions for live lobster trade in the FTA and be aware of issues that may arise with certificates of non-manipulation and deemed values.

Australia would no doubt benefit from the lessons learnt by New Zealand, he said, and the now well-established standards for documentation, which would ensure faster customs clearance and, potentially, more profitable trade with China.

## Food safety

The potential for a greater volume of, and more profitable, trade with China means the stakes become higher to maintain the reputation of the industry as sustainable, safe and fresh.

Independent certification of these qualities could provide a mechanism to achieve this.

Southern Rocklobster Limited has developed industry best-practice standards with its Clean and Green Program; and the Western Rock Lobster industry, the first MSC-certified fishery, is still certified sustainable 15 years on.

However, the potential for the presence of paralytic shellfish toxins (PSTs) in exported rock lobster could jeopardise these achievements.

Tom Madigan, research scientist with the South Australian Research and Development Institute, said this weakness was identified in 2012 when a case of PST in Tasmanian shellfish transported to Japan led to the testing of other marine animals in Tasmanian

## TAKE CARE IN THE SUN

The CEO of melanomaWA, Clinton Heal, had a personal story to share with the rock lobster industry at the recent Trans-Tasman Rock Lobster Industry Conference in Perth. After years playing football in the sun, at age 22 he found an unusual lump on his neck, which was diagnosed as a secondary melanoma. The doctors later found more than 30 other secondary melanomas throughout his body. When Clinton was first diagnosed his major concern was: "Can I still play football on the weekend?" His mother had a question for the doctors too: "How long does he have

to live?" More than a decade on, Clinton Heal is wary, but healthy and now a strong advocate for skin cancer and melanoma awareness. He presented to the conference as a reminder to those in the primary industries that anyone spending time in the sun is at risk. Conference organiser John McMath said the feedback from this presentation was particularly positive. "Quite a few people said 'I went out of there and I made a booking to get my skin checked'."

"It's good to have the opportunity to promote awareness of additional or incidental issues that the industry needs to be aware of."

waters. The testing revealed that high levels of PST could also accumulate in rock lobster.

The Tasmanian industry now had mechanisms in place to deal with this, including closer monitoring of 'sentinel' species such as mussels and less lag time between testing and sending to market.

However, Tom Madigan said research into this issue and management plans in other states were still lagging.

This was despite the fact that China did not distinguish between different states of origin; any unfavourable event from one state would affect all states equally.

Tom Madigan has been investigating the extent of any risk to human health from consuming affected rock lobster and how long PSTs persisted in rock lobsters. The research is due to be completed in early 2016.

In the meantime, the industry needed to be more proactive on this issue, considering the potential implications for Chinese trade in the event of an incident with PSTs in exported rock lobster, he said. [FRDC project 2012/060]

### Social licence to fish

Among the broader topics discussed at the conference was public approval, or the so-called 'social licence to fish', which has at least one high-risk issue for the Western Australian industry in the form of whale entanglements in rock lobster fishing gear.

A presentation on the issue of entanglements highlighted that while these were unlikely to threaten the expanding whale populations, they did carry a significant social price: loss of public confidence.

Maintaining the viability of small country towns reliant on fishing is also an important part of maintaining the social licence to fish. For example, Seabird in WA, which has a population of less than 100, depends on continued rock lobster fishing for its survival, although the economics would dictate that production moves to larger centres, such as Geraldton, WA.

Maintaining the viability of small fishing communities was the focus of a presentation from Kristan Porter, director of the Maine Lobstermen's Association in the US. He discussed the social incentives underpinning

the management arrangements of the lobster industry in Maine. Of the seven fisheries management zones that harvest American Lobster, Maine is the largest producer.

"My town has 510 people," Kristan Porter said. "We are all pretty much reliant on lobster. It is our way of life."

It is this reliance that has maintained the fishery as owner-operated, with limited entry for newcomers.

He said there were only two ways to enter the fishery. One was to add yourself to a long list of people waiting to take up a licence when current licence holders did not renew. The other is through an apprenticeship program, which encourages young fishers to continue the lobster tradition and allows them to jump the queue in limited-entry fisheries if they are able to purchase a licence at 17 years old. Once they turn 18, they join the general waiting list.

Many attendees said the apprenticeship program was "commendable," providing "food for thought" on the Australian industry's own leadership succession and people-development strategies. **F**

## TRIBUTE TO AN AQUACULTURE PIONEER

By Mick Hortle, Tasmanian Salmonid Growers Association

**W**hen the first batch of Atlantic Salmon eggs arrived in Tasmania from Gaden Hatchery in New South Wales in July 1984, it was a pivotal moment for the development of aquaculture in Australia.

Trevor Dix, head of the Fisheries Research Laboratory at Taroona, Tasmania, had worked tirelessly for that moment, prophesying that "these eggs could provide the state's most valuable fishery".

Today Atlantic Salmon aquaculture is worth more than \$600 million a year, and the industry is a lasting legacy of Trevor Dix, who died in June 2015.

Originally from New Zealand, Trevor Dix worked on pearl oyster and pearl cultivation at James Cook University when he first moved to Australia, becoming head of the newly built Fisheries Research Laboratory at Taroona in 1972.

Establishing the Atlantic Salmon industry was his greatest passion, although he also had a guiding hand in work on

Pacific Oysters, Rainbow Trout, Native Oysters, mussels, scallops and abalone.

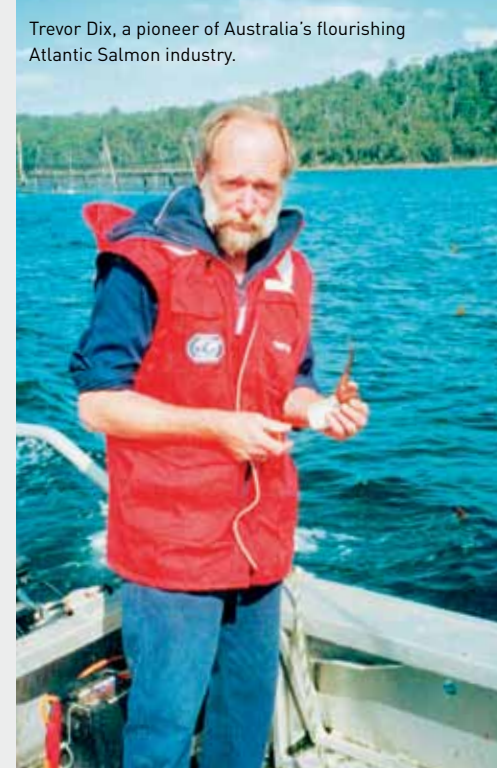
He had significant input into the foundation of the Atlantic Salmon industry – the *Salt-water Salmonid Culture Act 1985*, which provided a financial basis for research and defined the Tasmanian Government's role in development for the next decade.

Trevor Dix established his own consultancy in 1985 to fulfil his vision of farming Atlantic Salmon. He was the founding managing director of Tasmanian Atlantic Salmon, the first publicly listed salmon-farming company in Australia.

The business merged with Tassal in 1990 and he became general manager of marine operations at Tassal for the next 15 years, retiring in 2007.

Through his long career Trevor Dix mentored many young scientists and fish farmers who are now the backbone of Australia's aquaculture industry.

His legacy to Tasmania is a thriving aquaculture industry, the envy of the other states, and an industry that has provided the impetus for the development of aquaculture across Australia. **F**



Trevor Dix, a pioneer of Australia's flourishing Atlantic Salmon industry.



# Students catch onto fisheries lessons

## EDUCATION AND TRAINING

**The new national curriculum requires school students to learn about Australian fisheries, and new resources are making it as easy as possible for teachers**

**A**mid the growing disconnect between Australia's population and the source of its food and fibre, agencies involved in primary industry research and in education have come together to establish a peak body to teach children more about fishing, forestry and agriculture.

The FRDC is among those supporting the Primary Industries Education Foundation Australia (PIEFA) to address this disconnect, which also coincides with a downturn in the number of young people seeking a career within the fishing industry.

While the Australian seafood industry has an enviable international reputation for high-quality production and sustainability, a 2011 survey commissioned by PIEFA and conducted by the Australian Council for Educational Research reveals some disturbing facts. These include:

- 75 per cent of Australian school students were unaware Atlantic Salmon was farmed;
- 80 per cent of Year 10 students believed that Australian fish stocks will eventually be entirely depleted;
- 40 per cent believed the primary industries sector, including fisheries, damaged the environment;
- 95 per cent of students have never visited a marine discovery centre or fisheries-themed excursion; and
- 90 per cent of students in Year 10 would not consider a career in the fishing industry.

However, the fishing industry is not alone and PIEFA has been operating since April 2010 with a vision to support "an Australian community that understands and values its primary industries sector". One of its first crucial tasks was to influence the development of the new national curriculum, which outlines the content of what is taught in Australian schools.

"When the first drafts of the curriculum were released in 2010 there was absolutely no mention

of the seafood industry at all," says PIEFA chief executive officer Ben Stockwin.

"We knew before we began to develop resources or promote the industry that it was critical to give teachers a reason to teach students about primary production. The most important aspect was to develop content for the curriculum."

Such content exists now with more than 168 compulsory outcomes – topics related to primary industries that students must consider – as part of the current curriculum. Such examples include:

- Year One – "Consider how science is used in activities such as fishing ..."; and
- Year Nine – "Identify and describe the major aquatic biomes of Australia and the world and their spatial distribution".

FRDC research projects manager Jo-Anne Ruscoe says it would have been a significant missed opportunity if the fishing industry had not been represented in the curriculum.

"Thanks to our work with PIEFA, teachers now need to include specific fishing-related content. The next challenge is to support teachers to deliver high-quality information."

In 2014, the Australian Government announced a \$2 million initiative, 'Agriculture in Education', to develop resources to specifically match curriculum outcomes and make it as easy as possible for teachers to embed related content.

PIEFA's part in this project was to develop 23 units of study and 40 matching videos to support teachers and their students.

The videos are divided into two sections. The first have industry members discussing their industry to provide teachers with background information to increase their knowledge and confidence to teach students. These videos are also a great source of information for students directly. The second group of videos shows teachers who have trialled the videos discussing their education value and how they implemented the unit in their classrooms.

"We felt it was important for teachers to talk to other teachers about this work," Ben Stockwin says. "Although our surveys report that 100 per cent of primary school teachers and 93 per cent of secondary school teachers felt it was important to educate students about the origins of their food,

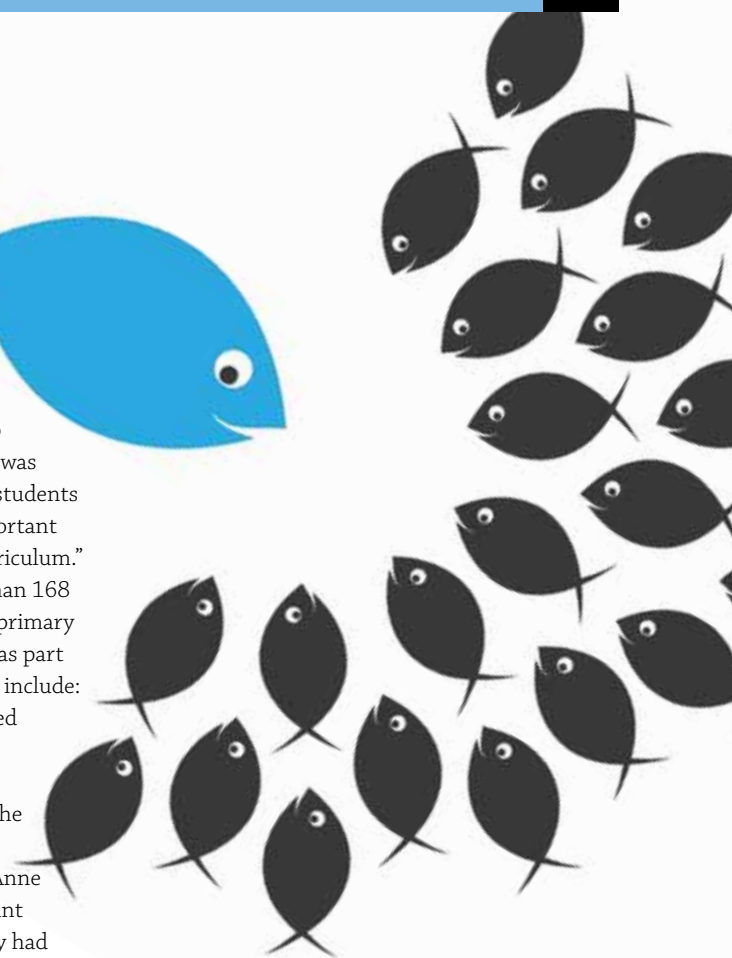
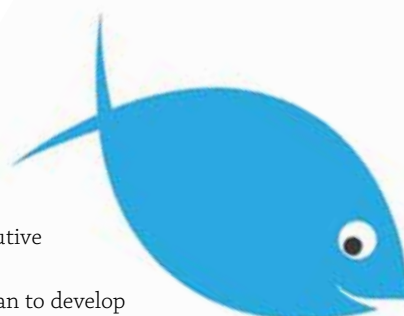
they identified their own lack of confidence and knowledge as inhibiting factors in them doing so."

The resources cover all of Australia's primary industries but several specifically target the fishing industry. For example, Year Five has a unit entitled 'Investigating Australian approaches to producing fish, seafood and meat'. The videos accompanying these units feature well-known industry figures such as Lance Vater of Vater Corporation and rocklobster exporter Andrew Lawrie of Sky Seafoods.

PIEFA is in the process of putting these and other primary-industry-themed resources in as many of Australia's 9500 schools as possible. Making seafood industry information accessible is a primary goal for PIEFA. To this end it hosts a one-stop web portal for schools entitled Primezone ([www.primezone.edu.au](http://www.primezone.edu.au)). Primezone houses more than 220 resources across the agriculture, forestry and fishing industries.

"PIEFA's value is far beyond the development of resources," Jo-Anne Ruscoe says.

"For the first time we have a credible body out there in schools advocating for students to learn about how the Australian fishing industry is managed. It is a recognised and respected educational organisation and it promotes a wide range of resources." **F**





(From left) White Teatfish, Black Teatfish and Prickly Redfish are among the sea cucumber species hand-collected from 154 zones for 15 days every three years as part of a rotational harvesting strategy developed and implemented by industry in the Queensland East Coast Beche-de-mer Fishery.

# Crop rotations in the zone

## WILD-CATCH MANAGEMENT

**Research on the Great Barrier Reef has identified a sea cucumber harvesting strategy with global application**

By Clarisa Collis

**N**ew Australian research has shown that crop rotations and, more specifically, zone-based rotational harvesting have the potential to lift the sustainability, productivity and profitability of the sea cucumber industry.

CSIRO researchers Eva Plaganyi and Tim Skewes have led a two-year FRDC-funded project to evaluate rotational harvesting of sea cucumbers across 154 zones in the multi-species Queensland East Coast Beche-de-mer Fishery (ECBDMF). Beche-de-mer (sea spade

in French) is a commonly used name for the sea cucumber. The two main operators in the fishery are Tasmanian Seafoods and Seafresh Australia, which voluntarily introduced a three-year rotational harvest strategy in 2004. Now researchers have verified that this novel approach can provide both biological and economic benefits.

"It's the first study that has used quantitative modelling to rigorously show that a rotational harvest strategy can reduce population depletion, increase long-term yields and improve profitability in a sea cucumber fishery," Eva Plaganyi says.

The ECBDMF covers 514,000 square kilometres of the Great Barrier Reef Marine Park. Fishers hand-collect a variety of sea cucumber species from each of the fishery's 154 zones for 15 days once every three years.

In contrast, the conventional approach to sea cucumber fishing involves harvesting

animals every year from the entire, un-zoned area of a fishery. Eva Plaganyi says that apart from increasing the spawning biomass of sea cucumbers, the research has shown that the three-year rotational zoning scheme (RZS) could raise the fishery's productivity up to 10 per cent.

The annual average yield (landed catch) in the three-year RZS model simulation was 305 tonnes worth US\$6.22 million compared with 296 tonnes worth US\$6.07 million in the simulation based on conventional harvesting.

However, Eva Plaganyi says the nine-tonne improvement in the simulation is a conservative estimate, because conventional harvesting strategies have a higher risk of population depletion and subsequent declines in harvest.

The study also assessed RZS harvesting intervals from one to six years, applying the same level of population risk (probability of a



PHOTO: TIM SKEWES, CSIRO



PHOTOS: TIM SKEWES, CSIRO

species' biomass dropping below 40 per cent to each. There was an exponential increase in biomass with the increase in rotation interval.

A modelled comparison of conventional harvesting with a three-year rotation strategy provided an additional 140 tonnes over 20 years, worth US\$2.9 million, from the rotation strategy.

Such a production increase is significant in the context of the Australian sea cucumber industry, which has an annual average catch of 501 tonnes, valued at US\$11 million.

Eva Plaganyi says the finding shows that while rotational harvesting can increase yields and gross margins at low catch levels, these benefits tend to further increase at higher catch levels.

Tim Skewes says the modelling highlighted the importance of the three-year RZS in reducing the risk of species depletion.

"The biggest benefit from the RZS is that it can markedly reduce the risk of over-exploitation both within each zone and across the entire fishery. Depletion of these ecologically important animals is something that managers and fishers are keen to avoid in the Great Barrier Reef Marine Park."



PHOTO: CSIRO



CSIRO researcher Tim Skewes.

Drawing on 160 simulations for nine sea cucumber species in each of the fishery's 154 zones over 20 years (from 2012 to 2032), the study also examined the trade-off between risk and revenue across different rotational harvest periods from one to six years.

It found the three-year period, developed and implemented by industry in the Queensland fishery more than 10 years ago, provided the optimal balance.

"With a six-year cycle, there is a much lower risk of population depletion, but revenue is slightly lower because this involves forsaking some catch," Tim Skewes says.

He says another important finding of the two-year study was the need to address "information gaps" as part of future research to help improve the sustainability of all species fished in the ECBDMF.

Sea cucumber species that have been harvested from the fishery include the Black Teatfish (*Holothuria whitmaei*), White Teatfish (*Holothuria fuscogilva*), Prickly Redfish (*Thelenota ananas*), Brown Sandfish (*Bohadschia vitiensis*), Golden Sandfish (*Holothuria lessona*), Curryfish (*Stichopus vastus*, *Stichopus hermanni*), Deepwater Blackfish (*Actinopyga palauensis*) and Burrowing Blackfish (*Actinopyga spinea*).\* Black Teatfish is not currently included in the fishery's catch quota, as harvesting this species was banned in 1999 due to overfishing concerns.

Tim Skewes says better data for these target species, particularly age and size at maturity, growth rates and natural mortality, is required to better predict population trends and measure the risk of population decline.

"Information on growth and age at maturity is critical to the success of the RZS because the approach also relies on appropriate size limits to be effective," he says.

The study identified the need for future research to address gaps in the data about the fishery's high-risk species, specifically

Burrowing Blackfish outside fished zones and White Teatfish throughout the fishery.

Burrowing Blackfish is not a traditional catch species and its stocks are managed differently to the rest of the fishery. Fishing is largely concentrated in dedicated 'Burrowing Blackfish zones' that are not part of the three-year RZS the commercial operators have implemented.

The annual catch for the White Teatfish declined from 120 to 70 tonnes between 1995 and 2011, in part because of reduced total allowable catch levels over this period, but also because the fishery switched its fishing effort to other species, such as the Burrowing Blackfish. **F**

\* Scientific names of sea cucumbers are currently under review.

## INTERNATIONAL INTEREST

The findings from the Australian research have already drawn international attention with reports in *Scientific American*, among other journals.

Resource management is an important focus in sea cucumber fisheries worldwide because these animals are vulnerable to over-exploitation. In the Pacific region alone, overfishing has resulted in the closure of fisheries in Papua New Guinea, Palau, the Marshall Islands, Tuvalu and French Polynesia.

Sea cucumbers are sedentary animals and most live on the seafloor in shallow coastal and reef areas – which makes them an easy target for fishing and vulnerable to exploitation.

Risk of population depletion stems from increasing demand for the slug-like creatures in high-value Asian markets, particularly in China where they are prized for their culinary and medicinal uses. Demand from Asian markets is estimated to be worth US\$60 million a year.

# STANDARDS HELP SECURE SEAFOOD CONFIDENCE

## INDUSTRY STANDARDS

**Creating standards for the Australian fishing industry will help to ensure consistency and confidence in the way seafood is produced and marketed, ultimately improving sales and profitability**

By Alan Snow and Sevaly Sen

**W**hen consumers buy a fish, they want to know that they are getting what they pay for, whether that is Barramundi or Blue-eye Trevalla. Increasingly, consumers also want to know where their fish has come from and how it was harvested. And the FRDC is now in a stronger position to help the seafood industry deliver on this increasing demand for consistently available and reliable information as an accredited Standards Development Organisation.

This means it has been accredited by Standards Australia “to develop Australian Standards in the fields of terminology, sustainability and operational practices in the fishing industry”.

### What is a standard?

Standards are published documents setting out specifications and procedures designed to ensure products, services and systems are safe, reliable and consistently perform the way they were intended to; users can make reliable assumptions about a particular product, service or practice. Standards can be applied at an international, regional or national level, or within a private organisation. Compliance with standards can be either mandatory (regulated by government) or voluntary.

Conformance to a standard means that the ‘requirements’ of the standard/specification are met as measured by conformance criteria. This process is called a conformity assessment (CA).

Australian Standards are developed by a Standard Development Organisation that has been accredited by the national Accreditation Board for Standards Development Organisations

(ABSDO) – the FRDC is one such organisation. A formal and technically robust process is involved in developing a standard, although conformance with a standard does not necessarily lead to any kind of certification.

There are also Standards Development Organisations that can only develop private standards – these organisations are not accredited by the ABSDO. Private standards are voluntary and are developed by entities other than government (companies, NGOs, stakeholder associations) known as Standards Setting Organisations.

There are many private standards in the food and seafood sector including those of the Marine Stewardship Council, the Alaska Seafood Marketing Institute Responsible Fisheries Management and the Gulf United for Lasting Fisheries scheme.

These have usually been developed in response to a perception that public standards or regulatory frameworks are failing to achieve certain outcomes (sustainability and responsible fisheries management, food safety assurance, animal ethics, child labour) and/or where there is a desire to differentiate certain products or operators in the market. They may or may not be publicly available.

Private standards do not have to go through the processes specified by Standards Australia, although it is generally accepted that a credible standard should be developed by following three internationally recognised principles:

- openness and transparency of process;
- consensus; and
- balance of representation.

### Benchmarking

In addition to standards, benchmarks provide a set of criteria and indicators to measure and compare the performance of different standards, codes and guidelines. The aim is to avoid duplication and encourage harmonisation and, ultimately, reduce cost.

In the seafood industry the Global Sustainable Seafood Initiative (GSSI) is developing a benchmark for seafood standards so that a seafood supplier can (a) know which standards meet the

benchmark and (b) select one that best fits their requirements, therefore avoiding the need for dual or multiple certifications. Benchmarks have been used in food safety with great success.

The GSSI is focused on benchmarking private voluntary schemes only. However, this could conceivably be extended to other codes, guidelines and policies as well as government standards and legislation.

### Traceability

The finfish traceability standard and chain-of-custody certification can also help consumers make informed decisions. Traceability is the process of tracking seafood from its origins through all stages along the supply chain to the retailer. It is fundamental to ensuring accurate labelling and food safety, especially in the event of a product recall.

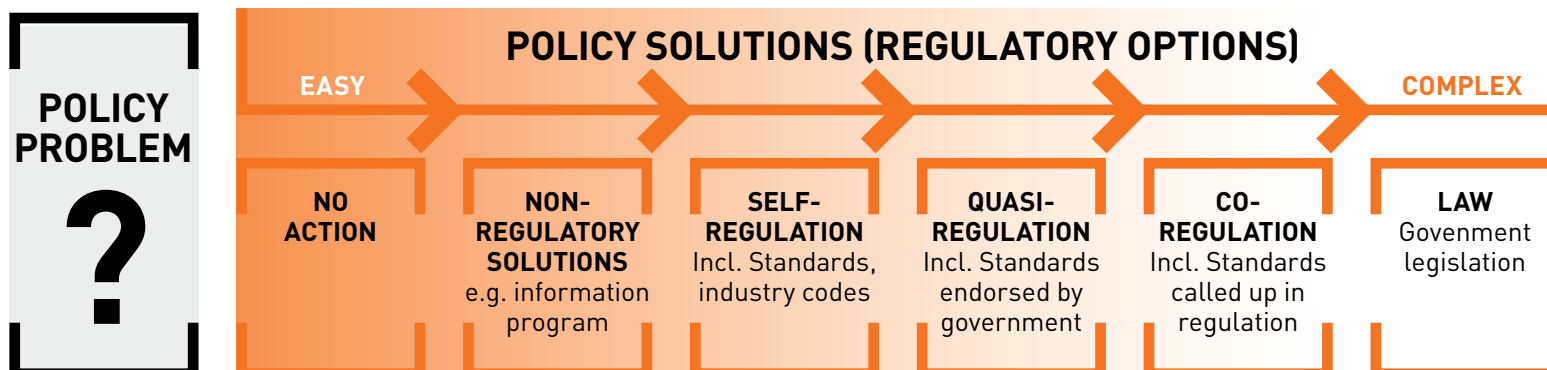
Chain-of-custody certification occurs against a chain-of-custody standard audited by a third party to ensure that products labelled as coming from a certified fishery come from that fishery.

The term ‘chain of custody’ is used when all steps, including processes, transportation and ownership of that product, are accurately documented and proven secure from loss in traceability. Chain of custody has an identified start and end point for the product. For seafood, this can be at a point of harvest, of landing or first sale to a point of final consumer packaging.

### Australian Fish Names Standard

In order to trace a fish’s origin and its path to market, it is essential that each species is uniquely identified by a single name used consistently throughout the supply chain. To assist with this, the FRDC maintains the Australian Fish Names Standard (AS 5300), which defines the names to be used for all fish and seafood in Australia.

It includes a prescribed standard fish name for almost 5000 species of Australian and imported fish produced or traded in Australia. Most are finfish, but there are plans to add more crustaceans, molluscs and sharks. Standard 2.2.3 of the *Food Standards*



*Australia New Zealand Act 1991 Food Standards Code recommends the use of the names in the Australian Fish Names Standard.*

The standard specifies that fish sold to consumers, for example retail sales and restaurants, must be identified by their standard fish name. Fish not sold directly to consumers (for example, wholesale, export and import) must be identified by their standard fish name or scientific name.

Standard names allow for more effective fisheries monitoring and management, which in turn results in greater sustainability of fisheries resources. Traceability and food-safety management can also improve seafood marketing campaigns and reduce the potential for misleading and deceptive conduct, resulting in a more profitable industry.

The searchable online standard fish names database ([www.fishnames.com.au](http://www.fishnames.com.au)) includes all species listed in the Australian Fish Names Standard. Users can find a fish by name and read its previous or non-standard names as well as viewing an image in some cases.

### Naming a fish

The FRDC's Fish Names Committee (FNC) determines whether to change or add a name to the Australian Fish Names Standard through a rigorous process that includes public consultation and consensus decision-making. The FNC includes representatives of all major stakeholders in the seafood industry and is chaired by Gus Dannoun from Sydney Fish Market.

FNC protocols have been developed by some of Australia's best taxonomic experts and also consider the market appeal of a proposed name.

### HOW TO CHANGE OR ADD A FISH NAME

- Discuss a proposed name with the secretary of the Fish Names Committee (FNC) before lodging an application to check whether the proposed name already exists or whether the species already has a name.
- Submit the application. As part of this application process, evaluate the proposed name against the fish names protocols. The application form can be downloaded from the FRDC Seafood Standards website (<http://seafoodstandards.com.au/fish-names/Pages/default.aspx>).
- The FNC secretary will check the proposed amendment for consistency and spelling and proper scientific name and make any changes in consultation with the applicant.
- The FNC secretary will provide additional information, which typically includes all names historically used for the species, other names used in Australia and internationally, the names used for closely related species, and any other information that may be helpful.
- The FNC will meet to evaluate the proposed amendment, calling on the expertise of committee members and information provided by the applicant and FNC secretary. If approved, the proposed amendment is sent for public consultation.
- A three-month public consultation is conducted by sending all information about the proposed amendment to as many interested persons in the Australian seafood industry as possible. This relies on emails to key stakeholders who forward the email to all people in their contact lists.
- Respondents can provide information via email, fax, letter, or (the preferred) online feedback process that has been developed.
- All feedback on the proposed amendment is collated and sent to the FNC for final evaluation at its next meeting. A consensus decision with at least two-thirds majority of voting members in favour of the proposed amendment is required.
- If approved, the Australian Fish Names Standard is amended accordingly and the online searchable database is updated immediately with the change.

SAI Global prints updates of the Australian Fish Names Standards, the latest of which, Australian Fish Names Standard AS 5300-2015, was published in April/May 2015. It is also available at: [http://seafood.net.au/files/AS%205300-2015\\_public\\_consultation\\_draft.pdf](http://seafood.net.au/files/AS%205300-2015_public_consultation_draft.pdf)

### Industry input

All participants in the seafood industry can contribute to the fish naming process. Consider the species and the names currently assigned to the species, particularly if they were bycatch in the past and are now commercial species. Does the name have market appeal and is there a better name?

When proposed amendments are circulated for public consultation, consider the proposal and make comments, even if it is a simple "yes, I support this name".

Also remember to forward to all of your contacts, as they may have an interest in the proposal. **F**

# The transformer

## PROFILE

**Connecting with the community is a crucial part of Damien Bell's efforts to ensure the long-term sustainability and social acceptability of his fishery**

By Melissa Marino

**W**hen Western Australia's Damien Bell describes what he does, it is hard to believe he can run a viable business. "We are primarily sole operators fishing in a Ramsar-listed wetland, in less than a metre of water, with six-metre-long boats," he says.

The Peel-Harvey Estuarine Fishery is so shallow that he once waded home, dragging his boat behind him after its motor failed, "dodging crabs and stingrays on the way."

But while the estuary is an internationally recognised conservation zone, it is also a hive of human activity. The commercial fishery, operating out of Mandurah, is less than an hour south of Perth and is a magnet for recreational fishers, birdwatchers on kayaks and a growing population driven by urban sprawl.

The fishery's success is based on its "social licence to operate" forged through co-operative agreements between fishers and the estuary's diverse recreational users, aimed primarily at protecting the resource.

"We are trying at all stages to work with all the stakeholders around us so we can stay forever," says Damien Bell, who is president of the Mandurah Licensed Fishermen Association and head of BellBuoy Seafoods.

## The right place

Damien Bell always wanted to be a fisher, inspired by a childhood spent "bouncing around" on the back of the Abrolhos Islands rock lobster boat where his dad was a deckhand. But it took some time to find his place. He could never afford to buy into the rock lobster industry, so he followed his love of

the water into an honours degree in aquaculture. Study was punctuated by summers spent on the rock lobster boats, and followed by a decade of pearling in both Indonesia and Broome, WA.

The life of a pearler – offshore for weeks at time – did not suit family life, however. So, newly wed, a move to Perth soon followed.

But a desk job in environmental assessment was also the wrong fit. So when his dad, Aiden Bell, bought into the Peel-Harvey Estuarine Fishery more than a decade ago, Damien Bell had little hesitation in taking over his dad's boat. "I booted him off his own boat and leased his licence off him," he says. By the time another licence came up for sale 18 months later he was in a position to buy one for himself.

Damien Bell credits his marketing-consultant wife Susan Bell with supporting him for his first two years in his new job as he learnt the ropes in his "little estuary", which, despite all his experience, took time to master.

He had found his niche, finally doing what he had always wanted, and soon set about ensuring he could continue for as long as possible.

"The ecosystem in this waterway is in delicate balance so we have had to find ways to keep the environment in the best shape to ensure we have fish and crab stocks going forward," he says.

## Changing fortunes

As a high-volume, low-value fishery, the estuary supported up to 150 fishers from 1880 to the 1940s with the majority of the catch canned directly onshore. When canning operations ceased after World War II, bait became the main game. In 1976, it provided one million kilograms of mostly mullet and Yelloweye Mullet for rock lobster bait, although the estuary was quickly becoming a 'biological desert', according to environmental assessments.

While many environmental and political factors have since helped transform the fishery back to health, Damien Bell says he was inspired by the now-retired Peel-



From a young age Damien Bell loved fishing, unfazed even as a toddler, by a Blue Swimmer Crab.

Harvey fisher Bruce Tatham who worked tirelessly with the community to build the estuary's health and the fishers' reputations as responsible environmental stewards.

His father, Aiden Bell, also played a major role in changing the market for the fishery. "Dad through his marketing enforced strict quality controls, changed fishers' mental ethos and ensured the best product was delivered daily to buyers," he says.

Today, there are just 11 fishing licences in the Peel-Harvey Estuarine Fishery, operated by seven families who provide local and sustainable catches of Blue Swimmer Crab, Sea Mullet and Yellowfin Whiting largely to market demand in and around Perth.

"Gone are the days of catching in bulk," Damien Bell says. "It is now fish to order, fish to high quality and for a better price."

Meanwhile, Damien Bell has led environmental initiatives for the fishery to shore-up its long-term sustainability – and therefore its viability. These include an environmental management system (EMS), resource sharing agreements with the recreational sector, and a world-first assessment, now underway, for joint Marine Stewardship Council (MSC) accreditation for both its recreational and commercial fishing interests.

With the recreational sector accounting for about half of the Blue Swimmer Crab catch, such an initiative is logical, he says. But it also serves a greater purpose.

"We will be able to hold up our fishery to the world and promote it as both commercially and recreationally sustainable," he says. "I want

the region stamped as sustainable so people feel confident fishing sustainably, eating sustainably, buying our crabs that are caught sustainably.”

The goodwill and promotion such environmental agreements can provide was evident when the fishery introduced its EMS in 2009 and landed itself in the pages of *The West Australian* newspaper. “There we were, the fishers’ association, the recreational fishers, environmental people – all the stakeholders – under the big, bold headline, ‘We’re Sustainable’,” he says. “And you can’t buy that.”

Damien Bell says the EMS put the area on the local map and he hopes its profile will only increase with future MSC accreditation. “I want it to be a red-hot talked about destination that is good for tourism, good for local restaurants, good for fishing stores, good for boat dealers, and good for us to stay here,” he says.

Strong environmental credentials will also help protect the fishery as the region continues to grow. “If a developer wants to dredge a channel through my fishery, I can and will defend it,” he says.

## Leadership skills

Damien Bell’s wide-ranging background – from deckhand and science graduate, to pearl diver, environmental manager, seafood exporter and TAFE lecturer – has enabled him to see the big picture. And that is that the fishery’s survival depends on both its environmental sustainability and support for the commercial sector from the local and broader community.

In 2008 he added to his skills through the National Seafood Industry Leadership Program (NSILP), which he completed with sponsorship from the WA Fishing Industry Council and the FRDC. “It helped me feel comfortable engaging with different people involved in the

fishery,” he says. “So I can talk to a minister of fisheries, a scientific researcher, a fisher on the ground or an elderly person on the boat ramp.”

The NSILP also gave him new ideas about

how to improve outcomes in the fishery.

“It gets you out of your little backyard and opens your eyes,” he says. “Seeing what was happening away from Mandurah gave me ideas of what I could bring to Mandurah.”

One significant initiative Damien Bell involved himself with was the Mandurah Intervention Program, which ran for almost a decade. This five-week course in fishing skills offered three times a year was drawn from the TAFE curriculum and run with the local fishing club in conjunction with WA Police and local schools for teenagers at risk.

In the three years he was involved, Damien Bell saw the course provide real job opportunities and a future for the students, while building considerable goodwill in the community.

“I just thought it was a good idea to engage 30 kids a year who would engage 60 parents who would see a fisher as being a good bloke and prepared to give time to the community,” he says. “But some of them have gone on to marine engineering, fishing charters, and the back of prawn trawlers and it’s been very satisfying.”

Community support and goodwill have also been strengthened through the involvement of commercial fishers as volunteer firefighters and as members of wildlife rescue services. “So we try and do as much as we can to show that we are part of the community, more than just going out there and taking stuff out of the water,” he says. **F**

Damien Bell will discuss the revival of the Peel-Harvey Estuarine Fishery at the Seafood Directions 2015 conference in Perth from 25 to 27 October.

Damien Bell fishes for Blue Swimmer Crab, Sea Mullet and Yellowfin Whiting in the Peel-Harvey Estuarine Fishery.



PHOTO: KARL MIETHE



PHOTO: KARL MIETHE

## New web functionality

You can now search our active projects by sector and species by visiting the Current Research Projects page at: [www.frdc.com.au](http://www.frdc.com.au)

### EMPOWERING INDUSTRY

2009/300

The project 'Empowering II' sought to develop an ongoing, cost-effective and transparent process to match the best industry RD&E ideas, on a national or regional scale, with the most suitable RD&E providers. These could then be developed into successful projects with valuable industry outcomes in efficiency, profitability and capacity building. This project followed the very successful Empowering I project, which generated 35 projects, 16 of which were funded through a variety of sources. While the underlying objective of Empowering Industry remained sound, as the project proceeded it was agreed to vary the focus to facilitate the capture of the RD&E needs of the fishing and seafood industry and bring them into the higher-level research prioritisation process.

The Queensland and Victorian Fisheries Research Advisory Bodies (FRABs) agreed to be case studies to use the Empowering Industry approach and framework to feed into their prioritisation process. The trial FRAB case studies showed that the Empowering Industry process and website are cost-effective ways to more closely link industry needs with FRAB priorities, and that they provide a direct way to engage with a diverse range of stakeholder groups in the commercial and recreational sectors.

**MORE INFORMATION:** Ian Knuckey, Australian Seafood Co-products, 0408 581 599

### FISH KILL INVESTIGATION

2009/315.29

As part of this project, three Primary Industries and Regions South Australia (PIRSA) staff (two funded by the FRDC) attended the Department of Fisheries, Western Australia, fish kill training course in June 2014. This provided a valuable opportunity to upskill staff, strengthen relationships with WA fish kill investigators and gain knowledge and resources to assist PIRSA in the development of a SA-based fish kill training course for regional staff.

**MORE INFORMATION:** Shane Roberts, PIRSA, 08 8226 3975

### PREDICTING RECREATIONAL IMPACT

2010/001

This project has provided managers with information about the relative extents to which the stocks of Silver Trevally and King George Whiting in coastal waters near Perth might be expected to be affected if fishing pressure were to increase by specified amounts. Managers are now aware that King George Whiting stocks are likely to be more vulnerable than Silver Trevally to increases in fishing pressure in inshore waters.

Detailed summaries of the biology, stock assessment and management for 30 of Western Australia's most important and/or well-known temperate fish species are now accessible to fishery stakeholders in the form of a species guide (published separately as Fisheries Research Report No. 242 by the Department of Fisheries, Western Australia). The guide provides a comprehensive source of information for anyone who wishes to find key facts and/or literature relating to these species.

**MORE INFORMATION:** Alex Hesp, Department of Fisheries, Western Australia, 08 9203 0145

### IMPACT OF GILLNETTING

2010/016

In Tasmania, both recreational and commercial gillnetting is permitted. This study, conducted by the Institute for Marine and Antarctic Studies between 2010 and 2013, represents the most comprehensive investigation into the Tasmanian gillnet fishery and its implications for by-catch and biodiversity. The by-catch component, as a proportion of total catch numbers, was found to be relatively high. The main

non-target by-catch species included Draughtboard Shark, Marblefish, Bluethroat Wrasse, leatherjackets and skates/rays.

Several interactions with threatened, endangered and protected species were observed in this study. Although the majority of individuals captured were in excellent condition and lively when released, a small proportion of those captured in overnight deployments were either in poor condition or had died, confirming some by-catch mortality in these longer soak times. There was general agreement among recreational fishers that recent management changes affecting gillnetting had been effective in improving fishing practices and in reducing waste and by-catch.

**MORE INFORMATION:** Jeremy Lyle, Tasmanian Department of Primary Industries, Parks, Water and Environment, 1300 368 550

### MUSSEL BIOFOULING TREATMENT

2010/202

This project aimed to develop information to enable mussel farmers to more effectively recognise, avoid, prevent and treat biofouling outbreaks. This project demonstrated that biofouling affects the mussel industry in Port Phillip Bay in a variety of ways. The presence of the fouling organisms *Ciona intestinalis*, *Styela clava* and *Ectopleura crocea* reduced mussel shell growth and flesh weight, even at low to medium fouling levels, probably due to food competition.

The recommendation from this study is that mussel growers should consider methods to reduce fouling. However, some authors suggest that removal of fouling may not be cost-effective as mussels may be lost in the cleaning process and the cost of fouling removal may be greater than the reduced profits caused by fouling (de Sa et al. 2007). A variety of treatment options were found to be effective against key fouling species and not harmful to mussels. However, prevention is better than treatment in most cases and manipulating farm management strategies is a relatively easy way to achieve this.

**MORE INFORMATION:** Isla Fitridge, University of Melbourne, 0403 721 223

### DEFENDING AUSTRALIAN FISHERIES

2010/226

The main aim of the project was the publication of at least two peer-reviewed articles to defend the credentials of the Australian fishing industry, and was achieved with four papers published. Through the life of the project we have actively engaged in the debate on how effective spatial management is, as well as the debate on the effectiveness of fisheries management in Australia. This report and its associated publications have been widely disseminated to both industry and government to address common misconceptions about the sustainability of fishing as managed in Australia.

**MORE INFORMATION:** Colin Buxton, Colin Buxton and Associates, 0419 301 923

### ADJUSTING TO QUOTAS

2010/229

The project has produced a simple but comprehensive guide to understanding individual transferable quota (ITQ) management with information on how to best adjust and adapt businesses to operate efficiently and profitably. The information contained in the guide should reduce some of the initial resistance of small and medium-sized operators that can occur when moving from input controls to quota management. This will be achieved by providing information targeted at what to expect in the fishery and guidance as to how to evaluate the best choices for operators to adapt to the changed operating environment.

Industry reviewers of the guide have observed that it would be very useful for operators new to quota management. It is anticipated that management agencies will

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also benefit as a better understanding by operators of ITQs would ease the transition to ITQs, thereby reducing transitional costs and expediting what has often been a long adjustment phase.

**MORE INFORMATION:** Sevaly Sen, Fisheries Economics Research and Management Specialists, 0414 344 593

## INDIGENOUS RD&E OUTCOMES

2010/405

Indigenous Australians have been involved in fishing and using seafood for a range of purposes for many thousands of years. The Indigenous fishing sector is acknowledged as one of the three major sectors, along with the commercial and recreational sectors. However, due to a range of factors there had been, in effect, a market failure in respect to RD&E for this primary sector of the broader industry.

In 2010, during the development of the first National Fishing and Aquaculture RD&E Strategy, the challenges and constraints confronting RD&E in Indigenous fisheries were identified – geographical and cultural diversity, which makes it difficult to coordinate planning and investment, a lack of comprehensive information, and limited engagement with Indigenous communities.

The FRDC sought to establish a group to provide advice on a range of matters dealing with engagement on aspects of fishing and seafood-focused RD&E with Indigenous Australians. Over a short period this group developed into the FRDC Indigenous Reference Group (IRG). The scope of the IRG is to ensure that fishing and seafood-industry-focused RD&E assists in delivering improved economic, environmental and social benefits to Australia's Indigenous people.

With the support of the FRDC and the Australian Department of Agriculture, the IRG has overseen two National Indigenous Fisheries RD&E forums, which provided high-level outputs to help guide RD&E investment in the Indigenous sector.

**MORE INFORMATION:** Chris Calogeras, Australian Barramundi Farmers Association, 0401 692 601

## TEMPERATE REEF CHANGES

2010/506

Waters along Australia's most densely populated south-east coast are warming at 3.8 times the global average rate, the most rapid change in the Southern Hemisphere. Ecosystems in this region are therefore likely to be severely affected by climate change and significant biodiversity change is expected. The rapid nature of these ecosystem changes requires science-based decisions about where, how and when to apply adaptive management interventions.

In the initial phase of the study we focused on examining temporal patterns in species abundance and the relationship with physical drivers such as temperature. In the second phase of the study we modelled the latitudinal species abundance curves of a wide range of fish and mobile invertebrate species. The species distribution models predict significant changes in the assemblages of fishes and mobile invertebrate species in the south-east region.

The major predicted change of consequence to ecosystem function was a doubling of *Centrostephanus* abundance in eastern Tasmanian waters, and extending to the south coast in significant numbers. This was coupled with a predicted decline in Southern Rock Lobster numbers in this region (in the order of 20 per cent), such that the key predator of *Centrostephanus* will be declining at a time when increasing numbers are needed to arrest likely barren formation.

**MORE INFORMATION:** Neville Barrett, University of Tasmania, 03 6227 7210

## NORTHERN CLIMATE IMPACT

2010/565

A key output from the project was the development and application of vulnerability assessments of key fishery species from three key regions of northern Australia. The assessment framework developed is semi-quantitative and draws on the elements of

exposure, sensitivity and adaptive capacity. The assessments are species-based and regionally targeted and the framework is a tool to assess the relative vulnerability of species to climate change, providing an objective and strategic basis for developing responses to projected changes. The framework is also transparent and provides the means for determining the appropriateness of responses. The framework can readily be adopted for similar assessments in other regions and, with modification, could also be adopted in other disciplines.

The vulnerability assessments here focused on 2030, a medium-term outlook, and one considered to be more relevant to all stakeholders, although an assessment was also carried out based on the A1FI emissions scenario for 2070. Another important outcome was the greater understanding of the impact of short and long-term climate variability on northern Australia's key fisheries' species, fisheries and regions of northern Australia, and the key environmental drivers. These include identification of priority species, fisheries and/or locations for targeted monitoring.

Collectively, the key outputs of this project provide an informed basis for management and industry to assess current fisheries management against likely future scenarios. Management as well as commercial and recreational fishing interests were key participants in the project and had direct input into key outcomes.

**MORE INFORMATION:** David Welch, 0414 897 490

## PERIWINKLE FISHERY OF TASMANIA

2011/024

This represents the first comprehensive study of the fishery, fisheries biology and markets for the edible periwinkle, *Lunella undulata*. Commercial catch and effort data, fisher knowledge, and growth and reproductive biology of periwinkles were integrated to provide a robust foundation supporting the management of the Tasmanian fishery. In addition, an evaluation of the domestic market for periwinkles, including distributors, retail and restaurant components, identified several impediments that need to be addressed by suppliers (fishers) if market growth and improved economic returns are to be realised.

In accordance with the stock status classification guidelines defined in the *Status of Key Australian Fish Stocks Reports 2012*, the Tasmanian periwinkle fishery is assessed as sustainable. Rezoning of the fishery coupled with the increase in the minimum size limit, both implemented in 2013, should help facilitate the sustainable expansion of the fishery. Ongoing monitoring of commercial catch and effort data will underpin assessment of the fishery and a supplier-driven integrated marketing approach represents an important strategy to facilitate market expansion and increased economic returns to industry.

**MORE INFORMATION:** Jeremy Lyle, Tasmanian Department of Primary Industries, Parks, Water and Environment, 1300 368 550

## NEW COPPER GUIDELINES

2011/041

Farm-based monitoring has shown copper concentrations in sediments under salmon farms in the Huon River and D'Entrecasteaux Channel are elevated relative to background conditions as a result of long-term use of copper-based anti-foulants.

The concentrations of relevant forms of copper were assessed, and the associated sediment conditions determined. While anti-foulant use was shown to be the primary source of elevated copper concentrations within farms, local environmental conditions and certain farming practices can have a significant influence on copper accumulation and impact levels throughout the system. Consequently, it was possible to make operational management recommendations that will reduce the potential effects into the future. The study also recommends refined regulatory guidelines that should provide better protection with respect to chronic ecotoxicological impact.

**MORE INFORMATION:** Catriona Macleod, University of Tasmania, 03 6227 7237

**ASSESSING HARVEST RULES****2011/203**

The focus of this study was on the potential to improve financial viability of the supply chains for Western Rock Lobster and the West Coast Demersal Scalefish Fishery. In the study, supply-chain models for Western Rock Lobster and the West Coast Demersal Scalefish Fishery were developed and calibrated to investigate the impact of harvest rules and management regulations on economic returns to agents at all stages in the supply chain.

**MORE INFORMATION:** Paul McLeod, University of Western Australia, 08 6488 2498

**INDUSTRY ECO-CERTIFICATION****2011/222**

The project facilitated ongoing discussion on eco-certification for the Australian seafood industry. The project demonstrated that clear benefits can be gained from eco-certification and that there are numerous certification programs available to industry. The project has resulted in ongoing support by the Commonwealth Fisheries Association (CFA) for the development of a whole-of-government eco-certification policy (including funding) for Australian fisheries. This position has been incorporated into a CFA policy paper as part of the CFA 2013 federal election policy platform.

The National Seafood Industry Alliance is still developing its position on the proposal for a government policy on eco-certification; however, at least two members (WAFIC and CFA) support the approach. A key recommendation is that any 'Australian Standard' (compliant with the standards of the Food and Agriculture Organization) that may be developed in the future should be available to commercial fishers on a voluntary basis under an eco-certification policy.

**MORE INFORMATION:** Annie Jarrett, Northern Prawn Fishing Industry Pty Ltd, 0411 426 469

**STRATEGIC PARTNERS: CSIRO AND THE FRDC****2011/244**

In recent years, the FRDC and CSIRO have had informal discussions about developing a more strategic engagement. They have agreed that a leadership role between the two agencies to deal with issues of strategic importance would be of great benefit to Australian fisheries.

Two key issues that have been raised, implicitly and explicitly, as priorities by stakeholders and are identified in the 2010 Primary Industries Standing Committee RD&E strategy for fishing and aquaculture and the FRDC's current strategic plan, are:

- social licence to operate implications for industry and management; and
- implications of changing governance and regulatory frameworks on the economic, social and ecological performance of fisheries.

A small team from the FRDC, CSIRO and the Commonwealth Fisheries Association was formed to undertake a scoping study and develop research strategies and a strategic research plan to address both issues. Considerable consultation was undertaken in the development of the strategic research plan covering the two key areas of social licence and governance. It is recommended that the research plan developed for the two strategic issues is used to guide future research investment in these important areas.

**MORE INFORMATION:** Cathy Dichmont, CSIRO, [cathy.dichmont@csiro.au](mailto:cathy.dichmont@csiro.au)

**BUILDING KNOWLEDGE ON CLIMATE CHANGE****2011/503**

This was a national project to increase knowledge and understanding of climate change and adaptation in the fishing industry and coastal communities. The project focused on three case-study areas in the tropics, south-west and south-east of Australia. Researchers identified a range of barriers for climate change knowledge uptake including economics, fisheries management, time pressure, social licence to operate, and habitat and related stock loss. These barriers create a significant challenge for climate change knowledge extension and uptake, where climate change issues take a low priority because the threat is not perceived as an immediate one.

Climate change information is not seen as a priority issue in many communities, so the team used traditional and innovative communication techniques to successfully deliver this information. In fishing communities where participants were reluctant to articulate their views, an approach using shared experiences and shared knowledge was effective. Importantly, the use of information that was considered salient, credible and was respectfully delivered by trusted sources appeared to increase engagement and knowledge uptake.

**MORE INFORMATION:** Jenny Shaw, Western Australian Marine Science Institution, 08 6488 4391

**REVITALISING AUSTRALIA'S ESTUARIES****2012/036**

This project puts forward the proposal that stakeholders and government should concentrate on repair of the more developed coastal catchments around Australia where major investment and Australian Government leadership is required to re-establish estuary productivity.

The business case sets out the rationale and the priority opportunities for investment to repair and restore, under a 'no regrets' policy, estuary and inshore wetland and floodplain areas. It seeks to maximise community benefits from these important parts of our landscape while minimising costs and effects upon adjacent land users of the coastal zone. It builds upon the Australian love of coastal landscapes and the resources they provide and the Australian community's and political commitment to implement major natural resources initiatives such as the Natural Heritage Trust, Caring for our Country and the Biodiversity Fund.

Like Reef Rescue and the National Action Plan for Salinity and Water Quality, the business case proposes a major focus, in this case on estuaries and their wetland ecosystems. Most importantly, through ongoing fisheries productivity, the proposed once-off five-year Australian Government investment will return economic benefits year-in and year-out that will far outweigh the \$350 million costs of repairing these key estuary assets. Our estimates suggest a break-even for investment is well under five years and from then on benefits will exceed costs into the future.

**MORE INFORMATION:** Colin Creighton, 0418 255 894

**EEL INDUSTRY DEVELOPMENT****2012/208**

Tasmanian commercial eel companies, Inland Fisheries Service and the University of Tasmania, along with other key stakeholders, have produced an industry development and management plan to guide the future of the eel fishery in the state. The plan was developed through a series of workshops, meetings and feedback sessions with eel fishers and associated stakeholders. As a 'living' document, the plan is expected to evolve over time to cater for the changing needs of industry and government. The plan is available at the FRDC website ([www.frdc.com.au](http://www.frdc.com.au)).

**MORE INFORMATION:** John Purser, University of Tasmania, 03 6324 3820

**LEADERSHIP PROGRAM: 2012-14****2012/401**

Forty-three graduates from across the industry value chain successfully completed the National Seafood Industry Leadership Program (NSILP) in 2012-14. The participants were reflective of the whole industry and were willing to take on new ideas and be challenged. The graduates are well placed to ensure positive change occurs for industry and are all poised to take on new opportunities. Having made the investment in the development of this group, the industry has a responsibility to integrate them into existing and future decision-making and leadership opportunities within and beyond the industry.

This has been the experience of past NSILP graduates, many of whom have been encouraged to become involved in organisations at sectoral, local and national levels. Program evaluation found that the participants and stakeholders consulted identified

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that the NSILP 2012–14 achieved significant outcomes for participants, their businesses and the industry. They spoke very highly of the program, were extremely supportive of it and believed that it was a key strategic program for the industry's future development and leadership succession planning.

**MORE INFORMATION:** Jill Briggs, Rural Training Initiatives, 0409 455 710

## NEPTUNE PROJECT

2013/004

Aquatic animal health experts from Queensland Museum (QM) have been completing work on a parasite and disease database called Neptune. Work on Neptune has taken place at QM in Brisbane since May 2013, resulting in the completion of major improvements to the database.

These will allow Neptune to become Australia's most comprehensive online resource on aquatic animal health. Improvements were carried out in conjunction with IT staff from three different organisations: the Australian Biosecurity Intelligence Network (ABIN), which was based in Canberra until September 2013; Edith Cowan University (ECU), which is based in Perth; and Pixcelldata, which is based in Ireland and runs digital pathology software. The database was hosted by ABIN until September 2013, when ownership passed to ECU. This project was funded by the FRDC and the Australian Department of Agriculture, with contributions from QM.

**MORE INFORMATION:** Marissa McNamara, Queensland Department of Agriculture and Fisheries, 07 3842 9173

## Movers and ...

**JACK ARCHER** is the new CEO of the Regional Australia Institute, taking over from **SU McCLUSKEY**, who stepped down in June.

**BENN GRAMOLA**, manager of business services at Primary Industries and Regions South Australia, has been replaced by **CHIARA CIUI**.

**NIGEL PRESTON** has been appointed as the new director-general of WorldFish. He will start his new role in November 2015, when the current director-general, **STEVE HALL**, finishes his role after 11 years in the position.

**DEREK CROPP** has joined the Geraldton Fishermen's Co-operative team as research and development manager and will be based at the co-operative's live lobster export facility in Perth, when it becomes operational. He has 30 years' experience in the fishing and aquaculture industries, including working on rock lobster culture, holding and transfer systems, most recently in Borneo, Malaysia.

**FEEDBACK**  
FRDC WELCOMES YOUR COMMENTS  
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**MOVERS WE'VE MISSED?**  
INFO PLEASE TO

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## Calendar of events

DATE	EVENT	MORE INFORMATION
<b>2015</b>		
8 to 10 September	Seafood Expo Asia, Hong Kong	<a href="http://www.seafoodexpo.com/asia">www.seafoodexpo.com/asia</a>
8 to 9 October	International Fisheries Stakeholders Forum / 20th Anniversary of the Code Of Conduct (FAO), Vigo, Spain	<a href="http://www.conxemar.com/v_portal/apartados/apartado.asp">www.conxemar.com/v_portal/apartados/apartado.asp</a>
11 to 14 October	5th International Symposium on Stock Enhancement and Sea Ranching and 2015 Australian Society for Fish Biology Conference, Aerial Function Centre, University of Technology, Sydney	<a href="http://www.asfb.org.au/events">www.asfb.org.au/events</a>
21 to 23 October	6th International Oyster Symposium, Cape Cod, Massachusetts, USA	<a href="http://www.oystersymposium.org">www.oystersymposium.org</a>
23 to 24 October	2015 Shellfish Futures	<a href="http://oysterstasmania.org/events">http://oysterstasmania.org/events</a>
24 to 25 October	Women's Industry Network Seafood Community AGM and conference, Perth	<a href="http://www.winsc.org.au/event/winsc-agm-2015">www.winsc.org.au/event/winsc-agm-2015</a>
25 to 27 October	Seafood Directions, Crown Casino, Perth	<a href="http://www.seafooddirections.net.au">www.seafooddirections.net.au</a>
17 to 18 November	FRDC Board Meeting, Canberra	02 6285 0400
<b>2016</b>		
10 to 12 February	Species on the Move, Hobart	<a href="http://www.speciesonthemove.com">www.speciesonthemove.com</a>
23 to 27 May	7th World Fisheries Congress, Busan, Korea	<a href="http://www.wfc2016.or.kr/english/02_program/02_program.asp">www.wfc2016.or.kr/english/02_program/02_program.asp</a>
11 to 15 July	International Institute of Fisheries Economics & Trade conference, Aberdeen, Scotland	<a href="http://www.seafish.org">www.seafish.org</a>
4 to 6 August	ASEAN Fisheries and Aquaculture Conference and Exposition 2016, Bangkok International Trade & Exhibition Centre, Bangkok, Thailand	<a href="http://www.aseanfishexpo2016.com">www.aseanfishexpo2016.com</a>



# FRDC

FISHERIES RESEARCH &  
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Discover  
the latest information  
on fish species



## Catch of the day

### King Prawns

King Prawns are the most popular species of prawn in Australia, due no doubt to their rich flavour and moist flesh. They are extremely versatile and excellent for display purposes. Suggested coatings include batters (regular or tempura) with a touch of saffron.



## Recipe of the day

### Lime and Lemongrass BBQ Skewered Prawns

The combined flavours of lemongrass, chillies, ginger, sugar and fish sauce will certainly entice you and your guests to more than one of these skewers at your next lunch or dinner event.



## Knowing

Trouble deciding on which fish? Look here for some help



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What you need to know about handling and storing seafood



## Handling

What you need to know about handling and storing seafood



## Cooking

Everything you need to know about seafood

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