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VOLUME 23 NUMBER 4
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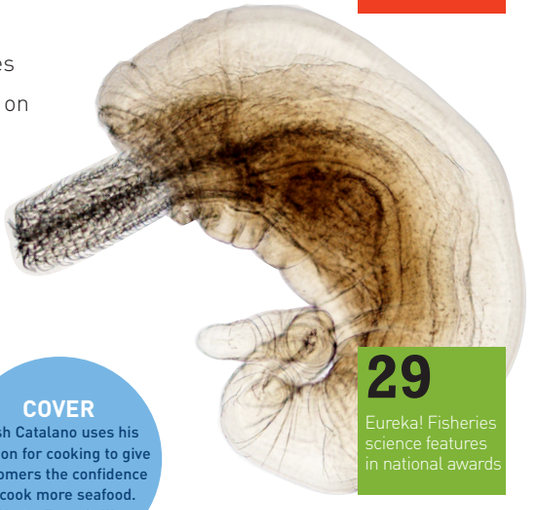

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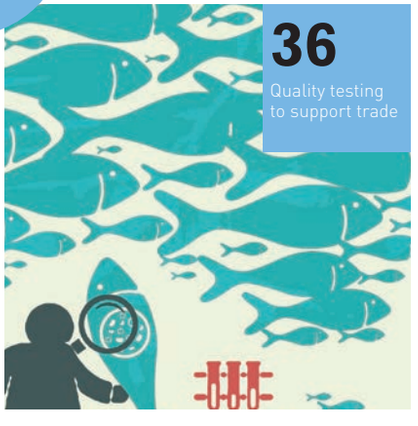

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PHOTOS: CARL DAVIES

To market, to market

RETAIL MARKETS

Direct contact with customers adds to fishers' job satisfaction, and brings new opportunities to educate the public

By Ilaria Catizone

Dealing directly with the public is one of the main reasons that Hayley Abbott loves attending farmers' markets in Moruya, New South Wales, and Canberra to sell the catch from her family's fishing business, Narooma Seafood Direct.

It is a business that dates back to 1949, when Desmond Creighton first started fishing on the NSW south coast. He is now nearly 90 years old and still involved in the business, but it is his daughter and son-in-law, Vicki and John Abbott, and their children, Hayley, Todd and Ryan, who run the business today.

Depending on the weather, they fish several times a week and sell their catch to wholesalers in Sydney and Melbourne, as well as exporting to Japan and the US via agents. They also attend three farmers' markets every week, which Hayley Abbott says are an important part of the marketing mix and help to keep their boats in the water.

They own two boats, a pelagic longliner and a smaller fishing boat they use when fishing with hand lines. "Dad and the boys run the boats while Mum and I take care of cutting and selling the fish," she says. "We work seven days a week and long hours, but the returns are much better than selling all our catch to wholesalers."

Despite the family tradition, Hayley Abbott had not planned on a fishing future; she travelled to the US to study sports management and business administration. However, not long after returning home she found herself with a filleting knife in her hand and then helping to run the farmers' market stalls with her mum. She has been doing it for two years now and loves it.

The Abbotts aim to bring in catch by Monday lunchtime so they can prepare the fish for the Moruya market on Tuesday. For the two Canberra markets on Saturday and Sunday the boats return by Thursday lunchtime.

The weekend markets involve packing six pallets of fresh fish into a refrigerated truck and an overnight stay in Canberra. What they do not sell is frozen, smoked or made into fish cakes to be sold at the next market.

Hayley Abbott says the relationship with the customers is a source of real satisfaction and it helps to keep her motivated. "It's very rewarding when customers say things like 'My family never ate fish, but they now eat your fish'."

It is not all compliments and smiles though. The Abbotts' catch includes Southern Bluefin Tuna (SBT). While SBT populations are now recovering, many members of the public know it as an overfished species. The Abbotts explain to customers how the stock is now being sustainably managed and catches are within the limits set by the fishery managers to allow the SBT population to recover from past depletion.

Hayley Abbott says longlines also have a bad reputation with the public but, once again, she takes the chance to explain the advantages of this catching method. "Most people are very interested to hear the facts and learn more about fishing practices and regulations. It's a good opportunity to educate the public," she says.

Personal interaction with customers has also provided a boost for another NSW fisher,

known simply as Aaron, who tested a fortnightly farmers' market at New Brighton, NSW, for several months. Hayley Egan, a research officer from Southern Cross University, assisted Aaron at the markets as a friend. She says while well-known fish such as Snapper and Flathead made it easy to attract customers, it was not so easy when the week's catch included mostly lesser-known species such as Leatherjacket.

But she says the interaction with the public was particularly rewarding for Aaron, who received praise for his product and plenty of questions about how to prepare it. "At first he didn't know how to take these compliments," she says. "But as he got more comfortable he admitted that talking directly to customers really improved his pride in his work."

As part of their marketing they developed information stickers used in the fish packaging that included contact details for the fisher along with information about the origin of the fish. The stickers proved a hit with customers.

Hayley Egan says although the variability of supply for the high-demand fish ultimately meant the markets were not viable for Aaron, the effort did win him a host of regular customers who are just as happy to buy fish fresh off his boat at Brunswick Heads as they were to buy at the market.

Vicki and Hayley Abbott selling their catch at Canberra farmers' markets.

Diversified approach

As a long-time market stallholder, Tracy Hill, co-owner of Coorong Wild Seafood in South Australia, has refined her sales strategy and is maintaining strong links with customers while diversifying into education and tourism.

For 15 years, Tracy Hill and her family sold their catch at various farmers' markets in their region, but found that travelling time and the expectation of cheap products really cut into their earnings. The logistics of selling a product that needed refrigeration complicated matters further and added to the cost.

"Over the past couple of years we've had more and more people contacting us about selling direct at our door," she says. "But this was not time-effective either, unless we got big orders. When people do come here they want to chat, which can be hard if you are trying to get all your fish processed for the day. We needed to cover the cost of our time."

To do that they started offering tours of their facility featuring filleting demonstrations and tastings. They also offer seafood lunches for groups, which allows them to charge more.

Currently they average about one group visit each month, mainly through word-of-mouth promotion. But they are considering an expansion of their premises to include a room for presentations, a commercial kitchen for cooking classes and refrigerated displays to sell their own and other local products.

"Our 'cellar door' will be a sustainable seafood centre, also partnering with other producers to include other varieties of seafood and different products such as olive oil, sauces and seasonings. We will be promoting the region as well as our business," Tracy Hill says. She has approached the local council's tourism officer, as well as Regional Development Australia, seeking a grant to turn this vision into a reality.

Retailing with assurance

In larger urban centres such as Melbourne and Sydney, buying direct from a local fisher and understanding their fishing techniques and the sustainability of their catch can be a greater challenge. In Sydney, Jules Crocker of Joto Fresh Fish in Banksmeadow is helping to bridge this gap for his customers.

He has been selling fish to restaurants for 17 years and now runs his own Saturday fish market where he retails fish from all over Australia and New Zealand, with an eye to top quality and sustainability.

Although not a direct seller, Jules Crocker offers a unique service to his customers, who can be sure all his product has sustainability credentials, is high quality and affordably priced. Many of the fishers he buys from also sell to major supermarket chains, but it is the way he handles and markets the fish at Joto that makes the difference.

Jules Crocker makes sure he only sells product that has been independently assessed to be sustainable, for example by the Marine Stewardship Council. If a particular species does not hold an accreditation, it is checked against the FRDC's *Status of Key Australian Fish Stocks* to ensure it is rated green on that scale.

"We don't have a wide range of fish every day, we only sell what's in season and fresh at that time." he says. "For most of our customers the superior quality of our product is the main drawcard, with its sustainability being a nice bonus." F

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In-store chefs help customers **master seafood**

RETAIL MARKETING

Tips from the kitchen can provide the missing link to bring more customers to seafood more often

PHOTO: EVAN COLLIS

Josh Catalano (left) with Stuart Fergusson, executive chef at Catalano's Seafood.

By Catherine Norwood

Western Australia's Josh Catalano believes the key to increasing seafood consumption is giving people more confidence in selecting, handling and preparing their fish. And this philosophy underpins the newest retail store opened by his family's business.

Catalano's Seafood at the Westfield Whitford City shopping centre in Perth's northern suburbs is the first of the company's seven retail stores to include a kitchen.

The store staff includes two qualified chefs (Mark Yates and Stuart Fergusson) along with Josh Catalano himself who was a contestant on the first season of the reality television cooking show *MasterChef Australia*.

In the store the chefs prepare gourmet deli offerings such as marinated octopus and smoked seafood ready to eat, plus heat-and-eat products. They also provide live demonstrations of different preparation techniques for customers, answer questions and offer advice.

The store has been unashamedly decorated with a family theme, featuring family photos including a giant portrait of Catalano's Seafood patriarch and founder Francesco Catalano, who began the fishmongering business in 1969.

For Josh Catalano, the Whitford store has been a labour of love and a tribute to his grandfather, combining his passion for seafood, cooking and family. He says it took two years to persuade his family to support an in-store kitchen. "But within the first week of opening we could tell that it was a great decision."

It was Josh Catalano's uncle Paul Catalano who initiated retailing a decade ago with a store in Perth's Westfield Garden City shopping centre in 2005, building on the family's wholesaling and processing business. But Catalano's Seafood retail stores have never been a typical wet seafood store.

There are few of the typical cues associated with a fishmonger – no fishy odour, no melting ice or exposed whole and filleted fish. From the beginning there has been a focus on chilled and frozen portions, hygienically pre-packaged to maximise quality and convenience.

Josh Catalano admits the pre-packaged approach, while good for the product, has been difficult to sell to consumers. There is a perception that the fish is not fresh, he says.

"But the packaging actually slows the growth of bacteria, and is better for maintaining the quality of the product than exposing it to the open air in display cabinets or on ice. Our product stays fresher longer."

Since the Whitford store opened in May 2015, he says they have become much better at selling their story.

"We have seafood masterclasses fortnightly, which I host with our head chef, Stuart Fergusson, where we can give people an understanding of why we do things differently, why we package our seafood the way we do.

"For example, we only sell frozen prawns. A typical wet fish shop that defrosts prawns and puts them on display would sell so many more prawns than we do, but we are trying to sell the product in its purest form.

"In the masterclasses we are able to explain that and provide customers with different options for handling the prawns, and other fish, to get the best result."

Confident cooks

Josh Catalano says many people struggle with the hands-on aspect of cooking seafood. Being able to watch someone prepare it gives them the confidence to do it themselves.

He says whatever fish they use in the masterclasses, the sales of those fish continue to grow, whether it is a low-cost species such as Australian Sardines or a delicacy such as Glacier 51 Toothfish, which retails for $80 per kilogram or more.

"It's very hard to persuade people to buy a product – particularly an expensive product – if they are not confident about what they are going to do with it," he says. "But because of the education we are providing, we are getting more repeat customers and they are coming back sooner because they feel more confident, safer in their cooking."

Another initiative at the Whitford store has been the reintroduction of the 'fresh' counter at the front of the store, in addition


PHOTO: FRDC

Catalano's first retail store in 2005.

to pre-packaged products in refrigerators and freezers that line the shop's walls.

It is a concession to public perceptions about the fittings at a fishmonger. However, the counter is filled mostly with value-added products: fresh arancini, prawn rolls, marinated octopus and pickled Australian Sardines.

They have all been prepared, fresh, by chefs at the in-store kitchen. "And if customers want to go home and make these dishes for themselves, we also cater for that," Josh Catalano says.

That increased confidence in the kitchen also allows people to be a bit more daring and willing to try some lesser-known species. "That's a great aspect for our business, because we are really the only ones processing a lot of these species such as Threadfin Bream or Grass Emperor – smaller fish that haven't really been processed in the past. But we have confidence, from our customers, to give them a go."

Frozen options

Josh Catalano says selling fresh fish is a tough business; the day you do not have fresh product is the day the customer wants it. That is when you need to have confidence in your frozen range to offer both quality and continuity of supply.

Across the Catalano's retail stores sales of fresh and frozen product are 50:50, except in the Whitford store. There, fresh fish sales have increased and make up 60 per cent of the total, a combination of the chilled pre-packaged product and value-added product from the 'fresh' counter at the front of the store. The aim now is to increase frozen fish sales to maintain the 50:50 balance.

"When it's in fresh you buy it fresh and when it's not, the frozen range is just as good."

As processors of a wide variety of fish, the Catalanos take pride in preparing fish to maintain its best possible condition, often working with fishers such as Cape Le Grande Australian Sardines to develop customised processing techniques.

"The process we have to fillet and freeze Australian Sardines, for instance, gives us such a superior product. We freeze them straight off the filleting machine and when you defrost them they often curl up; they are still in rigor mortis – and that's a frozen product," he says.

In March Catalano's Seafood also introduced a new range of 'skin pack' frozen products, in 200 and 250-gram serves, which can be sold frozen or thawed and provided with a date-stamped shelf life. This is a widely used strategy for smoked Atlantic Salmon products.

The portioned serves are allowing the company to expand from Western Australia to national markets by targeting smaller, independent grocers and helping them to offer a quality product while managing their stocks and reducing wastage. F

SEAFOOD VENDING MACHINES

The latest innovation for Catalano's is the introduction of seafood vending machines. The first of these will be trialled in a major shopping centre in the Perth suburb of Cannington, where Catalano's Seafood does not currently have a retail store. It is the same suburb where Francesco Catalano opened his first store in 1969.

The machine has been designed to dispense Catalano's skin pack range, which includes natural or marinated Atlantic Salmon fillets, natural or marinated prawn meat, and whitefish fillets with garlic butter.

The whitefish could be one of several species, including Grass Emperor, Saddletail Snapper or Crimson Snapper, depending on supplies.

There is also marinara mix of Green Mussels, squid, Atlantic Salmon and prawns. All portions, either 200 or 250 grams, retail for $9.99 each.

Josh Catalano says the vending machine provides ideal conditions for the product: "It has a perfect temperature-controlled environment, because it never really opens or closes, except for restocking."

He says if the vending machine gains any traction in the shopping centre, they will look at a range of other venues. These include gyms and high-rise residential buildings, targeting health-conscious, time-poor consumers.

BAKED FISH

Ingredients

- 1 leek, sliced
- ½ fennel bulb, sliced
- 40g butter
- 4 x 180g Red Emperor or any fresh Western Australian fish (skinless, boneless portion)
- 8 cherry tomatoes
- 8 clams
- 1 glass of white wine
- olive oil
- salt and pepper
- chives (and sliced chilli to taste) for garnish
- lemon to serve

Method

- Divide the sliced fennel, leek and butter between four small baking dishes (with lids).
- Place the portion of fish on top of the leek and fennel mix in the centre of the baking dish, then divide the tomatoes and clams and place around each fish portion.
- Splash over the white wine and season with olive oil, salt and pepper.
- Place the lid on the baking dishes (or cover with aluminium foil).
- Place baking dishes in a pre-heated oven (180°C) and cook for 30 minutes.
- Garnish with chives (and sliced chilli to taste) and serve with a slice of fresh lemon.

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Student innovation addresses seal relations

INNOVATION AND TECHNOLOGY

Marine science students rise to the challenge of finding new ways to prevent interactions between seals and commercial fishers

By Catherine Norwood

It was a light-bulb moment for Tommy Cheo as he debated the best way to power his proposed seal deterrent, the Nagging Siren: why not let the waves do the work?

It is a concept that has won the favour of judges for this year's Seal Thing competition at the Institute for Marine and Antarctic Studies (IMAS), a contest for innovative thinking to reduce the interactions between fishing vessels and seals.

Already familiar with the use of sound to deter marine mammals from the trawler nets, Tommy Cheo says he was inspired by hand-cranked fire sirens when it came to finding a power source for his winning Nagging Siren design.

"Electricity and water are not a good combination, and then I realised I could make the waves crank the siren," he says.

The Australian Fisheries Management Authority and the South East Trawl Fishing Industry Association (SETFIA) sponsor the competition as part of the Responsible Fishing unit of study offered through the Australian Maritime College at the IMAS campus in Launceston, Tasmania.

So far only a concept, the Nagging Siren is a mechanical device that would be towed behind a boat or attached to fishing gear. When dragged through the water it would emit an irritating noise to deter seals from entering the area of the fishing operations.

Competition judges, which included commercial fishers from SETFIA, said Tommy Cheo's entry was a simple, easily constructed device that, if developed, would likely see high acceptance among industry due to the 'set-and-forget' nature of the design.

Senator Richard Colbeck visited IMAS to announce the winners in August as Parliamentary Secretary to the Minister for Agriculture at the time. "It is great to see such innovation and enthusiasm from students to design 'real' solutions for challenges faced by Australia's trawl fisheries," he said.

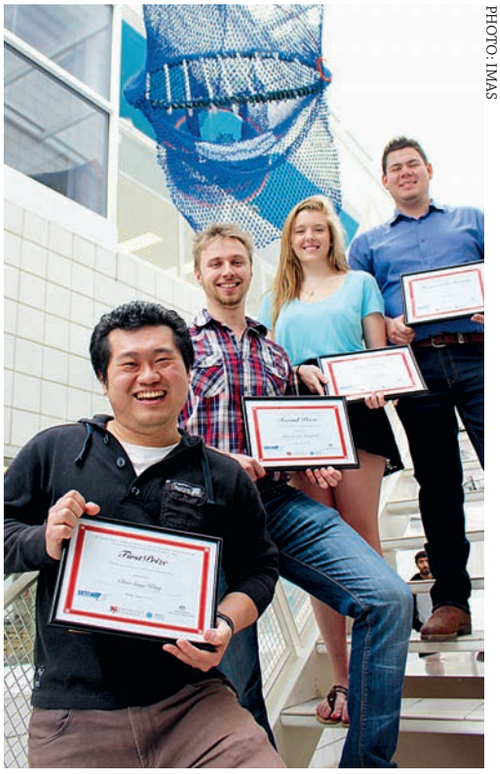

PHOTO: IMAS

Winners in the seal-deterrent design competition, (from left) Tommy Cheo, Ben uit den Bogaard, Tana McCarthy and Jack Hauser.

"Innovation is important as we continue to work together with industry and other fishery stakeholders to ensure Australia's fisheries management practices remain among the very best in the world."

SETFIA's CEO Simon Boag says operators in the South East Trawl Fishery have worked with scientists over many years and that the competition helped to support the next generation of researchers.

Similar innovations had already reduced seabird interactions in the south-east fishery by 75 per cent, almost eliminated seal interactions in the freezer vessel grenadier fishery and also reduced bycatch. The Seal Thing competition was a gateway to further innovation in commercial fisheries, he said.

SealYaLater

Second place in the competition went to Ben uit den Bogaard for his entry SealYaLater – a grid of flexible electrodes that carry a small direct current (DC) across the mouth of the net. The source of the current would be provided by specially designed battery units fitted to the head rope of the trawl. The mild fields of DC would cause an uncomfortable sensation and deter the seals from entering the net.

Judges said this was a novel idea worth investigating and could be further developed and potentially commercialised. The idea of using electric barrier nets had been shown to work in other applications.

The Illuminator

Tana McCarthy was awarded third place for the Illuminator, a system of lights and reflectors designed to aid seals to orientate themselves in the net and increase their ability to escape. Seals voluntarily swim into nets as it is easier for them to catch fish in there, but then may struggle to exit. Illuminated and flashing panels of the net would increase the probability of seals finding their way out of the mouth of the net and also through an escape hatch (the escape hatch is already a proven methodology).

Judges said this system of lights and reflectors to help seals escape the net was novel and could be put into practice, warranting further investigation. If successful, it was likely to have high uptake within industry.

Seal Mask

An honourable mention was also awarded to Jack Hauser for his entry Seal Mask, a system of canisters containing chemical irritants and dyes that would be released around the boat and the net. Once released, this cloud of substances is designed to mask the fishing operation, confusing seal senses and deterring them from entering the mouth of the net. The ingredients used in Seal Mask would be natural products not harmful to seals.

Judges said this was a thoroughly researched entry of a very high standard and was an innovative idea. However, they agreed that the masking effect was likely to work only in a small area immediately around the release point of the irritant, which seals could circumvent. They also suggested it was also possible that seals may become accustomed to the deterrent. F

Fisheries and aquaculture-focused Nuffield scholars

Three fisheries and aquaculture-related Nuffield Scholarships were announced at Nuffield Australia's annual conference in September, with two scholarships sponsored by the FRDC and one by Woolworths. The scholarships allow those involved in primary production to travel internationally for up to 12 weeks to investigate issues of personal and fisheries and aquaculture sector importance.

Dennis Holder, from Port Adelaide, South Australia, plans to research new marine technologies in electric propulsion and drive systems, energy storage and power generation for hybrid operations for commercial fishing vessels. He plans to travel to Canada, Japan, Norway, the Netherlands, Singapore and the US to look at the latest and most successful innovations being used in commercial fishing vessels. He will assess potential applications in Australia and undertake cost–benefit analyses for local fishers.

Steven Davies is senior manager of Marine Produce Australia and is responsible for the company's Kimberley-based fish-farming operation, Cone Bay Ocean Barramundi. Based in Perth, he will investigate ways to improve efforts to develop socially responsible and economically sustainable wild-catch seafood and aquaculture industries in Australia. He hopes to visit Chile, China, Iceland, Kiribati, Norway and the US to identify potential new practices and insights that can be applied to the Australian wild-catch seafood and aquaculture industries.

Dan Richards, from Darwin, will study international seafood and aquaculture production technologies and market trends. As general manager of the Northern Territory-based Humpty Doo Barramundi aquaculture operation, he believes there are big opportunities to develop premium-quality, sustainably produced white fish to complement pink fish markets in Australia and overseas. He plans to visit Belgium, Denmark, Japan, Norway, Saudi Arabia and the US.

More information: Nuffield Australia, www.nuffield.com.au

PHOTOS: NUFFIELD AUSTRALIA

MORE PRAWN FISHERIES MSC CERTIFIED

Western Australia's Exmouth Gulf and Shark Bay prawn fisheries received Marine Stewardship Council (MSC) certification in October, joining an elite group of fisheries recognised worldwide for their commitment to environmental sustainability.

These fisheries provide a combined total of $30 million worth of King Prawns and Tiger Prawns to state, national and international markets each year.

Western Australian Fishing Industry Council (WAFIC) chief executive John Harrison said the two prawn fisheries were the first WA fisheries to obtain full MSC certification under the $14.5 million MSC initiative developed by the WA Government in partnership with WAFIC.

There are seven operators in the Shark Bay Prawn Fishery, selling under the Shark Bay Wild brand. Boats from the MG Kailis Group operate in the Exmouth Gulf Prawn Fishery, marketing their catch under the Exmouth Wild brand.

More information: www.wamsc.com.au

Workshop discusses national disease response

The fisheries sector is soon to join the livestock and plant industries with a formal agreement for disease prevention, containment and emergency response funding being developed.

A stakeholder workshop in March 2016 will discuss the potential inclusions in industry–government emergency response arrangements for Australia's aquatic animal industries – both wild capture and aquaculture.

The workshop follows more than a year of consultation and a six-month consultancy to analyse possible public–private cost-share arrangements to pay for the emergency responses in the event of a disease outbreak. This could include compensation for stock losses, which is already a provision in similar agreements for Australia's livestock and plant industries.

Working with Animal Health Australia, Jane Frances is managing the four-year emergency response project, funded by the Australian Department of Agriculture and Water Resources.

PHOTO: NSW DPI

Jane Frances

A workshop in 2012 supported by the FRDC was the precursor to the current project, which began in October 2014. The aim is to develop formal industry–government response arrangements for aquatic animal diseases so the roles and responsibilities of different government and industry organisations in the event of an outbreak are clearly outlined.

More information: Jane Frances, Animal Health Australia, jane.frances@dpi.nsw.gov.au

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SENATOR SETS FISHERIES AND AQUACULTURE STAGE

GOVERNMENT POLICY

The new minister in charge of fisheries and aquaculture outlined her priorities at the seafood industry's national conference

Following the recent federal government reshuffle, South Australian Senator Anne Ruston has taken over from long-term fisheries Parliamentary Secretary Richard Colbeck as minister responsible for fisheries and aquaculture at a national level.

Her first major fisheries-related event as Assistant Minister for Agriculture and Water Resources was the official opening of the national Seafood Directions conference in Perth in October.

While Senator Ruston does not have a direct background in the industry, she is no stranger to primary industries.

Speaking at the conference, Senator Ruston said that she was, at heart, a country girl, having been born and raised on a horticulture

PHOTO: GRANT NOWELL PHOTOGRAPHY

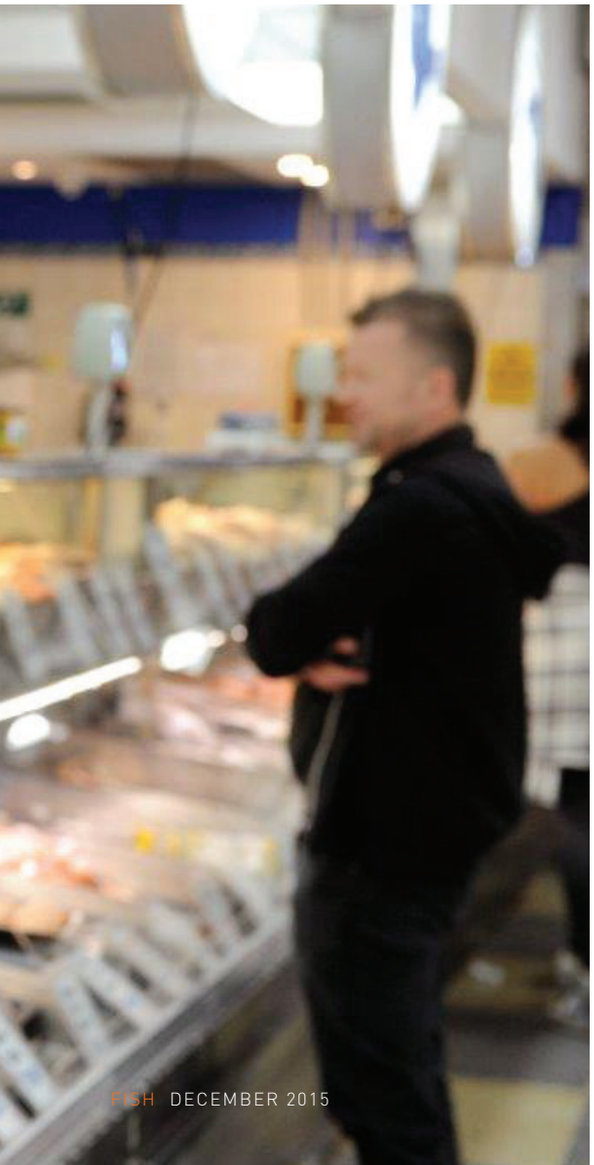
South Australian Senator Anne Ruston.

property. "I still own and operate a floriculture business – Ruston Roses – that has all the challenges, and hopefully the rewards, that face us all in the primary industry sector," she said.

Senator Ruston maintains her electorate office in her home town of Renmark, on the SA end of the Murray River, which allows her to stay in touch with the rural sector. While she does not have as much time these days she said she still likes to occasionally cast a line from a 'tinnie' on the river.

However, she noted that "compared to the previous minister, Senator Richard Colbeck, who had a lifelong knowledge of fisheries, I am a bit of a blank canvas. I have an untainted and open mind when it comes to taking Australia's amazing fishing and aquaculture forward."

Senator Ruston assured the industry that she would not be an interventionist minister and has no intention of imposing anything that was not required by regulation or legislation. She said she strongly believed governments should only do what the private sector could not, would not and should not do.



"Fundamentally, and in practical application, I believe that industry representatives are the best placed to make decisions about their own industry. I'd like to concentrate on creating the best possible environment in which you can operate – an environment relieved of unnecessary red tape, one that provides easy access to markets and resources, and one that recognises how fantastic our fisheries really are."

Tell your story

"Let me paint a picture of where I see the industry and how we as a government can assist in facilitating the outcomes you seek for your future. I believe we have a great story to tell all Australians.

"Even in the few short weeks since taking the role, the contribution that the seafood industry provides to the nation has become very evident. The fact that Australia's seafood sector is forecast to reach a value of $2.9 billion in 2015-16 is case in point.

"What's more, Australian seafood is a premium product that ranks among the world's best. But the work and dedication that underpins sustainable Australian fisheries is frankly far less appreciated outside the industry than it should be."

Senator Ruston said the establishment of a single peak body was an important step that would allow industry to effectively speak with one voice, highlighting the good work that had been done and responding to future demands.

To help develop a commercial peak body for the seafood industry, the government provided $500,000 in May 2015 to the National Seafood Industry Alliance.

She said that in terms of progressing good policy outcomes, any industry that could come to government speaking with one voice was likely to be far more successful in achieving its outcomes. "Coming to government with a heap of different opinions will mean you're unlikely to get any outcome, or worse the government may choose the ones which invariably no one really wants."

"Cutting red tape is at the heart of this government's mission to build a strong and prosperous economy and has been an ongoing focus for this portfolio over many years, and believe me this is very, very close to my heart," Senator Ruston said.

"Our aim is to provide the best possible settings to ensure sustainable use of fisheries resources, while supporting the fishing industry and reducing red tape. All of this work is designed to ensure that your industry is able to respond to market demand in the most agile, innovative and effective way possible.

A strong voice

"However, there are many other challenges that must be overcome in order to realise that success, and they are challenges that both government and industry must embrace.

"A strong policy foundation alone will not be enough. Neither is it enough to simply be good at what you do, to produce a premium product for global markets, and to do that efficiently, sustainably and responsibly.

"The harsh reality in today's media environment – which is far broader than news media alone – is that popular opinion and an understanding of the real values of the Australian seafood industry will be central to your future success.

"This is because the legitimacy of any industry is only as strong as the community sentiment that supports it. We all know that modern industries face the challenge of social licence, but you could certainly make the case for seafood to be a textbook example of this challenge," Senator Ruston said.

"Frankly, in light of the sheer volume of rigorous science that underpins Australian fisheries management, it's difficult not to be left somewhat speechless at times by some of the anti-fishing campaigns."

She said these kinds of campaigns were symptomatic of a much broader issue that challenged not only the science that underpinned the management of Australian fisheries, but the legitimacy of commercial fishing in the eyes of the public.

"It is a battle for the hearts and minds of Australian seafood consumers. To win this battle, the seafood industry must have a clear and united voice. In the absence of that voice, the loudest voice will prevail, regardless of the facts.

"In short," Senator Ruston said, "a strong and united industry voice is the defining challenge for the modern Australian seafood industry."

She said she would enthusiastically continue to support the industry through the next phase and was looking forward to working with the whole seafood and aquaculture sectors to create a vibrant future for Australian fisheries and aquaculture. F

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SEAFOOD MARKETING: it's about the whole picture

MARKET RESEARCH

Improving community perceptions and seafood prices is the aim of new research to make Australian fisheries and aquaculture more profitable

By Peter Horvat

Marketing to a consumer and selling at a premium price is very simple: if you have the right product, at the right price, available at the right location and you promote it to the right people. Unfortunately most fishers and companies in the seafood industry struggle to bring all of these elements together.

When it comes to improving business profitability there are two basic approaches: reduce the cost of production or harvesting; or increase the price paid for your product.

For more than 20 years the FRDC has invested in research to help fishers reduce costs or improve efficiency. This includes new processes or new materials and technologies, for example, new on-board freezers, improved animal health or more energy-efficient trawl gear.

When it comes to increasing prices, marketing is a key strategy. However, according to a recent industry survey, only 40 per cent of Australian fishers invest in marketing to increase prices.

It is not an easy task to increase demand and get consumers to pay more for your product.

The key is to change the value proposition for consumers. This means looking at the different elements of your product marketing strategy – place, product, price and promotion. These should all aim to position the product in a way that will deliver value to the consumer.

Knowing what a consumer wants may deliver some insight that could be easily translated into increased prices. For example, if quality is a key attribute for customers, then small improvements to handling on boat, when packing and when transporting could lead to better prices. The reality is that most people buy with their eyes, so if it looks good the odds are high you will get a better price.

Market research is essential to collect the data that can tell you whether your product provides what consumers want and where its potential is. This includes:

- consumer research – basic information that will help producers to understand what the customer wants and needs;
- market and trade data – how much product is being sold, where and for how much. This can give producers a starting point for their marketing; and
- supply data (production and sales volume) – know what is in the market and when. Too much of one product can reduce price.

There is a broad range of marketing activities that producers can use either individually or together. These include: consumer education, digital engagement (Facebook, Instagram and Twitter), trade shows and markets, public relations, advertising, and point-of-sale materials and promotions.

In discussing marketing, many people make television advertising a priority. While television is a powerful medium, it is expensive and should be used when costs can be justified because it meets a specific marketing need.

Marketing and advertising activities can take place at many different levels. There is a very specific company or product level ('Eat Joe's prawns'), which progressively broadens to sector ('Eat prawns') or regional campaigns ('Eat Eyre Peninsula seafood'), and to very broad generic campaigns ('Eat seafood').

The costs and benefits of campaigns can change for individual producers depending on the level at which the campaign operates. Multiple campaigns can run concurrently without necessarily damaging each other, and can in fact complement each other. Efforts to promote Banana Prawns (product), would benefit from the 'Love Australian Prawns' campaign (sector) and also from an 'Eat seafood' campaign (generic).

National concept launch

The Australian Department of Agriculture and Water Resources (DAWR) has recently undertaken market research to help the industry take its first steps towards a whole-of-category, industry-wide marketing initiative.

DAWR carried out the research under instruction from the Australian Government as part of work to develop an Australian fisheries communication strategy to increase the community's confidence and pride in the Australian seafood industry.

According to findings from 27 focus groups, 20 in-depth industry interviews and a large online survey (1722 respondents), fishers and fisheries are low on the radar for many Australians. The general Australian community knows little about the industry, what fishers do or who they are. Because of the low levels of recognition or understanding, the general Australian community can be more easily swayed by negative messages about fishers and fisheries.

It also means that fishers lack the same cultural connection that Australians have with land-based farmers.

The good news is that seafood consumers and the community do not hold negative views about the seafood industry and that it would not take too much to build a sense of pride and a cultural connection with the seafood industry to create a positive image.

Images tell the story

The market research led to the development of a creative marketing concept and communication strategy, and discussions with industry are continuing about how to make use of the concept and strategy.

Speaking at the national Seafood Directions conference in Perth in October

2015, Senator Anne Ruston, the minister responsible for fisheries, said the market research was initiated 18 months ago.

Senator Ruston said her predecessor Senator Richard Colbeck had run a consultative process involving industry roundtables, market research interviews and face-to-face meetings with a cross-section of industry members. This process highlighted the need for a tangible marketing concept and communication strategy that could be used by all industry sectors.

The objective of the marketing concept and strategy is to increase the community's confidence and pride in the Australian seafood industry. It presents a recognisable image for the industry that:

- recognises that Australian seafood is among the best in the world;
- recognises that Australia's seafood and fishing industries care about the health and sustainability of the oceans and their marine life;
- focuses on the people within the industry and their stories; and
- creates an appeal and desire for seafood.

The visual concept developed embraces people working within the industry and profiles industry members around Australia. It demonstrates how generations of families have proudly devoted their lives to creating a sustainable Australian fishing industry and are undoubtedly producing some of the highest-quality seafood in the world.

Visually, the campaign aims to be simple and fresh. It uses simple, clear photography and quotes from the featured fishers. The creative concept allows the people to speak for themselves. Each poster also includes a 'taste appeal' shot, further strengthening the message that high-quality Australian seafood is produced by those most passionate about it, for the enjoyment of all Australians.

A key to the strategy is showcasing real people who genuinely feel proud to deliver the seafood Australians see on their plates every day.

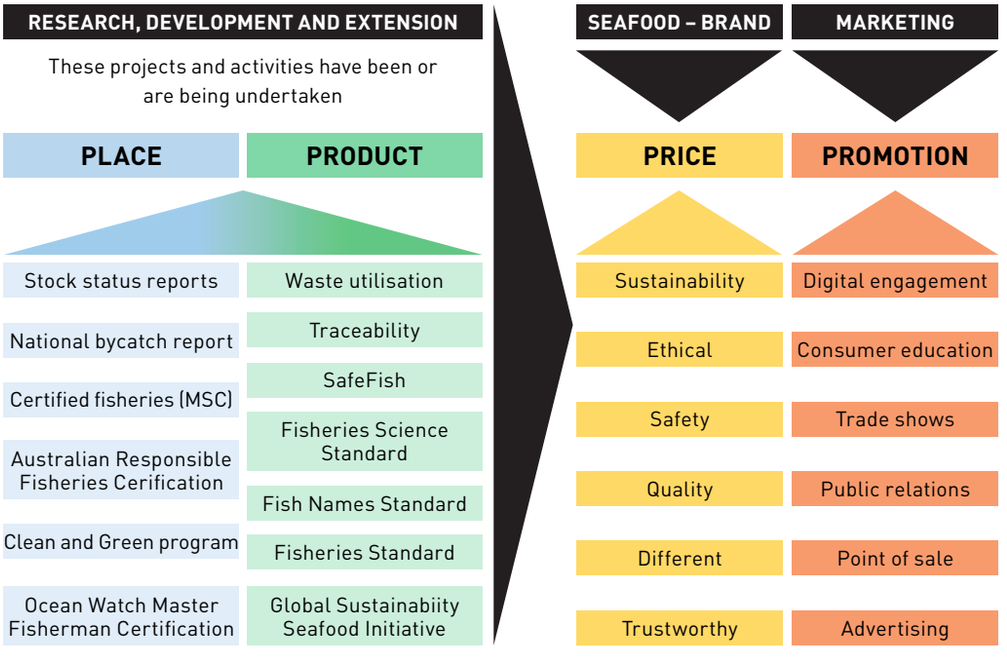
Does the message work?

The creative messages were devised from a solid understanding of what consumers want to know and what will influence them.

The initial research discovered that consumers want to know that the marine environment is in safe hands. They are also open to feeling pride about Australia's oceans, marine life and associated seafood products.

Market testing of the campaign concepts with consumers provided strong evidence that it would be effective to in creating positive community perceptions about fishers.

THE MARKETING FRAMEWORK – GETTING THE WHOLE PICTURE



CHARACTERISTICS OF MARKETING CAMPAIGNS OPERATING AT DIFFERENT LEVELS

COMPANY / BRAND / PRODUCT

Characterised by ...

- Very targeted – eat "my" prawns
- Direct cost to business
- Higher attribution of results (more than 95 per cent)
- Results easy to measure
- Greater control and ownership
- More individual risk

SECTOR / SPECIES LEVEL

Characterised by ...

- More generic – eat prawns, seafood from Eyre Peninsula
- Less direct cost
- Results spread across group
- Results harder to measure
- Governance and control shared
- Less risk
- Can achieve more than an individual

GENERIC / WHOLE OF CATEGORY

Characterised by ...

- All industry – eat seafood, or know industry
- Minimal individual cost
- Results spread across "all" industry
- Results very hard to measure
- Governance and control is shared and more difficult
- Broader targets
- Higher level message
- Greater coverage
- Can do more than an individual or sector

What happens now?

The development phase has been now completed by DAWR. Following the release of the concept by Senator Ruston at Seafood Directions, a group of industry representatives are examining how they might take the campaign forward.

The government still has a role – to implement the government stream of the communication strategy, which focuses on communicating clear messages about science, management and compliance.

The foundations have been laid for the concept to turn into a very powerful campaign and be effective in building an identity for the seafood industry that Australians will love. F

Lead, collaborate and partner

POLICY

The FRDC has officially launched its Research, Development and Extension Plan to guide fisheries and aquaculture research priorities to 2020

By Josh Fielding and Ilaria Catizone

During the next five years, the FRDC aims to increase the gross value of fishing and aquaculture from $2.41 billion in 2013-14 to about $3.2 billion. Its vision is to have vibrant fishing and aquaculture sectors that adopt world-class research and achieve sustainability.

The FRDC's direction for 2015–20 is detailed in its new Research, Development and Extension (RD&E) Plan, which signifies a major evolution in the way the FRDC operates.

The plan was launched on 16 September 2015 at Parliament House in Canberra by Senator Richard Colbeck, who was Parliamentary Secretary to the Minister for Agriculture at the time.

'Lead', 'collaborate' and 'partner' are the three key implementation mechanisms that the FRDC will use: leading in national areas of research; collaborating with sectors and jurisdictions to achieve the national priorities; and partnering with industry sectors and jurisdictions, allowing them to determine their own research priorities.

In launching the new RD&E Plan, Senator Richard Colbeck supported the FRDC's approach. "The Plan aims to drive change to benefit Australia's fishing and aquaculture sectors more broadly. It will ensure these sectors continue to have excellent performance in environmental sustainability as well as business productivity and profitability," he said.

He also acknowledged that Australia's fisheries were among the best managed in the world, largely as a result of a commitment to investing in good science and applying these outcomes to fisheries management.

The new Plan is a step change and sets out quantifiable, measurable targets to allow for evaluation of the Plan annually and at the end of the five years. These targets include increasing the sector's value over the five years of the Plan, while at the same time improving community satisfaction with the industry; community satisfaction is the FRDC's first national priority.

Aquaculture has seen substantial growth in Australia in recent years. This growth has increased the availability of seafood and raised the overall value of fishing and aquaculture, but it has only occurred in a few species.

Aquaculture in Australia is well placed for further growth and the FRDC will invest in RD&E for the development of new or emerging opportunities for this sector. The aim is for significant growth in new and emerging species, taking aquaculture production in Australia from about 80,000 tonnes in 2012-13 to more than 100,000 tonnes by 2020.

Another major component of the RD&E plan, and part of the evolution of the FRDC's operations, is the greater role that industry sectors and jurisdictions will play in planning and prioritising RD&E. "This plan recognises the significant capability in leadership for a large number of our sectors and leaders will be empowered to take the lead in prioritising research for their sectors," Senator Richard Colebeck said.

"The Plan also focuses on recreational fishers and Indigenous fishers, who derive benefit from fishing activities. Fishing and aquaculture are vital for many rural and regional communities and underpin jobs and livelihoods throughout Australia, it is important that these sectors are appropriately supported," Senator Richard Colbeck said.

The FRDC's executive director Patrick Hone and FRDC chair the Hon Harry Woods also spoke at the launch.

"Today is a very important day for the FRDC and for our partners across fishing and aquaculture, be they commercial wild catch, fish farmers, recreational fishers or Indigenous and Torres Strait Islanders," Patrick Hone said.

"Today we go from plan development to plan delivery. This Plan marks a quantum change in how the FRDC invests in RD&E," he said

The core principles that will drive the Plan's implementation are lead, collaborate and partner.

Nationally, the FRDC will work with LEAD bodies to deliver three national research priorities:

PHOTO: KYAW KYAW SOE HLAING

Executive director Patrick Hone (left) and FRDC chair the Hon Harry Woods (right) discuss the new FRDC RD&E Plan with the then Parliamentary Secretary to the Minister for Agriculture, Senator Richard Colbeck.

PHOTO: KYAW KYAW SOE HLAING

Leadership Program participants celebrate the launch of the new FRDC RD&E Plan with Patrick Hone (left) and Senator Richard Colbeck (right).

- ensuring that Australian fishing and aquaculture products are sustainable and acknowledged to be so;
- improving productivity and profitability of fishing and aquaculture; and
- developing new and emerging aquaculture growth opportunities.

The FRDC will establish and support regional and sector partners to COLLABORATE ensuring that a united approach is achieved wherever possible. Importantly, the FRDC is committed to continuing its support for people development, the Indigenous Reference Group, Recfish Research and key services including the Fish Names database and SafeFish.

At an operational level this will change the way the FRDC invests. The FRDC will continue to invest through its open process, working with state, territory and Industry Partnership Agreements to invest in priority areas. However, it will also invest in initiatives to deliver on the national priorities. For example, it will fund the stock status reports for the life of the plan.

PARTNERING will devolve more responsibility to jurisdictions and sectors, allowing them to take greater ownership of how to invest. Jointly with its partners, the FRDC will support subprograms, infrastructure and services.

"While plans are great and full of good intentions, you are only as good as the difference you make," Patrick Hone said. "The FRDC's commitment is to ensure our performance is measurable and all the benefits are realised."

The launch in Canberra was well attended, with more than 60 representatives from government and other stakeholder groups present.

Participants in the National Seafood Industry Leadership Program (NSILP), which is an important part of the FRDC's People Development Program, also attended the launch as the program's final residential session was also being held in Canberra at the time.

"Attending this event provides a unique opportunity for these young fishing and aquaculture leaders and one they would not have had before," said Jill Briggs, managing director of Rural Training Initiatives, which runs the NSILP program for the FRDC. F

THE FRDC'S 2020 PERFORMANCE TARGETS:

- fishing and aquaculture will continue to have improved performance in environmental sustainability;
- fishing and aquaculture will be more resilient to social, environmental and economic change;
- fishing and aquaculture businesses will be more productive and profitable;
- recreational fishers will have improved opportunities for better fishing experiences and will play a greater role in the stewardship of fisheries resources;
- more Indigenous people will derive benefit from fishing and aquaculture activities and will play a greater role in the stewardship of fisheries resources; and
- information about the science and management of the sustainability of fishing and aquaculture will be more accessible to the consumer and meet consumer's needs.

New directors to drive new direction for the FRDC

CORPORATE GOVERNANCE

From a strong field of contenders, new directors have been selected to oversee the future of the FRDC

By Catherine Norwood

The FRDC's new board of directors has been appointed and its role will be to oversee the implementation of the FRDC's new Research, Development and Extension (RD&E) Plan 2015–20.

Appointed by Minister for Agriculture and Water Resources Barnaby Joyce, the board includes a mix of familiar and fresh faces, combining fisheries, research, marketing, finance and agribusiness experience.

New directors appointed until 31 August 2018 are Colin Buxton, John Harrison, John Susman and Lesley MacLeod. Renata Brooks has been reappointed for her third term as a director and has now been appointed deputy chair. Former director Daryl McPhee will rejoin the board, which also includes the Hon. Harry Woods as FRDC chair and executive director Patrick Hone.

Harry Woods says the previous board initiated changes to the FRDC's operational structure and the funding processes of RD&E, which have been incorporated within the new RD&E Plan (see page 14).

"We are moving to a regionally distributed model for delivery of our functions, which will provide for both a regional and national approach to delivery," he says.

The vision behind these changes is "to have vibrant fishing and aquaculture sectors which adopt world-class research to achieve sustainability and prosperity".

The FRDC will also deliver against its new roles in marketing and extension.

Outgoing directors who played a crucial role in developing the new direction for the FRDC are Heather Brayford, Brett McCallum, Bruce Mapstone, Peter O'Brien and the late David Thomason.

THE HON. HARRY WOODS, CHAIR

Appointed chair 1 September 2010

Harry Woods comes from a diverse background having been an auditor, bookmaker and publican before serving many years as a politician in both the Commonwealth and NSW governments. He was the Member for Page from 1990 to 1996. Following this Harry Woods was elected as the Member for Clarence in the NSW Legislative Assembly. During his time in NSW Parliament he was Minister for Regional Development and Minister for Rural Affairs from 1997 to 1999, and Minister for Local Government, Minister for Regional Development and Minister for Rural Affairs from 1999 to his retirement in 2003.

Since then Harry Woods has spent time as a professional fisher, undertaken policy review work for the NSW Government, worked as an accredited mediator and has been involved in the development and building of commercial property. He has a deep understanding of not only the fishing industry, but the broader primary industries arena. As the Member for Page his responsibilities included a diverse range of issues – dairy cattle, pigs, maize, tropical fruit, sugar cane, fishing, prawning, oyster farming, butter and bacon factories, breweries, timber mills and tourism.

PHOTOS: FRDC

RENATA BROOKS, DEPUTY CHAIR

Appointed as a director 1 September 2009

Appointed deputy chair 4 November 2015

Management and policy consultant

Renata Brooks is an independent director and consultant. Previously she was deputy director general, Land and Natural Resources in NSW Department of Primary Industries (DPI), with responsibility for the NSW crown land estate, natural resource policy and programs, and coordination of primary industries policy. She has held senior executive positions within NSW DPI in the areas of science and research, agriculture, fisheries, biosecurity, compliance and mine safety. She holds a Bachelor of Veterinary Science from the University of Sydney with first-class honours, a Graduate Certificate in Bioethics from the University of Technology Sydney, and is a Fellow of the Australian Institute of Company Directors.

COLIN BUXTON

Appointed as a director 1 September 2015

Adjunct professor, University of Tasmania; co-chair Bioregional Advisory Panels, Australian Government Department of the Environment; board member Tasmanian Environment Protection Authority

Following appointments at the Port Elizabeth Museum (marine biologist), Rhodes University (associate professor) and the Australian Maritime College (head of the Faculty of Fisheries and Marine Environment), Colin Buxton joined the University of Tasmania as inaugural director of the Tasmanian Aquaculture and Fisheries Institute. He was also a deputy chair of the Australian Seafood Cooperative Research Centre (CRC) and the CRC for Sustainable Aquaculture of Finfish.

JOHN HARRISON

Appointed as a director 1 September 2015

CEO of the Western Australian Fishing Industry Council

John Harrison was previously CEO of the Western Rock Lobster Council and executive officer of the Professional Fishermen's Association in New South Wales. He has been a member of many committees including estuary floodplain management, the NSW Seafood Industry Advisory Council and the NSW Fisheries Research Advisory Board.

He was CEO of Recfish Australia, participating in the Commonwealth Fisheries Research Advisory Board, the National Oceans Advisory Group, the National Shark Recovery Group, the Co-management of Fisheries Task Force and the Aquatic Animal Working Group under the Australian Animal Welfare Strategy. He was also executive director of the Amateur Fishermen's Association of the Northern Territory from 1998 to April 2005.

JOHN SUSMAN

Appointed as a director 1 September 2015

Managing director and owner of Fishheads Seafood Strategy

John Susman ventured into the restaurant business at a crucial stage in the evolution of Australia's culinary scene after initially completing a Bachelor of Arts (Commerce). He set up the Flying Squid Bothers, an integrated scallop fishing business, which became Australia's first water-to-plate operation.

He is internationally recognised as a leading authority on seafood. John Susman is a regular judge in consumer and industry awards and regularly appears on television, radio and in print media to lend his expertise and views on sustainability and seafood. In 2004 he was admitted in to the Fairfax Australian Food Industry Hall of Fame for his services to the Australian food industry, and in 2012 *Delicious* magazine awarded him Outstanding Provedore of the Year.

DARYL MCPHEE

Appointed as a director 1 September 2015

Associate dean (research), Bond University

Daryl MacPhee's core expertise is in fisheries and marine ecology. He has published more than 90 reports and his publications include *Fisheries Management in Australia* (Federation Press), the only dedicated fisheries management book in Australia today. He has undertaken a broad range of consulting projects, from the impacts of dredging and spoil disposal, to liquefied natural gas plants and pipelines, sand extraction, bauxite mining, port developments, desalination, thermal discharge from power generation, and fisheries and marine aquaculture.

He is internationally recognised as a leader in fisheries management research, particularly recreational fishing. Much of his recent work has focused on understanding and mitigating the risk of unprovoked shark bite on people, and the environmental history of Australian coastal areas. Daryl McPhee also served as an FRDC director from 1 September 2009 to 31 August 2012.

LESLEY MACLEOD

Appointed as a director 1 September 2015

CEO of Dairy Innovation Australia; board member Murray Dairy Inc.

Lesley MacLeod has 20 years' experience in senior agribusiness management and is a former board member of Barley Australia. She has helped to establish several national R&D programs and companies, with a focus on national quality systems in primary industries.

Originally from Scotland, she has a Bachelor of Science in Marine Biology and a PhD from Heriot-Watt University in Edinburgh, UK, a Diploma in Business Management from the University of Queensland and is a graduate of the Australian Institute of Company Directors.

PATRICK HONE

Appointed executive director 21 April 2005

Patrick Hone has extensive knowledge of all sectors of the fishing industry. He has spent the past 30 years working on fisheries and aquaculture in Australia. Early in his career he spent a large amount of his time underwater exploring the coast of South Australia.

During the past 10 years at the FRDC he has played a key role in the planning, management and funding of fisheries-related research and development in Australia.

Prior to joining the FRDC Patrick Hone played a lead role in the science for the development of several significant aquaculture industry developments, including Southern Bluefin Tuna, Pacific Oyster, abalone and mussel aquaculture in SA.

LIVING THE SEAFOOD STORY

NATIONAL CONFERENCE

Australia's seafood industry came together to celebrate its successes and seek inspiration for the future at its biennial national conference

By Catherine Norwood

The 2015 Seafood Directions conference held in Perth in October has drawn the industry more strongly towards a single, focused course of action for the future. More than 300 delegates attended the biennial conference, which this year had the theme 'Selling our story'.

While delegates heard about several international and local initiatives designed to promote sustainable seafood, the presentation that resonated most was from Joshua Stoll, co-founder of the US-based Walking Fish co-operative, whose conference attendance was sponsored by the FRDC.

He outlined a local marketing initiative that has helped to improve the viability of small-scale fishers in North Carolina, with a model that has since spread throughout the US and Canada.

He said local and direct marketing was a tremendous opportunity for fishers to sell their story. But more than just a marketing ploy, it was a livelihood strategy that provided a broader opportunity to build community capacity.

"When you live the story, the story sells itself," he said.

The Walking Fish co-operative allows community members to buy a 'share' in the catch of the co-operative, pre-paying for weekly or biweekly deliveries of whatever fish have been caught that week. In the eight years since the Walking Fish co-operative was launched, the business model has been taken up by more than 250 communities in the US and Canada.

Joshua Stoll says the model allows community members to invest in fishers and their fisheries, and to engage in new conversations about sustainability and conservation. As consumers, there are opportunities to try unfamiliar fish species and to make fish a regular part of their diet.

For fishers, it has increased returns by more than 30 per cent. It has also encouraged greater communication and cooperation among fishers, and with management agencies and consumers.

The conference was officially opened by Assistant Minister for Agriculture and Water Senator Anne Ruston who told delegates the seafood industry needed to drive its own strategy and sell its own message.

"The legitimacy of any industry is only as strong as the community sentiment that supports it. The battle is for the hearts and minds of the Australian seafood consumers. To win this battle the seafood industry must have a clear and united voice," she said.

She said that the industry also needed a united voice if it was to effectively deal with government, and to help the government and government agencies create the best possible environment in which the industry could operate.

Local success stories featured in many presentations, as well as works in progress and familiar challenges. Several speakers highlighted efforts to assess and certify the sustainability of fisheries, with a growing emphasis on social sustainability, in addition to environmental sustainability.

Chief executive of the Marine Stewardship Council (MSC) Rupert Howes outlined how the MSC certification program had gained momentum and international recognition in the 15 years since it was launched. Certification has often been viewed as a marketing tool that could help fisheries attract a premium, or as an insurance policy to help protect the reputation of a fishery. However, Rupert Howes said the fundamental aim of the program remained to improve the sustainability of fisheries around the world by identifying processes that could be improved and encouraging change.

Western Australia reported on the progress of its initiative to assist all of its fisheries towards MSC certification. (The Exmouth Gulf and Shark Bay prawn fisheries both received accreditation

WAFIC chair Arno Verboon (right) hands over the conference baton to Bryan Skepper, general manager of Sydney Fish Market, which will host the next Seafood Directions conference.

PHOTO: FRDC

PHOTO: WAFIC

"When you live the story, the story sells itself."

– JOSHUA STOLL, CO-FOUNDER OF THE US-BASED WALKING FISH CO-OPERATIVE

in the lead-up to the conference.) However, Kim Walshe, manager of the WA Department of Fisheries certification program, reported that full certification would be a difficult process for many of the state's small-scale fisheries. More than half of WA's fisheries fell into this category, he said, with 10 or fewer licence holders, and an annual value of less than $1 million.

Small-scale fisheries and the MSC were also central to the Project Inshore initiative developed by the UK-based fishing industry authority Seafish, which was outlined by the FRDC-sponsored keynote speaker Tom Pickerell, the technical director at Seafish.

Tom Pickerell said while many suppliers had committed to sustainable purchasing policies, it was difficult for many of Britain's smaller, data-poor inshore fisheries to demonstrate sustainability, and they were losing access to markets because of this.

Seafish had partnered with the MSC and many other government, industry, producer and supplier agencies to map inshore fisheries – within six nautical miles of the coast. The mapping identified 450 different species and gear combinations, and allowed Project Inshore to prioritise fisheries for the development of management plans and an MSC pre-assessment. Tom Pickerell said this established a baseline for the performance of these fisheries, which would allow them to demonstrate sustainable practices, even if they did not proceed to full MSC certification.

He said the involvement of suppliers in Project Inshore was important in that it allowed them to confidently purchase seafood from these small-scale fisheries by identifying the fisheries' alignment with sustainable practices.

In another initiative, Seafish has developed the Risk Assessment for Sourcing Seafood (RASS) tool for wild-harvest seafood species, which is available through the Seafish website (www.seafish.org). RASS combines fisheries data from other sources and develops a score from 1 (very low) to 5 (very high) for the potential "reputational risk" to a business based on four criteria: stock status, management, bycatch and habit.

He said RASS did not provide an amalgamated score or a 'buy' or 'don't buy' recommendation. "Rather than you having to align with our philosophy of what is good and bad, this tool allows the buyer of seafood to comply with their own corporate social responsibility commitments," Tom Pickerell said.

Niklas Wehner, from the Secretariat of the Global Sustainable Seafood Initiative (GSSI), agreed with the approach of the Seafish RASS program, which allowed users to select the level of performance they were comfortable with. In his presentation he said the newly released GSSI benchmarking tool worked in a similar way. It provided a baseline to assess how different fisheries accreditation systems performed, allowing users to compare their programs with the benchmark.

Commercial services

Interactions between the fishing community and resources sector were the theme of several presentations, including from Bertie Armstrong of the Scottish Fishermen's Federation. He said that in Scotland the resources sector had significantly infringed on traditional fishing grounds over the past 50 years, causing considerable conflict between the two sectors.

But rather than seeking compensation for lost resources, the federation had identified an opportunity to work with the resources sector. It established a commercial division, providing commercial services that generate income for fishers and for the federation itself. Bertie Armstrong said the interaction between the two sectors on a commercial arrangement had improved the basis of communication between them and understanding of how each operated.

Labelling campaign

In other presentations, Katherine Winchester from the Northern Territory Seafood Council championed country-of-origin labelling for seafood. She said the development of a national marketing campaign would lose its impact without the support from regulation requiring the hospitality industry to identify where its fish came from. While the recent Bill introduced in Federal Parliament to remove the country-of-origin labelling exemption from hospitality services had failed, the campaign for national country-of-origin labelling would continue.

Distribution networks

Janet Howieson, from Curtin University's Centre of Excellence for Science, Seafood and Health, and WA fisher Peter Jecks also outlined their efforts to streamline the development and marketing of new products. However, Peter Jecks said restrictions in distribution channels were undermining the process of product development.

A small number of wholesale distributors created a bottleneck in the system, he said. Even when these companies had agreed to list new products in their inventory, they were reluctant to deal with small quantities. Peter Jecks called for a series of national seafood hubs that could effectively centralise small quantities of product for cost-effective national distribution. This would also more closely link seafood producers with end users, without the need for wholesale distributors as intermediaries of 'approved' inventory.

Focused action

The FRDC's executive director, Patrick Hone, provided a concluding summary for the conference saying the overall message was positive. There was plenty of evidence of the passion and pride that fishers have for their industry.

He said the conference also identified opportunities to engage better with the rest of the world. Fisheries sectors internationally were facing similar challenges, operating in a "parallel universe" and Australian fisheries could learn more from greater interaction at an international level.

There was also a clear message that fisheries needed to be a stronger part of local communities. "It goes beyond the point where you catch the fish. You have to reconnect and innovate and be part of that community. We need to reconnect and build pride and trust in the local product," Patrick Hone said.

"This is all about making sure we have a viable, positive industry that our children want to go into, whether they are scientists, fishers or managers. We want an industry that people feel proud to be part of."

He said there was a lot of positive activity within the industry, and the challenge now was to direct that towards a single, coordinated course of action, where players recognised their own roles as part of the larger story. F

AWARDS CELEBRATE INDUSTRY LEADERS

Best Primary Producer: Huon Aquaculture (TAS)
Finalists: Coffs Harbour Fishermen's Co-operative (NSW), Australia Bay Seafoods (NT)

Best Large Business: De Costi Seafoods (NSW)
Finalists: Austral (WA), Humpty Doo Barramundi (NT)

Best Small Business: Central Seafoods (WA)
Finalists: Debbie's Seafood (QLD), Darwin Fish Market (NT)

Research, Development and Extension: Northern Prawn Fishery and The Expert Group (QLD)
Finalists: Daniel Lerodiaconou (SA), Small Pelagic Fishery Research Team (TAS)

Environment: (joint winners) Darwin Harbour Clean-Up partners (NT) and Dave Wyatt, Matt Dell and the South West Tasmania Marine Debris Cleanup team (TAS)
Finalist: Xl Oysters (NSW)

People Development: Janet Howieson (WA)
Finalists: Northern Prawn Fishery Industry Crew Member Observer Program (QLD), Aquaculture Trade Training Centres Group (TAS)

Best Promotion: Love Australian Prawns (QLD, WA)
Finalists: Regional Development Australia Whyalla and Eyre Peninsula (SA), Bruce Davey, 'Drawing the Line' Documentary (NT)

Best Restaurant: Incontro Restaurant (WA)
Finalists: Saffron (NT), Flathead Café and Fishmongers (TAS)

Best Fish and Chips: Morgans Fish Market & Takeaway and Morgans Fish Bar (QLD)
Finalists: Frying Nemo (NT), Sweetlips (WA).

Young Achiever: Claire Webber (SA)
Finalists: James Tyrer (QLD), Christine Huynh (TAS), Johnathon Davey (VIC) and Phillip Clark (WA) – all finalists received Encouragement Awards

Seafood Industry Ambassador Award: Bill Passey (NT)
Finalists: Bradley Warren (NSW), Grahame Tapley (SA)

NATIONAL AWARDS

There is no shortage of passion and commitment to the industry among the winners of the 2015 National Seafood Industry Awards

By Catherine Norwood

The largest-ever seafood industry awards night provided a gala conclusion to the successful 2015 Seafood Direction conference in Perth, with well over 400 guests attending the event at the Crown Perth convention centre to celebrate the industry's leaders.

The awards also included the induction of three new members to the National Seafood Hall of Fame: Peter Dundas-Smith, John Cole and Terry Adams (deceased).

Chair of the Seafood Directions conference committee Arno Verboon said the standard of entries for the national awards was excellent, making it difficult for the judging panel of five. However, **Huon Aquaculture** was a stand-out for its ongoing commitment to innovation and improvement in its production practices and product quality, and to promotion of the seafood industry in general.

As pioneers of the Australian Atlantic Salmon industry, Huon Aquaculture's founders and owners Peter and Frances Bender started their company in 1986. From one staff member and one pen of fish, the business has grown to become Australia's premium producer of Atlantic Salmon, with 550 employees producing 17,000 tonnes of fish a year. Since 2013 the company has introduced major changes to its operations, making the business a leader in global best practice in sea-cage design, occupational health and safety, feeding and animal husbandry technologies and online sustainability reporting.

Bringing the catch to customers, New South Wales wholesaler and retailer **De Costi Seafoods** was named as the Best Large Business for its constant product innovation and pursuit of excellence, based on the principles of providing a diverse range of quality, sustainably produced seafood, with outstanding customer service.

Wholesaler **Central Seafoods** in Western Australia won the Best Small Business Award. Established in 2011, the wholesale fish business is a relative newcomer, but is well supported by local industry. Its use of high-profile, branded fridge and freezer cabinets in retail outlets, clear labelling, convenient serving sizes and packaging combined with online marketing has contributed to a rapid growth in sales.

The Best Promotion awardee, **Love Australian Prawns** campaign, successfully united prawn farmers and wild-catch fishers in the first national campaign run across an entire seafood category. Now in its third year, the campaign has increased awareness of Australian prawns, leading to increased prices and an increased profile for prawn fishers and farmers across the county.

Catering for diners, Kelly Morgan, in Mackay, Queensland, won the Best Fish and Chips Award with a business that began as a roadside stall selling her husband Andrew Morgan's fresh local catch. She now has 28 staff in two stores, **Morgans Fish Market & Takeaway** and **Morgans Fish Bar**, which makes a point of preparing all seafood products fresh in-store, and featuring fresh fish caught daily from local fishers.

In Perth, chef Peter Manifis and co-owner Anna Watts go further afield to source the very best seafood from around Australia for their **Incontro Restaurant**, which won the Best Restaurant Award. This includes difficult-to-source, seasonal seafood, with up to 11 species on the menu at any one time. Often dealing direct with fishers, their criteria include sustainability, quality and care in handling along the entire supply chain.

Always willing to share his seafood knowledge, Peter Manifis was also involved in seafood training videos that won the People Development Award. The project was led by **Janet Howieson**, of Curtin University's Centre of Excellence for Science, Seafood and Health, and **Patrick O'Brien** at the West Coast Institute of Training, and addressed an identified gap in the seafood training for certified chefs and trained apprentice chefs in the selection, care and preparation of a diverse range of seafood.

Northern Territory fisher **Bill Passey**, of Australia Bay Seafoods, was named Seafood Industry Ambassador for his contribution over 50 years to the development of WA's rocklobster fishery, and three NT fisheries: drop line and trap; finfish trawl; and demersal trawl. This includes his development of the semi-demersal trawl net, the Wendy net and bycatch reduction devices, which have become the mandated industry standards to ensure the sustainability of trawl fishing in the north.

Research and liaison officer for the Australian Southern Bluefin Tuna Industry Association, **Claire Webber** was named the Seafood Industry's Young Achiever. However, all finalists in the Young Achiever Award category received Encouragement Awards, which Arno Verboon said reflected the difficulty the judges faced in selecting the winner.

A collaboration between the **Northern Prawn Fishery** and the refrigeration specialist consultancy **The Expert Group** won the National Research, Development and Extension Award. The refrigerant currently in use is being phased out internationally. This Australian Seafood Cooperative Research Centre project developed and tested new high-efficiency refrigeration designs to help trawlers select a replacement refrigerant capable of meeting the fishery's needs, which are among the most demanding refrigeration requirements in the world (see pages 20 to 22, *FISH* September 2015).

The Environment Award was presented jointly to two clean-up campaigns, the **Darwin Harbour Clean-Up** and the **South West Tasmanian Debris Cleanup** team, led by rocklobster fisher Dave Wyatt and environmental consultant Matt Dell. This award recognises contributions to the protection and rehabilitation of aquatic environments, and efforts to reduce adverse impacts of the seafood industry on the environment.

The Darwin Harbour Clean-Up has been running since 2010 as a work-day clean-up involving many businesses and agencies that work on the water on a daily basis, rather than volunteers. More than 17 tonnes of rubbish has been collected from the harbour in the six annual clean-ups.

The Tasmanian event has been running since 1999 as a week-long clean-up of remote beaches on Tasmania's south-west coastline, which are generally only accessible by boat. In 2014 more than 47,000 items of rubbish were collected by the 20 volunteers involved. F

PHOTO: IAN + ERICK

People Development Award winning team: (from left) Jason Smith, Patrick O'Brien, Janet Howieson, Peter Manifis and Nathan McMurdo.

NEW MEMBERS JOIN SEAFOOD HALL OF FAME

Terry Adams, WA

Terry Adams (deceased) discovered Greenlip Abalone in commercial quantities in the Augusta region of Western Australia, established a professional abalone fishery in the area and laid the foundations for abalone aquaculture in Flinders. He was also active in salmon, tuna, rocklobster, snapper, shark and scallop fisheries at a time when societal attitudes to the use of marine resources challenged the fishing industry. He provided leadership through local and industry representative bodies, including the Western Australian Fishing Industry Council, to respond positively to these challenges, and supported management that combined sustainable fish stocks and responsible harvesting as a basis for profitable enterprises. He was a committed practical, conservationist who made a significant contribution to the conservation estate in WA.

John Cole, WA

Based in the small fishing town of Dongara in Western Australia, John Cole has been actively involved in the fishing industry for more than 50 years, taking on leadership roles at a local, state and national level. These ranged from the Dongara Professional Fishermen's Association to the chair of the Western Australia Fishing Industry Council. John Cole was also heavily involved in the consultation process that helped to establish the FRDC and the Australian Fisheries Management Authority in the 1990s. In 1990 John was awarded membership in the Order of Australia (General Division) AM for services to the fishing industry. He also helped to initiate the process that led to the formation of the Western Rock Lobster Council, serving as chair in 2009-10, and continuing as a director today.

Peter Dundas-Smith, NSW

Peter Dundas-Smith has shown leadership and dedication to the future of the Australian seafood industry through his numerous and varied roles over the past 22 years. These roles have included: inaugural executive director, FRDC; chair, Aquafin Cooperative Research Centre (CRC); chair, Australian Seafood CRC; director, OceanWatch Australia; director, Seafood Services Australia; and vice-president, Australian Fisheries Academy. He has also been a member of numerous advisory bodies related to the fishing industry and the science community. He continues to advocate for his longstanding vision for the industry: united under a single entity charged with the responsibility for contributing to the economic, environmental and social sustainability of the seafood industry.

MORE INFORMATION: Jesse Leland, jesse.leland@scu.edu.au
FRDC RESEARCH CODE: 2014/011

Jesse Leland in the Southern Cross University ageing laboratory with a Giant Crab specimen.

PHOTO: JOHN WADDELL, SCU

A stomach for history

INNOVATION AND TECHNOLOGY

Innovative Australian research provides greater insight into the age, growth and longevity of valuable crustacean species

By Jesse C. Leland

Crustaceans are a notoriously difficult-to-age animal group. Because they grow by moulting, it was always presumed that their hard parts could not contain any chronological growth record. However, researchers are challenging this assumption and making advances towards solving the longstanding problem of crustacean age determination.

Accurate age information is valuable for fisheries management because it provides the basis for important productivity, growth and longevity calculations.

In 2011, researchers from the Southern Cross University (SCU) Marine Ecology Research Centre (MERC) hypothesised that gastric ossicles might hold the key to solving the ageing problem. The research team, led by Jesse Leland and Daniel Bucher (MERC) and Jason Coughran (Sheridan College, Perth), applied traditional direct fish-ageing methods to the gastric ossicles of crustaceans and reported the presence of growth marks that could equate to chronological age.

Rock lobsters and crabs have gastric ossicles – bone-like structures with teeth – in their stomachs for grinding food. The innovative ageing method involves cross-sectioning ossicles and counting growth marks that are deposited within them.

The idea came while researchers were discussing the use of ossicles in freshwater crayfish taxonomy. They reasoned that any calcified structure could contain growth marks and were pleasantly surprised to find that the ossicles did.

However, before ossicular growth marks can be used to accurately determine age, researchers must provide species-specific validation of how regularly they are deposited.

In 2013, the MERC research team began a small-scale validation study using a relatively short-lived and well-studied freshwater species, Redclaw, to assess the periodicity of ossicular growth marks. This study was funded through the FRDC-sponsored 2013 Department of Agriculture, Fisheries and Forestry's Science and Innovation Award.

Recently the findings were published in the open-access journal *PLOS ONE* in the article 'Direct age determination of a subtropical freshwater crayfish (Redclaw, *Cherax quadricarinatus*) using ossicular growth marks'. The Redclaw study clearly demonstrated for the first time that crustacean ossicles retain a record of events that occurred during the animal's life.

This opens the way for future age-validation studies, showing that formal accuracy assessments are possible. The study presented strong evidence that ossicular growth marks are deposited annually in Redclaw, but called for further research to provide a definitive validation.

In the past, the ages of crabs and rock lobsters could only be estimated from indirect methods such as tag-and-recapture. Such methods can indicate approximate age – plus or minus a few years – but their accuracy is somewhat limited, particularly for long-lived species.

The Redclaw study also demonstrated that, similar to fish species, directly obtained size-at-estimated-age data can be used to model crustacean growth.

Marine ecologist Daniel Bucher says the study is an important turning point for the fisheries industry since the ability to determine the age of harvested animals is central to assessing whether fishing levels are sustainable.

"Several research groups around the world are taking up our method, with each new publication really increasing the existing knowledge base," Daniel Bucher says. "This makes for an exciting time in a new research field.

"The Redclaw study is also the first published work to demonstrate effectiveness using a subtropical freshwater species, which extends the applicability to many other Australian regions."

Freshwater ecologist Jason Coughran says the findings are also a welcome breakthrough for conservation efforts. "Around the world, freshwater crustaceans are increasingly being recognised as a highly imperilled group of animals," he says.

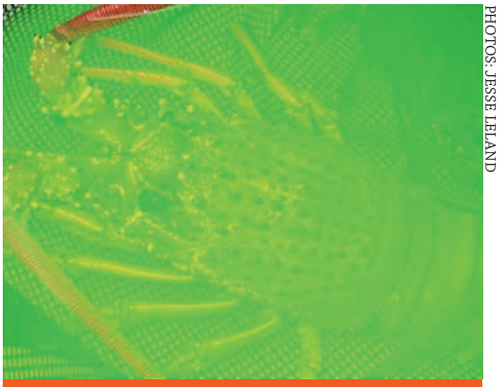
"Research on these animals has been hindered by a lack of accurate age information. Tagging studies indicate that some freshwater crustaceans are very long-lived, perhaps 40 years or more. The potential to definitively establish longevity now promises to reshape the broader work on protecting these species."

The ultimate aim is to use the method for age-based stock assessments within major Australian fisheries, but while we now know that it can work there is still further research needed to explain the processes and mechanisms involved.

The ageing method is currently being applied to the Western, Eastern, Southern and Tropical Rock Lobsters and to Giant, Crystal and Mud Crabs as part of a two-year national project funded by the FRDC in 2014.

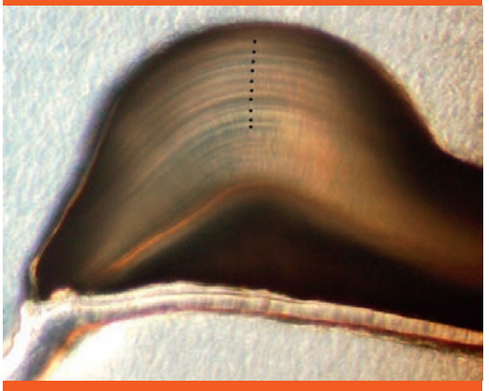
More than 400 specimens have been collected from tropical, subtropical and temperate regions in Australia for the project, which will produce the world's first direct age and growth models for the long-lived Western and Eastern Rock Lobsters.

PHOTOS: JESSE LELAND



Adult Eastern Rock Lobster being stained with the fluorescent dye calcein.

A gastric mill extracted from a large Eastern Rock Lobster.



Light-microscope image of growth marks (indicated by black dots) in an adult Eastern Rock Lobster ossicle.

To assess growth mark periodicity, some rock lobsters and crabs were stained with a fluorescent dye called calcein. After 18 months, researchers will check how many growth marks were deposited during that time. If the growth marks are annual then only a single mark should be deposited each year.

Another validation technique that is being applied is the analysis of ossicular composition using laser ablation. Laser ablation analysis can identify cyclical changes in the ossicle composition, which reflect changes in seasonal temperature (for example, summer to winter). This can be compared with the number of visible growth marks. Hopefully, this will provide further insight into the periodicity of ossicular growth marks in Australian crustaceans.

Taking part in the collaborative FRDC ageing project are fisheries scientists from SCU (Jesse Leland, Daniel Bucher and Renaud Joannes-Boyau), the University of Tasmania's Institute for Marine and Antarctic Studies (Caleb Gardner), the Department of Fisheries, Western Australia (Simon de Lestang and Jason How), the New South Wales Department of Primary Industries (Geoff Liggins and Paul Butcher), the South Australian Research and Development Institute (Adrian Linnane), the Northern Territory Department of Primary Industries and Fisheries (Mark Grubert) and James Cook University (Clive Jones).

Due to the fundamental importance of age information for sustainable fisheries management, the FRDC project has received strong support from industry groups including the Western Rock Lobster Council and NSW lobster industry.

Other government institutions such as CSIRO Marine and Atmospheric Research are also supportive of the project.

The preliminary results are positive. Researchers have identified a strong relationship between size and the number of ossicular growth marks for six of the seven species, with estimated ages being broadly consistent with existing age and longevity information.

The laser ablation analysis component was recently completed, while the validation grow-out is ongoing. There is considerable excitement in Australia and elsewhere about the usefulness of direct ageing methods, but a definitive periodicity validation is essential before extending it further.

The building of the scientific knowledge base required for routine validation of finfish took almost a century. Such prior knowledge is advantageous and will hopefully facilitate a comparatively rapid development for crustacean ageing, but there are still challenges to overcome before this longstanding problem is solved.

To further age-related innovation, MERC researchers will convene for a crustacean ageing workshop at SCU in 2016 as part of the FRDC project. Fisheries scientists and collaborators from around the country are expected to attend. F

MORE INFORMATION: www.ruraltraininginitiatives.com.au
FRDC RESEARCH CODE: 2014/407

Sense of pride

UNITES SEAFOOD LEADERS

Artwork from promotional NSILP postcards and business cards.

PEOPLE DEVELOPMENT

New perspectives and initiatives emerge from the latest group of fisheries and aquaculture leadership graduates

By Catherine Norwood

'United by pride' is the theme of the touring photographic exhibition that highlights the human face of fisheries and is an initiative of the 2015 National Seafood Industry Leadership Program (NSILP).

The exhibition was featured as part of the industry's national conference, Seafood Directions, held in Perth in October, and plans to visit several other Australian cities. It is one of several initiatives to come from the NSILP participants this year. Others featured point-of-sale information for consumers and a fisheries education and careers strategy.

Each year participants in the leadership program develop a vision and mission statement for themselves, before establishing project groups that each develop an initiative to advance their vision and mission for the seafood industry.

In 2015 the vision and mission were as follows.

VISION: To celebrate our story of proudly and responsibly harvested Australian seafood.

MISSION: United, we tell the Australian seafood story to increase community awareness of its sustainability, quality and diversity.

Focusing on 'Pride', one project group initiated a survey of seafood businesses and individuals, which generated more than 70 profiles that describe what the respondents love about their work. There were also hundreds of photos submitted. From these submissions, 26 profiles and accompanying photos were selected to create the exhibition, which was supported by the Australian Department of Agriculture.

PHOTO: CATHERINE NORWOOD

Part of the collection in the 'United by Pride' exhibition developed by the 2015 National Seafood Industry Leadership Program participants, on show at the Seafood Directions conference in Perth.

NSILP participant Julian Harrington says the group was encouraged by the high level of response to the questionnaire it sent out, seeking firsthand stories from members of the Australian seafood sector.

He says the profiles have also been adapted for use in social media, including a smartphone app that is being developed by the Tasmanian Seafood Industry Council (TSIC).

The app is based on a popular Tasmanian Seafood Trail brochure TSIC previously produced and is now looking to move to an electronic format. The app allows travellers to find information about fishers, fisheries and fish-related food outlets based on location, and to be alerted to relevant local information as they travel.

The profile of seafood industry members produced as part of the 'Pride' initiative will be incorporated into the app, which also includes details of local commercial and recreational fisheries, Indigenous heritage and reviews of fish shops and restaurants.

Point of sale

A second project group developed point-of-sale promotional material, giving consumers information to connect the fish they have bought with the fishers and fisheries that have provided the catch.

Project group member Veronica Papacosta says they focused on two species – Spencer Gulf prawns and New Zealand snapper – with industry partners willing to fund the preparation of materials.

The Spencer Gulf and West Coast Prawn Fisherman's Association assisted with the design of a postcard featuring its product for retail buyers, and a business card for restaurant diners. The postcards were trialled over 10 days through the Sydney Fresh Seafood Group. The business cards were trialled at Sarin's Restaurant and Del Giorno's Cafe, both in Port Lincoln, South Australia. The business card, which featured a QR code and web links to online information, was delivered to diners ordering prawns, either when their meal was delivered to their table or when the meal was paid for. The snapper postcards, funded by Southern Cross Fishing, were trialled for five days through the Sydney Fresh Seafood Group.

Veronica Papacosta says although the initial trials were short, the feedback was overwhelmingly positive. There was also an increase in activity on the web pages listed on the cards, such as the FRDC's Fishfiles (www.fishfiles.com.au), which was attributed directly to the project. She says that in retail outlets once shoppers had the postcards, they were keen to see more about other species as well. The group plans to expand the trial to other species and provide an analysis of return on investment to determine the value of the promotional material to industry.

Education

The third project group focused on an education initiative to raise the profile of fisheries in the general public. It developed a concept for collectable Australian seafood cards for supermarkets featuring different fish species, and fishing techniques. Discussions are underway with both Coles and Woolworths about the possibility of taking part.

The group also analysed available information about fisheries jobs and careers, identifying a need for a more national approach to establish clearer career pathways and to link relevant jobs in an easily searchable way. It also plans to establish a presence on LinkedIn for the NSILP program.

Although the 2015 NSILP participants officially graduated in September, all of the project groups have developed a plan of action and committed to pursuing their initiatives further in the coming year. This year's graduates are:

- Michel Bermudes, hatchery manager at Shellfish Culture Ltd, Tasmania (now mariculture and aquatic biosecurity expert, Secretariat of the Pacific Community, Noumea, New Caledonia);
- Chloe Clauson, licence manager, abalone industry, SA and WA;
- Adam Clow, owner-operator of Southern Cross Fishing, New Zealand;
- Craig Fox, abalone diver and director of AquaFox, Victoria;
- Johnathon Davey, executive director, Seafood Industry Victoria;
- Hayley Egan, researcher, Southern Cross University, NSW;
- Darvin Hansen, general manager, Tasmanian Seafoods' Margate factory, and vice-president of the Tasmanian Abalone Council;
- Julian Harrington, chief executive, Tasmanian Seafood Industry Council;
- Aaron Irving, executive officer, Pearl Producers Association, WA;
- Rhiannon Jones, fisheries management officer, Department of Fisheries, WA;
- Rachel King, executive officer, Oysters Australia, NSW;
- Robert Langdale, Tasmanian-based fisher;
- Emma Lowe, assistant director, Australian Department of Agriculture and Water Resources, ACT;
- Stephen Mayfield, science leader – fisheries, South Australian Research and Development Institute Aquatic Sciences, Primary Industries and Regions South Australia;
- Suzanne McEnallay, operations manager, Wallis Lake Fish Co-operative, NSW;
- Veronica Papacosta, director and chief financial officer, Penrith Seafoods (Wetherill Park), NSW;
- Josiah Pit, operations and supply chain manager, Aquarium Industries, Victoria; and
- Alicia Sabatino, fisheries management officer, Australian Fisheries Management Authority, Queensland.

The NSILP program is part of the FRDC's people development portfolio, with gold sponsorship from Sydney Fish Market. F

NSILP 2016

Expressions of interest for the 2016 National Seafood Industry Leadership Program (NSILP) are now open. It will involve three residential sessions from 19 to 21 April in Darwin, from 26 to 28 July in Sydney and from 1 to 3 November in Canberra, as well as an ongoing project throughout the course of the program.

NSILP is the only national leadership program specifically developed for the seafood industry. It was designed in consultation with people from the seafood industry and with their specific needs in mind. More than 200 people of all ages and representing all industry sectors have graduated from the program, including processors, fishers, extension officers, exporters, importers, marketers, scientists, managers, deckhands, and Indigenous and recreational fishers.

It focuses on developing personal, business and national industry leadership skills. Handling conflict, communication techniques, meeting management, team building, change management and media training are included in the program.

For more information or to apply contact Jill Briggs at Rural Training Initiatives, 0409 455 710, www.ruraltraininginitiatives.com.au

Prawn farming pioneer remembered

VALE FRANK ROBERTS
18 August 1933 – 16 September 2015

The success of the Australian prawn farming industry owes much to the entrepreneurial spirit and drive of Frank Roberts, who harvested the country's first commercial crop from prawn ponds on his converted cane farm at Yamba, New South Wales, in 1984.

The business he began more than 30 years ago continues to operate as Tru Blu Prawn Farms, and the industry he helped to pioneer is today worth more than $70 million nationally.

Taking on prawn farming was a high-risk venture – capital-intensive with hazards that ranged from cold snaps or disease, to hungry cormorants and human poachers.

Although Frank Roberts was known as something of a gambler, when he made a decision he stuck by it, be it right or wrong, and he had decided that prawn farming was the industry for him. It did not matter that everyone said it would not work, or that there was no long line of experienced farmers to learn from. More than once his crops were wiped out and he faced financial ruin, but he pressed on, ultimately becoming recognised as a prawn farming authority.

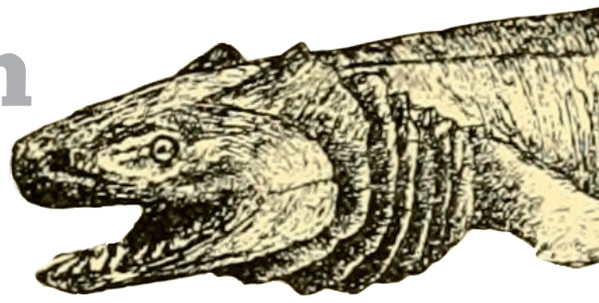
A longtime member of the Australian Prawn Farmers Association, Frank Roberts helped to lead the way for others, sharing his hard-won expertise. Always the innovator, this included trialling the export of live Tiger Prawns (*Marsupenaeus japonicus*) to Japan, which ultimately proved unviable.

Many others have taken up prawn farming since Frank Roberts launched his new venture in 1983, and the industry has attracted significant government-supported research to overcome the challenges. With improved genetics and production processes, the industry he helped to found has become one of the most productive and sustainable prawn-farming systems in the world. F

Frank Roberts

MORE INFORMATION: Daniel Gledhill, daniel.gledhill@csiro.au, www.csiro.au/anfc
FRDC RESEARCH CODE: 1994/136

Not your usual catch



BIODIVERISTY

Fishers are often at the frontline in close encounters with the weird and wonderful creatures that make up our marine and freshwater environments

By Gio Braidotti and Catherine Norwood

Occasionally something strange and unusual lands on the deck of a fishing trawler, highlighting the uniqueness of marine biodiversity in Australian waters, where new species continue to be discovered at the rate of about one a week.

In January 2015, a New South Wales fisher hauled in a specimen of the rarely seen and endearingly monstrous Goblin Shark (*Mitsukurina owstoni*). In the same month in Victoria, a trawler landed a prehistoric-looking Frill Shark (*Chlamydoselachus anguineus*). Both events generated significant international attention.

Fisher Lochlainn Kelly, 22, who pulled up the Goblin Shark off Green Cape on the NSW southern coast, told the *Sydney Morning Herald* he was excited by the find, which he had previously only seen in photographs. That excitement has resonated with the public: a YouTube clip of the Australian Museum's fish collection manager, Mark McGrouther, processing the specimen has garnered more than one million views (www.youtube.com/user/austmus).

The Goblin Shark, billed as an "alien of the deep", normally lives at depths of 300 to 900 metres. In these dark waters it targets prey through electroreceptors on its long snout that sense electrical energy from other marine wildlife.

The Victorian catch of a Frill Shark also generated "phenomenal international interest", according to the CEO of the South East Trawl Fishing Industry Association (SETFIA), Simon Boag. He published a quickly compiled 'odd spot' piece in SETFIA's e-newsletter about the catch by David Guillot, skipper of the trawler *Western Alliance*.

Within a few days he had received 500 emails from media around the world wanting more information about the "prehistoric monster". Supposedly linked to legends of sea serpents, the Frill Shark featured as a global news item in the following weeks.

The Frill Shark was caught in water 700 metres deep near Lakes Entrance in Gippsland, although it usually lives at depths of more than 1200 metres.

With the face of an eel, the body of shark and a mouth full of 300 needle-like teeth in more than 25 rows designed to snag soft-bodied prey (including squid and octopus), it had little trouble gathering attention.

While both of these rarely encountered species had previously been identified, about 50 new species are discovered in Australia's marine and freshwater ecosystems every year – and that is just the fish.

Dedicated discovery

The painstaking work of searching for and detailing the distinguishing features of a new species and its habitat is led largely by researchers, but is supported by fishers across all sectors. Fishers provide catch samples and also host scientific observers on their fishing vessels, both of which supplement dedicated scientific sampling expeditions.

CSIRO hosts the Australian National Fish Collection and director Daniel Gledhill says it has taken many decades to build a collection that reflects an accurate picture of Australia's marine life – and the collection is still growing.

"Knowledge improves in incremental steps – there are steps forward and backward stumbles when specimens turn up that force a rethink of existing groupings. And for Australia's marine organisms, that is still happening."

Part of the reason for this is the sheer complexity of the marine environments involved. Australia manages the world's third largest exclusive economic zone and it ranges from tropical northern waters to a temperate south and on to chilly sub-Antarctic waters, reaching depths of 5000 metres.

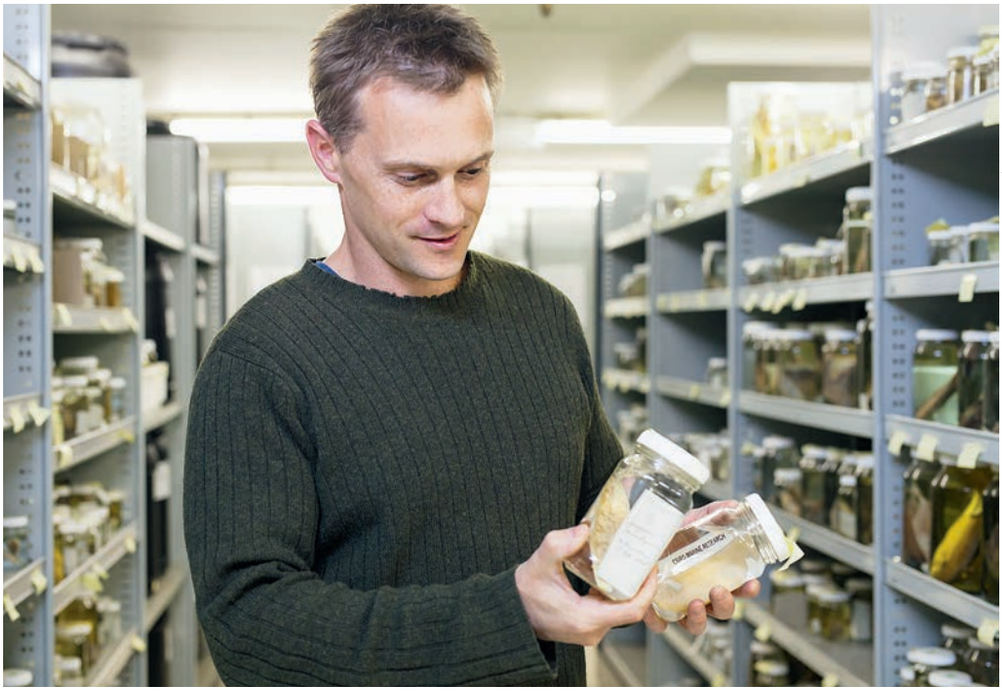
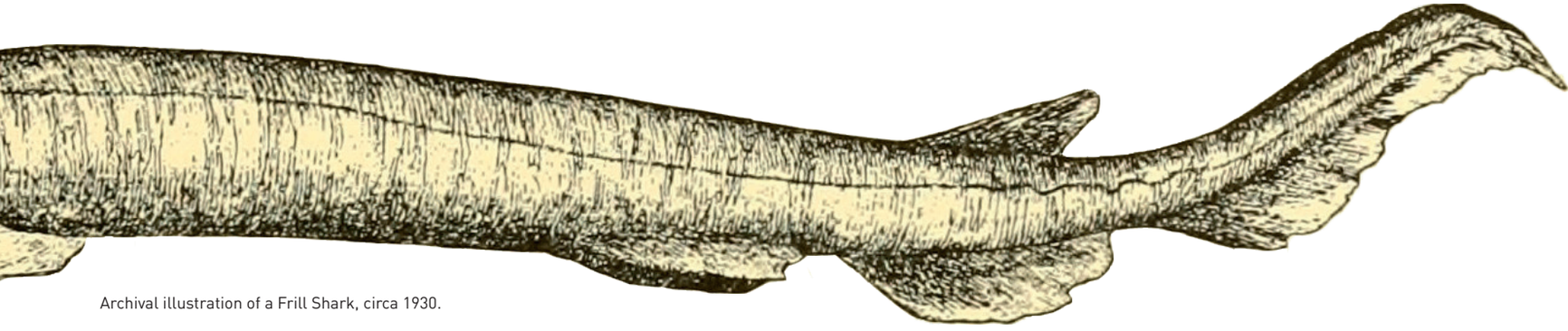


PHOTO: CARLIE DEVINE, CSIRO

Australian National Fish Collection director Daniel Gledhill with specimens awaiting formal identification and registration in the collection: just some of the treasure-trove awaiting further study.



Archival illustration of a Frill Shark, circa 1930.

Some of these regions have provided niche habitats for evolution to follow its own unique trajectory. Fish may share one gigantic global pool of water, but many do not opt to swim particularly far. Rather, they appear to have congregated in ways that have allowed them to adapt and specialise.

"In the tropics there is a lot of biodiversity that is shared with neighbouring Asia–Pacific nations but in the south we have some of the highest rates of endemism in the world – that is, species found only in Australian waters and nowhere else in the world."

While both the Goblin Shark and Frill Shark are found in international waters, Australia's abundance of isolated ecological niches has nurtured about 5000 known fish species, nearly 30 per cent of which are found only in Australia.

"But that's just fish, and we know these pretty well compared with many invertebrate groups, such as sponges," Daniel Gledhill says. "It's important we understand the spectrum of this biodiversity and the way it all interacts to ensure the sustainable and responsible management of our unique aquatic resources, heritage and industries."

Larval hotspot

Australia's newest research vessel, *RV Investigator*, is helping researchers to identify more marine species and to document the dispersal patterns of known species.

In June this year researchers onboard *RV Investigator* studied the species caught in an ocean eddy off the coast of Sydney. They discovered it was a hotspot for rock lobster larvae at a time of the year when they were not expecting to find larvae.

The chief scientist for the voyage was University of NSW marine biologist Iain Suthers, who was astounded to find juvenile commercial fish species such as bream and Tailor 150 kilometres offshore. Researchers had thought that once larvae were swept out to sea that was the end of them. However, the ocean eddies have now been identified as nursery grounds along the east coast of Australia.

The team of researchers also discovered a cluster of extinct volcanoes likely to be 50 million years old, which are about 250 kilometres off the coast of Sydney in 4900 metres of water. The four extinct volcanoes in the cluster are calderas – a volcanic crater that forms after a volcano erupts and the land around it collapses.

Crayfish quest

Rob McCormack is a man on a mission: to identify and map the habitat of all Australian freshwater crayfish species. He leads a group of up to 25 volunteers, all committed to the Australian Crayfish Project, which has identified almost a dozen new species since it began in 2005.

Four species have been officially confirmed and another six to eight are in the final phases of description and identification. Among the new species is one of the world's smallest crayfish, the eastern swamp crayfish (*Gramastacus lacus*). Rob McCormack says it is possible it could have been mistaken in the past as a juvenile of a larger species, but about five centimetres is its fully grown adult size.

"We really have no idea about the different crayfish species, and the extent of these species because in more than 200 years we haven't really gone looking," he says. "If no one knows these species are there, and they don't even have a name, how can we protect them and their habitat for the future?"

The eastern swamp crayfish, for example, is found in coastal New South Wales, where there is extensive urban development on reclaimed swamplands and large areas of its habitat have already been lost.

Although not a trained taxonomist (he is an engineer by training), Rob McCormack has built his expertise as an enthusiastic amateur through field experience and by working closely with fisheries collection staff at various state and national museums.

There has been little direct funding for the project, which is generally carried out during weekend forays into swamplands. "But support and interest from local communities, councils, catchment management agencies, and forestry and national park authorities has been outstanding," he says.

Many Australian crayfish species are already identified as endangered as a result of habitat loss and invasive species. They are also considered keystone species, helping to preserve the wellbeing of other species in their ecosystems, from fish and turtles, to snakes, mammals and birds.

More information: Rob McCormack, acp@aabio.com.au, www.aabio.com.au/the-australian-crayfish-project

PHOTO: ROB McCORMACK

Eastern swamp crayfish (*Gramastacus lacus*) from the Lake Macquarie catchment.

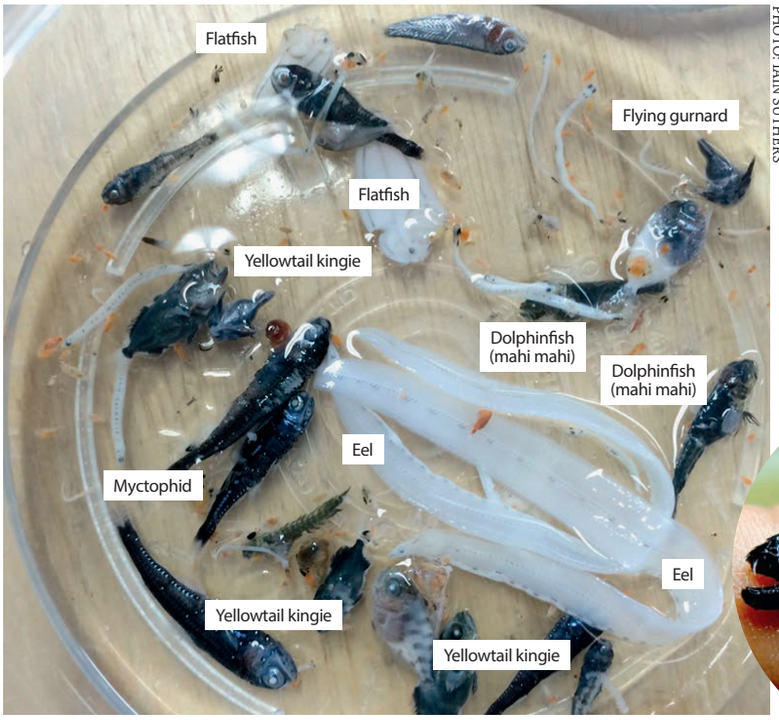


PHOTO: IAIN SUTHERS

Larval fish collected from an ocean eddy by rsearchers on *RV Investigator*.

PHOTO: DERRICK CRUZ

The largest caldera is 1.5 kilometres across the rim and rises 700 metres from the sea floor.

Sampling Australia's abyss

Another *RV Investigator* voyage is currently underway. Tim O'Hara from Museum Victoria is leading a 32-day voyage onboard *RV Investigator* to sample marine life along the base of Australia's eastern continental margin. The voyage departed from Brisbane in November 2015. The project aims to discover the fauna of Australia's abyssal sea floor, down to 4000 metres below the sea's surface. Never before has an Australian expedition focused on the biodiversity of our vast abyssal environment.

An international team of researchers will survey from Fraser Island, Queensland, to Tasmania to investigate the changes in species and genetic composition that occur with latitude and depth. The researchers expect to collect images and measurements of many species for the first time. F

SOMETHING STRANGE TO IDENTIFY

Fishers are often at the frontline of the discovery process, playing an important role to help understand marine biodiversity. For those who have a close encounter with a never-before or rarely seen creature, it is recommended photographs be taken of the whole animal, including close-up shots of markings and individual features, such a fins. If possible, the animal should be preserved frozen in a plastic bag.

Some rare specimens will be of interest to researchers, such as a 7.2-metre, 2.6-tonne Basking Shark (*Cetorhinus maximus*) that was landed by a trawler fishing in deep water off the Victorian coast near Portland in June.

The shark was donated to Museum Victoria. CEO of the South East Trawl Fishing Industry Association Simon Boag says the association has since established an SMS service that allows its members to alert the research community of any rare catches that might be of interest as soon as possible.

Fishers can also contact their nearest state museum or CSIRO's Australian National Fish Collection. It may take years of meticulous analysis, but the possibility exists that the specimen could be a new species.

CSIRO's national collection serves as a reference that is used to classify new specimens by a process of comparisons. It holds 151,000 registered specimens, with many more in freezers, preservative and tissue banks awaiting examination and registration.

The Photographic Index of Australian Fishes, managed by CSIRO, is also used for identification. It contains 40,000 colour transparencies and digital images of more than 2500 fish species, and is the largest taxonomic photographic collection in the Southern Hemisphere.

These images can be accessed through the collection's website, Fishes of Australia (www.fishesofaustralia.net.au), which is spearheaded and hosted by Museum Victoria and funded by the Australian Biological Resources Study. It is supported by a group of specialists from state museums and CSIRO called OzFishNet.

The original *Australian Seafood Handbook*, funded by the FRDC, and the free online tool FishMap (http://fish.ala.org.au) also provide a searchable atlas of more than 4500 marine fishes catalogued according to their geographical and depth distribution (see *FISH*, June 2013 issue, page 37). It encompasses all of Australia's commercial seafood species and contains the only photographs in existence of many bycatch species. It also contains images of species from rivers and estuaries and from near-shore. Its coverage spans the tropics to the sub-Antarctic.

PHOTO: WWW.SETFIA.ORG.AU

Basking Shark (*Cetorhinus maximus*).

Eureka! Fisheries science features in national awards

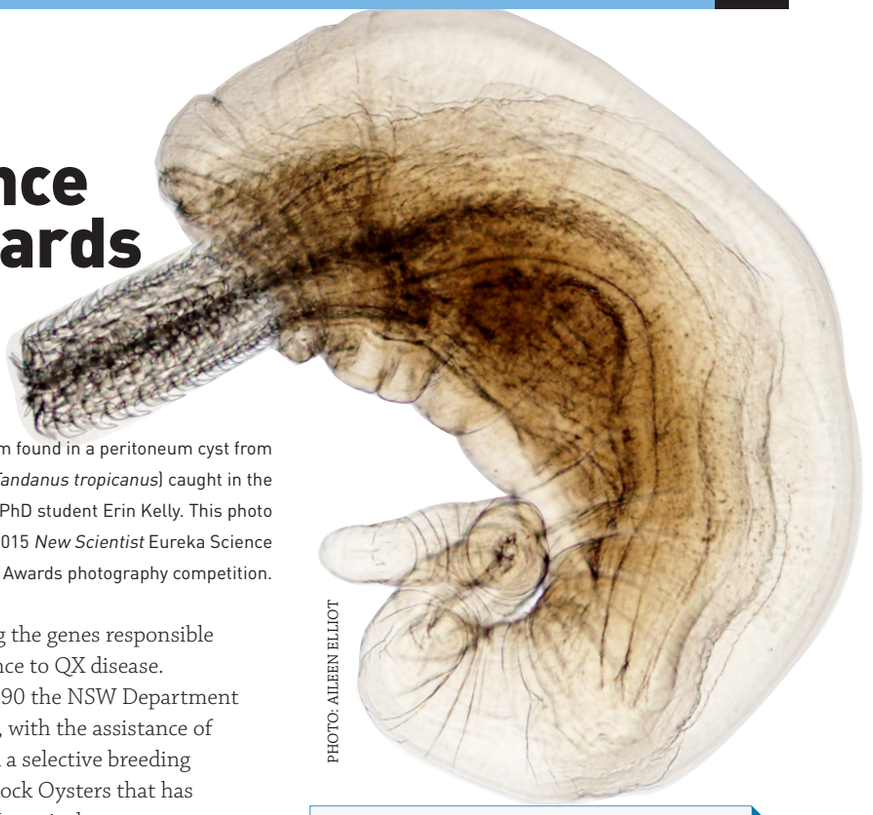


PHOTO: AILEEN ELLIOT

Thorny Headed Worm found in a peritoneum cyst from an Eel-tailed Catfish (*Tandanus tropicanus*) caught in the Barron River, Cairns, by PhD student Erin Kelly. This photo won second prize in the 2015 *New Scientist* Eureka Science Awards photography competition.

NATIONAL AWARDS

Oysters and marine parasites from opposite sides of the country featured in awards recognising great science and great science communication

By Catherine Norwood

Marine and fisheries science featured in two categories in the nation's leading awards for outstanding science and science communication – the Australian Museum's Eureka Prize program.

David Raftos from Macquarie University was awarded the Rural Research and Development Eureka Prize for Rural Innovation for research into breeding more disease-resistant oysters.

Winner of the *New Scientist* Eureka Prize for Science Photography was Gary Cranitch, from Queensland Museum, with an image titled 'Soft Coral'. Aileen Elliot from Murdoch University took second place with her photo of a Thorny Headed Worm taken during a chance encounter with the parasite while doing diagnostic work as part of an FRDC-funded project.

Disease resistance

The Eureka Prize awarded to David Raftos recognises more than 15 years of research into disease resistance in oysters, primarily Sydney Rock Oysters (*Saccostrea glomerata*).

QX disease is a perennial problem for Sydney Rock Oyster growers, with mortality rates of more than 90 per cent during serious outbreaks. The first major outbreak of the disease occurred in northern New South Wales and southern Queensland estuaries in 1974-75.

Later outbreaks have devastated whole estuaries, killing millions of oysters practically overnight and forcing many growers to leave the industry. In NSW, the oyster industry is estimated to directly employ more than 1500 people; when businesses close it can have a significant impact on local communities.

David Raftos says while QX disease does not affect every oyster-producing estuary, it can be a major impediment to production in those estuaries it does affect. His research has focused on identifying the genes responsible for conferring resistance to QX disease.

He says that in 1990 the NSW Department of Primary Industries, with the assistance of the FRDC, introduced a selective breeding program for Sydney Rock Oysters that has helped to improve QX survival rates.

"What we are trying to do is to use our understanding of the genetics of disease resistance to improve survival rates even more. There are several genes that contribute to the survival of oysters in the face of QX disease and we have undertaken our first experimental breeding trial using parents that carry those genes."

He says the initial results suggest a potential improvement in survival rates of 30 per cent for oysters selected on the basis of the newly identified resistance traits. "There is still a lot of work to verify the findings, but these sorts of results in a single generation would be a dramatic improvement, if they hold up."

Primed to respond

Another program under his supervision is the 'priming' of the immune response in Pacific Oysters (*Crassostrea gigas*) to enhance resistance to Pacific Oyster Mortality Syndrome (POMS) in their progeny. David Raftos says the POMS project is still at the fundamental research stage, and is being undertaken by research fellow Tim Green, who has also worked in France where POMS is a major problem for oyster growers.

He says molecules from the virus are injected into oysters and this primes their immune system to respond to the actual virus. Early findings indicate that the primed oysters have a greater resistance to later exposure to POMS. New laboratory trials will also analyse the resistance in progeny of the primed oysters to POMS. F

UNEXPECTED DISCOVERY SNAPPED

Aileen Elliot's chance encounter with a Thorny Headed Worm earned her second place in the *New Scientist* Eureka Prize for Science Photography.

Aileen Elliot is a parasitology technician at Murdoch University in Western Australia who discovered the subject of her image while undertaking some diagnostic work as part of a freshwater fish health survey funded by the FRDC.

She says the worm popped out from one of several cysts removed from an Eel Tailed Catfish (*Tandanus tropicanus*) caught in the Barron River, Cairns, and sent to her for identification.

"Seeing amazing life forms, such as this Thorny Headed Worm (phylum Acanthocephala), has the power to turn a mundane day in the lab into one of sheer brilliance," she says.

"Through this image and others like it I get to share my modern-day Darwinian moments of discovery with others and hope to excite and inspire the next generation of budding parasitologists."

Her images are part of the teaching resources for veterinary, animal science and biomedical students, and are also part of Murdoch University's in-house parasite museum.

MORE INFORMATION: Rebecca Metzner, rebecca.metzner@fao.org; Jacqueline Alder, jacqueline.alder@fao.org

GLOBAL APPROACH TO RESPONSIBLE FISHERIES

INTERNATIONAL POLICY

Celebrating its 20th anniversary this year, the international Code of Conduct for Responsible Fisheries continues to guide coherent, sustainable fisheries policy around the globe

By Rebecca Metzner and Jacqueline Alder,

Food and Agriculture Organization of the United Nations *

By the late 1980s, people the world over were aware that uncontrolled development and exploitation of fisheries resources was unsustainable and that action was needed. Responding to this concern, the Committee on Fisheries (COFI) – part of the Food and Agriculture Organization (FAO) of the United Nations – called for the development of new concepts that would lead to responsible, sustainable fisheries.

On 31 October 1995 the Code of Conduct for Responsible Fisheries (CCRF) was unanimously adopted by the FAO Conference Code, a text that:

- establishes principles, in accordance with the relevant rules of international law, for responsible fishing and fisheries activities, taking into account all their relevant biological, technological, economic, social, environmental and commercial aspects;
- establishes principles and criteria for the elaboration and implementation of national policies for responsible conservation of fisheries resources and fisheries management and development;
- serves as an instrument of reference to help states to establish or to improve the legal and institutional framework required for the exercise of responsible fisheries and in the formulation and implementation of appropriate measures;
- provides guidance that may be used where appropriate in the formulation and implementation of international agreements and other legal instruments, both binding and voluntary;
- facilitates and promotes technical, financial and other cooperation in conservation of fisheries resources and fisheries management and development;
- promotes the contribution of fisheries to food security and food quality, giving priority to the nutritional needs of local communities;
- promotes protection of living aquatic resources and their environments and coastal areas;
- promotes the trade of fish and fishery products in conformity with relevant international rules and avoiding the use of measures that constitute hidden barriers to such trade;
- promotes research on fisheries as well as on associated ecosystems and relevant environmental factors; and
- provides standards of conduct for all persons involved in the fisheries sector.

The FAO was a key player in the development of the Code of Conduct, but it is the FAO members, including Australia, which have a stake in fisheries and aquaculture and have adopted the Code that are the real owners.

The Code is used not only by the international community and nations, but also by businesses, fishers, processors, buyers and consumers – the general public – in their operations, activities and purchasing choices. It is a voluntary instrument that has laid out the principles and standards that, 20 years on, are helping to ensure we are sustainably using our living aquatic resources.

In practice

Countries continue to align and refine their efforts to achieve environmental, social and economic sustainability in their fisheries sectors. Most countries have fisheries legislation compatible with the Code, and references to it are now included in many national fisheries policies.

The principles and standards described in the Code are lived every day in fishers' and fish processors' activities – in such areas as fishing operations, the handling of catches, the use of particular gear and post-harvest technologies – as well as in the day-to-day management of fisheries. Other parts of the private sector also use the Code to guide their operations and this is often reflected or included in various certification schemes, best-practice awards and advertising.

Further developments

The Code has also inspired and shaped subsequent international instruments and agreements, within and outside the fisheries sector, including:

- Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security;
- Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication;
- Principles for Responsible Investment in Agriculture and Food Systems; and
- Guidelines for Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries.

The FAO Fisheries and Aquaculture Department has also used the Code to continuously guide its work in helping countries improve their fisheries and aquaculture management.

Since 1995, the FAO's work has included a considerable series of technical guidelines (TGs) and supporting supplementary information documents that provide in-depth information about specific aspects of topics covered in the Code. The far-ranging topics include fishing operations (TG 1) to recreational fisheries (TG 13), from the precautionary approach (TG 2) and the integration of fisheries in coastal management (TG 3) to responsible international fish trade (TG 11) and increasing the contribution of small-scale fisheries to poverty alleviation and food security (TG 10).

During the past five years the FAO has increasingly emphasised on-the-ground assistance to bring the Code into the lives of fisheries stakeholders. It has strengthened its interactions with the Global Environment Facility, the World Bank and other international development agencies, intergovernmental organisations and international financial institutions. It is also increasing its partnerships with non-governmental organisations and community, Indigenous, women's and industry groups active in the sector.

The result is that there are now specific initiatives about:

- blue growth – to strengthen countries and the

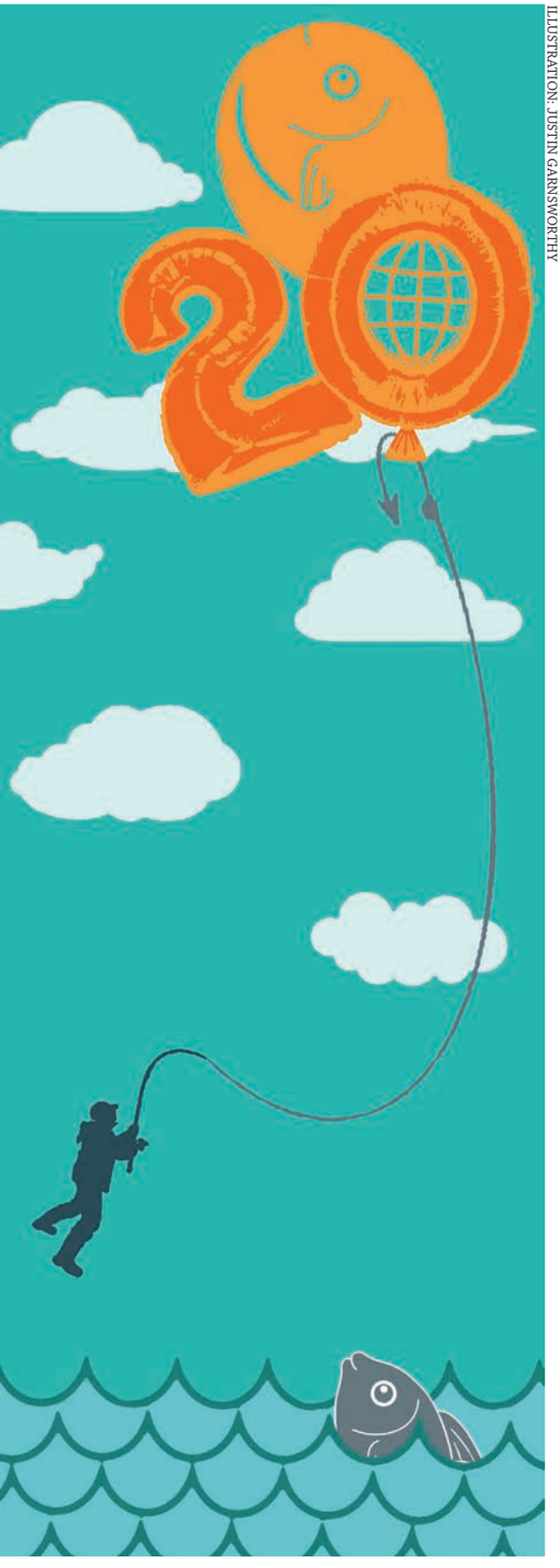


ILLUSTRATION: JUSTIN GARNSWORTHY

General principles of the Code of Conduct for Responsible Fisheries

Noting that the right to fish carries with it the obligation to do so in a responsible manner to ensure effective conservation and management of living aquatic resources, the Code of Conduct for Responsible Fisheries calls for all to:

- apply a precautionary approach;
- address environmental, economic and social factors;
- prevent overfishing and manage fishing capacity;
- include fisheries in the multiple uses of the coastal zone and integrate them in coastal area management, planning and development;
- have transparent decision-making processes;
- consult and ensure effective participation of industry, fish workers, and environmental and other interested organisations in decision-making;
- involve fishers and fish farmers in policy formulation and implementation;
- minimise and reduce waste, bycatch and their impacts;
- ensure safe, healthy and fair working and living conditions and meet internationally agreed standards;
- protect the rights of fishers and fish workers, particularly those engaged in subsistence, small-scale and artisanal fisheries, to a secure and just livelihood, as well as preferential access, where appropriate, to traditional fishing grounds and resources in the waters under their national jurisdiction;
- promote the maintenance of the quality, diversity and availability of fishery resources;
- conserve more than target species;
- rehabilitate populations;
- use the best scientific evidence available and traditional knowledge;
- use selective and environmentally safe fishing gear and practices;
- conserve the population structure and aquatic ecosystems and protect fish quality;
- maintain the nutritional value, quality and safety of the products;
- protect and/or rehabilitate critical fisheries habitats and protection from significant impacts resulting from human activities;
- undertake compliance and enforcement, including monitoring and control;
- flag state responsibilities;
- promote international engagement and cooperation in fisheries beyond national jurisdiction;
- trade in accordance with the principles, rights and obligations established in the World Trade Organization agreement and others;
- avoid creating barriers to international trade yet also avoid trade that has environmental degradation or negative social (including nutritional) effects; and
- cooperate in order to prevent disputes.

In addition to this, states should:

- promote awareness of responsible fisheries through education and training.

And aquaculture, including culture-based fisheries, should:

- be used as a means to promote diversification of income and diet; and
- use resources responsibly and minimise adverse environmental and local community impacts.

MORE INFORMATION: Australian Fisheries Management Authority, www.afma.gov.au; Sevaly Sen, 0414 344 593, sevalys@sydneyfishmarket.com.au FRDC RESEARCH CODE: 2013/023.20

private sector in their sustainable production and consumption of aquatic resources while reducing poverty and securing food and decent employment for fishers and fish farmers;

- coastal fisheries – to bring together countries, agencies and other partners at the forefront of efforts to improve coastal fisheries management and conserve marine biodiversity worldwide in a holistic and integrated way;
- combating illegal, unreported and unregulated (IUU) fishing – especially through the Agreement on Port State Measures to Prevent, Deter and Eliminate IUU Fishing and the development of the Global Record of Fishing Vessels;
- small-scale fisheries – and protecting the rights of small-scale fishers to have access to secure and just livelihoods through a Global Assistance Programme to help fisheries stakeholders around the world achieve the objectives of the small-scale fisheries guidelines;
- tackling food loss and waste – and turning fish processing by-products into products that boost nutrients for otherwise nutritionally vulnerable populations;
- supporting market access – so producers in developing countries become more competitive in international markets; and
- ensuring sustainable aquaculture intensification – so that the sector develops in a sustainable way and that planning and policies adequately integrate economic, environmental, social and governance factors.

What's next?

If we look at the changes in our capture fisheries, we see that their state is not declining as rapidly as previously and is even turning around in some cases. Drivers of over-exploitation and ecosystem degradation are being addressed through the use of better fisheries governance. Fisheries management is increasingly working to deliver social and economic benefits, improve our food and nutrition security, and make fishing and coastal communities more resilient to climate change and natural disasters.

In short, as we look to the future, we see that we have a solid framework for continuing our efforts to responsibly enjoy our wonderful fisheries resources and to ensure that we have, indeed, "fish for the future". F

*Rebecca Metzner is chief of the Policy, Economics and Institutions Branch in the FAO's Fisheries and Aquaculture Department. Jacqueline Alder is branch chief of the Product, Trade and Marketing Branch in the FAO's Fisheries and Aquaculture Department

Australian perspectives and memories on FOA Code of Conduct

INTERNATIONAL GOVERNANCE

Lessons learnt at home and overseas have helped Australia to take on the challenges of meeting international best practice for fisheries management

By Catherine Norwood

In the 1980s several of Australia's leading fisheries were near the point of collapse – Southern Bluefin Tuna, Eastern Gemfish, and Orange Roughy among them – sparking a major reform of fisheries management in Australia (and internationally).

Geoff Gorrie, who was head of the Australian Fisheries Service within the Australian Department of Primary Industry and Energy at the time, says many steps have since been taken to redress these fisheries declines.

This included Australia introducing new Commonwealth legislation as part of a nationwide fisheries management reform in the early 1990s. Geoff Gorrie says it was the first legislation in the world based on the principles of ecologically sustainable development. The reforms also established the Australian Fisheries Management Authority (AFMA) as a single, focused agency to oversee management of Commonwealth fisheries.

This early response to fisheries declines meant Australia had relevant experience to contribute to the development of the Food and Agriculture Organization of the United Nations' (FAO) Code of Conduct for Responsible Fisheries, which celebrated its 20th anniversary this year.

Australia's reforms also included the introduction of transferable quotas, in line with total allowable catches. Over-capacity in the Northern Prawn Fishery was identified, which later led to industry and government-funded buyback initiatives. Management advisory committees were also established to more closely involve the fishing industry and other stakeholders in fisheries management.

AFMA is one of the leading agencies implementing the FAO Code in Australia, and the executive manger of AFMA's fisheries management branch, Nick Rayns, says it takes the Code seriously. The principles are built into national policies and legislation, with management targets set to meet or better the Code's performance outcomes.

The FAO Code uses maximum sustainable yield as a target for fishing effort – a default to preserve 40 per cent of a fish stock's biomass. But AFMA often takes an even more conservative approach, using maximum economic yield, preserving 48 to 50 per cent of a stock's biomass. "Our aim is not to catch as many fish as we can, but to maximise the value of the fishery for Australian society as a whole," Nick Rayns says.

Stock status research

Good information on the status of fish stocks is essential to achieving this, but the required research has not happened overnight. In the 1990s Australia was commercially fishing 80 or 90 different stocks in Commonwealth waters without a real understanding of the status of most of those stocks, Nick Rayns says.

"Since then we have slowly but surely worked through almost 100 fish stocks and have good information on almost all of those to the point where they can be independently assessed," he says. This involved a huge amount of work and effort by government and industry, with up to $10 million a year spent on research.

"It has put us in the position where we have

Participants in the Ministerial Round Table on Blue Growth, held as part of the first International Fisheries Stakeholder Forum in Spain in October 2015, marked the 20th anniversary of the Food and Agriculture Organization's Code of Conduct for Responsible Fisheries.

PHOTO: FAO

"It has put us in the position where we have some of the best-managed and best-understood fisheries in the world. And it has only been possible in partnership with many people and organisations, including CSIRO, the FRDC, the fishing industry and other government agencies."

– NICK RAYNS

some of the best-managed and best-understood fisheries in the world. And it has only been possible in partnership with many people and organisations, including CSIRO, the FRDC, the fishing industry and other government agencies."

Nick Rayns says while Australia meets and exceeds the requirements of the FAO Code there is still further work to do, including efforts to reduce interactions with protected species. In July this year electronic monitoring, a system using tamper-proof onboard video cameras and sensors, became mandatory in three Commonwealth fisheries: the Western and Eastern Tuna Fisheries, and the Commonwealth Gillnet, Hook and Trap Fishery. The system will monitor catches and also interactions with protected species to verify industry logbooks.

With a longstanding involvement in the management of fisheries research, most recently as chair of the Australian Seafood Cooperative Research Centre, Peter Dundas-Smith agrees that Australia has performed well against many of the FAO Code's principles.

He says principles with an environmental focus, which have been taken up by fisheries managers as their core business are managed very well. But there remain gaps when it came to those principles with a post-harvest focus.

"There are still a small handful of principles largely relating to the product, its quality and nutritional value, marketing and trade that we don't do that well, as an industry. Fisheries management would see this as not their bag, but industry is not good at picking up these sorts of things either, and it is hard to get investment in these areas," Peter Dundas-Smith says.

Sustainability certification is one of the market trends to emerge in global fisheries during the past decade, allowing fisheries to align themselves with the objectives of the FAO Code. Certification programs use the technical eco-labelling guidelines developed to supplement the FAO Code, as well as the Code itself as the foundation for certification.

Data issues

A project to investigate what might be involved in developing an Australian Standard for responsible fisheries management is already underway. Partners in the project include AFMA, CSIRO and the FRDC. This aligns with work being also done to develop a fisheries science Standard.

Sevaly Sen, who is the lead researcher working on the project, says demonstrating that fisheries are responsibly managed is an ongoing issue. Working with Sydney Fish Market, she has evaluated the Responsible Fisheries Management (RFM) scheme – which is being used in Iceland and Alaska and other parts of the US – as a potential fit for New South Wales fisheries, which are the major source of seafood sold through Sydney Fish Market.

She says her research found that current third-party certification schemes, be it Marine Stewardship Council or RFM, work well for data-rich fisheries. However, it is difficult for small-scale and data-poor fisheries to meet their requirements, and many Australian inshore fisheries fall into this category. The search for an alternative method to independently verify that fisheries are responsibly managed continues.

It is not just an issue for Australia, Sevaly Sen says. More than 80 per cent of fisheries (by volume) around the world are not third-party certified. However, that does not mean they are all unsustainable or irresponsibly managed. The challenge is to identify ways to provide credible, low-cost and independent verification that these fisheries are responsibly managed.

She says these data-limited fisheries may need something that is fit for purpose, not a watered-down version of something that already exists to assess larger fisheries. "It's a different world they operate in. And many of these fisheries may never have the level of data we would like them to have, although technology to collect data is getting cheaper and will help.

"Going forward, we need to look at how to ensure that small-scale fisheries are not disadvantaged in the market and that these fisheries can defend their sustainability credentials when access is under threat. The FAO Code is important because it is a consensual document, and has been a guiding light. But we have to make sure it is interpreted and applied in a way that is appropriate to small-scale fisheries," she says. F

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FRDC RESEARCH CODE: 2012/508

Quick action improves fish welfare

RECREATIONAL FISHING

A proactive approach to animal welfare has developed new fish handling strategies for recreational fishers

By Bianca Nogrady

Scientists and fishers all agree it is important to minimise the stress of fish during fishing activities. This is humane and results in fish of superior eating quality.

Ensuring the most humane treatment possible has been the aim of a working group, which includes commercial and recreational fishers, vets and animal welfare supporters, which is studying the issue of animal welfare for fish.

"Our group believes welfare of fish is best served when we minimise the stress that fish go through from when they are captured until they die or are returned to the water," says Brett McCallum, chair of the Aquatic Animals Working Group, which was established by the government as part of the Australian Animal Welfare Strategy (AAWS).

The group recently delivered a report on animal welfare within the recreational fishing sector, which has taken a practical, evidence-based approach to minimising suffering – a term used in this context to mean stress – in recreationally caught fish.

An estimated 3.5 million Australians enjoy recreational fishing each year, catching more than 71 million finfish per year. It is as much a part of the Australian coastal lifestyle as prawns on the barbecue, beach cricket and sunburn.

While mammals and birds have long been the focus of animal welfare-protection efforts, fish are more challenging, says veterinarian Paul Hardy-Smith, also the report's primary investigator.

"Most people do not empathise with fish as much as they do with mammals, and while recreational fishing is widely accepted by the community, welfare concerns are nonetheless starting to surface. Paul Hardy-Smith suggests that this could be partly attributed to the popular 2003 animated film *Finding Nemo*, and its somewhat unscientific decision to give its fishy stars eyelids. "In part, by adding eyelids to fish, *Finding Nemo* got us to feel empathy for fish," he says.

In response to these growing welfare concerns, and as part of the Australian Government's AAWS initiative, the Aquatic Animals Working Group was convened. When the AAWS was disbanded, the members of the group agreed to continue on a voluntary basis to complete a series of projects funded through the FRDC.

In response to the growing interest in animal welfare, the Aquatic Animals Working Group took an inclusive and non-judgemental approach to the question of fish welfare that steered clear of the emotionally charged debate around whether fish feel pain. It has instead focused on how to treat the animals with respect, minimise unnecessary stress and maximise the outcome for the fisher.

They applied several guiding principles towards this aim:

- that live fish should be handled in such a way as to avoid damage;
- that live fish not intended for capture should be returned to the water as quickly as possible;

PHOTO:123RF.COM

- that capture methods should minimise the capture of unwanted species; and
- perhaps most importantly, captured fish should be killed as quickly and as humanely as possible after being caught.

"From an animal welfare perspective there is no downside to killing a fish quickly, in the sense that we know that when we kill the fish either by a spike to the head or a quick blow, the fish is no longer aware of anything," Paul Hardy-Smith says.

While being in the fish's best interest, this approach also benefits recreational fishers because it maximises the eating quality of the fish flesh. A fish that is left to slowly die in open air goes through physiological changes. As well as being distressing to the fish, this leads to the breakdown of cells, build-up of lactic acid and ultimately results in poorer-tasting meat.

"If you think about cattle, when a cow comes to the abattoir it is killed quickly to minimise stress on the animal, which therefore maximises its eating qualities. The same goes for fish," Paul Hardy-Smith says.

Given the intense debates and campaigns around animal welfare in other arenas, such as cattle, there has been an undercurrent of concern in the recreational fishing community about people who do not have all the facts coming in and laying down the law around animal welfare, Brett McCallum says.

"The recreational sector has recognised that it has a responsibility to address animal welfare because there's not always the perspective to maximise seafood quality when catching fish as there is in commercial fishing," he says.

A specific FRDC project trialled the guiding principles within the popular fishing tournament system in eastern Australia and received a very positive response from the recreational fishing groups involved.

As part of the process, researchers evaluated practices from a welfare perspective at two major fishing events – the Tea Tree Snapper Competition and the Mulwala Classic – as well as onboard several charter boat operations on the Great Barrier Reef, in the Northern Territory, and in estuarine and offshore Victorian waters.

For example, when surveying the Tea Tree Snapper Competition, the report examined how competitors killed their fish and how quickly. Many competitors placed their fish directly into an ice slurry after capture, thinking this was an effective killing method.

Unfortunately, research conducted on other large, warm-water fish species suggests that immediate immersion in an ice slurry may prolong death.

The survey also showed nine per cent of competitors kept the fish they caught alive in a 'livewell', tub or bucket, under conditions that often were not ideal.

"We realised the biggest problem a lot of the time was that the information wasn't out there, although many fishers really want to do the right thing by the fish," Paul Hardy-Smith says.

The initial survey of this competition was followed up by an educational campaign via presentations, mailouts, social media and online, which had a positive effect on the practices in the following year's competition. The number of people killing the fish humanely by a blow to the head or spiking increased from 34 per cent to 43 per cent. Fish were also being killed more quickly when using these methods. The number of fish killed within a minute of capture increased from 25 per cent to 36 per cent.

"Giving them the tools didn't detract from their love of fishing but heightened it and improved their eating experience," Paul Hardy-Smith says.

The Mulawa Classic cod competition presented a slightly different challenge as the fish are generally brought live to the weigh-in and then released. While most were kept in water until weighing, some were kept in nets or wrapped in wet towels or hessian sacks. In some cases they had been kept in the net for as long as 10 minutes.

Here, the aim was to educate fishers on the impact of air exposure on fish and to explore the possibility of equipping competitors with more appropriate storage options for live fish.

The group also observed that some European carp were being caught during the competition. Being considered pests, these fish were not returned to the water but, in several instances, were not killed quickly either. There was an opportunity to encourage humane killing of these fish, rather than leaving them to die slowly.

The recreational fishing sector is one of several aquatic-based sectors being explored from an animal welfare perspective as part of the Aquatic Animals Welfare Group initiative; others include commercial capture, and restaurants or retail outlets holding live fish and shellfish in aquariums.

The initiative is also looking to develop specific education materials about humane methods of killing live fish, such as spiking the brain.

"We're trying to develop the best practices being used in industry, and get those as common practice across the rest of the aquatic sectors," Brett McCallum says. "For fish being killed to eat, maximising quality of product is maximising animal welfare." F

THE IKI JIME TECHNIQUE

The technique used to kill a fish quickly with a firm knock to the head or by spiking the brain is called iki jime, pronounced 'i-ki ji-mi'. The Australian National Code of Practice for Recreational and Sport Fishing endorses these techniques.

The iki jime website (www.ikijime.com) provides details on ways to improve the handling of fish. It provides links to several smartphone apps that provide access to a database that identifies where the brain is located in many fish species, to help fishers kill their catch more quickly and humanely.

MORE INFORMATION: Aquatic Pest and Health Policy Animal Division, Department of Agriculture and Water Resources, AAH@agriculture.gov.au
FRDC RESEARCH CODES: 2012/001, 2013/414, 2014/002

Quality testing to support trade

ANIMAL HEALTH

Local knowledge and networks go a long way to providing accurate aquatic animal disease diagnostics

ILLUSTRATION: JUSTIN GARNSWORTHY

Identifying pathogens correctly is critical for Australia's management of aquatic animal health. During an aquatic animal disease emergency, reliable diagnosis is essential for a rapid and effective response, and to minimise the impact on trade and individual businesses. Reliable diagnostic testing also supports regular, ongoing aquatic animal health surveillance activities.

Australia has an effective and robust network of diagnostic laboratories, proficient in detecting exotic and endemic aquatic animal pathogens. However, sometimes biological specimens need to be sent to an overseas laboratory to help with diagnosis, as a part of collaborative research, or to contribute to international reference collections.

Working with international laboratories for infectious or parasitic disease testing can provide benefits to Australia's aquatic animal industries and scientific community.

Sending samples overseas presents some risks but state and territory governments have an agreed approach to managing these risks.

What industry has to lose

Australia is free from many of the diseases that affect other countries, which gives Australian exporters a trade advantage. Because of this, production costs and costs for export inspection and testing for diseases of concern to Australia's trading partners are lower.

Demonstrating Australia's freedom from various aquatic animal diseases supports international trade in aquatic animals and products and also justifies the quarantine policies designed to manage the risk of exotic pathogens entering the country with imported goods.

An incorrect diagnosis, or inaccurate reporting of a diagnosis, may lead to trade partners questioning Australia's disease status, potentially causing significant damage to international trade of Australian aquaculture and fisheries products.

Australia's chief veterinary officer Mark Schipp highlights the potential impact of a misdiagnosis.

"In 2012-13, our fisheries and aquaculture industry exports were worth $1.2 billion, representing half of the $2.4 billion gross value of Australia's aquaculture and commercial fisheries production. Market access for these products can take many years and significant investment to secure, but only a single piece of incorrect information to disrupt," Mark Schipp says.

"Undoing the damage from incorrect test results in overseas laboratories or the incorrect interpretation of the results can be difficult and expensive. Resolving these issues can take months or years and result in significant impacts on our fisheries and aquaculture industries."

Quality assurance

Most Australian aquatic animal disease diagnostic laboratories operate under a quality-assurance system that gives clients confidence in the reliability of their work. Laboratories may also be

accredited by the National Association of Testing Authorities, whereby they must demonstrate all relevant processes are sound, and participate in proficiency testing for important diseases, both of which provide further confidence in their results.

Additionally, Australia's laboratories work together to ensure diagnostic results are correct, and where the material produces an unexpected result, it is referred to the national reference laboratory for confirmation.

"When samples are sent to overseas labs, we may lose control of the specimens," Mark Schipp says.

"Overseas laboratories may not have the same quality-assurance systems in place that we do in Australia so the reliability of their results may be uncertain. If there are any unexpected results, we may not be able to investigate them in the same way we would if the testing was done in Australia."

He says any spurious diagnostic results could also be made public, with unfair and damaging impacts on industry.

Case study 1: Incorrect findings

John has recently started work on an Australian fish farm. When animals on the farm begin to show signs of disease, John investigates and takes some samples for laboratory testing. Having worked overseas, he recognises the signs of disease and considers it best to send the samples back to the laboratory he worked with as they have experience with what he thinks the problem is and would give him a discounted rate.

The overseas laboratory conducts testing on the samples but it does not have a quality-assurance system in place: the samples are contaminated and they mistakenly report a positive result. The laboratory thinks the results are interesting and reports the result on its public website. As a consequence, the export of fish is suspended to our major trading partners while Australia investigates the finding. John should have contacted his state chief veterinary officer before sending the samples.

Interpretation is critical

The wide availability of molecular diagnostic techniques, such as polymerase chain reaction (PCR) or DNA-based testing techniques, means that rapid and sensitive testing is now possible for many aquatic animal pathogens. Most laboratories have PCR testing capabilities because the techniques are routine and laboratory equipment is becoming increasingly affordable.

However, all diagnostic tests can produce incorrect results, including PCR tests. Good laboratories minimise the likelihood of this and investigate any unexpected results. PCR tests detect genetic material, not viable pathogens, so correct interpretation of test results is essential.

Testing laboratories must be aware of the limitations of diagnostic tests and understand circumstances where results should be disregarded or samples re-tested.

Without follow-up testing (which may not be possible in overseas laboratories due to the type or amount of samples) and the use of additional diagnostic tools to build evidence that a pathogen is truly present, incorrect conclusions can be made.

Mark Schipp says that molecular methods are very useful for detecting pathogens of interest when applied and interpreted correctly.

"Molecular methods test for small fragments of genetic material in a sample and strict laboratory procedures are necessary to prevent misleading outcomes. Incorrect results can occur for many reasons such as sample contamination or problems with test performance," he says.

"A test for one pathogen can also give a positive result for another pathogen if they are genetically similar. This can be a problem for some viruses because their genome changes over time."

Case study 2: Similar, but not the same

Australia has several endemic aquatic animal disease pathogens that are related but remain distinct from internationally reportable pathogens. Two examples are Tasmanian aquabirnavirus in Atlantic Salmon, and gill-associated virus (and other yellowhead virus complex variants) in prawns.

Nationally agreed procedures exist to ensure investigations for these pathogens follow a logical, transparent and best-practice approach before a final diagnosis is reached. In these examples, Australian laboratories accurately identified the new pathogen species or strains and could demonstrate their differences from the internationally reportable pathogens.

Without a rigorous and transparent diagnostic approach, presumptive diagnosis of a reportable disease may have led to Australia unnecessarily changing its disease status, triggering costly response actions and damaging our international trade in aquaculture and fisheries species.

Approved channels

Mark Schipp explains that government biosecurity agencies are responsible for responding to emergency animal disease incidents and managing the diagnostic testing to support their investigations. They also manage the transfer of specimens to overseas laboratories for research or routine work.

If a reportable disease is suspected, or when there is a significant disease event, by law, the chief veterinary officer (CVO) in your state or territory must be notified.

"It is crucial that aquatic animal biological specimens that need to be sent to overseas laboratories are submitted to, and sent by the biosecurity agency. A policy, developed by the former national Sub-Committee on Animal Health Laboratory Standards allows the transfer of aquatic animal biological specimens to overseas laboratories for infectious and parasitic disease testing under research and routine circumstances.

"This policy applies to all testing laboratories, research institutions and anyone who sends biological specimens sourced from Australian animals to overseas laboratories or other agencies for laboratory or consultative procedures."

The policy requires that the relevant state or territory CVO agrees to the reasons for testing overseas, and he/she must provide written approval for the transfer. The CVO must also be notified of any test results, and approve the release of any results by those who provided the samples.

Mark Schipp emphasises the need to comply with agreed arrangements.

"These arrangements ensure that aquatic animal diagnostic samples are sent through the appropriate channels, information is recorded and reported appropriately and, if necessary, further investigations take place.

"By working with state and territory aquatic animal health officers everyone can help provide industries and governments with confidence in diagnostic outcomes, regardless of where samples are tested." F

Anyone intending to send terrestrial and aquatic animal specimens overseas for disease testing should contact their state or territory animal health officer.

The **Outbreak** website (**www.outbreak.gov.au**) provides the contact details for state and territory biosecurity agencies, including reporting hotlines for aquatic animal disease.

Contributed by the Aquatic Pest and Health Policy Section, Animal Health Policy Branch, Animal Division, Department of Agriculture and Water Resources.

MORE INFORMATION: Tanya King, tanya.king@deakin.edu.au
FRDC RESEARCH CODE: 2012/402

Maritime anthropology: it's personal

PROFILE

For maritime anthropologist Tanya King, the people are the most fascinating part of a fishery

By Melissa Marino

Tanya King has always been driven by a sense of social justice. It may be why a curious contradiction in Australian culture lies at the heart of her work: why, when it comes to primary production, are fishers not held in the same high regard as land-based farmers?

Unlocking this riddle is the long-term focus of research for her work as an anthropologist, with a special interest in rural and marine communities. Far from being a purely academic pursuit, addressing this question has tangible implications in the real world for the wellbeing of fishers, their families and communities.

She says in other parts of the world, for example, in Norway and Japan, fishers are revered for their role in feeding the people. By contrast, in Australia they are often viewed with suspicion and as a threat to the natural resource rather than as its guardians.

"If they are present in the public consciousness at all it's as greedy pillagers of the ocean," she says. "This is in stark contrast to the reality in Australia where most fisheries are sustainably managed by small-scale family businesses."

Social impact

Tanya King says if fishers are not culturally valued within a society, policies around their practices, businesses and communities are less likely to support them. "If you don't culturally value something you don't necessarily protect it."

For example, in Australia, fisheries policies sometimes appear to be made "on the fly", with the goalposts changing without due consideration for small businesses and families.

An example of this is the 2014 pre-election promise of both major Victorian parties to ban commercial netting in Port Phillip Bay. The announcement was delivered with little policy detail or environmental justification and without a social impact assessment of the effect on fishing communities and families displaced by the decision, she says.

Similarly, in Queensland, netting closures were announced two days prior to the state election, and in New South Wales and Western Australia structural reforms and mooted changes are also causing ongoing anxiety. "The impact on the communities affected by those changes has been completely unexplored to this point," Tanya King says.

Like other primary producers, fishers face uncertainty from factors outside their control, such as climate and market variability. But unlike farmers they often face an extra layer of insecurity – around regulation.

"Because they don't have security of tenure or a freehold claim to the resource the way farmers do with their land, fishers are always subject to rapid regulatory changes," she says. "It makes for perpetual insecurity that is a key contributor to poor mental health."

In her role as maritime anthropologist at Victoria's Deakin University, Tanya King recently made a submission to the Victorian Government as part of a consultation process recommending that a social impact assessment be part of any significant fisheries governance decisions, such as commercial netting bans in Port Phillip Bay.

Such an assessment would help factor fishers into any equation about their future. More immediately, it would help allay anxiety generated by the lack of detail around the bans, including a start date or compensation scheme.

"Particularly when there are questions around the timing of changes or their environmental necessity, the lack of communication and consultation are key contributors to poor mental health for fishers affected," she says.

Minds matter

Tanya King's recent FRDC-funded project found that of all health and safety concerns, mental health was the biggest and uncertainty about the future was one of the major contributing factors.

This research, while identifying an important issue for fishers, also led Tanya King to a role on the board of Seafood Industry Victoria (SIV), after a director recognised the pertinence of the research and approached her to join.

As a SIV director, Tanya King says she sits in a privileged position between academia and industry – able to bridge the two by gaining insight into what the industry needs and building research parameters to back it. "Anthropological research is always a two-way street. It's very much, 'You tell me what's going on and I'll try and make sense of it'," she says.

Ways forward

With an insider's perspective, Tanya King now has the confidence to continue to explore the social impact and mental health concerns raised by regulatory changes.

"In principle, those issues have traction with the full range of industry people – from fishers to scientists to managers – everyone agrees social issues are going to need addressing," she says.

Under a new research proposal, Tanya King plans to collaborate with the National Centre for Farmer Health in Victoria to pilot the Sustainable Farm Families™ program in the fishing sector.

This program aims to improve the health, wellbeing and safety of people on-farm and it is backed by solid research. This is an example of positive government policy supportive of the agricultural sector, she says.

Other national measures, such as drought assistance, also reflect the priority governments give to ensuring the financial and mental wellbeing of farmers in a changing environment.

"It would be wonderful to see the same recognition extended to fishers who experience the same or greater trauma as a result of climate, market or regulatory uncertainty," Tanya King says.

"There is a difference between farmers and fishers in terms of attention to their health. This

PHOTO: DONNA SQUIRE, DEAKIN UNIVERSITY

Maritime anthropologist Tanya King studies rural and marine communities, looking at the social, environmental, political and economic factors that affect them.

is despite data suggesting the situation is as bad or worse in the fishing sector, and despite both industries being managed under the same government portfolio."

Meanwhile, Tanya King is also planning a national benchmarking survey to gather nationwide data on mental health in the fishing industry so clear comparisons can be made with the broader agricultural sector and the general public.

An international comparison will also be made through a partnership with the University of Exeter, Cornwall Campus, in the UK, where similar issues are being investigated.

Globally – and locally – social science and anthropological research will be as important to the survival of the fisheries sector as research into fish stocks, biota and markets, she says.

"It's an industry driven by human capital and understanding what motivates those people and what compels them to invest in a healthy sustainable industry is really important," she says. "A productive fishing industry is not just a matter of biology and economics."

The right place

From a farming family from Brimin in Victorian wine country near Rutherglen, Tanya King has always been interested in rural communities and driven by social and environmental justice. Her honours thesis looked at policies to enhance opportunities for women in management roles on farms, but she was lured to the marine sector with the chance to do her PhD on the dynamics between Bass Strait shark fishers and fishery managers. After that, she was "hooked".

"There's so much that's interesting about the industry – at the policy and the community level as an anthropologist and as someone who is concerned about the environment and social justice," she says. "Plus if I had continued working with farmers I would have married one and been living too far from the sea."

Instead, nestled in the "sleepy" seaside town of Indented Head, on Victoria's Bellarine Peninsula, Tanya King is anything but sleepy. She is raising her young family while rigorously combining her academic research with hands-on teaching as a senior lecturer at Deakin University, and building an understanding of the issues facing rural fishing families in Australia. She is also doing a law degree on the side.

Through academia, she says she has the best of many worlds. She is able to contribute to the betterment of the fishing industry without needing to be a licence holder or manager.

"All the issues are so compelling, it's amazing," she says. "I get the chance to promote biological diversity through advocating for better management practices. And I can raise issues around social justice when it comes to implementing good policy that reflect the fact that when it comes to natural resource management, people do matter." F

TAKE ACTION ON STRESS SYMPTOMS

While fishers may not be able to do much in the short term about political or resource insecurity, they can take action to address the symptoms of stress.

This includes seeking treatment from a general practitioner, a counsellor or by contacting one of the general support services such as Lifeline, beyondblue or the Black Dog Institute.

If you, or anyone you know, is experiencing signs of stress, or if you just need to talk, please contact:

- Lifeline: 13 11 14, www.lifeline.org.au
- beyondblue: 1300 22 4636, www.beyondblue.org.au
- Black Dog Institute: www.blackdoginstitute.org.au

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MODELLING SMALL PELAGIC HARVESTS 2013/028

This study undertook ecosystem and population modelling to evaluate and provide advice on the reference points (for example, biomass depletion levels) and settings (for example, exploitation rates) for the four main target species in the harvest strategy of the Commonwealth Small Pelagic Fishery (SPF) – Jack Mackerel (*Trachurus declivis*), Redbait (*Emmelichthys nitidus*), Blue Mackerel (*Scomber australasicus*) and Australian Sardine (*Sardinops sagax*).

The model found that, both singly and in combination, depleting these target species has only a minor impact on other parts of the ecosystem. Unlike some other regions, which show higher levels of dependence on similar species, the food web in southern and eastern Australia does not appear to be highly dependent on SPF target species. None of the key higher-trophic-level predators in south-east Australia, such as seals, penguins and tuna, have a high dietary dependence on these species. The findings have implications for the target and limit reference points that should be selected for the main commercial species in the SPF.

Population modelling suggests that target exploitation rates for the fishery should be species-specific and possibly even stock-specific. The results help inform the choice of suitable exploitation rates for each of the species and stocks. The base case exploitation rates that achieve this target, assuming surveys every five years, are as follows:

- eastern Redbait 9 per cent;
- western Redbait 10 per cent;
- Jack Mackerel 12 per cent;
- eastern Blue Mackerel 23 per cent;
- western Blue Mackerel 23 per cent;
- eastern Australian Sardine 33 per cent; and
- western Australian Sardine 33 per cent.

MORE INFORMATION: **Tony Smith, CSIRO Marine and Atmospheric Research, 03 6232 5372**

MARINE THREATS ASSESSED 2013/029

This study identified and prioritised marine environment and fishery threats and assessed the level of management they require. It also examined the effectiveness and ability of marine protected areas to adequately protect or ameliorate threats.

The results suggest that changes should be made to marine management and fishery management. It is evident that many of the identified threats are not best managed by marine protected areas. The main pressure on fishery resources is not from fishing at its current level but from a combination of land-based activities such as habitat destruction and the impact on water quality from industrial, agricultural and domestic activities.

MORE INFORMATION: **Robert Kearney, 02 9527 2936**

SUMMER SPAWNING SURVEY 2013/053

This study was the first dedicated application of the daily egg production method (DEPM) to Jack Mackerel (*Trachurus declivis*). It successfully collected large numbers of samples of eggs and adults concurrently from the key spawning area off eastern Australia during what has been previously identified as the main spawning period. The study established an effective method for sampling adult Jack Mackerel and provides the first estimate for this species of the adult reproductive parameters required for application of the DEPM. The spawning biomass of Jack Mackerel off eastern Australia during January 2014 was estimated to be approximately 157,805 tonnes.

This was also the first study to investigate the spawning habitat of Australian Sardines (*Sardinops sagax*) off eastern Australia during summer. It showed that during January 2014 spawning occurred between northern Tasmania and southern Victoria. The spawning biomass at this location during this period was approximately 10,962 tonnes. This estimate should be treated with caution as adult samples were not collected during the study. It is also important to note that this is not an estimate of the total adult biomass of Australian Sardines off eastern Australia. It is only an estimate of the portion of the population that was spawning in this southern part of the range during that period. The main spawning area of Australian Sardines off eastern Australia occurs off southern Queensland and northern New South Wales during late winter and early spring.

Results from the study provide insights into the catch levels that may be suitable for any developmental fishery that may be established in the Tasmanian and Bass Strait region. Egg samples collected in this and related studies (for example, FRDC project 2014/033) could potentially be used to support a cost-effective study of the stock structure of Australian Sardines off eastern Australia.

MORE INFORMATION: **Tim Ward, South Australia Research and Development Institute, 08 8358 4256**

FRAMEWORKS AND HARVEST STRATEGIES 2013/225

This project addressed one of the main shortfalls in the current Lakes and Coorong Management Plan by developing a management framework that can be used to control effort in the fishery as needed. It also addressed some of the operational constraints facing fishers including overly restrictive net entitlement transfer provisions. The results of this project will be included into the revised Lakes and Coorong Management Plan to increase certainty in the fishery, provide more flexibility in fishing businesses and assist in successful Marine Stewardship Council re-accreditation

MORE INFORMATION: **Ian Knuckery, Fishwell Consulting, 0408 581 599**

QUANTITATIVE TESTING OF MANAGEMENT 2010/023

This project used end-to-end (whole-of-system) ecosystem models to consider potential futures for south-eastern Australian marine and coastal waters under climate change. The work was part of a multi-partner collaboration formed to provide information in support of understanding and risk assessment. Membership of the group included state and Commonwealth agencies, CSIRO, the University of Tasmania and the FRDC. Together, this collaborative group developed a South-Eastern Australian Program to address adaptation of fisheries and aquaculture to climate change through coordinated action, which included social research on decision drivers, impact and risk-assessment methods.

The modelling work in this project was a means of synthesising all the available information so that potential alternative futures could be explored. The outcome of these simulations can then provide guidance for policymakers on the advantages and problems associated with a range of management arrangements and development scenarios. The models can help decision-makers understand both the form of potential changes, but also potentially resilient adaptation and management options.

MORE INFORMATION: **Beth Fulton, CSIRO Marine and Atmospheric Research, 03 6232 5018**

CLEAN AND GREEN PROMOTIONAL STRATEGY 2008/205

This project aimed to assess the viability of transferring the successful Clean Green product management system to the Queensland east coast fishery, particularly to prawns. The primary outputs of the business plan and implementation strategy will be used to achieve the expected outcome of increased prices paid for certified Clean Green Queensland wild prawns. This outcome will be achieved over an expected eight-year time frame, allowing for brand development supported by certified Clean Green fishers, processors and distributors.

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Leveraging market opportunities developed with the support of the FRDC will be an important path to adoption of the desired price building strategy. Notably, super premium markets established in the US, with funding from the FRDC and from the Australian Seafood Cooperative Research Centre, will provide valuable pathways for certified Queensland wild prawns (once the current import ban is lifted as expected).
MORE INFORMATION: **Martin Hicks, 0430 302 075**

LOW ROCK LOBSTER PUERULUS SETTLEMENT 2009/018

This project used models and a statistical analysis of environmental factors and spawning stock to understand the cause of six consecutive years of below-average puerulus settlement (including the two lowest in 40 years) in the Western Rock Lobster Fishery of Western Australia. The study identified that an earlier onset to spawning as a result of waning water temperatures and reduced winter storms provides a possible explanation for the decline in puerulus settlement in recent years.

The earlier spawning time may have caused a mismatch with other environmental factors such as peaks in ocean productivity and/or storms (westerly winds) that assist the larvae return to the coast. There may be climate change implications associated with the environmental factors (water temperature and storm activity) affecting the spawning and larval period as both these variables are showing long-term trends. The egg production is at record-high levels as a result of early management intervention to avoid overfishing the poor puerulus year classes.
MORE INFORMATION: **Nick Caputi, Department of Fisheries WA, 08 9203 0165**

PROFESSIONALISING INDUSTRY – NSW PILOT 2013/024

Addressing people-development skills and improving the profile of the fishing industry in the community are key priorities for the New South Wales fishing industry. As a direct response to these identified priorities, OceanWatch Australia developed the Professionalising Industry – NSW Pilot project, to combine people-development pathways for industry through formal best-practice training and assessment with opportunities to engage with local communities and tell their story.

The project was part of an overall FRDC strategy to improve sustainability reporting and public perception of the seafood industry. Other key components include improved management reporting mechanisms, development of a national harvest strategy, and seafood industry and retailers environmental certification activities.
MORE INFORMATION: **Lowri Pryce, OceanWatch Australia, 02 9660 2262**

OPTIMISING A NOVEL PRAWN TRAWL DESIGN 2011/209

In this project the investigators specifically propose a new trawl concept, named the 'W trawl'. This is an innovative idea for a more fuel-efficient trawl based on the current understanding of the engineering characteristics of prawn trawl systems. The W trawl has a 'double-tongue' format (tongue in both the headline and footline), and features to enhance the transfer of drag from the body of the trawl to the tongues rather than to the wings. It is envisaged that the reduction of drag transfer to the wings will make the trawl substantially easier to spread and result in smaller otter boards being required and subsequently reduced overall drag of the trawl system.

Results show that the developed small prototype W trawl effectively redistributed 64 per cent of netting-drag off the wings and onto the centre tongues, which resulted in drag savings of approximately 19 per cent for the associated W trawl/otter board/sled system compared with the traditional trawl/otter board arrangement in a single trawl or twin-rig configuration. Furthermore, based on previously published data, the new system is expected to provide approximately 11 per cent drag reduction compared with quad rig. The W trawl system also has benefits over quad rig in regards to the reduced number of cod-end/bycatch-reduction devices to be installed and maintained.
MORE INFORMATION: **Johnathan Binns, Australian Maritime College, 03 6324 9847**

FUTURE LEADERS IN RECREATIONAL FISHING 2011/403

The Future Leaders in Recreational Fishing program aimed to unearth aspiring young leaders within the recreational fishing sector who are passionate about recreational fishing and willing to contribute to the management, development, communication and extension of recreational fishing in Australia.

This project was undertaken following the delivery of successful entry-level leadership workshops by Recfish Australia in 2007, Recfishwest in 2008 and the Recreational Fishing Alliance of New South Wales in 2009. These workshops had similar structure and content, and formed the basis for the proposed workshops that were undertaken as part of this project.

In 2010, Recfishwest, in partnership with Recfish Australia, the Amateur Fisherman's Association of the Northern Territory, the Australian National Sportfishing Association Queensland, the Recreational Fishing Alliance of NSW and VRFish, undertook a project to deliver training and personal development workshops to participants aged between 18 and 35 in three regions throughout Australia. This was the first project aimed at delivering a consistent approach in leadership development workshops for the recreational fishing sector across Australia.
MORE INFORMATION: **Andrew Rowland, Recfishwest, 08 9246 3366**

SOUTHERN BLUEFIN TUNA DISPERSAL 2012/239

This project was initiated by an approach from industry in response to observed changes in spatial distribution of Southern Bluefin Tuna (SBT) in the Great Australian Bight through recent fishing seasons.

The project was a collaboration between CSIRO, the Australian Southern Bluefin Tuna Industry Association and the Bureau of Meteorology and was co-funded by the FRDC. It investigated habitat preferences of SBT in the Great Australian Bight and provides forecasts of habitat distribution to industry members to aid in their planning operations. An industry-targeted website was developed to deliver the forecasts. Feedback from industry members indicates the success of the project, with overall satisfaction with the content and delivery of information on the website being rated from 8 to 10 out of 10.
MORE INFORMATION: **Paige Eveson, CSIRO Wealth from Oceans Flagship, 03 6232 5015**

ECOSYSTEM REPORTS FOR PRAWN TRAWLING 2011/062

This Tactical Research Fund project has been undertaken by South Australian Research and Development Institute (SARDI) Aquatic Sciences in response to the Spencer Gulf Prawn Fishery's (SGPF) need for an ecosystem-based reporting framework to support ongoing Marine Stewardship Council certification.

The research team reviewed the relevant literature to identify an appropriate ecosystem-based reporting framework. They assessed the data available for the SGPF and its suitability for use in ecological assessment. The research team developed a conceptual ecosystem-based assessment framework for the fishery and highlighted the research required (for example, knowledge gaps) for full implementation. The approach developed would be of use to other prawn trawl fisheries that were seeking a transition from target-species to ecosystem-based assessments to underpin ecosystem-based fisheries management and ecologically sustainable development.
MORE INFORMATION: **Stephen Mayfield, SARDI, 08 8207 5427**

CULLING SEA URCHINS IN TASMANIA 2011/087

This report shows that systematic culling can significantly reduce the density of the Long-Spined Sea Urchin (*Centrostephanus rodgersii*) in discrete areas. The implications of these findings are that culling can be considered a viable method in

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the management strategy evaluation of controlling the deleterious effects of Long-Spined Sea Urchin.

The Long-Spined Sea Urchin has expanded its distribution southwards from southern New South Wales through eastern Victoria, the Bass Strait Islands and down the east coast of Tasmania. In some areas of Tasmania abundance of Long-Spined Sea Urchins has increased substantially, even to sufficient densities to form destructive grazing aggregations.

The research also provided costing models to estimate the direct cost of implementing a culling strategy at a range of spatial scales across the east coast and can be manipulated to provide a bio-geographically accurate estimate of cost depending on the location and size of area selected.

MORE INFORMATION: **Sean Tracey, University of Tasmania, 03 6227 7286**

DISEASE TRANSFER IN QUEENSLAND FISH 2010/034

This project has assisted in ensuring the future sustainability and profitability of the aquaculture industry and natural fisheries resources in Queensland (including the Great Barrier Reef Marine Park), by providing industry, the public, and state and Commonwealth governments with improved understanding of the occurrence of *Streptococcus agalactiae* in fish and crustaceans in coastal Queensland.

This project describes how *S. agalactiae* can be transmitted experimentally in Queensland grouper. Additionally, this research has developed diagnostic tools for Australian state veterinary laboratories and universities, which will assist in state and national aquatic animal disease detection, surveillance, disease monitoring and reporting.

Knowledge gained from this study will assist in developing biosecurity, health and disease management plans and programs relating to disease control for *S. agalactiae* in aquaculture facilities, commercial marine aquaria and live reef fish-holding facilities. The project has resulted in outcomes that support consumer confidence in the safety of Australian seafood as the *S. agalactiae* isolates from fish are genetically different from those isolated from mammals and have never caused disease in terrestrial animals to date. Outcomes of this project have assisted in protecting recreational fisheries, through improved knowledge on prevalence and distribution of *S. agalactiae* within fish species of the Great Barrier Reef Marine Park in northern Australia.

MORE INFORMATION: **Rachel Bowater, Queensland Department of Agriculture and Fisheries, 07 4760 1592**

FISHERIES MANAGERS' WORKSHOP 2013/235

A national fisheries management workshop was held at the South Australian Aquatic Sciences Centre in Adelaide on 26 and 27 March 2014, which brought together fisheries managers from all Australian jurisdictions. The workshop was conducted by the Australian Fisheries Management Forum's Fisheries Management Sub-Committee (FMSC), with funding support provided by the FRDC.

The two-day workshop was attended by more than 40 fisheries managers from all jurisdictions across Australia. The format included several keynote and national issues presentations, followed by presentations of case studies of small-scale fisheries by individual fisheries managers to highlight successes, failures and innovations.

The feedback from participants at the workshop was that they had gained significantly in their understanding of national and 'big-picture' issues, of matters around the management of small-scale fisheries, and that they now had new ideas about tools and approaches that they could use in their jurisdictions. There were also significant networking outcomes, with fisheries managers from different jurisdictions realising that there were other people around the country experiencing similar issues with whom they could discuss matters. There was also interest in holding another workshop in the next 12 to 24 months to build on the knowledge and networks arising from this workshop and to look at forming a National Association of Fisheries Managers. These matters will be fostered by the FMSC in its overarching national fisheries management coordination role.

MORE INFORMATION: **Lindsay Joll, Department of Fisheries WA, 08 9482 7319**

REFRIGERANT ALTERNATIVES 2013/227

The fishing vessels of the Northern Prawn Fishery (NPF) create one of the most demanding tasks for refrigeration equipment, this is only easily achieved using HCFC-22 (R22), a refrigerant that is on the verge of being completely phased out within a matter of years.

Further down the supply chain, the very large refrigeration system around which Sydney Fish Market is built is also at the end of its design life and reliant on more than $500,000 of the same refrigerant, HCFC-22. In addition to the logistics of replacing a working system of this size in a facility that requires operation seven days per week to maintain the stock in trade, the locality of Sydney Fish Market on the edge of the largest CBD in Australia – in the middle of an active tourism, retail and hospitality precinct – means that the use of certain refrigerants that have potential safety issues is unlikely to be acceptable, even though they may be the best technical solution for the requirements.

The proposed shift from the Australian Department of the Environment towards the use of low global-warming-potential refrigerants, such as natural refrigerants, has highlighted an urgent need to consider alternative options suitable for fishing operations in the NPF, and to review practices and system design changes that may be required.

The most efficient way for the NPF to manage the transition for the fleet is for the industry body to invest in a vessel technical standard and demonstration system. New refrigeration systems can then be ordered with delivery and installation dates scheduled for after the removal of the levy, ensuring reasonable prices are paid for gas.

As for Sydney Fish Market, it is recommended that the board consider conducting a detailed feasibility study into the design and development of an advanced HFC-134a/CO_2 cascade system. If the board chooses to embark on additional engineering, the ammonia/CO_2 system would eliminate any future scrutiny from government regulators on HFC refrigerant usage.

MORE INFORMATION: **Annie Jarrett, Northern Prawn Fishery Industry, 07 5437 0513**

SUSCEPTIBILITY TO INFECTIOUS MYONECROSIS 2011/048

This investigation has demonstrated that the two commercial species of prawns of Australian origin, the Banana Prawn (*Panaeus merguiensis*) and the Brown Tiger Prawn (*Penaeus esculentus*), are susceptible to infection with the exotic virus infectious myonecrosis (IMN).

Such information is important to policymakers, regulators and primary producers with respect to relevant biosecurity issues at all levels of government.

IMN is a viral disease that has caused significant disease outbreaks and mortalities in farmed Pacific white shrimp (*Litopenaeus vannamei*) overseas. This investigation has demonstrated that the two commercial species of prawns of Australian origin, *F. merguiensis* and *P. esculentus*, are susceptible to infection with the exotic virus IMN.The research was undertaken by the CSIRO Australian Animal Health Laboratory in Geelong, Victoria, with assistance from Indonesian scientists at the Brackishwater Aquaculture Development Center, Jepara, Indonesia.

MORE INFORMATION: **Mark Crane, CSIRO Australian Animal Health Laboratory, 03 5227 5118**

Movers and ...


Julie Haldane

After nine years and 36 editions of *FISH* magazine, we farewell FRDC assistant editor JULIE HALDANE, who retired at the end of November. Julie joined the FRDC in 2006 and commenced revamping the unassuming R&D Newsletter into *FISH*. Working with Melbourne-based company Coretext, she developed editorial processes and design standards for *FISH* that transformed it into the magazine it is today.

From writing stories, taking photographs and managing overall production of *FISH* magazine, Julie was also responsible for many other FRDC communication activities, including production of the annual report, media releases and many of the FRDC's stands at trade shows and conferences.

Julie will be kept busy building a house on the New South Wales south coast and touring the country on her much loved BMW motorcycle with her partner, Sid. She is also going to spend time in Puglia, Italy, soaking up some Salento style.

JACK ARCHER has replaced Su McCluskey as chief executive officer of the Regional Australia Institute.

Sydney Fish Market's technical and sustainability manager MARK BOULTER is the new president-elect of the International Association of Fish Inspectors. He will officially take up the role of president in 2018, coinciding with the World Seafood Congress in Vietnam.

FEEDBACK

FRDC WELCOMES YOUR COMMENTS

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MOVERS WE'VE MISSED?

INFO PLEASE TO

Ilaria Catizone, 02 6285 0445, ilaria.catizone@frdc.com.au

Calendar of events

DATE	EVENT	MORE INFORMATION
2016		
1 to 3 February	**SeaWeb Seafood Summit on Seafood Sustainability, Malta**	www.seafoodsummit.org
4 to 5 February	**Economic Advice in Fisheries Management, Malta**	www.economics-fisheries.eu/programme.html
10 to 12 February	**Species on the Move, Hobart, Tasmania**	www.speciesonthemove.com
16 to 17 February	**FRDC Board Meeting, Port Lincoln, South Australia**	02 6285 0400
6 to 8 March	**Seafood Expo North America/Seafood Processing North America, Boston, US**	www.seafoodexpo.com/north-america
26 to 28 April	**Seafood Expo Global/Seafood Processing Global, Brussels, Belgium**	www.seafoodexpo.com/global
10 to 11 May	**FRDC Board Meeting, Sydney, New South Wales**	02 6285 0400
23 to 27 May	**7th World Fisheries Congress, Busan, Korea**	www.wfc2016.or.kr/english/main/index_en.asp
11 to 15 July	**International Institute of Fisheries Economics and Trade Conference, Aberdeen, Scotland**	www.iifet-2016.org
4 to 6 August	**ASEAN Fisheries and Aquaculture Conference and Exposition 2016, Bangkok International Trade & Exhibition Centre, Bangkok, Thailand**	www.aseanfishexpo2016.com

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fishfiles

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.

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