FISH

FISHERIES RESEARCH & DEVELOPMENT CORPORATION **NEWS**

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JUNE 2018

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FRDC

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Cover: Maningrida fishers are successfully harvesting fresh seafood for local markets. Photo: Bawinanga Aboriginal Corporation

Prawn farmers regroup

Queensland's Rocky Point Aquaculture is cutting its losses after white spot disease, expanding to farm other species

By **Rebecca Thyer**

The rhythms of farming life have returned to Queensland's Rocky Point Aquaculture after a tumultuous 18 months.

This is despite the continuation of movement restrictions imposed on white spot disease-affected animals including prawns.

Instead of prawns, the Zipf family, owner–operators of Rocky Point Aquaculture, have used their knowledge of aquaculture and its business infrastructure to grow and market two new fish products, Queensland Groper *(Epinephelus lanceolatus)* and Cobia *(Rachycentron canadum)*.

The change came about fortuitously, aided by FRDC-funded research and sheer determination from the Zipf family. While still reeling from the devastation of white spot disease, Rocky Point Aquaculture was approached by Richard Knuckey about Queensland Groper (also known as Giant Grouper).

He had initially led research into the farming of Queensland Groper as part of a Queensland Government research, development and extension (RD&E) project, but this work has since been taken up by The Company One, a registered Australian company.

Richard Knuckey is general manager of The Company One and a member of the new FRDC-funded project investigating farming fish in the Logan River. He says the R&D being gathered now could potentially offer other white spot disease-affected prawn farmers a lifeline.

The company has for some time been keen to see an expansion of Queensland Groper production in Australia. "When white spot disease occurred, we had some fish here in Australia and we thought 'Let's make them available for free to affected farms'. We wanted to test if Queensland Groper could be an alternative," he says.

With strict biosecurity measures in place, prawn farmers could not grow prawns or fish in their ponds. The Zipfs, however, were in a unique position – they had a large hatchery and a land-locked saline lake, a leftover from sand mining. Queensland Groper fingerlings are now being grown indoors in the hatchery facility before being moved to the lake.

> "Although fish farming is still in its early days, it has helped the family move on from the devastation of white spot disease. It has really saved us. We have moved back to the rhythm of farming and that has enabled a sense of normality for us and our staff."
>
> Serena Zipf, Rocky Point Aquaculture

Serena Zipf is pictured above with head chef of new restaurant Donna Chang, Jason Margaritis (left), and Ghanem Group executive chef Jake Nicolson (centre). Photo: James Barnes, Destination Food

A local market for the fish has also been found for the initial offerings (see story page 5).

As well as Queensland Groper production, the Zipfs decided to try Cobia farming, and approached the Queensland Department of Agriculture and Fisheries' (DAF) Bribie Island facility.

Queensland DAF has been involved in Cobia aquaculture for more than 10 years, with initial interest in the fish coming from prawn farmers looking to diversify. Since then, north Queensland-based Pacific Reef Fisheries has collaborated with Queensland DAF on a series of projects aimed at developing a Cobia aquaculture industry,

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FRDC RESEARCH CODES: 2011-724, 2014-242, 2017-103, 2017-165

Queensland Groper is being trialled as an alternative aquaculture species. Photo: Richard Knuckey

integrated within prawn farming operations.

Queensland DAF principal scientist (aquaculture) Peter Lee says Pacific Reef Fisheries has achieved considerable success, producing 100 tonnes annually for a keen restaurant market.

However, Rocky Point Aquaculture offered Queensland DAF an opportunity – to evaluate Cobia performance in a tank-based system, a valuable addition to its existing Cobia research, which had focused on pond aquaculture. It also fit with the department's strategic aim of expanding opportunities for Cobia aquaculture in Queensland.

Peter Lee says that as well as providing fingerlings, Queensland DAF was able to bring fish aquaculture expertise to Rocky Point Aquaculture's project and provide husbandry advice and assistance with sampling and stock management.

It is too early to assess the viability of Cobia as an alternative for prawn farmers in the Logan region but the research is progressing well, he says. "We knew from earlier work that growth rates would be lower in the Logan, due to lower water temperatures, so a different model of production was needed.

"Working with Queensland DAF, Rocky Point Aquaculture developed a system of holding Cobia indoors in heated tanks for the winter, before growing them outdoors in spring, when water temperatures are increasing."

The FRDC-funded project is evaluating Cobia and Queensland Groper's performance within indoor biosecure aquaculture systems and then growing them in ponds. If the project is successful, Cobia and Queensland Groper could be overwintered indoors before being moved to ponds belonging to other affected prawn farms. "Diversification using species

→

Queensland Groper a feature for new venture

Rocky Point Aquaculture's Queensland Groper will be a special feature item for new restaurant Donna Chang when it opens its doors in Brisbane's George Street this July.

Groper will appear on menus and in the fish tanks of the Ghanem Group's latest venture, a new take on a traditional Chinese restaurant.

Ghanem Group executive chef Jake Nicolson says the fish, with its beautiful bright yellow and black markings, is a wonderful choice for the new restaurant. "It's a uniquely Queensland product, is sustainable and lends itself beautifully to the flavours of Chinese cuisine."

The product will be sold live to the restaurant and delivered daily at a size of about one kilogram. Jake Nicolson says the fish, which has a fantastic layer of fat just beneath the skin, will be cooked on a wood-fired, open grill. "We will wrap it in paperbark and flavour it using a blend of Australian desert limes, Chinese black tea, local ginger and soy (pictured above).

"It will be the essential flavours of modern Chinese cuisine, beautifully highlighted by our unique Australian ingredients."

More information: www.ghanemgroup.com.au

Above A signature dish created for new restaurant Donna Chang using Queensland Groper.

Photo: James Barnes, Destination Food

A large saline lake at Rocky Point Aquaculture now hosts Queensland Groper and Cobia, rather than prawns. Photo: Elijah Zipf

which are not carriers of white spot disease could be an alternative for these farms," he says.

While there are differences between fish farming and prawn farming, Serena Zipf says the essential 'husbandry' aspects of animal handling, behaviour, feeding and disease are fundamentally similar. "You still need to ensure that you cater to the needs of the animals you are growing and anticipate, where possible, what problems may be threatening in the future.

"Animals still need good-quality water and to be fed and checked every day to ensure their wellbeing. Once you develop a feel for what is normal for the species you are working with, the similarities between species become clearer."

The Company One's Richard Knuckey says there are some important differences between farming the different species. "Prawns are a reasonably short crop compared to fish.

"Queensland Groper juveniles are more difficult to grow and fingerlings are more expensive. The process requires more monitoring and input. But, that said, they have performed really positively."

It takes 10 to 12 months to take Queensland Groper from fingerlings to a marketable product, while Cobia take 15 to 18 months.

Serena and Murray Zipf say they are encouraged by initial results but, like any new venture, acknowledge it is a long road to success. "We have suffered setbacks and have lost some fish. For us, it's an ongoing R&D project – firstly answering 'Can we grow it?' and then, 'Can we sell it?'" Serena Zipf says. "We are still learning."

The family is investigating the steps required to take both fish operations to the next level. "We've started to build a recirculating aquaculture system. It's the logical next stage. We'd have total control over the weather, the temperature and biosecurity."

She says although fish farming is still in its early days, it has helped the family move on from the devastation of white spot disease. "It has really saved us. We have moved back to the rhythm of farming and that has enabled a sense of normality for us and our staff." F

FAMILY HISTORY IN AQUACULTURE

The Zipf family has 150 years of farming history in south-eastern Queensland. With 52 hectares on the Logan River, they were first small crop farmers and later cane farmers. For the past 30 years the family's Rocky Point farm has produced Brown and Black Tiger Prawns and *Japonicus* prawns for sale as grown and larval products.

In 2016, the outbreak of white spot disease again led the Zipfs to consider alternative crops.

White spot disease was first detected in Queensland in October 2016 and confirmed the following month, when seven Logan River prawn farms tested positive for the disease. The highly contagious virus affects crustaceans and in overseas incidents it has reduced prawn farm productivity by up to 40 per cent. Until 2016 Australia had been one of only two major prawn-growing countries free of white spot disease.

Failed import biosecurity measures led to huge quantities of white spot disease-infected raw prawns being sold in supermarkets, according to a report released late in 2017 by Australia's inspector-general of biosecurity, Helen Scott-Orr.

The result for prawn farmers was dire. Strict biosecurity measures saw authorities kill prawns on all seven farms in the Logan River region, and ponds emptied. The Commonwealth Government provided more than $20 million to assist prawn farmers.

Although the Zipfs' hatchery was not contaminated, its location within the 'hot zone' meant all movement of prawn larvae to areas outside the control zone was banned.

At the time, the hatchery accounted for 60 per cent of Rocky Point Aquaculture's business. "We had $250,000 worth of hatchery product to go to the NSW Department of Primary Industries the next day, but because of restrictions we could not sell them – even though nothing was wrong with them," Serena Zipf says. Instead, the larvae were destroyed.

The cost to the prawn industry as a whole has been enormous, with production losses alone estimated at more than $25 million.

Serena Zipf says that for Rocky Point Aquaculture a prawn production future is slim. "History shows that once this disease hits, it spreads across the country. Our saving grace could be that the biosecurity response was unprecedented. It gives us a glimmer of hope (that prawn farming could be viable again)."

New state fisheries ministers

In Tasmania, Sarah Courtney (above) has been appointed as Minister for Primary Industries and Water in the Liberal government under Premier Will Hodgman. Elected as the Member for Bass, she previously worked in the finance industry before establishing a boutique vineyard in the Tamar Valley.

In South Australia, the new Liberal government under Premier Steven Marshall has appointed Tim Whetstone (below) as Minister for Primary Industries and Regional Development, which includes fisheries.

Tim Whetstone is the Member for Chaffey in SA's Riverland. Before entering parliament he was a grape and citrus grower, a director of the Renmark Irrigation Trust and chair of South Australian Murray Irrigators.

Seafood and fisheries training review

Low enrolments during the past three years have put more than 50 training units in the Seafood Industry Training Package on the list for deletion unless industry feedback demonstrates an ongoing need for the skills.

The list includes subjects such as operating a hatchery, working with crocodiles, supporting a diving operation, and constructing and customising net design.

Skills Australia is reviewing and redrafting the Seafood Industry Training Package. The 12 qualifications, 13 skill sets and 104 units of workplace competency are related to the following occupations: aquaculture specialist/manager, fish farmer, hatchery manager (fish), mussel or oyster farmer, commercial diver, deckhand, senior deckhand, fisher, boat captain, general hand or field hand, and leading hand.

A review of post-harvest training includes eight qualifications, one skill set and 49 units of competency. Related occupations include seafood/fish processor, factory hand, process worker, seafood/fish packer, seafood/fish seller, seafood/fish transporter, store person/assistant/manager, team leader, compliance manager, marketing manager, and new technology/automation specialist.

Revisions will address changes in processing, distribution, storage, fishing and environmental management.

Redrafted qualifications are expected to be available for stakeholder comment during July and August 2018. The review process is being managed by Skills Impact and led by the Aquaculture and Wild Catch Industry Reference Committee chaired by Johnathon Davey.

Register your interest or provide feedback at the Skills Impact website (www.skillsimpact.com.au/aquaculture-and-wild-catch/training-package-projects). F

More information: Danni McDonald, dmcdonald@skillsimpact.com.au

Save the date

On 19 October 2018 the Women's Industry Network Seafood Community (WINSC) will celebrate its 20th anniversary at the Hilton Adelaide.

The event will also mark the launch of a new honour roll to recognise the contribution of significant women in the Australian seafood sector.

WINSC had its beginnings in the Women's Industry Network in South Australia, established in 1996, and was established as a national organisation with state branches in 1998. It provides a unique network that encompasses commercial fishing, aquaculture, research, processing, policy and resource management.

WINSC works to support and build the capacity of women and their ability to contribute to the future of the seafood sector.

More information: Karen Holder, 0407 618 659, dkholder2010@gmail.com

Fighting food waste

The seafood supply chain is expected to benefit from the efforts of the Fight Food Waste Cooperative Research Centre (CRC), which was officially announced in April and will begin operating on 1 July 2018.

In Australia an estimated 35 per cent of harvested seafood becomes waste. The Fight Food Waste CRC has won $30 million funding from the Australian Government's CRC Program, which has an estimated $133 million of funding over 10 years. It aims to tackle the growing international problem of food waste by reducing food waste throughout the supply chain, transforming unavoidable waste into innovative high-value co-products, and engaging with industry and consumers to deliver behavioural change. It will take a triple-bottom-line approach to preventing and transforming food waste and developing the circular food economy.

More information: Steve Lapidge, steven.lapidge@sa.gov.au

ECOLOGY

Handfish
Photo: Antonia Cooper

SECOND RED HANDFISH POPULATION FOUND

Divers from the Institute for Marine and Antarctic Studies in Tasmania and the citizen science project Reef Life Survey (RLS) have discovered a new population of what is believed to be the world's rarest fish. Until early this year, only one population of Red Handfish (*Thymichthys politus*) was known to exist, comprising 20 to 40 individuals.

The newly discovered population also comprises an estimated 20 to 40 individuals and is several kilometres away from the previously known population in Frederick Henry Bay, off the south-east coast of Tasmania. Discovery of this new population means there is potentially a bigger gene pool for the species and a greater likelihood of the existence of other populations.

Each of the population sites covers just 50 metres by 20 metres – about the size of two tennis courts; the range of the handfish is limited by the fact it walks on the seafloor instead of swimming.

Management options are being developed for the new Red Handfish site. The handfish survey work is supported by NRM South and the Australian Government-funded National Environmental Science Programme Marine Biodiversity Hub.

More information: http://reeflifesurvey.com; www.nrmsouth.org.au; www.nespmarine.edu.au

BREAKTHROUGH

PLASTIC-EATING ORGANISMS

Australian research investigating plastics in the marine environment has found that Antarctic krill, which are the foundation of the ocean's food chain, can physically break down the microplastics they eat and excrete them back into the environment in a much smaller form.

Experiments at the Australian Antarctic Division's krill aquarium were led by Griffith University's Southern Ocean Persistent Organic Pollutants Program and published in *Nature Communications* in March.

Australian Antarctic Division krill ecologist and research co-author Dr So Kawaguchi says more information is needed to understand the implications of this new pathway for microplastics to interact with the ecosystem.

Meanwhile in the UK, scientists at the University of Portsmouth have engineered an enzyme that can digest and transform polyethylene terephthalate (PET), commonly used in plastic bottles, which otherwise persists for hundreds of years in the environment.

During their research to understand the workings and structure of PETase – a naturally occurring enzyme that digests PET – they inadvertently engineered an enzyme that is even better than the naturally occurring enzyme at degrading the plastic. Scientists are working on further improvements to allow the enzyme to be used industrially to break down plastics in a fraction of the time.

This research was led by teams at the University of Portsmouth and the US Department of Energy's National Renewable Energy Laboratory and published in *Proceedings of the National Academy of Sciences of the United States of America*.

More information: www.marinedebris.engr.uga.edu

TECHNOLOGY

TRACING LOST GEAR

Abandoned, lost or discarded fishing gear is a serious issue in our oceans. Although the exact volume of lost gear is not known, it is estimated 640,000 tonnes of commercial fishing gear disappears into the ocean each year.

Global Ghost Gear Initiative has developed the Ghost Gear Reporter app for smartphones to report the details and location of lost gear, much of which is found washed up on the shoreline or on the seabed. The app can be used to report:

- fishing gear location;
- activity being undertaken when 'ghost' gear was found;
- details about the gear;
- images of the gear; and
- any wildlife that may be caught in the gear.

This information is passed to local conservation groups, which can recover the gear. The information also contributes to a global effort to study and better understand the issue (see page 28).

The Ghost Gear Reporter app is free to download for users of both Android and iOS.

WORD WISE

'Natural' jellyfish have deadly potential.

'NATURAL'

An assumption is often made that 'natural' means good; it is used to denote the intrinsically healthy or beneficial qualities of a product or substance.

Conversely, 'unnatural' is used as a stand-in for harmful or unhealthy.

But what 'natural' actually means is that something exists in nature. Plenty of what exists in the natural world is harmful to human beings. Hemlock, arsenic and irukandji jellyfish are all naturally occurring; all have deadly potential.

MORE INFORMATION
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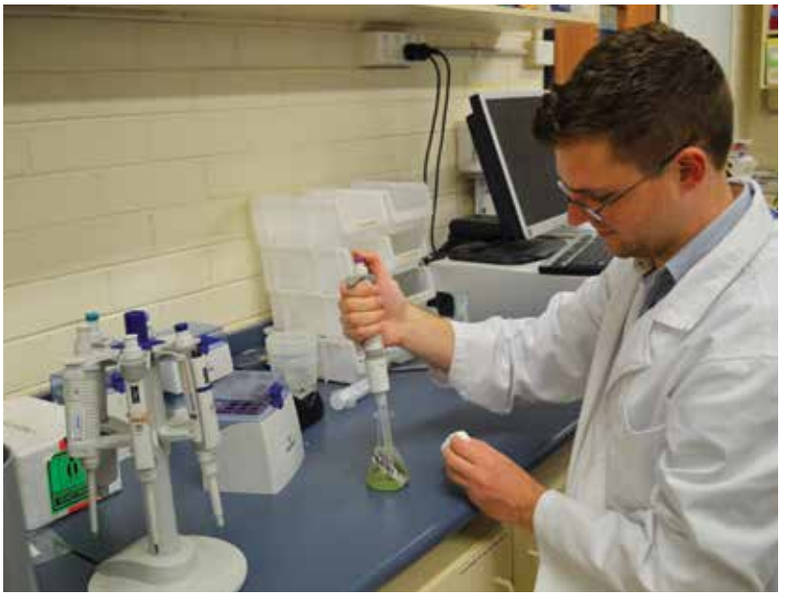
FRDC RESEARCH CODE: 2008-339



Far left FRDC executive director Patrick Hone (left) with fisheries science award winner Dale McClure at the Australian Bureau of Agricultural and Resource Economics and Sciences 2018 Outlook conference. Photo: Steve Keough

Left Dale McClure working with algae in his laboratory. Photo: courtesy Dale McClure

Just add algae

Aquaculture farmers may be able to turn their wastewater into a new income stream by producing high-value nutraceutical compounds

By Andrew Cooke

Kicking around ideas with colleagues at the University of Sydney, chemical engineer Dale McClure saw potential for growing microalgae in the nutrient-rich water left over from intensive land-based fish farming.

The project that evolved from this brainstorming session has now won him an FRDC-supported science and innovation award, which was presented by the Australian Department of Agriculture and Water Resources in March and includes $22,000 funding for further research. The awards are announced at the ABARES Outlook conference.

Dale McClure's idea has the potential to provide a lucrative new income stream for fish farmers, using wastewater as the basis for growing algae that produce high-value pharmaceutical or nutraceutical compounds.

Dale McClure says the initiative largely grew out of conversations about industrial biotechnology projects.

"The point is to take something that is a waste product and see if we can do something a bit more valuable with it."

He says algae company MBD Industries is already using algae to remediate wastewater at prawn farms in northern Queensland, but his idea focuses on the production of high-value compounds.

"We are most interested in making vitamins and higher-value products that can be put into nutraceuticals or foods."

One such product is vitamin K1, which is important for blood clotting and is thought to help with osteoporosis and other bone diseases. This is currently manufactured chemically, but algae can be used to produce a natural source of it.

Vitamin K1 and another target compound, the weight-loss pigment fucoxanthin, are highly sought after by the pharmaceutical and food industries and can be worth more than $10,000 per kilogram.

"In the lab, we have done a bit of work to select the best algae species. We have worked out ways to prepare it so we can go from a little bit in a tube to enough to feed the process. That's all doable.

"We have a few things running in the laboratory at a 50-litre scale," he says. "They are going well at the moment, and what we would like to do is take some of them out of the lab and put them into a fish farm or somewhere outside and see how they go.

"We want to see what opportunities there are to commercialise or do something with the technology. We would be interested in chatting to anyone (in aquaculture) who is interested."

He says it could reduce the costs of treating water, and may allow farmers to operate relatively low-cost and low-maintenance tanks to generate another product and diversify revenue.

Dale McClure is not sure how far away commercial application of the process might be, because the red tape "can be tricky", but is confident he is ready to start testing on-farm. F

THE AWARDS

Each year the Australian Department of Agriculture and Water Resources and its award partners present the Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry. The Science and Innovation Awards are a competitive grants program that provides funding for innovative research projects to benefit Australia's rural industries.

MORE INFORMATION
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FRDC RESEARCH CODE: 2017-184

Batter at the ready: fish 'n' chippers get set to be the best

Building on momentum from last year, the 2018 national Fish and Chips Awards kick off in August

The FRDC will again run the competition to crown the makers of Australia's best fish 'n' chips in 2018, following enormous support for last year's awards from consumers, shop owners and industry members.

"The event in 2017 proved very successful – it exceeded everyone's expectations," says Peter Horvat, the FRDC's general manager of communications, trade and marketing.

"This was in part because the awards coincided with the state and territory seafood awards as well as the biennial national conference, Seafood Directions," Peter Horvat says. "Ultimately, we were encouraged to build on the momentum from last year and continue the awards.

"We began the awards to try to educate consumers on the sustainability of the Australian seafood industry and where their seafood comes from," he says. The 2017 awards gave the FRDC access to a large number of consumers interested in receiving more information on seafood. This year the awards will provide further opportunity to push important sources of information such as the Status of Australian Fish Stocks Reports.

There will be a People's Choice and a Judges' Choice winner in each state and territory. However, only the judged category winners will go on to compete for the title of Australia's Best Fish and Chips 2018.

The fish 'n' chippers selected for judging will be based largely on the votes garnered, so fish 'n' chips shops and consumers are urged to vote for their favourite via the awards website (www.fishandchipsawards.com.au).

The FRDC has made three key changes to address issues identified last year.

2018 Judging Criteria

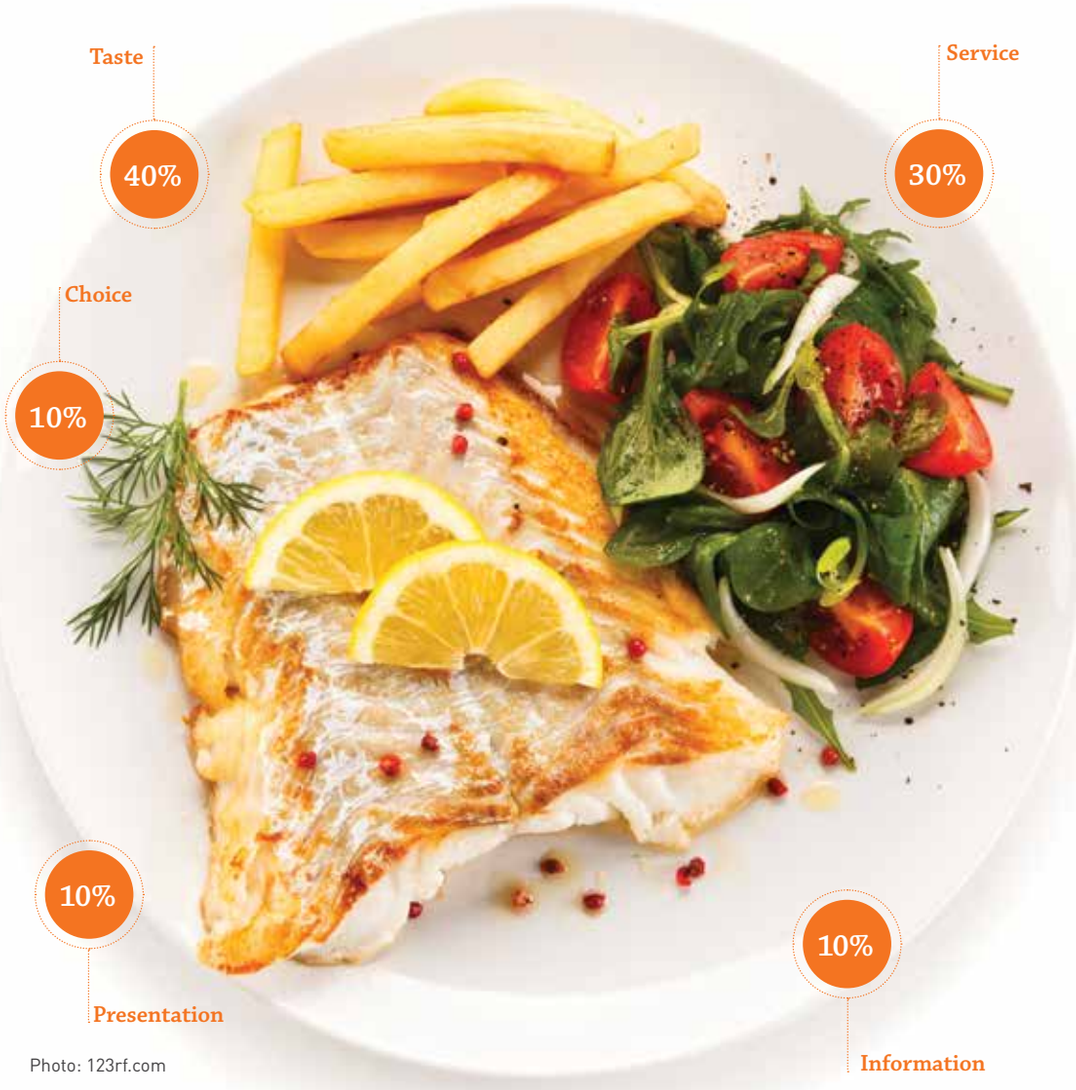


Photo: 123rf.com

A national vote
Voting for the awards will begin on 1 August 2018 in all states and territories and will run for six weeks. The consistent timetable across the country addresses confusion caused by different dates in different jurisdictions in 2017.

Verifying votes
The online voting system will require those voting to verify their email address, to ensure votes are genuine. This follows concerns about the potential for fake votes. Any vote not linked to a verified email address will be removed from the tally.

Make a case
Shops will be able to submit an online application to be evaluated for the Judges' Choice awards rather than relying solely on votes from customers. Last year several smaller shops in regional areas felt they were disadvantaged over stores in more populated areas, which had high customer traffic. To address this, the FRDC will trial a two-tiered approach that will allow judges to assess a business with a lower number of votes if the submission from the business suggests this is warranted.

Judging criteria

The verifying of votes for the People's Choice Awards, and judging for the Judges' Choice winners, will begin on 16 September, once voting has closed. Winners will be announced in early October.

The Judges' Choice Awards will be overseen by an anonymous panel of judges who will visit the businesses that achieve the greatest number of votes across Australia (or which make an outstanding submission for judging).

The judging criteria have also been updated to reflect feedback. The information and labelling categories have been merged, while a presentation category has been added – how the seafood is presented and how the shop looks. All businesses will be assessed against the same criteria.

The scorecard

Taste 40%: Does the seafood taste good? Cooking method will be key here – using the right approach for the right fish and doing it well to make your seafood sing.

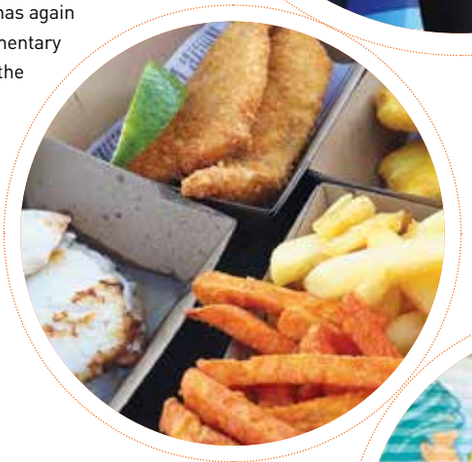
Service 30%: Does the service meet customer expectations? Everything from the welcome to the goodbye is important.

Choice 10%: Does the menu offer customers options? The diversity of seafood, cooking methods and batter styles will count.

Information 10%: Are customers provided with accurate information about the source and qualities of the seafood? The menu must comply with the Australian Fish Names Standard and accurately label the seafood's provenance to a national level, or better.

Presentation 10%: Is the store clean and inviting? Is the food packaged well to maintain quality? F

Right Senator Anne Ruston, the Assistant Minister for Agriculture and Water Resources, will continue her support as the patron of the awards. Senator Anne Ruston has again challenged her parliamentary colleagues to support the awards and their local fish 'n' chips shops. Stand-out efforts last year included the Member for Gippsland, Darren Chester, who got right behind his local businesses.



Last year's winners

National Fish and Chips Awards
Frying Nemo, Darwin, Northern Territory

State and Territory People's Choice Award winners

ACT	Hughes Takeaway, Canberra
NSW	Terrigal Beach Fish & Chips Co, Terrigal
NT	Jetty and the Fish, Darwin
QLD	The Great British Fryer, Sunshine Coast
SA	Dolphin Fish Shop, Netley
TAS	Tasmanian Gourmet Seafoods, Cambridge
VIC	The Kingfisher Blue, Wheelers Hill
WA	Ocean and Paddock, Albany

State and Territory Judges' Choice winners (National Fish and Chips Award finalists)

NSW	Pelican Rocks, Greenwell Point
NT	Frying Nemo, Darwin
QLD	The Great British Fryer, Sunshine Coast
SA	The Stunned Mullet, Henley Beach
TAS	Tasmanian Gourmet Seafoods, Cambridge
VIC	Trident Fish Bar, Queenscliff
WA	Ocean and Paddock, Albany

Above
Winner of the 2017 Best Fish and Chips Award, Eddie Willoughby-Smith, Frying Nemo, Northern Territory. Photo: Michael Costa
Above left (from left) Grilled Jewfish, Crumbed Threadfin and Battered Barramundi, from Frying Nemo, Northern Territory

For more information on the Fish and Chips Awards visit the website (www.fishandchipsawards.com.au) or sign up to the Fish and Chips Awards Facebook page (www.facebook.com/catchoftheyear).

Don Wilton with a great catch at Nardilmuk. Photo: Bawinanga Aboriginal Corporation

On-country fishing brings broader benefits

Fresh food and community pride are two of the benefits that come with the opportunity to expand fishing activities for the Northern Territory's remote coastal Indigenous communities

By **Annabel Boyer**

In July 2017 a group of Indigenous fishers from the remote community of Maningrida made their first sale of fish to Darwin – a catch of mullet. The sale was made possible by recent changes to Aboriginal Coastal Licences in the Northern Territory that allow Indigenous fishers to sell their catch into markets beyond their own communities.

Licence changes bring new business and employment opportunities, along with new sources of fresh food for remote communities, many of which struggle to secure high-quality supplies and adequate protein.

The High Court's 2008 Blue Mud Bay decision was the catalyst for the licence changes. It recognised that indissoluble, communally held 'Aboriginal Land' extended to the mean low-water mark. Access to the area between low and high tide, known as the 'intertidal zone', is now regulated by traditional owners and the relevant land council.

Negotiations over access subsequently revealed the depth of interest in commercial fishing operations in coastal Indigenous communities.

The Northern Territory Government committed to changes to coastal fishing licences in the wake of the Blue Mud Bay decision and these came into effect in 2015. By late 2016 local communities were beginning to act on the new opportunities.

Licence changes

Previously, just one licence was available in each Indigenous community and the catch could only be sold within that community. Now there can be more than one licence holder and the catch can be sold commercially to markets further afield.

The total allowable catch for each licence is five tonnes a year, but no one has so far reached that limit. Licence holders can target mullet, Blue Threadfin, queenfish, Milkfish, trevally and reef fish such as cod, parrotfish, Coral Trout and snapper.

Licence holders cannot target managed species, such as barramundi, Spanish Mackerel, King Threadfin, Mud Crab or Sea Cucumber (although

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Left Jimmy Olsen, Stuart Yirawara and Don Wilton pull a net in. **Below left** Jimmy Olsen sells Mullet at the Thursday night market. **Below** Jack Doolan and Sonia Kurrkmarra practise net mending. Photos: Bawinanga Aboriginal Corporation

"There is a lot more market need in those remote communities than in Darwin, as many remote communities are too far from the coast to catch their own fish, and have a need for fresh and affordable sources of protein."
Matt Osborne

allowances are made for incidental catch), and cannot fish in reef-fish protection areas.

The new licences also allow fishers to combine traditional fishing practices and modern techniques. As well as net and line fishing methods, traditional fish traps can be used, along with scoop nets, hand lines and hand spears. Allowable net lengths have been increased from 16 to 100 metres.

At Maningrida, 500 kilometres east of Darwin, there are now three fishers with Aboriginal Coastal Licences – Don Wilton, Stuart Yirawara and Jimmy Olsen.

Don Wilton says he fishes three days a week, taking seven or eight of the younger members of the community out with him. He acts as a mentor for their entry into the seafood industry and the boys are encouraged to participate in the Community Development Program fishing activity, which provides small increases to their welfare payments in exchange for participation.

Across the Northern Territory, from Borroloola in the east to Wadeye in the west, there are about 20 licences operating. Aboriginal coastal licence holders in Wadeye, the Tiwi Islands and Nhulunbuy are supplying their local markets while also looking to increase catches and expand sales.

However, doing so is not just a matter of catching more fish. Remoteness and lack of infrastructure make storage difficult, and meeting market requirements, packaging and logistics make it a challenge to establish consistent supply of product.

Remote challenges

Fundamental issues that come with remoteness include availability of materials and the lack of reliable essential services.

Currently, the Maningrida fishers transport their fish to market in the equivalent of a one-tonne esky. With funding from the Northern Territory Government, two shipping containers have been fitted-out to help the fishers. One has a dedicated ice machine. The other has been modified for fish processing, and meets the accreditation requirements to process fish for sale. Processing of fresh catch and is expected to begin this year.

Clément Bresson is the enterprise development manager for the Bawinanga Aboriginal Corporation in Maningrida, which has been providing support to the community's fledging commercial fishing operations.

"Sending the fish by road in the dry season is straightforward, and we are able to sell to neighbouring communities, but during the wet season these roads are closed, requiring us to barge our catch to Darwin. This takes up to four days and makes it a lot harder," he says.

He says selling to local communities is definitely the preferred option for Maningrida fishers: "Community members love buying fresh fish; the support has been very good."

The manager of aquaculture and Aboriginal business development for the Northern Territory Department of Primary Industry and Resources, Matt Osborne, says the increasing number of licences has had a

Below Graduation ceremony for the Certificate II in Fishing Operations delivered by Chris Francis from the Australian Maritime and Fisheries Academy supported by Klaus Jeffrey from NT Fisheries. Photo: Simon Rodgers

Below Gavin Ankin and Hans Lawrence catch some fish. Photo: Bawinanga Aboriginal Corporation

positive impact on community cohesion.

"More licences have resulted in a culture of collaboration, with fishers working together to fish," he says.

Fresh food

Fish have been sent from Maningrida to Darwin twice, with more shipments planned. But a higher priority for many is the opportunity to provide more fish to remote communities as a source of healthy and fresh protein. So far, the communities of Gunbalanya and Ramingining have received Maningrida catch.

"There is a lot more market need in those remote communities than in Darwin, as many remote communities are too far from the coast to catch their own fish, and have a need for fresh and affordable sources of protein," Matt Osborne says.

While doing this is still some way off, Matt Osborne says there are already tangible benefits occurring in communities where the Aboriginal Coastal Licences are active.

"Both anecdotally and from logbook returns we can tell that more fresh fish is being sold in these communities. The availability of fresh and affordable fish is an extremely positive development."

Sharing the costs of the new equipment and fuel required for the increase in fishing effort has been important in helping the fledgling fishing businesses to develop, establish and thrive. A joint approach has also helped to make the most of other resources, such as mentoring opportunities, infrastructure and administrative support, as the fishers work their way towards becoming independent, sustainable and financially viable operators.

The Bawinanga Aboriginal Corporation has provided important support in these areas, including help with grant applications. Matt Osborne says Northern Territory Fisheries is keen to replicate the model of support and fishing established within the Maningrida community.

Support and training

Northern Territory Fisheries manages the Aboriginal Coastal Licences and also delivers two support programs, the Aboriginal Fishing Mentor Program and the Indigenous Marine Training Program. Matt Osborne says the mentorship and training programs are just as important as the changes to the licence.

Indigenous Northern Territory Fisheries officers act as mentors to help fishers learn how to operate commercially in their communities, including how to maintain gear, how to process and store catch, and how to comply with fisheries regulations.

The Indigenous Marine Training Program formalises the skills and training provided through the delivery of nationally accredited training to participants. More than 45 participants have completed a Certificate II in Fishing Operations, which is delivered by Northern Territory Fisheries in partnership with the Northern Territory Department of Trade, Business and Innovation and the Australian Maritime and Fisheries Academy. The success of the program saw it awarded the 2017 National Seafood Industry People Development Award.

Many of those who fish with licence holder Don Wilton will soon complete a filleting course in preparation for getting processing underway in the community. Don Wilton completed that same course in 2015.

Clément Bresson says the licence changes are bringing positive changes for people in the Maningrida community, who are excited to be accessing their resources.

"It is providing people with the opportunity to learn and take a further step towards applying for commercial licences. There is pride in the fishers and in the community in their fishers. By helping people to supplement their income and provide fresh fish it helps them to stay on country," he says. F

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FRDC sponsors innovation competition

Fostering innovation and greater productivity in Australia's fishing sector is the aim of an event that connects innovators with the investment to make their ideas a reality

Improved catch methods, aquaculture innovation and new seafood products are among the focal points of a new Australian track of the 2018–19 international Fish 2.0, which brings together entrepreneurs and investors to identify and accelerate sustainable seafood business opportunities.

The FRDC's Peter Horvat attended the most recent Fish 2.0 event, held at Stanford University in California's Silicon Valley, to scope out the potential for an Australian event. He was excited by what he saw: 40 finalists, who rose to the top from 184 applicants, pitching their sustainable seafood ventures to more than 200 potential investors and industry experts. One finalist was Australian Thomas de Kock from Tuna Solutions, which is developing an online tuna marketing and trade platform. Others innovations pitched included ventures that improve transparency in supply chains, provide new seafood snack foods, farm and market oysters, and develop new fish feeds, among the innovations.

Fish 2.0 was founded in 2013 by Monica Jain and Remy Garderet to create a network of entrepreneurs and investors who could grow the sustainable seafood sector. The Fish 2.0 network has seen explosive growth since then, and now includes more than 400 entrepreneurs, 300 investors and 40 sponsors, all making connections that enable regional and global expansion of the sector.

"Fish 2.0 has grown enormously since 2013, but we're still just scratching the surface," Jain Garderet says. "We had 40 exciting entrepreneurs on stage at the 2017 Innovation Forum, and we know there are many more potentially market-moving businesses in Australia and elsewhere."

Fish 2.0 in Australia

The 2018-19 Fish 2.0 Australia track will be open to ventures across Australia including those that are working on innovations in the following areas:

- aquaculture production and technologies, including new fish feeds and disease control;
- changing and improving seafood supply chains;
- new seafood products for consumers;
- sustainable packaging and logistics, and reducing waste in seafood supply chains;
- traceability and transparency;
- wild-capture fisheries technologies supporting sustainability or fisher safety; and
- algae and pearl farming.

The Australia track will launch with an in-person workshop in October for entrepreneurs and an investor networking event. Participants – as well as all other qualifying Australian seafood ventures – will then be invited to apply for the 2019 competition.

The competition will be conducted online up to the final events. It has several stages, and at each one, participants will receive invaluable feedback from investors and sustainability advisers on how they can improve their business model, practices and prospects for investment. The top-scoring ventures will be invited to present live to investors at events in Australia and in the US. There is no cost for ventures to participate, but they must apply and be invited to attend.

Investors also gain from participating in Fish 2.0: they get early insights into sustainable seafood trends and opportunities, gain access to companies that are ready for investment, and meet co-investors who are interested in the seafood sector.

Research priority

In 2018, the FRDC will support the Fish 2.0 event in Australia. The goal will be to improve the value of sustainable seafood ventures, create regional and international connections among enterprises that help ventures grow and to demonstrate a range of attractive opportunities to interested investors.

The FRDC is interested in Fish 2.0 as a way to link R&D solutions with alternate funding models that accelerate products to commercialisation. This will come about through people applying to the competition with ideas that respond to sector needs and deliver through research, development and extension.

This is in line with the FRDC's Research, Development and Extension Plan 2015–2020 national priority two: 'Improving productivity and profitability of fishing and aquaculture'.

The FRDC has also invested in the Fish-X program, which takes a similar approach to helping stakeholders with their approach to business and problem-solving (see pages 30 and 31). F

To learn more about Fish 2.0, contact Peter Horvat (as above) or sign up to info@fish20.org.

Fisher takes on ocean workplace safety

Marine safety and welfare are crucial in bringing fishers home to their families

By **Annabel Boyer**

Port Phillip Bay
Photo: FRDC

Queensland's Joel Feeney has been diving commercially for 20 years, and his life has twice been touched directly by the tragedy of losing people he loves to workplace accidents at sea. It has made him determined to improve safety for those who face the dangers of the ocean every time they go to work.

In October last year the *FV Dianne* went down in rough weather off the coast of central Queensland, taking most of its crew with it, including Joel Feeney's brother, Zac Feeney, who was a also a diver.

Three years ago, in 2015, Joel Feeney also lost a close friend when the *FV Returner* sank off the coast of the Pilbara, in Western Australia.

It is a story that is all too common in Australia's small commercial fishing sector. In the past five years 21 people have died, making fishing the most dangerous job in the country.

For Joel Feeney and his sister Jackie Perry, the loss of their brother has provided a call to action to help make sense of his death, and to drive change in the sector and prevent further deaths.

While fishing is a dangerous occupation, that risk is compounded by the poor culture of safety within the commercial fishing sector.

Joel Feeney recognises that the sector still regards safety as a cost rather than an investment, but says the challenge is two pronged.

Fishers are unlikely to adopt anything that adds to their costs. There is also a fundamental lack of trust between the fishers and the authorities touting safety regulations.

He believes his story, coupled with his experience in the commercial fishing sector, gives him credibility with fishers, which he hopes will help to overcome distrust and to effect substantive change.

Improved alerts

Joel Feeney is in talks with the Bureau of Meteorology (BoM) to develop an alert system for dangerous weather conditions. He says while BoM produces forecasts, what is lacking is an alert system to deliver information when and where it is needed.

"What I'm trying to do is bring in changes that have little to no cost associated, because if there is any cost then most fishers are not going to make the change."

He says one reason for the lack of trust between fishers and authorities relates to the use of vessel monitoring system (VMS) data, which tracks the whereabouts of fishing vessels as part of fishing compliance monitoring. The authorities that hold this data do not actively use it as an alert system for fisher safety. Instead it is used

Joel Feeney is advocating for the development of alert systems that can put relevant data into the hands of those who will take action quickly, such as fishers and their families.

retrospectively; for example, to find a capsized vessel once an accident has already occurred. In the case of the *FV Dianne*, the rescue effort was set in train only once the sole surviving crew member was rescued by a passing yacht. The VMS signal had stopped transmitting many hours before.

Joel Feeney is advocating for the development of alert systems that can put relevant data into the hands of those who will take action quickly, such as fishers and their families.

The lack of workplace statistics that look specifically at the commercial fishing sector compounds the difficulty of making safety a priority. Safe Work Australia, for example, combines data from commercial fishing with land-based agriculture and forestry sectors. The combined fatality rate is 14 deaths per 100,000 workers, with 418 workplace fatalities recorded from 2007 to 2016. But it is difficult to know how many of these fatalities came from the fishing sector.

National initiative

Putting marine safety front and centre, the FRDC is set to launch its new National Research, Development and Extension Marine Safety and Welfare Initiative, working with industry partners such as Austral Fisheries and the Western Australian Fishing Industry Council.

FRDC's executive director Patrick Hone says the new initiative will be ambitious, with a goal of zero deaths, an 80 per cent reduction in injuries and 100 per cent compliance with safety regulations.

"I ask our stakeholders to hold the FRDC to account. If you see or hear anything that FRDC produces that is not promoting a safe workplace, please let us know."

Over the past year the FRDC's internal policies have made wearing life jackets or personal flotation devices (PFDs) mandatory for all FRDC staff and all those working on FRDC projects while onboard vessels.

Advances in PFDs mean that they are less bulky, so can be more easily worn. Many PFDs are now fitted with personal location beacons (PLBs), which operate similarly to emergency position-indicating radio beacons (EPIRBs) used on vessels.

The FRDC's national research initiative will build on and broaden previous FRDC investment in this area, committing research funding around the following four key areas.

1. Education: the development of electronic learning tools to facilitate the uptake of knowledge required for an improved culture of safety awareness, including general workplace safety requirements under workplace health and safety legislation and Australian Maritime Safety Authority legislation (FRDC Research Code: 2017-194, see SeSAFE project below).
2. Adoption of a new 'safety focused' culture within the industry: for example, through the promotion of 'marine safety champions' or the development of capabilities to ensure that safety regulations are adopted.
3. Behaviour, understanding and influencing: for example, to understand the inhibitors and motivators for behaviour change in relation to industry safety (FRDC Research Code: 2017-046).
4. Coordination and communication: the initiative will establish a coordination and communication hub to ensure all FRDC marine safety projects are linked and collaborate effectively, and will establish a process for collecting and reporting statistics on marine safety and welfare.

As part of the national initiative the FRDC is in discussion with further industry partners and organisations who share a vision to make commercial fishing a safe workplace and an attractive one for young people to work in.

Details of the projects attached to this initiative are available on the FRDC's website (www.frdc.com.au). F

If you work in the fishing industry – be it out on the water or on the wharf, working on your own or for a fishing business – the FRDC is asking you to have your say and fill out the 'What's stopping you from keeping you and your mates safe?' survey, which is available online (https://www.surveymonkey.com/r/keeping_you_and_your_mates_safe).

2013–17* COMMERCIAL FISHING WORKPLACE FATALITIES

2013
- 1 Matthew Shrimpton (dory) Queensland
- 1 Glen Wilson (dory) Queensland
- 1 Ryan Donoghue (trawler) Queensland/ Northern Territory

2015
- 1 John Rogers (trawler) South Australia
- 1 Joe Russell (abalone vessel) Tasmania
- 3 *FV Returner* (trawler) Western Australia

2016
- 2 *FV Cassandra* (trawler) Queensland
- 1 *FV Seabring* (trawler) Queensland
- 3 *FV Night Raider* (trawler) Queensland
- *FV Cygnet Lass* (line fishing vessel) Queensland

2017
- 6 FV *Dianne* (dive vessel) Queensland

*July 2013 to February 2017 inclusive
Source: Australian Maritime Safety Authority

Discussing new safety measures, Joel Feeney (centre) with Australian Maritime Safety Authority CEO Mick Kinley (left) and chair Stuart Richie (right).
Photo: Seafood Industry Australia

SESAFE – SAFETY TRAINING DELIVERED ONLINE

"It is difficult to comprehend that working a kilometre underground is safer than working on the water," says Steve Eayrs, principal investigator on SeSAFE, an FRDC-funded project aiming to improve sea safety performance in the fishing and aquaculture industry.

SeSafe is addressing these issues using education and training. It is developing a learning management system (LMS) comprising multiple simple training modules to deliver essential safety training to fishers and aquaculture workers prior to going to sea.

"These modules can be completed using a computer, tablet or smartphone and are specifically developed for this industry," Steve Eayrs says.

The LMS integrates and complements vessel safety-management systems to provide a more holistic, user-friendly approach to basic sea safety training. Significantly, it also operates as a verification to ensure that crew haved been provided training and demonstrated proficiency in sea safety.

The LMS is designed to overcome barriers including cost, timeliness, relevance and accessibility. The system is being tested with skippers and crew from Austral Fisheries.

More information:
www.sesafe.com.au
FRDC Research Code: 2017-194

MORE INFORMATION
Debbie's Seafood and Deb's Fish Cafe,
www.debbiesseafood.com.au
FRDC RESEARCH CODES: 2013-301, 2014-301

Mackay estuary fisher Dave Daniel supplies fish regularly to the Mackay community.

Local catch makes a splash

Seafood enterprises in Queensland's Mackay region are finding new ways to add value to consumer experiences and community wellbeing

Story and photos by Melissa Marino

Mackay, sitting midway between Brisbane and Cairns, is a city of more than 120,000 people in the heart of sugarcane and cattle country. Offshore lies the lower end of the Great Barrier Reef and a wealth of marine resources, including fresh local fish for locals and visitors alike.

With 320 kilometres of coastline in the Mackay local government area, fishing is a crucial part of the regional economy. But assessing the value of the sector has often been difficult, particularly in a region where farming and, more recently, mining, have dominated the economic horizon.

A Queensland research project sponsored by the FRDC and published in 2016, *Beyond GVP: The value of inshore commercial fisheries to fishers and consumers in regional communities on Queensland's east coast*, suggests the gross value of production (GVP) of commercial fisheries represents only a third of their value to the state's regional communities.

Either side of effort to catch fish – the basis for GVP – are the benefits to those who supply the sector, and the multiplier effect of fisheries-related income circulating in the local economy.

At the end of 2014, the world coal price plummeted and Mackay Mayor Greg Williamson says the local resources sector "fell off a cliff". Not long after, commercial fishing effort in the immediate Mackay vicinity was also reduced, making the efforts of those who continue to supply fresh regional seafood of even greater value.

The two main seafood wholesalers and retailers in Mackay are Mackay Reef Fish Supplies and Debbie's Seafood.

David Caracciolo at Mackay Reef Fish Supplies says the sector contributes a lot to the local economy: "The fuel suppliers, packaging, marine outfitters, the groceries for fishers going out, the ice suppliers, even the laundries that wash all the gear – it all filters through," he says.

While David Caracciolo's business also trades out of Darwin, Debbie's Seafood, owned by Debbie and Mark Ahern, has a more fiercely local focus.

Debbie Ahern started selling her seafood catch from the back of her Chrysler car 16 years ago, largely as a ploy to get off the fishing boat she and her husband operated at the time.

"If we didn't fish we didn't get paid, so we were often out in huge waves and it was scary and physically it was very hard," she says. "So

Below Mackay Marina.
Bottom Debbie and Mark Ahern from Debbie's Seafood.

I said to Mark, 'You catch it and I'll sell it'."

That decision to market their own fish led to the creation of Debbie's Seafood, which now operates a fleet of six trucks – mobile seafood retail outlets that supply freshly caught fish to thousands of people in the region, many of whom live hundreds of kilometres from the coast.

While Mark Ahern still tries to fish whenever he can, the success of the business means he is more often in the office, sourcing product from other fishers up and down the coast.

In addition to their retail trucks, the Aherns have a newly constructed wholesale and retail outlet adjacent their latest venture, Deb's Fish Cafe. Demand means the Aherns need more seafood than Mackay fishers alone can provide, and so they source product from up and down the coast.

Today their business employs 35 people and Mackay Regional Council's economic modelling estimates it contributes $13 million to the local economy.

As with other operators in the sector, the ripple effect spreads from their business to others and into the broader community. At a grassroots level, this includes sponsorships to community groups and sporting teams, or discounts to help schools put seafood on their menus.

"It's like a spider web," says Mark Ahern of the interdependence of diverse businesses. "There's a massive branch of businesses that rely on us – and we rely on them as well."

Mayor Greg Williamson says the Aherns have had a significant impact in the community, particularly in the wake of the mining downturn, which slashed local jobs and confidence. "The trickle-down effect is immense," he says.

In fact, the Aherns used one of the sector's biggest challenges – a change in government fishing policy – as an opportunity to expand their business, going against conventional wisdom.

Queensland's fisheries managers created net-free fishing zones in Mackay in 2015. The resulting 'marine haven' has proven attractive for the recreational fishing community but it also reduced the commercial catch from the immediate area.

However, as the *Beyond GVP* research showed, local people are prepared to pay a premium of 10 per cent or more for fresh, local fish. Similar socioeconomic research in NSW has shown that eating fresh seafood is viewed as part of the tourist experience when visiting coastal communities (see 'Beyond the Catch', *FISH* December 2016).

Recognising these trends ahead of any official research, the Aherns decided to expand in the wake of the fishing net bans. They made a $1.5 million investment in a new warehouse for their wholesale and retail business, and

With 320 kilometres of coastline in the Mackay local government area, fishing is a crucial part of the regional economy, but assessing the value of the sector has often been difficult, particularly in a region where farming and, more recently, mining, have dominated the economic horizon.

DEBBIE'S SEAFOOD FRESH FISH OUTLET

- 35,000 customers at the Slade Point Debbie's Seafood retail outlet each year
- 600 kilograms of fish and 250 kilograms of fresh local cooked prawns sold each week

DEB'S FISH CAFE

- 1000 weekly customers
- 700 pieces of fish and 150 kilograms of chips cooked each week

DEBBIE'S SEAFOOD VANS

- 20,000 customers annually
- 750 kilometres per week travelled
- 350 kilograms of fish and 350 kilograms of fresh local cooked prawns sold each week

Above Beth Moore works the filleting station at Debbie's Seafood in full view of customers.

Top Locally caught fish and produce sourced from further afield is on offer at Debbie's Seafood.

Above Debbie and Mark Ahern say the alfresco dining area at Deb's Fish Cafe is a big drawcard.

opened Deb's Fish Cafe, which has allowed them to employ an additional 10 staff.

Destination seafood

The Aherns' new retail outlet and Deb's Fish Cafe are located deep in the backblocks of an industrial zone at Slade Point – hardly a place you would expect to find a bustling food business.

But, despite limited passing trade, that is exactly what the Aherns have created. "We are a destination," Debbie Ahern says. "People come."

One of the drawcards – as is often the case when the fishmongers bring out their knives – is the spectacle of filleting the catch.

At the cafe customers relax in a dining area full of tropical plants and can see locally caught fish filleted and cooked before their eyes. "It's like the theatre, and people love it," she says.

Beth Moore is a lead player in that "theatre". She is one of five employees who specialise in filleting fish – sometimes up to 500 kilograms a day – in full view of customers. Despite the workload, she says she never tires of the fresh product she prepares for hungry diners. "I love seafood; I could eat it every day."

Debbie Ahern describes the filleting station as the "engine room" of the business, and one of its most popular attractions. Fresh fillets are cooked in the cafe, stocked in the retail shop for immediate sale, loaded into the trucks and sold to restaurants and fish and chip shops or frozen for storage.

Mackay Regional Council Deputy Mayor Amanda Camm says Debbie's Seafood and Deb's Fish Cafe have generated a buzz for the community and enhanced the town's liveability credentials. Debbie's Seafood was also a winner in the Queensland Seafood Industry's 2017 Large Business Award and a finalist in the national competition.

"To have that kind of dining experience with the product and service they deliver in a quirky and unique location – it's critical for people who live here as well as for visitors," she says.

Amanda Camm, who is also a director of Mackay Tourism Ltd, says fresh seafood is "completely aligned" with the 'Nature. Reserved.' campaign promoting nature-based experiences in the region – a campaign that helped increase international tourism to the region by five per cent in 2017.

The success of the cafe has meant more employment opportunities too – for cooks, waiters and retail staff, and extra juniors around Christmas and Easter.

"We keep expanding," says Debbie Ahern, who has a retractable roof for the cafe and cooking classes on the agenda. "And I think it's because we listen to what people are telling us."

For instance, Mark Ahern noticed an increasing Indian population in the region, and began cutting fish into 'steaks' straight across, with the bone and skin intact – a style preferred in Indian cuisine. "They sell out every time we put them up," he says.

At the cafe customers relax in a dining area full of tropical plants and can see locally caught fish filleted and cooked before their eyes. "It's like the theatre, and people love it," Debbie Ahern says.

"It's amazing how it all evolved," says Debbie Ahern, remembering the couple's early days fishing from a 'tinny' and "sleeping on the beach being eaten alive by sandflies and mosquitoes". And how, based on demand, the business grew truck by truck. "I would have been a bit overwhelmed if I'd had known what it would be like today." F

Left Sharon Petersen packs her truck in preparation for her Mornabah run.

Below The nature of fishing means you never know exactly what mix of fish they will receive each delivery, but consistency of supply is helped by their ongoing relationships with their fishers.

Have fish, will travel

Sharon Petersen reckons she has the best job in the world, bringing seafood to far-flung communities around the Mackay region

While Debbie and Mark Ahern's car was effectively Debbie's Seafood's first mobile retail vehicle 16 years ago, the fleet has grown over time with demand, travelling more than 750 kilometres to service clients every week.

Other seafood supply businesses also operate travelling retail trucks out of Mackay, although the Debbie's Seafood fleet is the largest.

As one of the drivers, Sharon Petersen leaves Mackay at 6 a.m. each Thursday (barring cyclones) for the two-and-a-half-hour drive to Moranbah – a mining community 200 kilometres inland and home to a sizeable customer base. Without fail, she says, she is greeted by customers waiting for her. "No matter what time I arrive."

Families and mine workers plan their menus around the fish she delivers, clearing her out of the 50 to 60 kilograms of fresh fish, plus 50 kilograms of prawns, she stocks. "The regulars come every week and you have a chat and it's really nice," she says. "It's really worthwhile going."

It is important, Debbie Ahern says, for people to have access to great produce no matter where they live.

Sharon Petersen, who has done the Moranbah run for Debbie's Seafood since 2011, keeps her truck shop open until 6 p.m., allowing people to visit after they finish work. It means she does not return to Mackay until 9 p.m., but she would not have it any other way.

"I love it," she says. "And the customers appreciate it. They support me every week." F

Finding the fish

Mackay fisher Dave Daniel considers himself lucky that he has had a regular buyer for his catch over many years. It makes a tough job a lot easier, he says.

As an estuary fisher, he usually heads out for 24 hours at a time on his four-metre punt, delivering fish such as Barramundi, King Salmon and Grunter two or three times a week.

He says Debbie and Mark Ahern take whatever he catches at a fair price – an approach stemming from their own start as fishers.

"They take cheaper varieties as well as the more expensive ones, so I'm never stuck shopping around trying to get rid of something; it's much easier for me," he says. "It's a very long-term, trusting relationship."

Doug and Terri Robke also supply seafood markets in Mackay, as well as exporting live reef fish, mostly to Hong Kong. They employ six full-time staff who fish for two to three weeks at a time, up to 100 kilometres offshore, and who rely on regular buyers for their living.

Sourcing fresh local fish has become increasingly challenging as commercial fishing effort moves further from Mackay.

Debbie Ahern says ongoing relationships with fishers are crucial in providing a consistent supply of fresh product to their customers at Debbie's Seafood, although she never knows exactly what mix of fish there will be in each delivery.

Business supplies

Brendan Jones, wholesaler

For locally owned businesses, success is built on relationships with other businesses and community organisations, says Suncrest Food Distributors owner Brendan Jones.

The Mackay-based wholesaler has more than 400 clients, including many in the retail and hospitality sector who supply seafood to the local community and as part of the 'visitor experience'.

Supplies to these customers include a wide variety of goods from chips and breadcrumbs to foil and clingwrap, even notepads for waiters.

He says if clients feel well served, they are likely to stay loyal. And in an environment where family-owned businesses such as Suncrest are competing with multinationals, good service is a key point of difference.

In turn, the success of Suncrest enables it to support local schools and the sporting club playing in the Mackay rugby league competition.

"The sporting club is a good customer of ours and we help out where we can," Brendan Jones says. "We do a lot with school fetes and other sports like netball and lawn bowls ... we share the love around."

Brendan Jones

Francis Vigliante

Icey innovation

Francis Vigliante, ice-maker

In 2016 Francis Vigliante, at Mackay's Blue River Ice, invested $30,000 in a new ice-crushing machine. It was a big outlay, but worth it for his seafood customers. The machine, he explains, efficiently crushes ice to a smaller size, ideal for seafood. "The bigger the ice, the more it damages the product," he says.

It also works alongside an ozone filtration system that pumps oxygen through the water as it is frozen to kill bacteria, a process that helps extend seafood shelf life.

In any given week, local seafood businesses Debbie's Seafood and Mackay Reef Fish Supplies buy up to 25 500-kilogram bins of specially crushed ice. And, at that rate, the crusher will quickly pay for itself.

Professional fishers are also an important client base for Blue River Ice, both for crushed ice and the standard tube-based product, popular also among recreational fishers and sold bagged up through retail outlets, including the seafood companies themselves. In total, the commercial fishing and seafood industry accounts for up to 25 per cent of Francis Vigliante's business, which produces 35 tonnes of ice per day.

Keeping community together

The flow-on effects of successful fisheries businesses contribute to improved community wellbeing in diverse spheres

Below left
Shaun Macklin from the Dysart Bulls Masters team.
Photo: Melissa Macklin

The small town of Dysart has been hit hard in recent times. About 250 kilometres south-west of Mackay, it was built in the 1970s to service nearby mining operations. So when the mining downturn hit, it hurt.

"We've had a few hard knocks, with people moving away and the mine closing," says Melissa Macklin, a photographer and Dysart resident, whose husband Shaun works in the mining sector. "We lost shops and families and the town has been struggling."

A highlight on the local calendar each year is the National Rugby League Masters Carnival, a chance for old friends and their families – many of whom have been forced to move away for work – to reconnect.

"It's so important that we can get people together to have a bit of fun," says Melissa Macklin, also manager of the Dysart Bulls Masters team, which includes her husband, a father and son, two sets of brothers and players aged in their sixties. "I think for some people it's the highlight of the year."

Making their participation in the Gold Coast carnival possible, she says, are sponsors, which include Debbie's Seafood and Blue River Ice. They pay for the team's registration and uniforms, which are colour-coded according to age. "So if the old fella's in the gold shorts, no one can tackle him," she explains.

Seafood vouchers also help with fundraising to pay for food and drinks during the masters carnival. "Without the help of our sponsors we wouldn't have a team and we wouldn't be part of it," she says. F

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FRDC RESEARCH CODE: 2016-408

The mark of a leader

Leadership program proves valuable to sector into the future

Below Helen Jenkins and Alex Ogg with their ARLP group, at the beginning of the program in Western Australia's Kimberley region. Photo: Alex Ogg

By **Gio Braidotti**

Queensland's Helen Jenkins was in the midst of her 15-month Australian Rural Leadership Program (ARLP) when, in a "baptism of fire" she found herself testing her newly learned skills.

"The course included media training for crisis management and a week later I was managing a crisis," she says.

That crisis was the outbreak of white spot disease in the Queensland prawn farming industry while she was executive officer of the Australian Prawn Farmers Association (APFA).

In dealing with the event, Helen Jenkins says her learning from the course provided an inner strength that helped her to manage this difficult period in the industry. "I received a lot of help and support from the people in my cohort."

Being able to deal with situations out of her comfort zone was one of the skills she took from the ARLP, which she says also created opportunities for collaborative learning, built her courage, and enabled her to take on new and challenging roles.

During 2017 she moved on from the APFA to become aquatic biosecurity liaison officer for northern Australia at Animal Health Australia. "I've taken on a bigger area, looking after more industries. I feel that I am better prepared to accept bigger challenges," she says.

Helen Jenkins is one of two FRDC-sponsored participants in the ARLP's most recently graduated cohort. The other is Alex Ogg, operations manager for the Western Australian Fishing Industry Council.

The ARLP is a highly regarded program established specifically to meet the needs of people in leadership roles in rural, regional and remote Australia, who often have a unique set of challenges, opportunities and aspirations.

The course stretches over 15 months and includes 55 days of travel. Unlike other programs, the ARLP does not teach a pre-set doctrine. Instead, it provides a broad range of experiences and novel opportunities to acquire new skills.

As Alex Ogg explains, one of the most beneficial experiences for him was the opportunity to deconstruct pre-existing ideas about leadership through a process that enhanced his capacity to listen and for self-reflection and critical thinking. These skills have engendered in him a greater awareness of different perspectives among his stakeholders and the way these inform how people form and communicate their views.

"I experienced significant changes to my mindset over the course of the program," Alex Ogg says. "I find I'm now listening to people on a deeper level, and seeking a better understanding of the perspective, values and context that lie beneath their stated position. Listening only at the surface level often leads to inappropriate judgement and is often counterproductive in finding solutions to difficult problems."

Both participants recommend the program to people willing to take their leadership skills to a new level and benefit from a network of more than 1000 alumni. Each intake accepts 30 people via a competitive application process. Scholarships of $55,000 are provided, with participants contributing $5500 to the cost. F

For more information about the program: rural-leaders.org.au/our-programs/arlp

THE VALUE OF GRASSROOTS KNOWLEDGE

Nathan Adams, the vice-chair of the WA Fishing Industry Council and a member of the Abalone Council Australia, is a participant of the 2017-18 ARLP. Already he describes the program as a "life-changing experience". One of the highlights was the two weeks he spent in the "awesome outback" of WA's Kimberley region.

"We got challenged mentally, physically and emotionally alongside people from many different backgrounds," Nathan Adams says. "You learn the importance of a really strong team, building trust and communication. And we got to see that amazing country and participate in cultural learnings."

Best of all, Nathan Adams says, the program is allowing him to fully capture knowledge he acquired working in the fishing industry and continues to apply working in the WA abalone fishery.

"The program is giving me tools to better tap that grassroots knowledge, adding a better understanding of governance structures and how to get that deep-seated industry knowledge represented effectively."

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A force for change

Work for the Dole participants in NSW learn new skills as they help rehabilitate local waterways

By **Andrew Cooke**

Ten years ago, Matt Hansen and Mick O'Neill set out to raise money to put native fingerlings into their local Central West NSW river system. The Dubbo pair's initial efforts have since turned into a successful model for changing attitudes and garnering community support, rehabilitating waterways and helping unemployed people find meaningful jobs.

Since running a raffle a decade ago, which raised an impressive $16,000 in just a few months, they have created the Inland Waterways Rejuvenation Association (IWRA), run numerous educational and media campaigns, and established one of Australia's biggest annual fishing competitions – the Lake Burrendong Classic. This event attracts hundreds of participants and raises tens of thousands of dollars to rehabilitate local waterways.

About two years ago, they bought a bus to transport Work for the Dole scheme participants to and from river-restoration sites. Since then, dozens of unemployed people have planted 7000 trees, weeded and removed rubbish from riparian zones, put snags into rivers and installed awareness signage. Several of the 'River Repair Bus' workers have moved on to full-time jobs.

Social benefits

Matt Hansen, who is a real estate agent, says these participants have done a great job restoring sections of riparian zones on the Macquarie River. "It's not just the environmental benefits and watching trees grow along the river, but we are really proud of the social benefits of helping people find routine in their life and return to full-time work. They are creating habitats and food sources for our native fish, and some of the work is incredible – the belts of trees that are springing up along the river, we can really see results from that."

While other changes in river systems are difficult to quantify, there is plenty of anecdotal evidence that their work is paying dividends. "A lot of people tell us that they catch fish around the snags that we have put in. It is common for families to catch 10 native fish in an afternoon, and that just wasn't happening a decade ago. The fishing was nowhere near this good. We believe that the river is fishing better than ever and it is thick with Murray Cod and yellowbelly (Golden Perch)."

Above Matt Hansen holds a Murray Cod.
Photo: Wayne Gilbert

Rob Ryan is a former River Repair Bus participant. He completed a standard three-month stint with the program in 2017 and subsequently found full-time employment as a nurseryman. He agrees the river is looking healthier and fishing better. "I grew up fishing in this area, and you can really see the program's benefits to the river system. It is a lot cleaner than it used to be, and a lot more people are getting down there to fish."

He is grateful to the IWRA for a positive learning experience and "getting me to where I am today". A year ago he was planting trees and cleaning up riverbanks with the River Repair Bus; now he is conducting research on Australian native plant species and involved in all aspects of the nursery industry.

Change of focus

IWRA initiatives have evolved away from initial efforts to restock rivers with fingerlings. "As our understanding grew, we found it was better to rebuild the system holistically and let the native fish repopulate on their own. It is a lot more cost-effective to get fish breeding well," Matt Hansen says.

Education work has also come to the forefront. "We have undertaken a number of educational strategies to not only lift the quality of our fisheries but also the understanding of our fishers.

"We have really worked to break the 'catch it and fillet' mentality that was rife here a decade ago, using initiatives like putting 100,000 educational beer coasters into pubs and clubs to get the discussion going around rules and regulations awareness, and encourage catch-and-release.

"We also recently conducted a TV campaign called 'When they're on the nest, give them a rest' highlighting the need for people to leave Murray Cod alone during breeding season. That was funded with Lake Burrendong Classic fishing competition money, and lets people know that they are leaving Murray Cod open to predation if they catch the large ones that are guarding the nests during those periods."

"They are creating habitats and food sources for our native fish, and some of the work is incredible – the belts of trees that are springing up along the river, we can really see results from that." Matt Hansen

Experience shared

IWRA's community engagement model has been used as a template by other organisations. This includes OzFish Unlimited, and Matt Hansen sits on the OzFish board. It has also co-hosted an inland fishing summit that included coaching for skills development around fundraising, event management and how to undertake habitat replenishment works from start to finish, as well as the chance to look at work that has been done.

The FRDC sees the value of this model and is keen to see more like it flourish, funding a project through OzFish Unlimited called 'Empowering recreational fishers as champions of healthy fish habitat'.

"This project is all about empowering local communities of recreational fishers to do exactly what Matt and his team have been able to achieve," says Josh Fielding, senior portfolio manager at the FRDC. "They've shown exactly how recreational fishers are leading habitat-rehabilitation work nationally."

However, there is plenty of work still to do, Matt Hansen says.

"We've got some huge battles with thermal pollution and ongoing issues with the failed thermal pollution curtain on Lake Burrendong. We also have issues with major barriers to fish passage, invasive pest species and aggressive weeds such as willows.

"But we have also had some fantastic results. We have changed well-ingrained habits that involved illegal fishing techniques such as set lines and nets.

"When we first started to speak out against illegal fishing, I was getting my tyres slashed regularly by a small group of hard-core illegal fishers, but that problem is in the past. Some of those people have since been helping out on the River Repair Bus and they couldn't agree more that the fishing is fantastic compared to before, when nets and set lines were evident up and down the local river.

"The change has been embraced by the community and they are right behind the inland waterways movement. People love to catch-and-release, post fishing photos on social media and come to the Burrendong Classic. The cultural change has been significant and is one of the proudest things for the IWRA to have achieved." F

Above right Trees planted by the Inland Waterways Rejuvenation Association beside the Macquarie River. **Right** Some of the rubbish removed from local waterways by River Repair Bus participants. **Far right** Mick O'Neill with some young helpers on National Tree Planting Day.
Photos: Matt Hansen

MORE INFORMATION
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FRDC RESEARCH CODES: 2005-024, 2007-066, 2008-076, (TRF No.) 2012-236

In the company of seals, Craig Fox harvests healthy abalone off Lady Julia Percy Island.
Photo: Western Abalone Divers Association

Joint approach aids abalone recovery

Collaboration between government and fishers has helped Victoria's western abalone fishery to recover from a catastrophic virus outbreak

By **Anne Crawford**

The rebuilding of abalone stocks in south-western Victoria over the past decade provides a world-first model for the recovery of the species, combining painstaking data collection and careful management with fisher-led initiatives to preserve breeding stock.

A decade ago, predictions for the future of the state's Western Zone Abalone Fishery, from Warrnambool to the South Australian border, were dire.

Abalone viral ganglioneuritis (AVG) had wiped out up to 80 per cent of the wild abalone in the zone after being detected in 2006; the herpes-like virus brought commercial harvesting to a standstill.

It attacked both Blacklip Abalone (*Haliotis rubra rubra*), the primary species harvested in the zone, and Greenlip Abalone (*Haliotis laevigata*), which makes up a small portion of the catch.

The virus is transmitted through mucus secreted from infected abalone and is therefore highly dependent on water currents and weather conditions to spread. The pattern of AVG's infection in 2006 has been compared to that of spot fires, with pockets of intense infection while nearby areas were totally unaffected.

AVG lost much of its virulence as it moved east into the Central Zone fishery (Warrnambool to Hopkins River), but it had affected almost 300 kilometres of coast before petering out near Cape Otway. The state's Eastern Zone (Lakes Entrance to the NSW border) was not impacted by the virus.

In 2008, an FRDC-funded report (project 2007-066) evaluating the future of the fishery post-AVG warned that the Western Zone in particular was in "dangerous territory".

While the assessment was grim, the report did provide information on biomass, modelling and predicted trajectories of recovery, which has helped inform industry and government responses.

There were no documented examples of other abalone populations recovering from similar catastrophic events. Worse still, there was no known or accepted approach to managing the reopening and rebuilding of

abalone fisheries that had been successful.

But a decade later the affected reefs have seen a remarkable recovery, with breeding populations re-established, the decline in abalone stocks reversed and quotas climbing, albeit slowly.

The recovery has been attributed to a combination of extensive data collection and analysis, careful monitoring, use of cutting-edge technology, conservative fishing effort and increasing the minimum size limit for harvesting to protect spawning animals.

In the immediate wake of the virus, in 2008-09, the Western Zone's total allowable commercial catch (TACC) was only 16 tonnes; it had been 270 tonnes pre-AVG. However, the recently announced 2018-19 TACC for Blacklip Abalone in the zone is 70 tonnes, up 6.8 tonnes on this year's quota.

Global fishery expert Keith Sainsbury is the independent chair of the forum that recommends annual TACC levels in the Western Zone to the Victorian Government and says the partnership between the Western Abalone Divers Association (WADA) and the Victorian Government has helped the recovery to happen.

Kirsten Abernethy uses a Scielex shellfish logger to collect information on the abalone catch. Photo: Western Abalone Divers Association

Continued fishing

The Victorian Government allowed low levels of controlled fishing to continue once the virus had cleared, Keith Sainsbury says. "That was a very brave step – it would have been very easy to say 'Leave it alone for 10 years'." While infected reefs were closed divers were given temporary access to disease-free reefs that were not normally fished.

In addition to population counts gathered by government scientists, the TACC Forum began to consider data collected by WADA divers.

Fishery stakeholders supported fishing at less than the allowable quota – an approach they had already been using pre-AVG – and also agreed that divers would fish according to a scientific design developed by the TACC Forum. While the design was not the most commercially efficient harvesting pattern, the divers' GPS loggers provided important information about abalone size and abundance to help gauge biomass.

CSIRO helped to verify the robustness of using both data sources to set catch limits as part of an FRDC project, which Keith Sainsbury also contributed to. "We were able to draft a harvest strategy using those methods for subsequent years and have been applying it ever since," he says.

WADA's executive officer Harry Peeters says prior to the virus outbreak the association had already begun fine-scale management of stocks, reef by reef, equipping divers with a GPS-fitted shellfish measurer that produced detailed data about the size of the fish and location of the resource on the reefs. WADA has since added to this with technology with sensor loggers attached to divers, and automatic uploading of information to the 'cloud'.

"What we're now getting is catch-per-unit-effort data along with time and location, which gives you a much better handle on the effort that goes into catching the fish and their abundance and biomass," Harry Peeters says.

Larger abalone

As part of the recovery process divers in the Western Zone also voluntarily increased the minimum size of the animals they harvested.

"Prior to the virus, the legal minimum length was 120 millimetres," Harry Peeters says.

"The fishers made a voluntary decision to limit the size to 130 millimetres when the reefs reopened. That's now been legislated," he says. "That single act, we believe, is the most important thing in the recovery of fishing that we're seeing."

This allowed the shellfish extra breeding time after reaching sexual maturity and before they were harvested to spawn more abalone.

The virus outbreak has taken a huge toll on the local abalone industry and the regional communities. The loss of production since the outbreak began has exceeded $100 million, and the value of the licences plunged from $6.4 million before the outbreak to less than $1 million in 2009. Of the 14 licence holders in the Western Zone, two went bankrupt and left the industry. Port Fairy processor Sou'West Seafoods closed in 2013.

New opportunities

But a decade on, the future of the industry is looking up. The Victorian Minister for Agriculture, Jaala Pulford, recently announced the increase in Blacklip Abalone quota for the 2018-19 year to 70 tonnes and praised the industry for actively managing the stock's recovery.

She also announced that commercial abalone fishers would no longer be required to obtain a PrimeSafe licence for food handling, which removes red tape and costs for the sector.

New opportunities are also opening overseas. Harry Peeters says abalone now being harvested average 137 to 141 millimetres, allowing the industry to venture into the live export of large abalone to China, attracting a premium price for their shellfish.

WADA is also exploring the possibility of selling live abalone in local restaurants. Harry Peeters says there could well be vibrant domestic demand for this as part of tourism initiatives to attract some of the millions of Asian tourists to Port Fairy and Portland where the catch is landed. F

MORE INFORMATION
www.ghostgear.org

Netting data to bury phantom fishing

Coordinating data collection and collaborating with fishers are key requirements in successfully dealing with the global issue of ghost gear

By **Annabel Boyer**

Lost fishing gear represents about 10 per cent of marine debris. About 640,000 tonnes of fishing gear is set adrift in the oceans every year, creating hazards for wildlife, people and boats.

As global initiatives to address the problem ramp up, Australia's experience in tackling abandoned gear in the Gulf of Carpentaria is helping to provide a roadmap for action.

In 2004 GhostNets Australia was set up to coordinate the response of local communities and Indigenous rangers in locating and retrieving the increasing volume of derelict fishing gear finding its way into the gulf.

As gear was retrieved, data on gear type and retrieval location was collected, allowing the GhostNets team to work with CSIRO researchers to find out where the gear was coming from. Using ocean modelling, researchers found that most nets were coming from gillnet and trawl fisheries in Indonesia's Arafura Sea territory.

"If you identify the fishery you have a better chance of resolving the issue because you can work with that fishery," says Riki Gunn, who was executive officer of GhostNets Australia at the time.

After the Indonesian Government began developing its first fishery management plan for the Arafura Sea in 2014, the GhostNets Australia team held six workshops over two years to improve the flow of information between Australian and Indonesian fishers and government officials.

Fishing insights

Insights from the workshops included the link between gear loss and high fishing pressure; there was a high incidence of illegal fishing in the Arafura Sea. Conservative estimates indicated 3000 vessels were fishing in the area, putting huge pressure on available resources.

Riki Gunn says illegal fishing vessels are more likely to abandon gear in order to conceal their activities. Increased competition also forced local fishers to adapt by fishing in more challenging conditions and to use damaged gear, which they could not afford to repair. This resulted in more lost and abandoned gear.

After identifying the issue, satellite technology was used to detect illegal, unreported and unregulated (IUU) fishing, which led to the well-publicised destruction of illegal fishing boats by an Indonesian Government keen to make an example of them.

Riki Gunn says that, anecdotally, less ghost gear is now being found in the Gulf of Carpentaria. At the same time, there are fewer vessels fishing in the Arafura Sea.

The Australian experience highlights the benefits of working with fishers to understand the issues they are dealing with and manage fisheries accordingly. It also illustrates the interconnected nature of the challenges.

Global initiatives

In 2016 the United Nations formally recognised ghost gear as a global concern and a threat to marine organisms and ecosystems.

At the time, Riki Gunn was on the steering committee of the Global Ghost Gear Initiative (GGGI), an international organisation working to highlight and tackle the issue of ghost gear, although she has now moved on. GGGI members range from fishers and community groups to state agencies, environmental organisations, researchers and governments.

Many small groups around the world, such as GhostNets Australia, retrieve and clean up lost fishing gear and other marine debris, but most are working in isolation and each group collects and categorises its data differently.

The GGGI is working to bring all this information together in a consistent way to create a more accurate and comprehensive global picture of causes and effects. Its efforts include a smartphone application to capture useable data about the locations and kinds of gear being lost or abandoned: position, date and gear class (net, pot or fishing aggregate device). All available information is being fed into an online data portal (www.globalghostgearportal.net).

Best practice

Annie Jarrett, the chief executive officer of the Northern Prawn Fishery Industry Pty Ltd, is a member of the Best Practices and Inform Policies working group of the GGGI, which finalised its best practice framework in October 2017.

She says the guidelines aim to reduce the likelihood of loss, particularly targeting gear types most likely to cause harm to marine organisms. Gear is assessed by

frequency and volume of use, likelihood of being lost or discarded, and impact on marine life.

For fishers, the best practice framework recommends:

- reduced soak times for gear;
- usage limits in locations and at times when gear is more likely to be lost due to environmental conditions;
- responsible storage of gear; and
- introducing mechanisms for the reporting and retrieval of lost gear.

The framework also recommends requiring ownership marks on gear. This could help authorities prosecute IUU fishers should unmarked gear be found in a location where all gear must be marked.

The framework includes working with other stakeholders such as gear manufacturers and fisheries organisations with recommendations to embed traceability in gear, develop biodegradable gear, develop incentives to return redundant gear and to have fisheries organisations implement codes of practice.

Annie Jarrett stresses the need to work with commercial fishers to solve the issue.

"We need voluntary buy-in from industry. I don't want it to operate as just another 'top down' impediment placed on fisheries from above. It would be great to see all Australian fisheries adopt the framework."

The Northern Prawn Fishery (NPF) has been proactive in dealing with the issue of ghost gear since the 1990s, with behavioural changes such as the proper stowing of gear. Dumping of nets at sea, once a common practice, is no longer acceptable.

Annie Jarrett says only about four per cent of ghost gear reported in the NPF comes from Australian vessels. "The big thing for our guys now is reporting ghost gear."

Education about monitoring, reporting and where possible retrieving ghost gear is part of the briefing attended by NPF skippers twice a year and information on gear retrieval and reporting is also included in the NPF Operations Manual. F

More information on the GGGI best practice recommendations and fact sheets for the management of gillnets, traps and pots and fishing aggregate devices can be found online (https://www.ghostgear.org/best-practice-framework).

In 2004 GhostNets Australia was set up to coordinate the response of local communities and Indigenous rangers in locating and retrieving the increasing volume of derelict fishing gear finding its way into the Gulf of Carpentaria.

Above The Global Ghost Gear Initiative website highlights clean-up activities around the world.

RE-USE SOLUTIONS

A shift in perception that makes old nets a valuable resource instead of waste can help solve the issue of ghost gear, and diverse initiatives are already underway around the world.

Energy from fishing gear
Since 2008, the Fishing for Energy partnership has provided collection bins at participating ports in multiple states in the US. Gear collected at the ports is first sorted for metals recycling, and the remaining non-recyclable material is converted into energy. About one tonne of derelict nets creates enough electricity to power one home for 25 days.
https://marinedebris.noaa.gov/prevention/fishing-energy

Nets become carpet
Net-Works operates in the Philippines and Cameroon to empower coastal communities to collect and sell used fishing nets. These are recycled into yarn for carpet tiles.
http://net-works.com/

Fish net skateboards
Skateboard maker Bureo buys old, worn-out fishing nets from fishers. It also works with local families who salvage nets from beaches. Old nets are transported to a warehouse, shredded, melted down and made into nylon pellets, which are injection-moulded into Bureo's signature fish-scale-patterned skateboards.
https://bureo.co/

From fishing to fashion
Nylon waste such as fishing nets is being transformed into first-grade nylon for the production of apparel and other textile products. The regenerated nylon yarn is called Econyl®.
http://healthyseas.org/about/regeneration/

Textiles in Pakistan
In Rehmangoth, Pakistan, ghost gear recovered by local divers is being turned into textiles with the help of textile researcher Seher Mirza from the Royal College of Arts. In doing so the divers are raising 92 per cent of a typical month's fishing income.
http://oliveridleyproject.org/blog/news-from-the-field/what-to-do-with-all-that-ghost-gear

MORE INFORMATION
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FRDC RESEARCH CODE: 2017-058

Fishers learn to catch innovation with Fish-X

Combining the stories behind our seafood with technological innovation can help businesses make it in the marketplace, Fish-X participants are learning

By **Rebecca Thyer**

The extraordinary skills and passion of those involved in Australia's seafood industry constantly surprise Tim Parsons, co-founder and chief executive officer of entrepreneurial connections agency X-Lab Ventures.

He leads Fish-X, an innovation program supported by the FRDC that aims to accelerate growth in the fisheries sector by helping small businesses bring their ideas to life.

Above X-Lab director Tim Parsons teaches Fish-X participants at the Brisbane hackathon. Photo: X-Lab Ventures

Fish-X has two core innovation streams

1. Two-day 'micro-hacks' – hands-on workshops where innovators are trained in the 'Lean Start-up' approach to better understand their business and test de-risking business models.
2. A three-month business accelerator program where teams are mentored through a disciplined process to explore new growth opportunities.

The program's third micro-hack was held in Brisbane in February at the Queensland Health and Food Sciences Precinct with 11 fisheries-related small business owners. Some have new products, while others are challenging existing supply chains.

Several businesses that have been mentored through the Fish-X accelerator program also participated to provide an update on their business progress and to share their experiences.

Tim Parsons says all the micro-hack participants have great ideas and enthusiasm, but a common theme in the sector is that many undervalue their product and could be even more ambitious than they currently are.

An example, he says, is the product caught by north Queensland's Kath and Tom Long, who operate a line fishing business on the Great Barrier Reef.

"TomKat Line Fishing has a wonderful story. How many fishers can say that they are operating in the deep ocean off the iconic Great Barrier Reef? Surely a high-end restaurant in New York or Tokyo would love that story and pay a premium to be associated with it," he says.

Tim Parsons believes that the answer lies in entrepreneurship and technology and says Fish-X comes at the perfect time for businesses in Australia's seafood industry.

"Innovation is required to evolve existing business models and harness new technologies to meet the changing needs of the value chain and the tastes and concerns of new markets and consumers."

To meet challenges such as these, Fish-X participants are coached to rapidly iterate and market-test ideas using the 'Lean Start-up' business model. This approach helps to reduce business risk by fine-tuning product value propositions and gathering stronger evidence to either support or 'kill' those ideas before investing precious time and money.

"We try to instil a 'learner' mindset in them, as opposed to a 'knower' mindset. They need to have sufficient humility to listen to customers, take responsibility for meeting their needs, and then ask themselves 'What evidence do I have or can I gather for what I want to do so I'm confident to invest more time and money?'"

'Learners' continually question their own assumptions about why and how something

is being done in order to keep up with market developments and changing customer needs, Tim Parsons says. At the opposite end, 'knowers' are a 'closed book' who do not challenge the status quo because they already 'know' it all.

For the FRDC, the program is a means to uncover promising ideas. However, even more than that the process can encourage the development of new ways of thinking to foster innovation for new enterprises, but also for the improvement of established ones. In turn, this can benefit the sector as a whole.

Since launching in March 2017, X-Lab has already trained more than 50 participants from across industry, research and government via its Fish-X micro-hack workshops, accelerated 10 teams via its Fish-X mentors, and run one local and two international linkage tours – to Silicon Valley, in the US, and to Brussels, Belgium.

A future proposal is to hold 'pitch' events, where business founders will get direct feedback from partners and investors looking for exposure to the industry.

The longline fishing business TomKat Line Fish is one of the most recent companies to benefit from the Fish-X micro-hack program. Others include a kelp-processing business, a recreational fishing business and a digital safety initiative.

The X-Lab micro-hack program can be used for all kinds of problems, as evident in the diversity of topics that have so far included: Tuna Solutions, a supply-chain transformation for tuna fishers; SmartOysters, a digital farm-management platform; Wild Gulf Barramundi's 'fisher to plate' sales and provenance tracking system; better fish health and growth in aquaculture while saving children in remote areas from hypoxic death; high-volume hatchery and nursery solutions for the oyster industry; a collaboration between recreational fishing clubs and associations and real-time data; to be the leading Australian provider of kelp and seaweed products; traceability marketing into China with food provenance and supply-chain audits; and a food technologies centre to enable food processing and supply chain innovation within the Australian seafood sector. F

Fish-X cuts to core of new business opportunities

By **Rebecca Thyer**

Above Ewan McAsh. Photo: Signature Oysters

Fish-X 'micro-hack' participants came together in Brisbane in February for a two-day, hands-on workshop. The aim was to show participants how to apply the 'Lean Start-up' method: a disciplined, entrepreneurial approach to exploring and de-risking existing and new business models.

The experience involves one session on the methodology, followed by three sessions conducting customer interviews, live-market-testing new ideas for growth to understand risk and value, and pitching new value propositions to other participants and invited guests.

A deliberately diverse group of businesspeople – ranging from commercial fishers to oyster farmers, seaweed processors and an e-sports entrepreneur – shared their knowledge and practice-pitched their products and businesses, gathering feedback as well as exposure to different parts of the fisheries value chain.

PARTICIPANTS

Ewan McAsh

SmartOysters and Signature Oysters

In November 2017, Ewan McAsh attended a micro-hack and joined the subsequent three-month accelerator program for his SmartOysters digital farm-management platform. He then attended the February micro-hack representing Signature Oysters, the marketing arm for his farmed oysters.

He says being involved with Fish-X had been so helpful for his SmartOysters platform that he wanted to take Signature Oysters through the process too.

Ewan McAsh says the weekly coaching he has received through the accelerator program has kept SmartOysters moving forward. "It's stopped us from making serious mistakes, the common pitfalls that new businesses often find."

The program has also made him think bigger. "It is hard work, so why not take my ideas and product to the world? Why not consider a $10 million business instead of a $1 million business?"

He says having 'fresh eyes' looking at his business has also really helped and has made him feel more in control of it and the future.

Above The bath range by Sea Health Products. Photo: Sea Health Products

Right Shark Bay Seafood's Wild Scampi Caviar, from WA, is one of the new seafoods Platinum Provedore promoted to chefs. Photo: James Barnes Destination Food

More information: www.signatureoysters.com.au

Jo Lane
Sea Health Products

Former marine biologist Jo Lane says the February micro-hack has helped to clarify the direction of her business Sea Health Products, which hand-harvests, sun-dries and processes Golden Kelp health products such as Golden Kelp granules, smoked granules and powder, as well as a range of bath products.

"It helped me see the bigger picture," she says. "As a small business owner I do everything – from harvesting the kelp to processing it, packaging it and sending it off at the post office. The micro-hack really allowed me to clarify my direction and think about where I want the business to go."

Jo Lane says she also found it valuable to talk to other people in the industry. "Although we all do different things, there was a real commonality of experience."

Her goal is to make kelp more prominent in consumers' pantries. "I want Australians to start using it and to follow the lead of other countries to really develop this new and emerging industry.

"The way forward is kelp farming – this would allow the kelp to be grown at scale; I can only collect so much."

More information www.seahealthproducts.com.au

Umar Nguyen
Platinum Provedore

Umar Nguyen is the former chef behind Platinum Provedore, a business that links fishers and top chefs, providing a route to market for secondary or bycatch species.

She says she took an open mind to the workshop and found it "a very safe, welcoming and comfortable environment to talk in".

The workshop helped her to understand her business better. "In a way I was stuck and confused, and it helped me to think about where I wanted to be and how to get there. I am more open to change than before."

She uses Instagram and text messaging to communicate with chefs, offering new seafood to try as a way of establishing new markets for different seafood products.

Feedback on her images and communication methods has been positive, with chefs keen to try new product offerings.

> "Although we all do different things, there was a real commonality of experience."
>
> Jo Lane

Tomaj Bayat
CrewCare

Tomaj Bayat is behind CrewCare, a real-time, automated, safety risk-assessment (SRA) tool for those who work on boats. His participation in the Fish-X micro-hack allowed him to workshop its use in the fishing sector.

He is interested in using entrepreneurship and technology to solve problems, and says the micro-hack was invaluable for connecting him to fishers and the industry. He says Fish-X participants were very generous with their time.

"I completed a program called 'Hacking 4 Defence Australia' with X-Lab before Fish-X and I was hoping to find out if CrewCare could help improve safety in the fishing sector too.

"My next steps are to understand

fishers' safety problems in more depth. I need to discover who can benefit from CrewCare."

Stefan Sawynok
Infofish Australia

Part of the recreational fishing industry, Stefan Sawynok brought his F1 e-sports fishing concept to the micro-hack, and has since used the lessons from the event across all aspects of his family business, Infofish Australia.

His F1 idea aims to revolutionise how fishers compete in fishing tournaments, enabling them to build a global profile and network.

A knockout competition, events would target 'T-20 fishers' (the top 20 per cent), who care deeply about the sport, and who would be happy to pay to compete with other recreational fishers around the world and to access the technology platform that will allow them to do just that.

"The 'hackathon' did not change my thinking but it did help me focus. For example, the entrepreneurial process – who is the client, what is the opportunity, what is the evidence around it, and ultimately, are you really delivering what you said you would – is an approach I've now taken across our businesses."

Above Creating international fishing competitions is the aim of Infofish Australia. Photo: 123rf.com

Above right Neil Moretto is working to restore wild-caught Barramundi's premium status among chefs. Photo: 123rf.com

"The 'hackathon' did not change my thinking but it did help me focus. For example, the entrepreneurial process – who is the client, what is the opportunity, what is the evidence around it, and ultimately, are you really delivering what you said you would – is an approach I've now taken across our businesses."

Stefan Sawynok

More information: www.infofishaustralia.com.au

Neil Moretto
Lenrex Seafood Marketers

Neil Moretto is in the Fish-X Accelerator program following the November 2017 micro-hack. He attended the February event to outline his experience of both the hackathon and as an accelerator participant.

The managing director of Lenrex Seafood Marketers, Neil Moretto says Fish-X has given him the focus he needs to further develop his idea – to restore wild-caught Barramundi's premium status among chefs.

He says wild-caught Barramundi has "lost its way and identity".

And this is what he plans to change. "We are looking to provide the market with the most viable product (in terms of product portioning and packaging) that will add value back to their business and in doing so provide this value back to the fishers.

"For me, the resources have been invaluable. It has extended my team to include people I would not normally have at my disposal. From here my idea has exploded, taking on new directions. I can see clearly that this has 'accelerated' my concept to a point that it is set to become a tangible thing, in the not-so-distant future."

More information: www.lenrex.com.au

MORE INFORMATION
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FRDC RESEARCH CODES: 2007-034, 2014-024

Photo: 123RF.com

Close-kin genetics shed light on shark populations

A scientific technique developed in Australia to estimate Southern Bluefin Tuna stocks is being applied to other species

By **Bianca Nogrady**

To work out the size and demographics of a human population we have endless tools at our disposal: a census, electoral rolls, surveys, polls and electronic health records, to name a few.

When it comes to doing the same for sharks things get a little tricky. They are a highly mobile population with poorly understood geographic distribution that could span hundreds of thousands of kilometres, the adults and juveniles occupy different spaces in the ocean and they are terrible at filling out forms.

But, thanks to CSIRO research funded by the FRDC, scientists now have a tool that can be used to not only estimate the size of shark populations, but could also be applied to a whole range of marine species.

Close-kin mark-recapture was first used to estimate the size of the Southern Bluefin Tuna population. The idea is deceptively simple: if you have two samples from a population, the likelihood of those two individuals being related to each other – either a parent to their offspring, or two siblings or half-siblings – decreases with increasing population size.

The genetic pool

For example, if you take a genetic sample from two individuals in Sydney, the chance of them being related to one another is a lot smaller than if you took genetic samples from two individuals living in a small town.

"The basic principle is every fish or every mammal or every bird only has two parents, and that is what sets up this natural mark-recapture experiment," says Campbell Davies, a senior principal research scientist at CSIRO Marine and Atmospheric Research.

So if samples are taken from a large enough number of individuals, the number of parent–offspring or half-sibling pairs in that sample set can enable researchers to work out the size of the entire adult population.

"The juveniles are tagging their parents through their DNA," Campbell Davies says. "That's the magic bit: it doesn't require you to see or sample the adults – you're getting that information through the relationship of their offspring."

This approach was first considered for Southern Bluefin Tuna because of concerns over the accuracy and reliability of fisheries estimates, and because of the difficulty and expense associated with conducting a conventional scientific survey of the species.

Great White Sharks

Even less is known about Great White Sharks. Despite being listed as 'vulnerable' on the International Union for Conservation of Nature and Natural Resources's 'Red List', their numbers are uncertain, and what little information is available largely comes from shark-control programs. It is also difficult to find adult Great White Sharks.

Thankfully, juvenile Great Whites are a little more accessible than their parents, so

Right Russ Bradford testing and tagging a Great White Shark. Photo: Kent Stannard

while researchers could not use the parent–offspring relationship to work out population size, they could still look for half-siblings.

"The same principle applies – that the more parents there are, the less likely you are to find a half-brother or sister, so you can flip that to find how many adults there are," says Rich Hillary, principal research scientist at CSIRO Oceans and Atmosphere.

With that in mind, researchers began collecting genetic samples from juvenile Great White Sharks off the eastern and southern coasts of Australia.

In the first phase of the study, they collected samples from 214 juvenile Great Whites, including 73 half-siblings. Using modelling developed by CSIRO statistician Mark Bravington, they were able to estimate the size of the Australasian adult Great White population at about 2250 individuals.

It also confirmed that there are two distinct populations of Great Whites off the Australian coast: an eastern Great White population consisting of about 750 individuals, and a larger western population of about 1500 Great Whites.

"If you draw a line from Wilsons Promontory in Victoria down to the top of Tasmania, everything to the east of there is one population – and that includes New Zealand – and everything to the west of there we call the southern–western population," Rich Hillary says.

These numbers, and additional data from stored samples from juvenile Great White sharks, suggest that the Great White population has remained at around the same size for the past decade. But Rich Hillary says it is very possible that the number of adults may start to increase as the protections that have been in place since the late 1990s mean more juveniles should survive to adulthood.

Shark sampling

Obtaining samples from the Great Whites certainly is not easy. In the Southern Bluefin Tuna studies, the genetic samples could be collected from catches, so researchers were able to collect genetic information for about 17,000 fish. But even finding Great Whites can be a challenge. However, juvenile Great Whites are known to gather every summer on the NSW coast near Port Stephens, which makes it an ideal location to gather samples.

To get the genetic samples from the Great Whites, the sharks have to be professionally caught, sampled, tagged and released – all without causing any long-term harm to the fish.

"It's pretty hard to get through the skin of a shark, especially a Great White Shark, because it's very thick," Rich Hillary says. So the juveniles are caught, tired out, then brought to the side of the boat and flipped on their back, which has a sedative effect on the shark. Scientists can also work with samples taken from dead sharks that have washed up on shore, or been killed or caught in nets.

> "The basic principle is every fish or every mammal or every bird only has two parents, and that is what sets up this natural mark-recapture experiment."
>
> Campbell Davies, CSIRO Marine and Atmospheric Research

The technique has proven so successful that it is now being applied in more shark species, in particular the School Shark in an FRDC-funded project, the Speartooth Shark and the Greynurse Shark.

Other species

The School Shark, which is being researched by Robin Thomson at CSIRO, is a commercially valuable species that became overfished as a consequence of Australians' love of fish and chips. The fishery was closed in the mid-2000s to allow it to rebuild, and now the close-kin mark-recapture technique is being used to estimate the size of the fishery.

The Speartooth Shark is a critically endangered river shark found in the north of Australia, whose adults are notoriously elusive.

"The juveniles live in the river, so the half-sibling approach is really useful there," Campbell Davies says.

Similarly, the Greynurse Shark is another critically endangered species (on the east coast, the Western Australian population is listed as vulnerable) that researchers have been targeting with the close-kin mark-recapture approach.

In theory, the technique can be used for any marine creature, such as whales or turtles, Rich Hillary says, although there are some notable exceptions.

"Elephant seals wouldn't work because you get one dominant beach male, and he's always going to show up as the dad everywhere, so it's going to be a very biased sample," he says. "When you've got really strong selection towards a dominant male or female, that tends to make a bit of a mess of everything because they just keep showing up everywhere."

The technique is also being applied in other tuna species. Work is underway to develop models applying it to Atlantic Bluefin Tuna and Pacific Bluefin Tuna stocks, with the US, Taiwan and Japan all expressing interested in using the method.

"The fact it works for such a broad range of species is both encouraging and exciting because it's not just going to be a case of something that would be useful for tuna," Campbell Davies says. "We have been surprised by how well that has worked. It is without a doubt one of the most exciting bits of science that I've been involved with in my career." F

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FRDC RESEARCH CODE: 2011-412

Seafood trading, European style

Local fishers gain a new perspective on market opportunities by viewing Australia from European shores

An Australian seafood industry delegation checked out international market trends at the Seafood Expo Global in Brussels (above) and at major supermarkets in London (right).

Story and photos by **Peter Horvat**

It can be difficult to grasp the global experience that is seafood from the deck of an individual vessel struggling to make headway in domestic regulatory squalls and fluctuating market currents.

But two fishers from Queensland and one from Western Australia took up FRDC-sponsored bursaries this year to attend a trade tour to the UK followed by the Seafood Expo Global in Belgium in April, which has given them new insight and direction for their own businesses.

Tom and Kath Long, from TomKat Line Fish in Queensland, and Morgan Hand from Chaceon in WA, joined an eight-day tour that included retailers, markets, fishers, restaurants, a side trip to the Belgian port of Ostend, and finally Seafood Expo Global in Brussels.

In London's supermarkets they found fresh display cases were almost entirely absent, with the exception of the high-end Selfridges and Harrods, where beautifully curated fresh selections could be found. Other supermarkets stacked their shelves with all kinds of pre-packaged seafood items – fish pies packed in wooden trays for baking, prawn linguine, fish patties – all designed for quick and easy preparation.

Tapping into history

A visit to Borough Market next to London Bridge was an experience in British and international boutique food production at its finest. The market has operated in one form or another on the southern side of the River Thames for almost 1000 years.

This excursion was followed by another venture into England's longstanding traditions with a visit to the Worshipful Company of Fishmongers (Fishmongers' Company). This is one of the earliest of the Twelve Great Livery Companies (City Guilds) in England, dating back 700 years, and is home to a significant amount of history for the fishing industry.

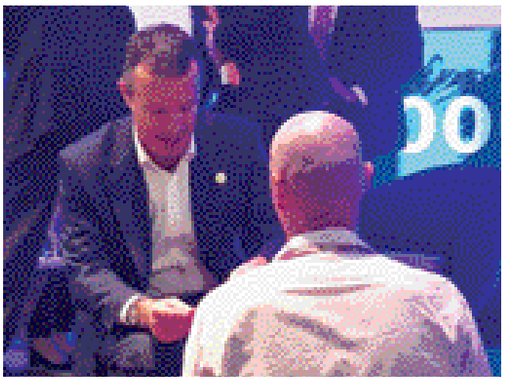
Coincidently, it was a fellow Australian, Eleanor Adamson, originally from Wagga Wagga in rural NSW, who led the group's tour explaining the role of the Fishmongers' Company, which works strategically to address key issues in the fisheries supply chain. Its modern incarnation includes partnerships with other agencies, such as Seafish and BluePlanet, working together to promote the health, prosperity and sustainability of the fish and fisheries sector for the long-term benefit of the UK.

Many of the issues Eleanor Adamson spoke about during the tour are ones Tom and Kath Long are keen to work on and learn more about for the Australian sector; issues such as product traceability, empowering small-scale fishers and developing professional standards for fishmongers.

After three days in London the group took a detour to the port of Ostend in Belgium. Like many small fishing towns, Ostend is steeped in history and tradition. Small seafood vendors line the street up to the local fish market. In speaking with one of the stallholders, the group discovered that the boat tied up at the side of the market – a small side-beam trawler – was part of a family operation, and had landed its catch for the day as part of the market offering.

Seafood expo

Following Ostend, the group made its way to Brussels for Seafood Expo Global and Seafood



Left Tom Long (right) introduces himself to Marine Stewardship Council CEO Rupert Howes with some questions on the value of sustainability certification.

Right (From left) Morgan Hand, Kath Long and Tom Long in London's Chinatown, searching for seafood opportunities.

Processing Global, the world's largest seafood trade fair. This year the expo featured more than 1850 exhibiting companies from about 80 countries. During its three-day run in April, it hosted 26,000 trade visitors from 140 countries.

Seven massive halls house the event, which consists of hundreds of exhibits offering connections with buyers or sellers, new machinery, products and other industry services. Preplanning helped the Australian delegates to home in on what fitted their own interests and needs. Tom and Kath Long and Morgan Hand spent the three days meeting suppliers and other international contacts to gain insight into ways they might improve and expand their business.

The Australian delegates also sat in on presentation and panel discussions for the Global Sustainable Seafood Initiative and the Marine Stewardship Council during the expo.

New horizons

The FRDC's trade tour program aims to help companies and individuals better understand the seafood market globally. It is designed to give participants an opportunity to expand their horizons in whichever market they operate.

For Tom and Kath Long the trip helped them understand how the seafood industry operates internationally, and its relationship to Australia's domestic industry. With a new perspective, they are keen to get more directly involved in the supply chain and develop their own skills. They are keen to focus on developing direct-market sales and the supply of premium product to fetch higher prices.

Morgan Hand says that while it could be easy to fixate on Asia's relevance to the Australian sector, the Brussels expo definitely has lessons for most sections of the Australian seafood industry and was a great opportunity to view seafood production on a scale not seen in Australia.

"The kind of machines and technology on display were amazing and very interesting," he says. "I plan to circulate information from the tour through some of the networks I am involved in, such as the Southern Seafood Producers Association."

China and US bursaries

The FRDC will offer trade bursaries to other events as part of a two-year program, providing up to $7000 for travel and accommodation costs and some meals. The bursaries operate in the same way as those for researchers pursuing or sharing scientific knowledge.

Future trade events will include:

- China Fisheries and Seafood Expo, Qingdao, China, 7 to 9 November 2018;
- Seafood Expo North America, Boston, USA, 17 to 19 March 2019; and
- Seafood Expo Global, Brussels, Belgium, 7 to 9 May 2019.

Contact the FRDC to express interest in attending and to apply for a bursary, or visit the Australian Seafood Trade and Market Access page at the FRDC's website (www.frdc.com.au). F

2018 BRUSSELS DELEGATES

Trade bursaries provide an opportunity to gain an international perspective on Australian fisheries through travel to major events. In 2018, participants included Morgan Hand and Tom and Kath Long.

MORGAN HAND

Morgan Hand (above left) is involved in many facets of the fishing, wholesale and seafood export industry. His father is a fisher and he grew up helping him out.

His family's company, Chaceon, operates vessels in multiple crab and rock lobster fisheries, spanning thousands of kilometres of the Western Australian coast.

On a day-to-day basis, he generally manages the operations of the processing factory and packing, while also being heavily involved in marketing Chaceon's product domestically and internationally. He also deals with fishers – some employed directly by Chaceon and some independent. Morgan Hand is also a member of the WA Research Advisory Committee for the FRDC.

KATH AND TOM LONG

The Longs (above right) are first-generation fishers operating out of picturesque Kurrimine Beach, far north Queensland.

They line fish in the pristine waters of the outer Great Barrier Reef (GBR) for premium quality species such as Red Emperor, Rosy Snapper and Goldband Snapper. They are passionate about increasing consumer awareness of the provenance of the region's seafood and fishing sustainably to maintain the health and resilience of the GBR.

The number cruncher

When it comes to fisheries data, Nadia Engstrom is the 'go-to' person in Queensland

By Anne Crawford

When Nadia Engstrom was young she loved catching prawns in Perth's Swan River in Western Australia. Now as Queensland's principal fisheries research officer, based in Brisbane, she spends her time catching outliers in the oceans of fisheries-related data for which she and her team are responsible.

An outlier is an observation in a set of data that sits a long way from the average of the sample. It could come about by human error or as a deliberate misreport. Either way, it can skew the results, she says. It must be queried and corrected if necessary.

But not every outlier is an error, says Nadia Engstrom, who leads the Queensland Department of Agriculture and Fisheries (DAF) teams responsible for collecting, verifying and analysing commercial fishing data. Analysis often reveals the larger story of our dynamic environments and our interactions with them.

One example of this was the 2011 spike in Barramundi catches off the central Queensland coast, she says – an increase in the order of 1500 per cent. Prior to this, the typical annual commercial catch in the region was somewhere between five and 16 tonnes a year. "The story behind the changing catch data was a flood in 2010," she says.

Barramundi that had been growing in a major freshwater dam suddenly found themselves washed over the dam wall with the floodwater and out into the estuary. As the 'escapees' have been caught in the intervening years, the wild Barramundi catches in the region have declined to near-normal levels, without further intervention.

"But the information really tells stories, which fascinates me," she says. "You can see the effects of different things and how trends emerge over time."

From zoology to Zimbabwe

Science and the marine environment have been long-held interests for Nadia Engstrom, although it was not until she was 24 that she started her university course, a Bachelor of Science (Zoology) at James Cook University in Cairns, Queensland.

"I'd always known what I wanted to study, but when I finished school I just wasn't ready," she says. Growing up, she had moved with her family from Victoria to WA and then across to Queensland. After completing Year 12 she bought a one-way ticket to London, the start of almost a decade of independent travel around the world.

When it came time to return home, Queensland's lifestyle and marine opportunities proved the drawcard. She had earned her diving certificate on the Whitsunday Islands, and during her travels dived on reefs around Asia, Egypt and the Red Sea. (Now based in Brisbane, her ideal getaway is a weekend on Moreton Island fishing with her husband and son.)

While studying, her interests always steered more to the ocean than the land-based zoology assignments, particularly when it came to data collection and field work. And from there, she quickly found herself drawn more to the process of analysing the information afterwards rather than to the data collection itself.

> "Particularly in Queensland, it's a really dynamic time in fisheries," she says. "We're trying to progress a lot of different initiatives to better manage fisheries in the future and have better understanding of stock sustainability." Nadia Engstrom

She joined Queensland DAF in 2006 after a three-month internship with CSIRO studying seagrass and macroalgae, and began teaching herself about data analysis and learning from others.

She was thrilled when a permanent position became available on the department's data analysis team, which she now leads. "Data is one of the main things feeding into fisheries management decisions; without that information sometimes you're going in quite blind. It's so pivotal that people have correct and accurate information to make the right decisions."

She says providing public access to fisheries data increases transparency in the workings of government. But, more importantly, it allows people to analyse the data themselves and make their own decisions.

The value of independent decision-making guided her solo travels around the globe – from 2 a.m. flights into India to expeditions to the hinterland of Zimbabwe. It remains an important principle in the work she does now.

Public access

To that end, she counts the creation of the QFish website (http://qfish.fisheries.qld.gov.au) as one of her best achievements to date.

QFish presents Queensland's fisheries resource data in an easily accessible way. It allows anyone to instantly access data about both commercial and recreational fishing, export it for use in their own research or project, and create their own graphs from it. Nadia Engstrom says the QFish shark-control program data section is particularly popular with the media.

Commercial and recreational fishers, researchers, students doing school projects – anyone who is interested – has equal access to the information.

The website took more than two years to

Nadia Engstrom
Photo: Paul Harris

develop, and the public access to data and the website's ease of use have improved the speed of access to data and reduced costs for those seeking information, while also freeing staff time to focus on improving the quality and accuracy of data.

Feedback from users has been good, and other jurisdictions have shown interest in this technology.

Nadia Engstrom also directs Queensland's data contributions to the Status of Australian Fish Stocks Reports published by the FRDC every two years, which brings together biological, catch and effort information to determine the status of Australia's key wild-catch fish stocks.

This information has also underpinned decision-making as part of Queensland DAF's major fisheries reform, the 10-year *Queensland Sustainable Fishing Strategy 2017–2027*.

Challenges ahead

Two key projects in the reforms are the data validation plan and the rollout of vessel tracking on all commercial fishing vessels by 2020, both of which help validate the accuracy of data and provide evidence that fishers are doing the right thing.

Nadia Engstrom is particularly excited about a project as part of the Advance Queensland's Small Business Innovation Research challenge calling for the development of an innovative, affordable, automated, electronic monitoring system for fishers.

The aim is to use cameras, sensors and machine learning to improve data gathering and make it easier for commercial fishers in commercial trawl, net and crab fishing operations to record information and submit it in real or near-real time to meet their regulatory requirements.

Queensland DAF has also put out a tender for a new commercial fishing app and an upgraded recreational fishing app.

The commercial app will allow fishers to report their catch information and undertake e-business transactions, such as managing their licences or quota. The recreational fishing app will include information on fishing rules, as well as a citizen-science component to improve data on recreational catch and effort.

In addition to her Queensland roles, Nadia Engstrom chairs the national Fish Strategy Information Working Group reporting to the Australian Fisheries Management Forum – an informal network involving all state and federal government agencies involved in managing fisheries and aquaculture in Australia.

Queensland DAF's deputy director-general is a member of the working group, along with counterparts from other state and territory governments.

It aims to ensure that all jurisdictions collect data in a consistent way so it can be used effectively for research and reporting by groups such as the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), CSIRO and the FRDC, who all attend the group's meetings.

"I always walk away from the meetings amazed at how much we learn from each other," Nadia Engstrom says.

While the working group members may share her love of data, Nadia Engstrom cheerfully acknowledges that not everyone is as enthusiastic, but she is heartened by changing attitudes that allow greater public access to data.

"Particularly in Queensland, it's a really dynamic time in fisheries," she says. "We're trying to progress a lot of different initiatives to better manage fisheries in the future and have better understanding of stock sustainability." F

MORE INFORMATION
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www.aims.gov.au/nw-shoals-to-shore/marine-noise-monitoring-and-impacts
FRDC RESEARCH CODES: 2012-008, 2014-041, 2017-142, 2017-186

Cooperative approach on seismic impacts

Western Australia's pearl industry is taking a new tack with seismic surveyors and oil and gas explorers

By **Bianca Nogrady**

The last wild-stock fishery of the Silverlip Pearl Oyster (*Pinctada maxima*), the world's largest and rarest pearl oyster, lies just offshore from the remote Eighty Mile Beach in north-west Western Australia. These wild oysters have been sustainably harvested by the Australia's pearling industry for more than 150 years.

The region has also recently attracted the attention of the oil and gas exploration industry. The Canning Basin and Roebuck Basin each harbour potentially rich oil and gas reserves. But locating these reserves requires seismic surveying of these basins – the same areas that are home to the *P. maxima* broodstock.

Research suggests that the undersea exploration for mineral resources using seismic surveying could cause damage to commercially valuable fisheries such as rock lobster, scallops, pearl oysters and finfish. Three years ago the seafood industry and the oil and gas exploration industry were locked in what appeared to be an intractable conflict.

On one side, there were potentially billions of dollars worth of undersea energy resources waiting to be discovered; and on the other, there were delicate marine ecosystems that support thriving and sustainable fisheries.

Fast forward to 2018, and the two industries are working to find common ground, says Aaron Irving, the chief executive of the Pearl Producers Association.

"The first thing was to really indicate to the seismic company what it meant to us – socially, economically, as well as ecologically – if these surveys did have negative effects, and we started having a conversation, which was great," Aaron Irving says.

Seismic operators and the oil and gas industry are not only listening to the concerns of the seafood industry, but energy companies such as Quadrant Energy are also helping fund research to better understand how seismic surveys might impact upon marine life.

"This is so important for us because we have to be assured that that science is robust, that it's accurate and it's actually providing us with really good determination of what the effects are on pearl oysters," Aaron Irving says.

This research is being undertaken by the Australian Institute of Marine Science under the 'North West Shoals to Shore' research program. The 'Marine noise monitoring and impacts' part of this program will investigate the impacts of seismic noise on finfish and pearl oysters.

Shared experiences

Australia is far from the only nation wrestling with the challenge of seismic surveying around commercially valuable fisheries. Aaron Irving and his colleague Johnathon Davey, the executive director of Seafood Industry Victoria, were funded by the FRDC to present at the 5th Sustainable Ocean Summit in Halifax, Canada, in 2017, on the unfolding situation in Australia.

"From the questions and responses we received from our presentations, people are interested in and watching what we're doing," Johnathon Davey says.

In Victoria, there are concerns about the impact of seismic surveys on Southern Rock Lobster (*Jasus edwardsii*) and scallop (primarily *Pecten fumatus*) fisheries. In 2016, two FRDC-funded studies found evidence of negative impacts of seismic airgun exposure on these two species (*FISH* December 2017, pages 28 and 29).

"We know now they have an impact so the discussion and way that consultation is going on has really changed," Johnathon Davey says.

Now seismic operators and fishers are negotiating access to overlapping territories, which may mean compensation for fishers for potential lost income, or restrictions on when seismic operators can conduct their surveys, to prevent the risk of damage during sensitive stages in the organisms' life cycles.

Coordinated research

This year the FRDC board approved a new project, to be managed by WAFIC, to prioritise and coordinate research into potential seismic impacts on fishing and aquaculture in Australia. The aims of this project also include developing a portal to hold relevant seismic research information and improve communication and consultation on the process for undertaking seismic surveys between the two sectors. F

Final reports

Boosting prawn knowledge 2013-221

This report provides information on the management and enhancement of Western School Prawns (*Metapenaeus dalli*) in the Swan–Canning Estuary in south-western Australia. The impetus for the project came from declines in catches since the 1980s, in what had been a thriving commercial and recreational fishery.

This project provided the funds to undertake the research and development side of the restocking, enhance understanding of the biology and ecology of *M. dalli*, and the subsequent monitoring of the population after the release of hatchery-reared individuals. It is the first comprehensive investigation into the biology and ecology of Western School Prawns in this fishery.

The project identified the abundance and distribution of Western School Prawns in the Swan–Canning Estuary, including seasonal distribution. It described their larval development, patterns of growth and response to different conditions such as water temperature and salinity and predation by small fish species.

It also engaged with the community to improve awareness and understanding of the fishery.

More information: Neil Loneragon, n.loneragan@murdoch.edu.au

Abalone sea ranching study 2014-214

The Ocean Grown Abalone Pty Ltd sea ranch is the first abalone sea ranching project to be commercialised in Australia. The abalone are grown on concrete structures that have been placed on the seabed at the company's location in Flinders Bay, near Augusta, Western Australia. In 2016, the farm exported 10 tonnes of product, and this volume is set to rapidly increase as the farm expands its artificial habitat structures. It is predicted that approximately 200 tonnes of abalone will be produced by 2022.

The company has undertaken feasibility studies in other areas within Australia that have been identified as suitable for abalone ranching, and is looking to expand in the near future.

This report deals with research into the food sources of abalone on the farm: drift macroalgae and seagrass. It examines the movement of drift algae in Flinders Bay across the Ocean Grown Abalone lease sites and focuses on how the quantity and quality of these food sources change seasonally throughout the year.

The report deals specifically with abalone in its discussion of physiological stress indicators as a way of predicting the condition of wild-caught and ranched abalone in Flinders Bay.

More information: Roy Smith, roy.smith@curtin.edu.au, www.oceangrown.com.au

Fostering leadership in the seafood sector 2014-407

The National Seafood Industry Leadership Program (NSILP) 2015–17 project was developed to align with the goals of the FRDC's People Development Program.

The ability to build leadership capability and enhance existing leadership capacity is a key focus for Australian fishing and seafood industry organisations and businesses.

Fifty-three graduates from across the industry value chain successfully graduated from NSILP 2015–17. The participants were representative of the whole industry and were willing to take on new ideas and be challenged. They are well placed to ensure positive change occurs for industry and are all poised to take on new opportunities.

The project evaluation identified that the NSILP 2015–17 achieved significant outcomes for participants, their businesses and the industry. Participants spoke very highly of the program, were extremely supportive of it and believed that it was a key strategic program for the industry's future development and leadership succession planning.

More information: Jill Briggs, jill@affectusaus.com.au

Coral substrate determination 2016-051

Catch reporting in the Queensland Coral Fishery has recently undergone reforms to provide accurate, high-resolution data for the management of the fishery.

The new measures require the reporting of total actual weights for corals protected under the Convention on International Trade in Endangered Species (CITES), but do not account for the weight of substrate attached to the actual coral when collected, which is typically removed after landing.

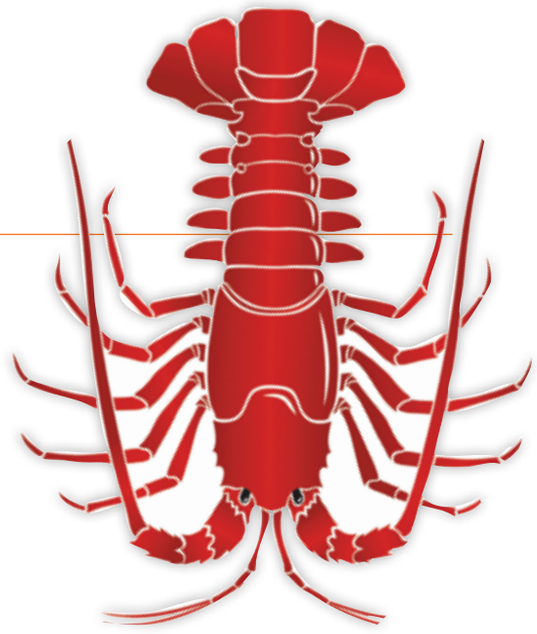
Corals were weighed tray by tray, which generally consisted of 10 to 50 individuals of the same species. To calculate the amount that was trimmed from corals, all discarded skeletal material was combined and expressed as a proportion of the total intact coral weight. A total of 7422 corals were sampled, representing 4.84 per cent of the total recorded catch for 2016–17.

The aim of the project was to accurately establish a representative and unbiased overall percentage of the amount of substrate that is trimmed from stony corals in the Specialty Coral quota. The study supports the 25 per cent reallocation of Specialty Coral quota to Other Coral, to reflect the overall percentage offcut of substrate and dead coral skeleton, which is ultimately discarded.

More information: Ryan Donnelly, muttleigh@me.com

Refocusing women's industry network 2016-409

The Women's Industry Network was formed in 1996 by a group of women fishing in South Australia. →



It later evolved into the Women's Industry Network Seafood Community (WINSC).

The objectives of this organisation are to recognise and enhance the skills of women in the seafood industry, to develop partnerships with government agencies and industry stakeholders, and to create a supportive environment that ensures women in the fishing industry reach their full potential.

The purpose of this study was to look at the existing model and offerings for WINSC and to determine whether the organisation needed to be revitalised and renewed to better meet the needs of its current members. The study involved two workshops and an online survey.

As a result of this study, WINSC has the data and a strong basis to refocus the organisation and how it interacts with and provides services to members and stakeholders. What is now needed is support for WINSC to build the capacity and capability to better connect with women in the seafood industry.

More information: Leonie Noble, coolimba@bigpond.com

National recreational fishing conference 2016-505

After the success of the 2012 and 2015 National Recreational Fishing Conferences, the Australian Recreational Fishing Foundation was successful in securing a funding grant from the FRDC to deliver a National Recreational Fishing Conference for 2017.

The 2017 National Conference was held at the Darwin Convention Centre on Saturday 25 November. Seventy-five people attended the conference, which included a broad range of people from numerous organisations.

The report identifies the opportunities afforded by a regular conference for peer networks to meet, discuss and learn from other jurisdictions about how to address the challenges that the recreational fishing sector faces.

More information: Mark Nikolai, mark.nikolai@tarfish.org

Resource sharing in Port Phillip Bay 2014-207

This project assesses the social and ecological issues associated with commercial and recreational fishing in Port Phillip Bay, Victoria. Two of Victoria's major commercial shipping ports – Melbourne and Geelong – operate in Port Phillip Bay, and it is also a popular tourist destination.

With fewer than 50 commercial licences operating in Port Phillip Bay at the beginning of this project (and far fewer at the completion), commercial fishers are substantially outnumbered by recreational fishers.

Perceived competition for species such as snapper and King George Whiting is a source of tension between recreational anglers and commercial fishers.

This project was designed to better understand the sustainability issues relating to both commercial and recreational sectors, and to investigate the social factors that underpin conflict among commercial and recreational fishers in Port Phillip Bay.

More information: Ian Knuckey, ian@fishwell.com.au

Crustacean age determination 2014-011

For the first time, researchers have been able to demonstrate the widespread applicability of direct ageing to Australian crustaceans, establishing that ossicular growth marks in Western Rock Lobster, Eastern Rock Lobster, Ornate Rock Lobster and Crystal Crab ossicles are deposited annually.

The ability to produce accurate age information is important for sustainable fisheries management. It underpins growth and productivity estimates and informs input control regulations. However, validated age information for crustacean fisheries management was needed.

For the first time, it has been demonstrated the widespread applicability of direct ageing to Australian crustaceans and validated that ossicular growth marks in Western, Eastern and Ornate Rock Lobster and Crystal Crab ossicles are deposited annually.

More information: Jesse Leland, jesse.leland@scu.edu.au

Western gemfish research 2013-014

Research to better understand and manage western gemfish stocks in the Great Australian Bight has recommended that both eastern and western gemfish stocks be treated as separate management units.

The project – initiated through the Great Australian Bight Resources Assessment Group to address stock structure issues – also recommended that the management boundary between both stocks be moved to better reflect genetically distinct populations.

This follows from the research, which confirmed that there are two distinct stocks of gemfish in Australia, with western Bass Strait the boundary between both stocks. For fisheries management purposes gemfish to the east and west of Bass Strait can be managed as separate management units.

More information: Andy Moore, 02 6272 3090, anthony.moore@agriculture.gov.au

Barramundi certification 2016-502

The FRDC is assisting the Australian Barramundi Farmers Association (ABFC) to understand how its certification standard measures up to international requirements of integrated standards for farmed seafood.

A gap analysis found that the ABFC's strengths are with eco-efficiency benchmarking, but unfortunately that only covers a small section of the Global Benchmarking Tool (GBT).

The ABFC could use this analysis as an opportunity to get its standard endorsed by the Global Sustainable Seafood Initiative. Many of the gaps between the GBT and the ABFC can be addressed.

More information: Belinda Yaxley, belinda.yaxley@petuna.com

Movers and ...

Kate Lorimer-Ward has been appointed to the role of deputy director general of Agriculture for the NSW Department of Primary Industries (DPI). She has replaced **Michael Bullen**, who held the position over the past six years. Michael Bullen is now leading the establishment of the Global Ag-Tech Ecosystem (GATE), working on new commercialisation paths for R&D outcomes and assisting in securing new partners and funding for research activities as deputy director general of Investment and Business Development for NSW DPI.

John Tracey has been appointed NSW DPI deputy director general of Research Excellence. Research Excellence is a new branch within NSW DPI, formed to continue to deliver world-leading research programs and services.

Southern Rocklobster Ltd has appointed **Tom Cosentino** as successor to **Justin Phillips** as executive officer.

Stuart Anderson is the new director of New Zealand Fisheries, replacing **Dave Turner**.

Seafood Industry Australia (SIA) has appointed **Jessica McInerney** as communications and media manager. She joins SIA from Fairfax Australia.

Joshua Fielding and **Christopher Izzo** have moved from roles as project managers – research with the FRDC to senior portfolio managers – research. **Matt Rutter** is to replace **Wayne Hosking** as executive officer of Geraldton Fishermen's Co-operative.

Karen Holder is to take over as new chair of the Women's Industry Network Seafood Community (WINSC).

Katie Hodson-Thomas is the new chair of WAFIC.

FEEDBACK
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Annabel Boyer, 02 6285 0415,
annabel.boyer@frdc.com.au

GILL HEALTH SYMPOSIUM FOR MARINE FISH

Then University of Sydney's Joy Becker will host a Gill Health Symposium for Marine Fish with Mark Powell (University of Bergen) and Neill Herbert (University of Auckland). The symposium will be held in Singapore on 21 to 23 November 2018. This three-day symposium will focus on the function and form of fish gills in the face of a changing ocean environment, with emphasis on ocean warming and acidification.

The symposium will bring together scientists with expertise in a variety of disciplines such as marine biology, ecology, ecophysiology, environmental chemistry, aquaculture and fisheries. The goal of the symposium is to create small teams of discipline experts to co-author topic reviews to be submitted as part of a special research topic in *Frontiers of Marine Science*.

More information: Joy Becker, joy.becker@sydney.edu.au, http://sydney.edu.au/science/life-environment/research/gill-health-symposium.shtml

Calendar of events

DATE	EVENT	MORE INFORMATION
18 to 21 June	**SeaWeb Seafood Summit, Barcelona, Spain**	www.seafoodsummit.org
1 to 5 July	**Canyons to Coast: Australian Marine Science Association Conference, Adelaide**	www.amsa.asn.au/amsa-annual-conferences
15 to 19 July	**13th International Conference on the Biology of Fish, Calgary, Alberta, Canada**	http://wcm.ucalgary.ca/icbf
16 to 20July	**International Institute of Fisheries Economics & Trade Conference, Seattle, Washington, US**	www.xcdsystem.com/iifet/website
12 August	**Hervey Bay Seafood Festival, Hervey Bay, Queensland**	https://herveybayseafoodfestival.com.au
14 to 15 August	**FRDC Board Meeting, Canberra**	02 6285 0400
19 to 23 August	**Annual Meeting of the American Fisheries Society – Communicating the science of fisheries conservation to diverse audiences, Atlantic City, New Jersey, US**	https://afsannualmeeting.fisheries.org
25 to 29 August	**Aqua 2018, Montpellier, France**	www.marevent.com/AE18_MONTPELLIER.html
2 to 6 September	**8th International Symposium on Aquatic Animal Health, Charlottetown, Prince Edward Island, Canada**	https://isaah2018.com
4 to 6 September	**Seafood Expo Asia, Hong Kong**	www.seafoodexpo.com/asia

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