

Adding value through research and innovation

“What we are really looking for is projects where new research or technology will deliver significant benefits and there is a clear pathway for translating the science into business benefits.”

Mike Mandeno, SIL General Manager



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Debbie Hannan

The New Zealand Government has set an ambitious target of doubling export volumes.

Under the Business Growth Agenda, seafood's target is \$3 billion by 2025.

But that is way too timid, according to the keynote speaker at the Seafood New Zealand conference in August 2015.

KPMG's Global Head of Business, Ian Proudfoot, argues we should be aiming at 5 percent of 800 million, and the elite who can afford to pay a premium.

And we should be aiming for \$6 billion, not \$3 billion.

Consumers globally are increasingly being influenced by factors such as health benefits, food safety and ethical

and environmental credentials of the food they are purchasing. They want to know where it comes from.

New Zealand sustainably harvests some of the world's premium seafood and has high standards in getting it to market. But are we doing enough to make the most of what we harvest and to exceed those customer demands?

The seafood industry recognises these challenges and is constantly seeking innovative ways to add value to its products.

An industry-led initiative, Seafood Innovations Ltd (SIL), was established in 2004 as a joint venture research partnership between Seafood New Zealand and Plant & Food Research, with funding from the Ministry of Business, Innovation and Employment (MBIE) to promote research projects that grow the value of New Zealand's seafood exports.

"Our aim is to underpin growth of the seafood export industry by increasing returns from the seafood harvest through developing and commercialising innovative products

that appeal to consumers," says SIL's General Manager, Mike Mandeno.

"SIL is there to help take industry from a harvest, pack and ship approach to diversifying into using seafood components for food, health and industrial applications," he says.

"There are enormous possibilities by adding value through using every part of the fish and developing new products that are appealing to consumers.

"Hoki, squid, Greenshell™ mussels, rock lobster, orange roughy and paua are our main exports today, but tomorrow you could see New Zealand as a key ingredient in "benefit plus" foods, nutraceuticals and pre-prepared meals around the globe.

"We're always looking for great new projects to fund. If you have an idea or want to know more contact us through our website www.seafoodinnovations.co.nz"

SIL has funded a variety of products over the past two years. Over the following pages we profile three projects adding value to the seafood industry. 🇳🇿

Science to maximise returns in a sustainable fishery

Rob Tipa

Seafood Innovations Ltd (SIL) and industry-funded research into the varying conditions of rock lobster across the seasons is bringing substantial economic returns to rock lobster fishers in the lower South Island.

The research, conducted by NIWA scientists, has confirmed observations by southern fishermen that the nutritional value and condition of rock lobsters varies at different times of the year according to their moult and

reproductive cycles, allowing fishers to get maximum returns by targeting lobsters in prime condition.

The project is one of three that the CRA8 Management Committee has invested in with the support of Seafood Innovations (SIL) over a number of years, resulting in significant financial gains in the CRA8 quota management area - the largest rock lobster fishery in New Zealand, covering South Westland, Fiordland, Stewart Island, Foveaux Strait, the Catlins and adjacent islands.

With a total allowable catch of 962 tonnes, the CRA8 quota represents 36 percent of the national production of rock lobster, which is the most valuable inshore fishery of any species in New Zealand and a top export earner for the seafood industry.

About 96 percent of rock lobsters landed in the CRA8 area are exported live to markets in China.

CRA8 Management Committee Chief Executive Malcolm Lawson says the

research project achieved what it set out to do, confirming long-held suspicions of southern fishermen that the quality of rock lobsters varied at different times of the year.

Lawson says the project's goal was to establish the extent that lobsters lost or gained condition in relation to their moult and reproductive cycles.

"The real value of this project was filling in the gaps in our knowledge and being able to map the shift in condition of lobsters at various times of the year," he says.

Small rock lobsters moult (shed their exoskeleton) at regular intervals. Small juveniles may moult up to five times a year, medium-sized specimens moult once or twice a year while large mature lobsters may only moult once a year.

Lobsters build up their reserves over spring and summer, but because they don't feed approaching or during the moult their condition drops off. Both males and females stop feeding



A scientist takes a blood sample from a rock lobster. Image: NIWA

“The other part of it is that lobsters caught in poor condition will actually recover very quickly if they are fed a suitable food source.”

when they are busy finding mates. The condition of breeding females also drops off when they are carrying eggs.

“The longer they carry eggs the more their condition reduces,” Lawson says. “The other part of it is that lobsters caught in poor condition will actually recover very quickly if they are fed a suitable food source.”

Lawson says fishermen obviously have no control over rock lobsters’ natural moult or reproductive cycles, but knowing how quickly they lose condition during these phases and how quickly they recover condition afterwards is important.

NIWA researchers Dr Alison MacDiarmid and Rob Stewart completed the research project between 2012 and 2013 and produced a final report on their findings in April 2014.

MacDiarmid says one of the highlights of the project was establishing that the simple and reliable

blood refractive index (BRI) test could be used to check the loss and gain of condition in rock lobsters through the moult and reproductive cycle.

The BRI technique was developed in Australia and is used to monitor the condition of rock lobsters there and in Canada to monitor the condition of clawed lobsters.

NIWA scientists found the BRI test was a useful way to monitor the condition of adult male and female rock lobsters by measuring changes in their blood protein levels at different times of the year.

“We knew their condition was likely to vary anyway in a natural wild population,” MacDiarmid says. “We found if lobsters stopped feeding their condition deteriorated, sometimes within days, and we can measure that with a blood refractive index test.”

Scientists were also able to measure rock lobsters’ recovery when they started feeding again.

Their findings are significant for the industry because for various reasons fishermen often hold lobsters in pots in the CRA8 southern region. They know that it is essential to feed lobsters to maintain or even improve their condition.

MacDiarmid says results of the BRI test on live lobsters landed at packing houses or held in tanks at NIWA’s laboratory, where they were fed or held for periods without food, clearly showed lobsters were in better condition at certain times of the year.

“The BRI test is an excellent tool for the industry to monitor the condition of lobsters at different times,” she says. “Unfortunately the period when lobsters are in their poorest condition may coincide with the time when their market value is highest.

“It is a bit of a conundrum for the industry, but our work shows you can influence their condition. If you catch them, hold them for a period and feed



NIWA's Rob Stewart analyses the results from a blood test. Image: NIWA



A blood sample is dropped on to a viewing screen. Image: NIWA

them, then their condition will recover provided they are not in a period when they naturally stop eating around mating and moulting."

MacDiarmid believes the BRI test offers the industry an excellent tool if it is used routinely to monitor the condition of lobsters at different times of the year.

Fishing boat crews or packhouse operators could learn the skills required to do the test themselves in a couple of hours. The technique is similar to that used by fruit-growers who use a BRIX test to monitor sugar levels in fruit crops.

NIWA's report to the industry has recommended minimum blood protein levels, below which live lobsters were unlikely to survive the journey to export markets.

"You can use this tool as a way of ensuring that the highest quality lobsters are actually landed and exported overseas," MacDiarmid says. "It will indicate when it is safe to catch lobsters and what places are best in terms of catching lobsters in the best possible condition."

She says good fishermen look closely at the condition of the lobsters they land anyway for the loss of limbs, any sign of disease and their general health and vigour. But unless fish are at one extreme or the other it is often hard to make a judgment call based on a visual inspection.

"This tool gives them more finesse and insight into what's happening with

the fished population," she says.

Lawson confirms NIWA's research definitely shows a correlation between the moult cycle and the best time of year for fishermen to catch fish.

Every piece of research about the lobster's life cycle helped the industry's understanding of its physiology, he says, and that information helped fishermen and exporters to predict the likely quality of rock lobsters at any time of the year.

Markets and prices strongly dictated the best times of year for fishermen to catch lobsters, but this research would help the industry understand the likely quality and performance of their catches in export markets at any time of year.

One of the price peaks was in January in the lead up to the Chinese New Year when demand was huge, so fishermen naturally targeted that market, Lawson says.

"We now know that small lobsters have just come through a moult period in January and are just recovering in condition so fishermen take particular notice of each fish to make sure it is going to be strong enough to land it and of top export quality."

"The Chinese are paying a premium price and the CRA8 exporters aim to send them a premium product."

He says the strategy adopted by the CRA8 Management Committee has shifted in recent years and fishermen are landing fewer rock lobsters than they were under the previous maximum sustainable yield model.

"Sustainability is a given. That's the bottom line," he says. "Instead of a maximum sustainability yield model, we're looking more at a maximum economic yield model, which is underpinned by a high abundance of fish in the water."

"The market varies at different times of the year in terms of demand for various grades and therefore prices vary."

Lawson says the aim is to have enough abundance of rock lobster stocks in the water that is well above the level of sustainability, allowing fishermen to make decisions about when and where they go fishing and what grades they land to maximise economic returns for them and the wider economy.

"In our fishery it's all about catching as much of the available quota at the time of year when the prices are highest. To be able to do that you've got to have high abundance, otherwise people are going to be fishing all year to fill their quota and we're well away from that situation."

Lawson says the southern region operates on "a very conservative level" so that rock lobster numbers remained high and fishermen could achieve a favourable economic return for their effort.

"If you can catch the right grades of lobster at the right times of year when prices are high, it also keeps your associated costs - such as gear, bait and fuel - down," he says. 🌊