

Creating value from a blue economy

Creating greater value from a marine based blue economy is among 40 Sustainable Seas projects receiving multi-million dollar Government funding.

That project, led by Auckland University's Dr Nick Lewis with a budget of \$1.135 million, has identified several activities that are helping the country transition to a blue economy.

They include the innovative precision seafood harvesting trawling method, harvesting of seaweed and industry commitment to a sustainable future that is embodied in Seafood New Zealand's Promise campaign.

Identifying other possibilities and fostering regional initiatives are part of the project.

Sustainable Seas is one of 11 National Science Challenges that aim to address some of the country's biggest science-based challenges.

They have received a staggering level of investment - \$680 million over 10 years, delivered in two five-year tranches.

The marine-based fund received \$71 million of that total.

It aims to support ecosystem-based management for the marine environment, which its NIWA-based director Dr Julie Hall defines as managing competing uses and demands on marine resources while also incorporating people's values.

A total of 222 researchers from 36 organisations are involved in 40 marine projects.

They include the development of an ecosystem-based approach to managing the health of the Tasman and Golden bays seafloor, which has been heavily impacted in some cases by sedimentation due to poor land management.

That study, led by NIWA's Dr Judi Hewett, has been allocated \$400,000 to trial several modelling tools to help predict how animals and plants respond to different scenarios.

A related project, led by NIWA's Dr Sean Handley costing \$300,000, is estimating effects from sedimentation and fishing in Tasman Bay.

Tasman and Golden bays once supported productive green-lipped mussel, oyster and scallop fisheries but these have been in severe decline for the past 10 years.

The study is measuring sediment structure to see how much has accumulated and where it has come from, including before human disturbance by carbon dating shells from the base of selected core samples.

Means of mitigating ocean acidification around mussel farms is another project under way, led by Prof Cliff Law across NIWA and Otago University with a budget of \$300,000.

Two techniques are being tested – the first involves using waste mussel shells, which could raise pH and dissolved carbonate as they break down.

Mussels are less healthy and do not grow as well at lower pH in more acidic waters.

The second approach is strategic aeration of farm waters at night, when oxygen and pH are naturally lower.

Cawthron Institute's Ben Knight has a \$450,000 budget to develop forecasting of contamination risk for shellfish harvest and beach use.

And another Cawthron scientist, Dr Lincoln Mackenzie, has \$300,000 to trial two innovative technologies to detect and monitor harmful algal blooms in coastal waters.

The possible generation of electricity from the strong tidal currents within Cook Strait is being investigated by MetOcean Solutions' Brett Beamsley.

He has \$300,000 to determine the best locations and size required for a tidal turbine farm that could generate 1000 megawatts of electricity, enough to power a major city like Auckland.

The wider National Science Challenges is bringing together thousands of researchers, encompassing projects as varied as freshwater hazards to healthy aging and nutrition.

Total funding is projected to reach as much as \$1.6 billion.

While this effort is welcomed, the New Zealand Association of Scientists – and Seafood NZ – are among those to raise questions about a perceived lack of rigour in transparency around projects and robust monitoring of their effectiveness and outcomes.

That may be the ultimate national science challenge.

Fish skins and lizards amp up production of ActivLayr

Hamilton company Stafford Engineering Ltd has created the most advanced electrospinning machine – the Iguana.

West Auckland nanofibre company Revolution Fibres appointed the help of Stafford three years ago to custom-build a machine that could produce their skincare product ActivLayr.

The product is made from marine collagen that's extracted from natural and sustainably sourced New Zealand hoki skins. An electrospinning machine combines the collagen with bioactive ingredients like hyaluronic acid, kiwifruit and grapeseed extracts to form an anti-aging nanofibre face mask.

Demand for ActivLayr has grown exponentially since 2016.

Revolution Fibres managing director Iain Hosie said they always knew a larger machine would eventually be required and Stafford were eager to be on board to build another.

The Iguana weighs in at 7000 tonnes, is seven metres in length and comprises 9,000 parts. Its width and length allow for greater production output and the machine has its own climate-controlled room, meaning greater environmental control.

It's the largest machine of its kind worldwide.

The Iguana will quadruple existing production output for collagen alone and has the capacity to increase scale in the future too, said Hosie.

“One thousand metres of collagen nanofibre a day is the target.”

Stafford co-founder Roger Evans never imagined he would be custom-building a machine that transforms hoki skins.

“When we started working with Revolution Fibres three years ago we knew nothing about electrospinning technology. We built a small ‘pilot’ machine several years ago for Revolution Fibres that gave us sufficient knowledge on how an electrospinning machine works.

“But the Iguana is on another level. I never thought we would be building a machine for an international beauty product but here we are, helping make a face mask that reduces wrinkles.

“The design of the Iguana is a collaboration of Revolution Fibres’ knowledge and requirements and our engineering expertise to ensure the equipment performs and functions the way it should and produces the best possible outcome,” Evans said.

With large orders in Asia, the Iguana will help meet international demand while increasing supply and availability in New Zealand.

“It's first steps, but it's going truly global,” said Hosie.



Revolution Fibres operations manager Brent Tucker (left), with managing director Iain Hosie and Stafford Engineering Ltd. co-founder Roger Evans.

Maximising value and minimizing waste at the aquaculture forum

Maximising value and minimising waste was the theme of this year's Smart+Connected Aquaculture forum.

Over fifty people from science agencies, Marlborough District Council and the marine farming industry attended the event.

As part of the forum's workshops, delegates canvassed ideas and presented projects for the working group to develop and adopt in 2019.

As with previous forums, mussels were identified as a core area of opportunity. Mussel shells cost the industry \$90 per tonne to transport to landfills where they become a wasted resource. Sean Handley of NIWA suggested the shells could be repurposed in the restoration of mussel beds and used to address sedimentation in the Marlborough Sounds. The level of alkaline contained in the shells could also help combat ocean acidification.

Other ideas included transforming the shells into a component of bioplastic or using them in vineyards to encourage grape yields while reducing weeds and pests.

Helen Mussely from Plant & Food Research pointed towards maximising the uses for seaweed. Seaweed sandwich slices was one idea generated, along with expanding the use of seaweed in health and beauty products and bio-materials.

The Precision Aquaculture project was also presented at the forum. Cawthron hope to develop and install sensors that will enable every marine farm in the Sounds to be viewed. The sensors collect real-time information on the farm's crops, the environment and on

structures. Stacey Young from Marlborough District Council signalled the Council's eagerness to support the project and hopes to manage the data for science and industry use in the future.

Maegen Blom from Mills Bay Mussels also attended the event, explaining how low-value seafood can still be a bonus. Blom said the pea crab is generally deemed a pest by New Zealand marine farmers, however, Japanese and Indian consumers who have visited her business consider them a delicacy that they incorporate into salad dishes. Her message was that strong customer relationships uncover unexpected value opportunities.

Working group chair Zane Charman said Blom's message summed up this year's theme.

"We wanted scientists, marine farmers and innovators to talk up the opportunities of adding value and minimising waste. We had an abundance of great ideas and our working group will now work through what we can pick up and help develop."

News

Maritime NZ said its investigation found there was no real risk of a Greymouth fishing boat being dashed against the Blaketown tiphead during the Cyclone Fehi storm surge on 1 February 2018. The incident occurred at approximately 9am when the ex-tropical cyclone whipped up a rough sea just as two of Greymouth's largest fishing boats, sister vessels *Ocean Odyssey* and *Moonshadow*, tried to cross the bar to enter the Port of Greymouth. *Ocean Odyssey* was apparently experiencing an electrical problem. *Ocean Odyssey*, having come close to the rocks at the river mouth, was next blown around the tiphead to the south side, where it was again driven close to the rocks in front of onlookers, who ran to give assistance. In the end, both boats abandoned the attempt to cross the bar and steamed back out to sea to sit out the storm. Maritime NZ said the investigation into the incident has now been concluded. "The Compliance Intervention Panel found that the company followed all correct procedures and acted as it should. It was found that there was no real risk of the ship hitting the breakwater at any stage. The file is therefore closed."

New Zealand King Salmon (NZKS) divers found two deceased dolphins while making routine checks of fishing nets in two of its salmon farms last week, *Stuff* reports. One Dusky dolphin was recovered from Kopaua farm and the other unidentified dolphin at Waihinou farm is yet to be recovered. Both incidents were reported to the Department of Conservation. NZKS completed a marine mammal fatality incident report which stated the missing dolphin had likely come loose from the net and drifted away. A DOC spokesperson said the unidentified dolphin was likely to also be a dusky dolphin. NZKS chief executive Grant Rosewarne said the company is still in the investigation process. "In terms of the amount of fish we produce versus the interaction with mammals, we're at an extremely low level and a level below that which has any impact on the population. This is a very rare occurrence for us. We are very open about these things. We obviously regret when they happen," he said. DOC confirmed they have not received any other reports on dolphins deaths from the company in the past five years.

Tairāwhiti Chief Fisheries Officer at the Ministry for Primary Industries (MPI), Richard Ratapu has sent out a firm warning to seafood poachers ahead of summer following multiple prosecutions of those caught taking product from the Rongokako Marine Reserve on the East Coast. Twenty three poachers have been prosecuted in the last 12 months. The Te Tapuwae o Rongokako Marine Reserve is managed by the Department of Conservation with support from MPI and NZ Police. They deal with poachers on a regular basis. “They come in the middle of the night to dive for seafood, taking crayfish, kina and pāua too,” said Ratapu. MPI Fisheries Officer Willie Waitoa says, “People amongst these fellas will be taking out up to 200 to 300 kina so that’s the sort of people we’re dealing with.” Ratapu says, “We catch them, they go to court and the court prosecutes them for their actions.” Ratapu encourages everyone to respect the marine reserve and respect rāhui in other areas as well, especially over the summer season.

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